

**INVESTIGATING WEAK SIGNAL OF RISK IMPACTS ON
DIVERSIFICATION TO RENEWABLE ENERGY: THE CASE
OF BRITISH PETROLEUM**



A thesis submitted for the degree of (MbR)

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Declaration

Candidate’s declarations:

I, **Nkwocha Chijioke Kennedy**, hereby certify that this thesis submitted in partial fulfilment of the requirements for the award of Masters by Research (MbR)], Abertay University, is wholly my own work unless otherwise referenced or acknowledged. This work has not been submitted for any other qualification at any other academic institution.

Signed – **C.K.N**

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Supervisor’s declaration:

I, [insert Principal Supervisors name] hereby certify that the candidate has fulfilled the conditions of the Resolution and Regulations appropriate for the degree of [XXXXXXXX] in Abertay University and that the candidate is qualified to submit this thesis in application for that degree.

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Certificate of Approval

I certify that this is a true and accurate version of the thesis approved by the examiners, and that all relevant ordinance regulations have been fulfilled.

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Abstract

Investigating weak signals of risk impacts on renewable energy diversification is critical in British petroleum projects and the renewable energy transition process. This research relates to the anticipated threats and risks in the ongoing British petroleum transition. With the recent shift in global energy supply to electric and other renewable energy sources, the impact of CO2 emissions on the environment has received a lot of attention. This study investigates macro-environmental factors, with a focus on macroeconomic factors, that are affecting BP as they transition to renewable energy sources. This study also discusses the impact and potential risk impacts on BP, as well as how the company is managing their transition process considering the anticipated threats and risks. The research was carried out through the distribution of semi-structured questionnaires, interviews with BP senior staff members working in the renewable energy, investment, and risk management sections, as well as the distribution of BP press releases and annual reports from 2018 to 2020. The key findings were examined in detail. This demonstrates that risk management, mitigation, and control are part of the organisational culture, bolstering BP's global integration with other oil and gas companies, as well as logistics providers, in the ongoing transition to renewable energy. Another key finding indicated that BP's collaboration and interdependence with the key players in the ongoing transition will aid in keeping the organisation strategically fit in the competitive energy sector market. The implication is that BP will need to rely on more collaborative efforts to sustain a diverse portfolio of renewable energy sources and innovations. Because oil and gas will continue to play a role in the energy mix for many years, the company has remained strategic in its commitment to reduce GHG emissions and CO2 emissions in their general operations.

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CHAPTER 1

1.0 Background

Early warning signs or weak signals were used as a military strategy during and after World War II, as a forecasting attempt to reduce risk and to support strategic decisions (Rossel, 2012). As a result, a weak signal could be defined as an observation, message, or communication that expresses the existence of future negative or positive issues or developments (Williams et al., 2012). The idea is to figure out a solution to the emerging issue, to mitigate risk and control cost.

Since then, the concept of weak signals has been applied to organisational studies in the form of expert opinions on prioritising the organisation's interest in detecting potential threats early, which could come from within or outside the organisation (Rossel, 2012). According to Ansoff, (1975) cited in Othman et al., (2018) pg.2, "[a] strategic event does not appear out of the blue, it must show their manifestation beforehand through signals". In as much as threats can come out of blue like the natural disasters and sudden economic collapse, organisations tend to take some calculated risks.

This is to strike some balance and weigh up risk and opportunities. Ansoff also defined a weak signal as early imprecise indications of impending impacts or effects on any project, which can result in some opportunities or threats of unknown source, shape, and nature (Othman et al., 2018). Ansoff considered the need for appropriate managerial capabilities, indicating that early perception of change cannot be incidental or automatic results of foresight. Emerging critical forces that may result in change are referred to as foresight in this context (Saritas and Smith, 2011).

This research work adopts a case study approach, using British Petroleum Company (BP); thereby investigates those weak signals or early warning signs regarding those macro-environmental risk factors

that may affect the company in remaining sustainable in the ongoing diversification/transition process to renewable energy. BP was chosen as the case study considering the organisation's long history in the energy sector and the oil and gas industry. The organisation strong brand and cooperate identity was also considered for this purpose. Being a British multinational oil and gas company with headquarter in London, the organisation aimed to reduce CO2 emission in their operations, and at the same time diversify their products into renewable sources. BP discovered oil in Persia in 1908 and has the culture of transitions which has been from coal to oil, from oil to gas, from onshore to deep water and presently diversifying into the new mix sources of energy (BP, 2021). The main strategy is to mitigate and control the climate change and reduce CO2 emissions.

With well-established organisational sustainability frame, BP underpinned their strategy by putting up an integrated approach which put the organisational aims and objectives into action. Most of these aims are the net zero operations, new energies, clean cities, clean energy, sustainable livelihoods and just transition to renewables (BP, 2021).

There have been indications from much literature on this topic which shows that organisations fail in identifying early warning signs (Williams et al., 2012). This has intensified interest among researchers, in offering opportunity to accomplish pro-activeness and encourage efficient risk management and control (Carman et al., 2018). This research work adds to the existing literature in terms of knowing the impacts of macro-environmental risk factors and other financial risks that are likely to hinder the ongoing speedy transition of BP's investment on renewable energy.

These macro-environmental risk factors are those global political factors, social factors, economic factors, oil and gas demand/price volatility and changes on existing technology.

In this case, weak signals can as well be associated with those factors that could drive change on the macro-environment, thereby resulting into risk. This can be any form of changes in government policies, emission trading system (ETS) and some social factors which have hindered the ongoing renewable energy projects in many areas or regions.

Weak signals involve cognitive problems, which businesses tend to ignore. This is because, weak signals rational biases impel the professional responsibility of collecting strategic evidence which obtain only those signals linked with their earlier encounters and opportunities (Garcia-Nunes and da Silva, Ana Estela Antunes, 2019). Within the current applications of weak signals, risk and uncertainty are also highlighted. In relating risk to weak signals, "risk is a measure of the probability or likelihood and severity of adverse effect" (Andretta,2014, Pg.1185).

Furthermore, the investment risk in renewables is becoming increasingly complex, necessitating adequate protection and risk management tools, which are critical to cash-flows (Gatzert and Kosub, 2016). They can also be associated to political, policy and regulatory risks. Risk consequences occasionally effect in a favourable effect on the organisational strategy, depending how the organisation associates and combines risk with strategy. This shows that risk can as well bring some positive changes in any renewable energy project, depending on how risk is being managed.

Because BP's core business – oil and gas – is unlikely to expand, the research focuses on risk. As the demand for green energy sources grows in the coming decades, BP will need to diversify. Obviously, BP's business will not drop away overnight, but they will need to adopt long term strategies to manage the reduction in oil and gas demand. At the same time, they will need to increase their commitment to other renewable sources of energy such as wind,

geothermal, solar, hydro, biomass, and other sources of green energy.

These risks require to be managed given the predicted increase in global demand on energy by one third in 2040 and the need to reduce carbon emission because of continuous usage of fossil fuel that is associated with climate change (Lu, H. et al., 2019). Climate change has posed a challenge to the oil and gas industry's efforts to diversify into low-carbon energy sources and shift away from fossil fuels in favour of greener energy sources.

It is an ongoing process of industrial decarbonization which entails, for example, moving away from petrol cars to electric cars, or changing from gas central heating to other less environmentally damaging sources. The diversification process, which is currently moving at a faster pace, requires investigation on these early warning signs that might be perceived through the emerging changes on global energy structure and increase in renewable energy status.

Although these investigations are currently taking place in BP, this research work considers more widely those macro-environmental risk factors. Given the growing economic and technological risks in the UK oil and gas sector, effective risk management is a critical factor to consider in any long-term business competitiveness and rate of return (Domnikov et al., 2015). This will have a lot to do with the cost for research and development, license issues and environmental concerns.

Some organisations consider the environment to be unanalysable and may implement a strategic approach to interpreting the environment (Almeida de and Lescab, 2019), such as by creating some external environment. It entails horizontal scanning and the organization's risk management strategy to deal with any type of risk, considering the likelihood of occurrence in any project plan (Othman et al., 2018). It

is not a question of obtaining results from an environmental scanning process, but rather of establishing perspectives and possibilities that could lead to a competitive advantage Gilad, (2011) cited in (Almeida de and Lescab, 2019).

According to Othman et al. (2018), weak signals can also be viewed as opportunities for strategic change within any organisation (Haji-Kazemi and Andersen, 2013). The indication is that application of risk strategy and quick response on those weak signals can be a road map in managing risks. Haji-Kazemi and Andersen, (2013), also mentioned that weak signals in any oil and gas project can be addressed by implementing a performance measurement system with well-defined key performance indicators. This can be seen as the best approach to look at those events that resulted to past project failure and unsuccessful completion.

For most of BP's projects to survive the current environment's drastic changes (renewable energy), they must be sensitive to any form of change or risk as quickly as possible, to capitalise on any form of opportunity due to the emerging changes (Hiltunen, 2010). This is by looking at the best possible ways to increase the demand for renewable energy sources by making it affordable, and to reduce fossil fuel supply.

However, these emerging changes can pose risks, which are aspects of organisational disaster that can potentially jeopardise the organisation's profitability and survival. These problems can sometimes have warning signs before they manifest themselves. This could lead to new changes and risks in the organisation's strategy. It also considers the impact on organisational sustainability and growth, as well as the significance of risk management, by looking at the various stakeholders, which include the oil and gas industry, government, private investors, and civil society.

Ethical business decision-making comes into action when such transition is in process, knowing how important it is to make the

environment a safe place both for business and the general well-being of the society, as well as the natural environment.

Organisational decisions have ethical implications for both the environment and human activities (Mellahi et al., 2010). This is primarily due to human and organisational behaviour, considering both the foreseeable and unforeseeable threats in renewable energy. Many of these foreseeable threats can be classified as threats to sustainability, incoherence, policy impacts, bait and switch tactics, and generally deceptive nature (Harjanne and Korhonen, 2019). The unforeseeable threat could also be the effects of Covid-19, which has a global impact, particularly during this period of significant sustainability in the energy sector via renewable energy (Pradhan et al., 2020). This will be covered in greater detail in the following section.

By way of example, the United States hydropower investment on renewable energy has attracted over US\$200 billion with a striking distance on the amount invested in fossil fuel power generator plant every year (Donovan, 2015). Yet the risk of reversal in fortunes remains whether power of oil price, government austerity and international political agreement on climate change will influence the outlook for renewables (Donovan, 2015).

While in the United Kingdom, the government has decided to issue new licences to oil and gas companies for more drilling in the North Sea, as part of a strategy to safeguard jobs and the economy by gradually transitioning away from fossil fuels (Harrabin, 2021). This has also enraged some environmentalists, who argue that fossil fuels have already done enough to contribute to climate change (Harrabin, 2021).

In relation to government policies and social factors, these are some of the macro-environmental factors. This also suggests that, given the UK's stance on international climate change agreements, oil and gas drilling and usage may not be completely phased out.

This study employs specific risk management standards such as ISO 31000, standard deviations (a risk practitioner's guide), and a framework for calculating cumulative risk. These are guidelines for assessing effective risk management. There is a need to investigate weak signals and evaluate risk factors for better investment decisions. Since renewable energy involves much capital intensive and high-tech innovation, organisations tend to face many risks during the investment decisions on such project (Liu and Zeng, 2017).

What constitutes these early warning signals, and how BP tempts to prevent those unwanted changes that may influence their strategy, is dependent on understanding the factors and mechanisms that may cause risk (Schreuder et al., 2020).

To tackle these risks, the research work looks at ways which BP handles them through. For example, strategic collaboration and involvement of all the necessary stakeholders. This leads to the development of a risk management model. In essence, this model uses existing data from a literature review to develop a supportive action in a well-developed standard for monitoring, validating, and developing control measures. This also considers the micro-environmental factors that are part of BP internal processes, such as customers, employers, shareholders, competitors, and suppliers. It also considers what needs to be done to address the negative consequences of those weak signals before they occur, as well as to avoid damage to any ongoing projects.

1.1 Research Gap

There has been very little qualitative primary research on BP in terms of investigating weak signal of risk impacts on diversification to renewable energy. This study aims to investigate and gain a better understanding of how to investigate weak signal of risk impacts in the

ongoing diversification to renewable energy, using BP as a case study.

1.2 Aim and Objectives

The aim is to comprehend the connection between macro-environmental factors, risk, and weak signals in the ongoing diversification to renewable energy.

This is accomplished by developing a risk management model and determining and assessing the types of macro-environmental risk factors that BP considers in the pursuit of operational objectives and strategies.

The research takes on the following objectives listed below:

- ❖ To analyse the risk implications of those identified macro-environmental risk factors on the BP company.
- ❖ To determine the best way of identifying weak signals in those factors without much negative impacts or changes on BP's organisational strategy.

1.3 Research Questions

- ❖ What is the link between risk and the possible impacts of the macro-environmental factors on BP in the going diversification to renewables?
- ❖ What can be seen as weak signals within the macro-environmental factors?

This is sourced through systematic research on the most recent data available and by identifying the various kinds of risk within BP's renewable energy investment activities. The primary goal of risk identification is to recognise the different types of risks and their potential consequences (Liu and Zeng, 2017). It is also impossible to know what category of risk exists without risk identification, as well as what happens during project implementation, which may result in a loss of effective and timely control.

1.4 Research Structure

The following chapters of the thesis are structured as follows: Chapter 2 focuses on a review of the existing literature, which highlights various aspects of weak signals and how organisations respond to them. It also covers the concepts of risk assessment, mitigation, and control. The review of literature considers the significance of the diversification process, the need for low carbon emissions, and BP's efforts to meet the net zero-emission target. Chapter 2 also provides some basic understanding of the available literature with critical analysis on previously mentioned macro-environmental risk factors, with regards to the ongoing diversification to renewable energy with a focus on macroeconomic factors, to achieve the aim of the research and answer the research questions. This also focuses on the need to reduce carbon emissions risk factors and drivers, as well as how this affects BP, based on a review of available literature.

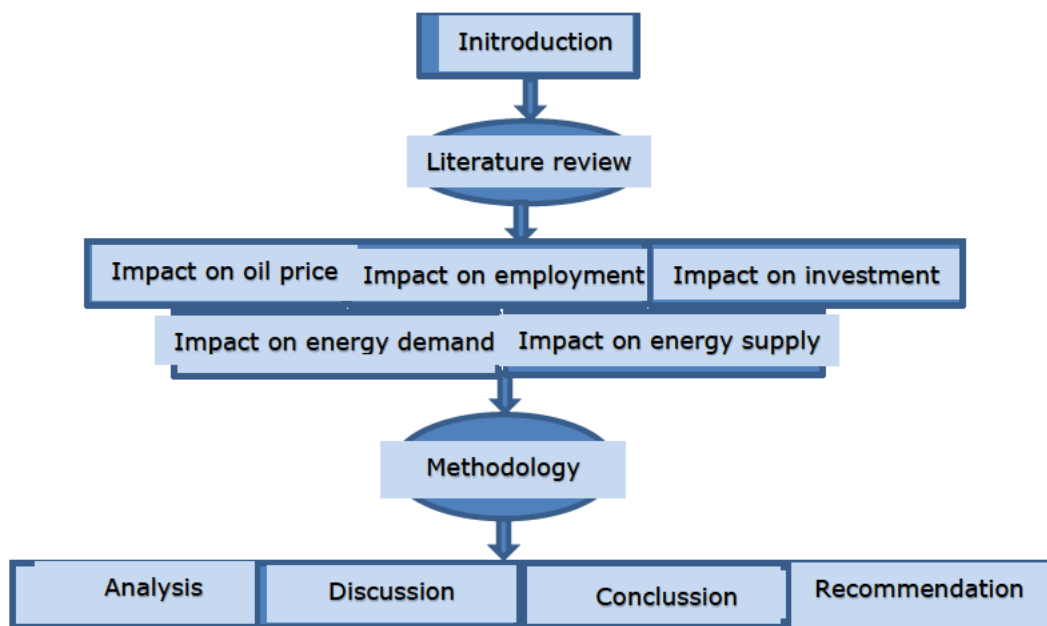
The methodology used to achieve the research's aim and objectives is discussed in Chapter 3. To conduct an in-depth analysis, the research uses a case study approach with the UK oil and gas company (BP) and a qualitative method. The qualitative methods include a semi-structured questionnaire, interview on BP's senior staff, BP press release and annual report 2018-2020. This aids in the exploration of dominant macro-environmental challenges on BP company in the ongoing diversification to renewable energy to reduce carbon emissions. This is by distributing semi-structured questionnaires to the appropriate people to elicit responses relevant to the research objectives.

The fourth chapter provides an analysis of the results and feedback from the data collected. This includes the creation of a risk management model as well as the use of other models found in the literature review. This will eventually contribute to improved and

reduced risk effects, resulting in higher project performance (Song, Sun and Jin, 2017).

The fifth chapter discusses the overall data collected. This section describes how the data gathered aided in answering the research questions and meeting the research objectives by connecting them to an understanding of the literature review. This is followed by conclusions on the overall findings of the research and potential recommendations, as well as some strategic options for identifying weak signals, risk management, mitigation, and control. The structure of the research is also depicted in Figure 1.1 below.

Figure 1.1 Research Structure



Source: (Author).

CHAPTER 2

2.0 Literature Review

This chapter discusses why the research focusses on the oil and gas sector, by looking at those weak signals and risks impacts that surrounds this sector. As part of the research questions, this section gives a detailed analysis on the macro-environmental risk factors, the link between risk and the possible impacts of the macro-environmental factors on BP towards the going diversification to renewables.

Macroeconomic factors are considered for further expansion due to its long-term impacts on the economic performances, which have direct effect on the energy sector.

Weak signals are detected in terms of the macroeconomic impacts on oil price volatility, employment, investment, demand, and supply, with a typology.

The section covers some aspects of weak signals within the macroeconomic factors, with further definitions of weak signals. This also includes some examinations on the relationship between environmental risk and macroeconomic factors.

2.1 Why Oil and Gas?

Despite recent advances in project management tools and techniques in the industrial sectors, many projects have failed to meet the required standard for successful delivery and completion. This is due to a variety of factors, including the failure to detect early warning signals and the neglect of key development practises, which may result in project failure (Othman et al., 2018).

Many oil and gas companies have considered complete diversification and moving into renewable and cleaner energy but balancing renewable energy with oil and gas appears critical because it is the only way for these companies to fuel the renewable sector.

The UK prime minister's request by Nicola Sturgeon to reassess licences already issued on the development of a new Atlantic oil field west of Shetland, but where development has not yet begun, could be seen as having some urgency after a UN report issued a "code red for humanity" to reassess licences already issued on the development of a new Atlantic oil field west of Shetland, but where development has not yet begun (Glenn, 2021). This is due to the severity of the climate change emergency; while the UK government intends to reduce the use of fossil fuels, there is still a demand for oil and gas. Targets such as phasing out gasoline cars by 2030 or achieving 0% carbon emissions in the aviation industry by 2050 are now deemed insufficient in terms of timescale and must be accelerated.

An example could be seen in Saudi Arabia's announcement, the world's top crude oil exporter, on the launch of an eco-city with "zero cars, zero streets, and zero carbon emission," which is their future megadevelopment (Economic times news, 2021).

This has also put additional pressure on the UK government's policy strategy (Road to Zero Strategy), which was published in 2018, with the goal of ending the production of fuel cars by 2030 and hybrids by 2035 to meet the 2050 net zero target.

Early warning systems or weak signals aid the oil and gas industry in risk management and the prevention of negative events (Bertoncel et al., 2018). This suggests that the oil and gas risk management procedure should be more effective to cover all aspects of an emergency. Risk management is required in any oil and gas project to ensure sustainability, growth, and continuity. One of the major considerations in risk assessment, mitigation, and control in the oil and gas sector and other sectors of the UK economy is the investigation of weak signals of failure.

Failure can refer to a variety of things, including inefficiency or ineffectiveness. Failure in this area may occur because of bankruptcy, discontinuance, decommissioning, or organisational death. Mellahi

and Wilkinson, (2010), pg.533, asserted that “an organization fails when its ability to compete deteriorates, because of actual or anticipated performance below a critical threshold that threatens its viability”.

This approach to detect weak signals is about developing a strategy which is aimed at looking into those risk factors. It is also about constant horizon scanning in business, and those economic consequences which in one way or the other may affect the oil and gas business in the UK.

According to Brittingham et al., (2014), the likely risk impacts of the oil and gas companies’ activities on terrestrial and aquatic ecosystems are mostly because of their extraction process and the rate of development. These include activities such as “road and pipeline construction, well pad development, well drilling and fracturing, water removal from surface and ground waters, establishment of compressor stations, and by unintended accidents such as spills or well casing failures” (Brittingham et al., 2014, pg.11035).

This is to say that other possible causes, for example, surface and groundwater contamination from accidental release of fracturing and drilling chemicals or waste materials, are likely novel to the oil and gas shale extraction process (Brittingham et al., 2014). All these indicators point to the fact that oil will soon be less produced and demanded, resulting in a more rapid transition to the ongoing shift to renewable energy to combat climate change.

2.2 Diversification/Transition to Renewable Energy Sources by Oil and Gas Companies

The ongoing energy transition/diversification is commonly referred to as a shift toward a cleaner, and lower-carbon system. This has far-reaching implications that extend beyond power markets, touching on liquids, heating and cooling, industrial demand, and transportation

(Zhong & Bazilian, 2018). This transition/diversification seems critical to the current global energy system and, most likely to the future. This has led to the pursuit for more ambitious initiatives by the oil and gas sector to reduce greenhouse gas emissions, reduce reliance on fossil fuels, and diversify the energy economies. It has also been seen as an issue to international oil and gas companies (IOCs), who are facing the challenge of repositioning their business strategies and risk management.

According to Allaev and Makhmudov, (2019), the global energy transformation that is currently taking place in the world in the twenty-first century will have an impact on the technological, social, economic, and other directions of every nation's development. Kirichenko et al., (2020) supported this by adding that both product substitutes and new entrants pose threats to the oil and gas industry. According to Kirichenko, (2019) cited in (Kirichenko et al., 2020), these threats posed by product substitutes are the desire of European citizens to receive more environmentally friendly products, the development of renewable energy sources, and new energy technologies. This emerging new reality will be fundamentally different from the traditional energy geopolitics that has dominated for more than a century and will have major impacts on oil and gas companies.

However, fossil fuels as the foundation of the global energy system, economic growth, and modern lifestyles, have increased global energy use fifty times over the last two centuries of operation, creating an environment in the modern world. This has had a significant impact on the welfare and security of nations. Now, one can see the emerging energy of the future, which can be represented by a square, the sides of which are the sun, wind, hydropower, and atomic energy.

2.3 Macro-environmental risk factors

Organisational environments have a significant influence on the organisations' strategy, which has required constant monitoring of managers to recognize the impact of these environments for improved decisions making (Castañeda-Ayarza and Godoi, 2020). These macro-environmental risk factors are larger forces in the society which an organisation has no control over, and can affect opportunities, pose as threats to organisational strategy, growth, and continuity (Samnani, 2014).

According to Makori, (2019), these macro-environmental risk factors affect organisation positively or negatively. This can be observed using the political, economic, social, technology, environmental and legal factors (PESTEL) model (Johnson et. al, 2008). Choo, (2002), also supported this by adding that macro-environmental factors are those external natural, legal, and competitive landscape for changes, trends, opportunities, and threats.

Early examples of these factors indicate that their impacts depend largely on the current environment, and organisations need a better understanding of these factors and flexibility, for organisational sustainability.

Much current literature from Makori, (2019), argued that these factors are opportunities and threats, and should be managed effectively to embrace any consequences either positive or negative for the long run accomplishment of organisational goals.

Bašan, (2012), also suggested that macro-environmental risk factors are actors and forces in the market environment that can affect potential customers' ability to establish and maintain a successful relationship with the organisation.

Mhlanga, (2017), also asserted that assessment of the macro-environmental risk factors is considered very important in any organisational decision-making process. Bašan, (2012), highlighted

that these factors can also be uncontrollable market variables, due to the inability of the enterprise to either control or influence them.

On the other hand, macro-environmental risk factors can also impact on the organisational performance and strategy Franke and John, (2011) cited in (Mhlanga, 2017).

The indication is that there are some emerging issues which may need monitoring of the macro-environmental risk factors, to know how relevant they are to any business organization. Kadlubek, (2016), opines that organisation should consider the strength of the impacts of individual macro-environmental risk factors on the organisational services, and the possibility of occurrence.

Mhlanga, (2017) supported this by adding that they do not have impacts on the daily operations of the organisation directly but will tacitly influence it. This requires professional strategic planning, which will have strategic impact on the organisation.

Furthermore, external environmental impact influences the competitive advantage between organisations and the economic sectors' development process. This has been observed by some studies that the external organisational environment determines the organisational innovation's success (Castañeda-Ayarza and Godoi, 2020).

This is to say that inside environment defines the organisation's strategies from the perception of the resources and abilities. In the peripheral environment, the sectorial environment or industry which is the point of interaction between partner organizations and competitors, the macro-environment can still be identified (Castañeda-Ayarza and Godoi, 2020). The implication is that business macro-environments can have considerable influence on the availability of financing, which shows that any dynamic environments often influence the performance of businesses organisation (Lin et al., 2020)

2.4 Possible Impacts of Macro-environmental risk Factors on the UK Oil and Gas Companies.

Energy is considered as a very important aspect of the economic development, which provides other essential services like employment, health, education, food, and the well-being of the public.

In the recent time, drastic increase in the energy consumption globally has estimated to be over a quarter by 2040 (de Souza Mendonça, Anny Key et al., 2020).

However, studies by Karunathilake et al., (2020), has established that many risks and uncertainties have affected the development of renewable energy which is powered towards net-zero, and to reduce the effect of fossil fuel on the environment.

Most of these risks may be considered as macro-environmental risk factors, because of the ongoing diversification of the energy sector to renewables and considering the needs for global energy sustainability, security, and CO₂ emission control.

Also, these factors have positively and negatively impacted on the ongoing diversification of BP to renewable energy, but in this case the negative aspects will only be considered.

They are identified in political, economic, social and technology factors (PEST), but the research focuses on the economic factor based on how critical it is in the ongoing diversification to renewable sources of energy. However, a brief description will be given on other factors.

2.4.1 Political risk factors

Political factors are those political policies that, in practise, are not intended to profit the government, but rather seek an implementation method that is often unfavourable to business organisations (kamali Zonouzi et al., 2021).

They also determine the level in which a government can influence the economy and some industries, mostly the oil and gas sector, for example the enforcement of penalties for environmental polluting industries (Widya Yudha et al., 2018).

However, the political will of the government is pushing through sustainable energy and renewables, to reduce the effect of CO2 emission on the environment.

Victor (2019) emphasised the lack of understanding of the political economic performance and political structure of the society, which have a close relationship and interaction with one another because the success and durability of any political structure is dependent on the performance of the economy (kamali Zonouzi et al., 2021). The evidence suggests that economic performance is heavily influenced by political structural quality, which is based on the stages of economic policy formulation, development, and implementation.

2.4.2 Social risk Factors

Activities of the oil and gas companies have impacted so much on the environment, health, safety, social and economic implications, which have caused companies in this sector to develop systematic processes to manage and reduce environmental risk impacts (Elhuni & Ahmad, 2017). This requires these companies to define their principal social contribution strategy for the public, because of the influence on the market and social community. The risk impact might be on the organisational long-term operational success and profitability which will put the organisation at risk and cause some changes in the organization strategy (Marzi et al., 2019).

2.4.3 Technological risk Factors

These factors are those research and development, technological knowhow, and mechanization, which need to be considered within an organisation.

Emphasis by Mullakhmetov, (2018), states the idea that the outcome of any technological changes is because of social choices and are defined by the actors of the organisation, rather than the requirements of a technology or market nature.

According to Buchanan and Boddy (1983), technology is more of an opportunity than a direction, and technologies are entirely the result of the need to manage the labour process to maximise profit (McLoughlin and Clark, 1994).

Though technology requires updating from time to time, failing to upgrade should be viewed as a risk in many ways.

2.5 Economic Risk Factors

Among the macro-environmental factors, economic factors are currently in the spotlight. This factor is considered because of its long-term effects on economic performance, which have a direct impact on the energy sector. An example could be the inflation rate increase which has impacted on the organisational product price and services by affecting the purchasing power. This as well may affect demand/supply mock-ups for oil and gas products and rate of demand for renewable energy.

Another example is government investment into research and development which is expected to develop and commercialise renewable energy technology for the future growth, and this is likely to be increasingly important.

Macroeconomic factors are interest rates, foreign exchange rates and economic growth patterns (Nitank and Trivedi, 2016). (Uddin and Boateng, 2011), examined those macroeconomic factors as very important, and should be part of the overall financial strength of a firm because of its relevancy to the cost of capital.

The studies by Saeed, (2013), considered the effect of the macroeconomic factors on the oil and gas sector, knowing that this

sector draws the attention of the highest level of foreign direct investments in any country that raises substantial tax income.

The current global pandemic has had an impact on the global economy, causing economic recession in many countries. Despite exceptional policy support, the starting point estimates a 5.2 percent decline in global GDP in 2020, the most unpleasant international downturn in eight decades (Global Economic Prospect, 2020). Growth is expected to be 6.0 percent in 2021 and 4.9 percent in 2022, both of which are higher than in 2020 during the peak of the pandemic; this is expected to be fuelled by the anticipated vaccine in the second half of 2021 (World Economic Outlook, 2021). This has drawn more attention to the need for renewable energy investment. This appears to be a weak indication of a quick transition in a post-Pandemic world. However, there are opportunities, such as North Sea wind farm licences.

The United Kingdom as a leading European country in the international market for two reasons provides a unique setting and dataset for corporate control for the analysis of macroeconomic factors (Uddin and Boateng, 2011). Firstly, the UK established its macroeconomic policies and interest rates as non-member of the European single currency, compared to countries in the single currency zone, and has different exchange rates and different macroeconomic environment (Uddin and Boateng, 2011). Any unfavourable exchange rate in this current era of low demand on oil, will adversely attract more need for renewable source of energy.

Furthermore, the Institute for Fiscal Studies (IFS) UK stated that managing higher debt from the pandemic is a task that has left the UK revenues depressed and shrinking; this has eventually resulted in some spending cuts and a higher tax for many organisations, particularly those in the oil and gas sector (Mark, 2020).

Macroeconomic risk factors also have some impacts on the major economic activities. This could be seen in the direction of oil price, employment, investment, energy demand and supply. The following points will be discussed further in this chapter.

2.6 Weak signals within the Macroeconomic factors

According to (Bertoncel et al., 2018) Weak signals are indication of anticipated development. Nikander, (2002) cited in (Bertoncel et al., 2018), defines weak signals as those signs, information and other factors that are seen as proof or indication of anticipated positive or negative issues.

Lesca and Lesca, (2011) cited in (Rowe et al., 2017), also argue that weak signals are those unimportant or unexpected issues that can possibly impact on any organisational aims and objectives, but can be identified and resolved, then be seen as an early warning sign.

In this case, the concept of detecting weak signals is very crucial, because it assist business experts with the key concepts for recognizing corporate prospects of complementary opportunities (Yoon, 2012).

Within the macroeconomics in the UK oil and gas sector, literature from (Lescaroux and Mignon, 2008), asserted that a weak signal on oil price increase may impact negatively on consumption, investment, and employment. This could also be associated with the consumption of energy products which tend to affect disposable income.

However, this obstructs investment by raising firms' costs and expanding uncertainty which likely leads to a postponement of investment decisions (Ferderer, 1996).

Lescaroux and Mignon, (2008), also opine that any increase in oil prices reduces the return of any sectors that depends largely on oil products and causes the organisation to strategize and create new source (renewables) that are less dependable in oil inputs.

On the other hand, this might create capital and labour restructuring across sectors which can affect unemployment in the long run (Loungani, 1986).

The growth of renewable energy has been tremendous in the past decade and is now an important developing trend (Sadorsky, 2012), which has also shown the global primary energy demand expected annual growth rate to be at the average of 1.8% between 2005 to 2030 (Nakicenovic, 2007).

Sims, (1980), has also observed that lowering renewable costs may have some effect, though it may be difficult to take a broad view of renewable energy costs due to differences from location to location; for example, increased costs from storing electricity, and the fact that solar energy is typically installed at the point of use to offset transportation and infrastructure costs.

These are anticipated developments that may have an impact on renewable energy sources, given the shift in the affordability of these green energy sources.

2.6.1 Impacts of Oil Price on Renewable Energy Transition

Macroeconomic factors have much impact on oil price which indicates that any rise in oil price will cause an unexpected increase in the oil index because of the relationship between the oil index and the entire oil market (El-Sharif et al., 2005). Oil index tracks the performance of the world's largest publicly traded companies involved in oil and gas exploration, extraction, and production.

Shah et al., (2018a), in their literature relate renewable energy to oil prices and the macroeconomy; the focus is on how government policy could be of need to encourage renewable energy investment. This is because renewable energy investment has not openly competed with traditional fossil fuels in price. It is an advantage to the investment into renewable, for example electric cars and a decrease in the running cost (charging points). There is also need to consider the

energy to produce batteries for these cars, which apparently will be powered by oil and gas.

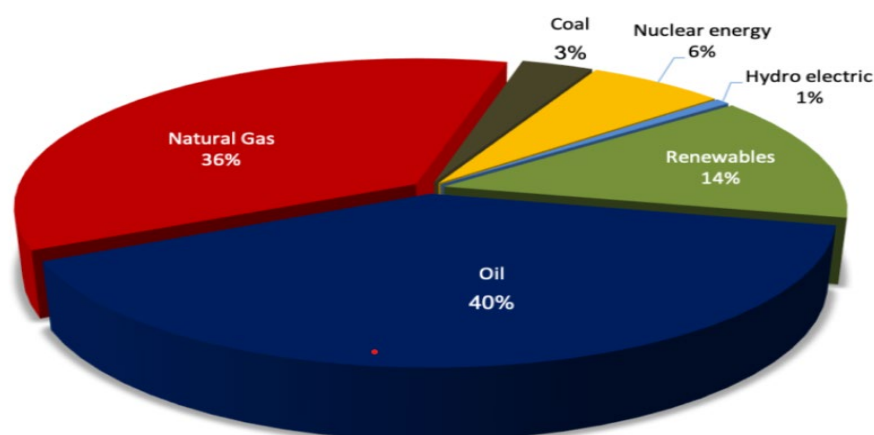
Literature by (Alaali, 2017), observed that oil prices hiking may create inflationary difficulties that may in the long run lead to narrowing the central banks' monetary policies and increase interest rates. This interest rates change has enormous implications on companies as it causes higher borrowing cost and reduces market value which will harm a company's capacity to raise funds.

In addition, Reuter et al., (2012), also developed a model which analyses that the bigger oil companies can impact significantly on prices in the renewable energy market.

Lee and Huh (2017), also argued that higher oil prices have caused an increase in renewable energy resources in the electrical power sector. This means that any higher oil price causes more push in transition into renewable energy, leading to less demand on oil and increase in the demand of greener energy.

That notwithstanding, figure 2.1 shows that fossil fuel burning continues to remain profitable and remain the UK primary energy consumption, but with much lower emissions. This is a weak sign to companies who are on to the ongoing transition to renewable energy sources of energy.

Figure 3.1 UK primary energy consumption 2019



Adapted source (BP Statistical Review of World Energy, 2020).

This remains a weak sign with no strategy, and unstable path the new technology will take, or how innovations will translate into market costs, competitive prices, and how political crises yet to come will play havoc with energy supply chains and energy prices (Howell, 2020).

The energy sector will be in a state of flux regarding demand, Government taxation policy, and the speed of rollout of things like electric charging points.

Mohn and Misund, (2009), pointed out that increase in the oil and gas price volatility, will raise the value options for investment on renewables.

Significantly as contributed by Ramos and Veiga, (2011), consistent oil price increase rises the reduced value of cash flows of the oil industry. If oil demand is not too low and firms can simply pass oil price increases on to customers, it will increase revenues, offset costs, increasing profits.

According to Charles (2021), over five oil tankers with 6 million barrels of North Sea crude are resting off the coasts of Europe, including two super tankers chartered by the world's largest independent crude oil trader, Vitol Group. This shows a sign of weaker demand from Asia and a low refining margin in the region amid a fuel glut, as the COVID resurgence have resulted in restrictions not only in India, but also in Malaysia. However, reviving oil prices could also be a reason for price-sensitive buyers to stay away from purchases (Charles, 2021).

Another example is the Shell court order to reduce emission by 45% by 2030 compared to 2019 levels, a case filed by environmentalist and human right groups (Seabrook, 2021).

These are factors and drivers for achieving the global target to reduce carbon emission before 2050, having Shell among the ninth polluter in the world from 1988-2015 and responsible for its CO₂ emission.

It is also worthy to note that other firms' share prices on an average cannot be compared with energy companies because of persistence rise in the demands and prices of energy.

The UK energy sector can be used to assess the effect of firm-specific and macroeconomic risk on leverage decisions, considering how slight difference in macroeconomic activities can impact the capital structure decisions of energy sector on renewables (Rashid, 2013).

2.6.2 Macroeconomic Risk Impacts on Employment in the renewable Energy Sector

Macroeconomic factors on renewable energy have some impacts on employment, which according to Lambert and Silva, (2012), can be categorised into input-output method to determine the economic impact on the investment activities.

The employment is determined by the labour intensity of the renewable energy, cost increases and the availability of investment (Lambert & Silva, 2012). The employment impacts are usually into three categories which are direct, indirect, and induced.

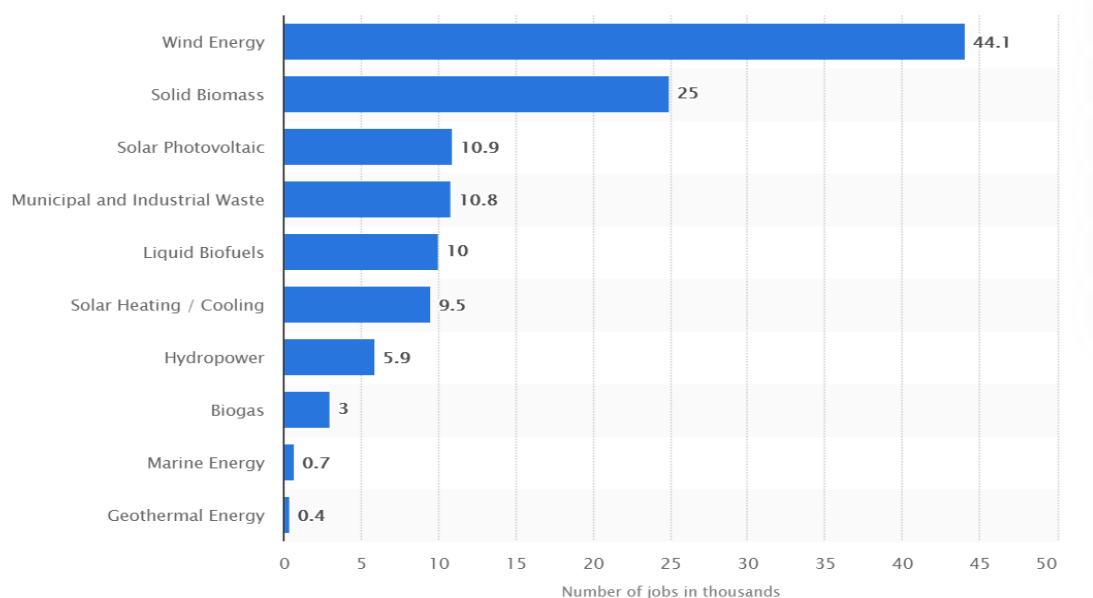
(Cai et al., 2011), also asserted that direct jobs are those created within the renewable sectors to support the increase of generation capacity, while indirect jobs are those created within the value chains of renewable energy to accommodate the expansion of renewables. For example, purchasing wind turbines or a new solar PV farm. The indirect impacts are not only on the value chains, but also in overall inter-industry purchases needed to support the growth of renewable energy. Induced impacts are those changes in household spending resulting from changes in labour income (Cai et al., 2011).

Bulavskaya and Reynès, (2018), discovered that renewable energy sector has the probability of creating more employment and growth for every economy. This impact is explained through a higher labour, capital intensity and maintenance costs of wind and solar

technologies, compared to gas and coal plants, which enables growth opportunities.

Furthermore, Mu et al., (2018), compared renewable energy policy designs as very important in terms of the general economic efficiency and the impacts on employment, which will aid policy makers to address both environment and economic development challenges. This will result to economic adjustment in the direction of energy generation such as natural gas and coal, thereby causing redundancy or loss of job in the oil and gas sector and the supply chain, and government will have to find a way of managing these job losses. Figure 2.2 below shows the rate of employment within the renewable energy sector in 2019, which indicates that more green jobs was created within the sector in the UK, despite the loss of job in the oil and gas sector.

Figure 2.2 Employment rate in the renewable energy sector in the UK in 2019



Adapted source: (Madhumitha, 2021).

Statistics from figure 2.2 above displayed a considerable higher employment rate within the wind energy technology, with a total number of 44.1 thousand jobs, while solid biomass and solar photovoltaic had good employment rate with 25 thousand and 10.9

thousand jobs, respectively. This indicates that renewables are sustainable in employment, also with more jobs to be created in the future.

As the UK government has announced the sale of diesel and petrol cars to be banned from 2030 which will lead to loss of job and redundancy, the need for green jobs has also increased.

Recent report from Mirror.co.UK has unveiled plan by the Japanese car giant (Nissan) to invest over £1Billion on electric car in Sunderland plant, which will create 6,200 new jobs and support up to 24,000 within the supply chain in UK (Graham, 2021).

For economic development and potential high growth productivity increases, Scottish government in 2007, announced the need for sustainable growth in the renewable energy capacity which will present opportunity for job creation (Scottish Government, 2007). This has resulted to speedy transition to renewables by the oil and gas companies, which the aim of the Scottish government is to be the centre of renewable energy green jobs, development, and manufacture of technology for renewables, particularly the marine (Executive, 2005).

Stern, (2019), argues on the relationship between energy and economic growth and production which the attention is on the impact of energy prices on economic activities. Their primary conclusion is the decline on energy used per unit of economic output, but not to a greater degree, because of the transition in energy use from fossil fuels to renewables. When this is considered, energy use and the level of economic activity are found to be tightly coupled.

This has also impacted on the employment level in the clean energy sector (green job), which seems to become a very important issue in the UK, as a means of curbing unemployment and grow the economy toward a sustainable path (Garrett-Peltier, 2017).

In as much as fiscal policy has involves tax preferences, direct public spending, loan guarantees, financing mechanisms, investments in

research and development, and other forms of financial support and incentives, the UK government have also used fiscal policy and regulation in the energy sector. This is to tackle the issue of job unemployment, emissions control, and energy use.

Garrett-Peltier, (2017), has suggested the importance of the economic impacts of energy policy and public spending within the energy sector, which tend to evaluate the employment effects of clean energy as opposed to fossil fuels.

This is by considering the percentage of jobs that would be supported by renewable energy and energy efficiency industries compared to fossil fuel industries. What is the effect on employment if the transition from fossil fuels to clean energy happens on a large scale? These are environmental risk as it affects the UK economy which will adversely influence the ongoing transition to renewable energy. Some body of literature have explored the economic benefits of the clean energy switch and job creation, this can be found in (Lehr et al., 2012; Pollin et al., 2014).

2.6.3 Macroeconomic Risk Impacts on Investment in the Renewable Energy Sector

Argument over the major factor preventing investment into renewable energy is the risk over the future returns it will provide (Shah et al., 2018b). Cicea et al., (2010) also argued that investments greatly encourage any development process and is being a raw material assisting economic growth.

On the other hand, the improved demand for renewable energy, has been an exceptional amount of financing and investing in the renewable energy sector, which suggests that effective investing and financing in the renewable energy sector involves a good knowledge of the trade-offs between risk and return (Sadorsky, 2012).

Systematic risk and return are weak signals for a publicly traded

renewable energy companies, having in mind that risk may be time contrasting.

Pernick and Wilder, (2007), established six major drivers (costs, capital, competition, China, consumers, and climate) behind what they call the "cleantech revolution", which has costs as a very important force leading the growth in renewable energy.

If the costs of renewable energy production declines while that of fossil fuels rise, the result would be a substitution emergence between fossil fuel sources and renewable energy sources.

A decrease in the cost of producing renewable energy leads to production economies of scale and more widespread use of renewable energy in any economy (Sadorsky, 2012).

In relation to research and development, studies by Sim, (2018), suggested the evaluation of economic value of R&D investment on renewable energy, due to the high investment in the renewable energy sector and the profitability.

This looked at the competitiveness of fossil fuel energy source and renewable sources of energy and with regards to rapid drop in the demand on oil and gas.

Lee and Shih, (2010), also established that, to encourage and mitigate the risk of investment into renewables, there is need for a long-term policy on renewable energy investment decision by the government. This in form of grant or public financing to the oil and gas companies will reduce the government burden on R&D investment into renewable energy (Martín-Barrera et al., 2016).

Shah et al., (2018b), also claimed that the government involvement in renewable energy investment is deteriorating, due to the growing competitiveness of renewable energy technologies, and the substitution between renewable energy and oil is increasing. This is an indication of weak signs in relationship between both sources, which are likely going to become more significant and vigorous in many nations like the UK.

Whereas, decommissioning a platform from the oil company, 80% of the materials can be used for the renewable sector (recycling economy) (Aker Solution, 2021).

On 9th March 2021, the UK government launched 3 innovation challenges towards green energy storage technology with over £90 million funding which is part of the government's £1 billion net zero innovation portfolio (Department for Business, Energy, and Industrial Strategy, 2021). These are warning signs which tend to push away entirely fossil fuel production for green energy and control climate change.

Another fact published by Goda, (2021), is the Bill Gates green energy financing programme (Breakthrough Energy Catalyst), which is aimed at raising 820 million euro for green energy demonstration projects. An act to invest in technologies that are at present too expensive, green hydrogen, sustainable aviation fuels, direct air capture, and long-term energy storage are just a few examples (Goda, 2021).

This will discourage fossil fuel production and encourage both government and private investors on the need for renewable and clean energy investment.

However, there has been a reasoned debate over the future of UK oil and gas. This is according to BBC news, which published a call by party leaders to put on hold the controversial oil field off Shetland. This has caused some UK business leaders to write a joint open letter to party leader. According to them, putting an end to new oil exploration have shaken investment confidence and put tens of thousands of jobs at risk. According to the letter, this will obviously threaten the fair and inclusive transition in the collective journey to a net-zero society and affect investment in the industry especially this crucial time of UK energy transition journey (BBC News 2021, <https://www.bbc.co.uk/news/uk-scotland-scotland-business-59717784>).

2.6.4 Macroeconomy Risk Impacts on Energy Demands

Considering the feasibility and the move by the western world to make energy system largely depend on renewable energy, it is also difficult combining both technical and economic issues since it is expected for the future energy system to become more sustainable and perform better than the fossil fuel, while been economically affordable (Bulavskaya and Reynès, 2018).

Literature from Tugcu and Topcu, (2018), address the fact that environmental degradation emanating from much energy consumption lowers economic growth, which is purely negative environmental externality.

This raises the following questions by Bulavskaya and Reynès, (2018), is it technically feasible to use a high percentage of renewable energy for power generation? Does it result in an increase in the price of electricity? What effect does it have on economic activity (employment, investment, value-added, prices, trade, tax revenue, and so on)?

According to Lu, Y. et al., (2020), the implementation of European Green Deal which is aimed at promoting the deep decarbonisation by accompanying the economic and industrial transformation, has resulted to shift of the economy from fossil fuels to zero-carbon and cause the increase demand and investment on renewable energy in a way that is socially and politically viable.

Alper and Oguz, (2016), also established that more consumption and demand on renewable energy can reduce the dependency of fossil fuel, guarantee energy security, and promote sustainable development of any economy as well as the environment.

This will promote the use of local contents to generate energy and push on more research and development.

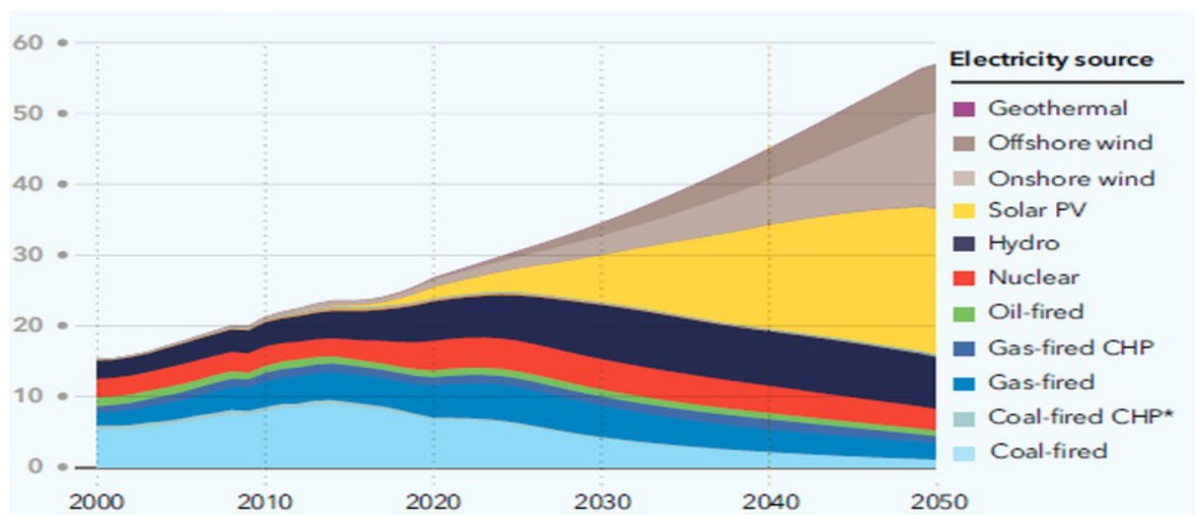
However, the demand can be very high due to the public perception of renewable energy, environmental safety, and economic benefits (Tampakis et al., 2013), which also involves cost and upfront

investment and may substitute income and job in the conventional energy industry (Blazejczak et al., 2014). This establishes the fact that the cause is to control climate change and reduce environmental degradation, while promoting the economy.

Furthermore, with the target to reduce carbon emissions by International and European Union through additional tax on fossil fuels, this has also expanded the production and demand of energy from renewable sources and through government subsidies (Shah et al., 2018c). The indication is to encourage investment on the ongoing transition to renewables by both private and public sectors.

Report from DNV (2017) shows that renewables like solar photovoltaic (PV), onshore wind, hydro and offshore wind power plant will generate over 80% of the global electricity in 2050, with the share of renewable energy in the world's energy mix approaching 50%. This will flatten the demand for fossil fuel and increase the consumption of renewables, mostly in the heating and transport sectors.

Figure 2.3 World electricity generation by source



Adapted source: DNV GL'S Energy Transition Outlook (2017).

Indication from the figure 2.3 above shows that wind and solar are the major sources of renewable energy and are likely to improve cost performance at a speedy rate than oil and gas.

This also links to the global goal on energy by SDG 7, which discusses on the three main targets, to ensure affordable, reliable, and universal access to modern energy services. The aim is to increase substantially the share of renewable energy in the global energy mix and double the global rate of improvement in energy efficiency (McCollum et al., 2017).

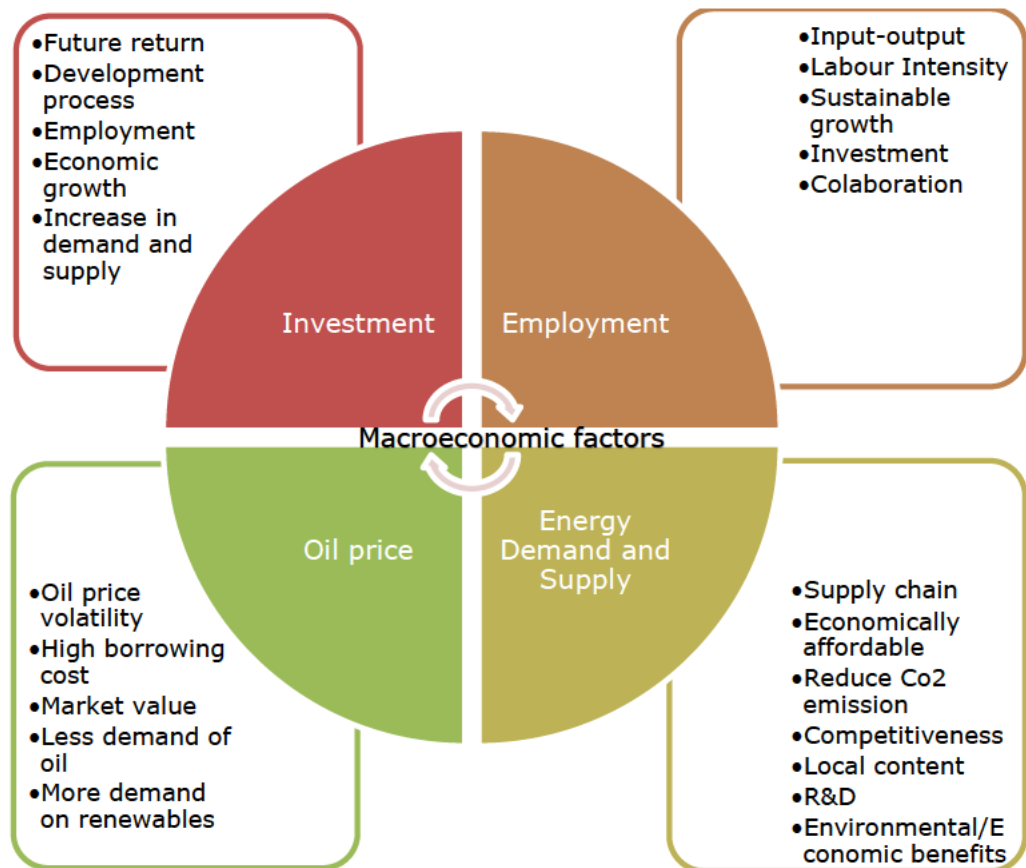
2.6.5 Macroeconomic Risk Impacts on Energy Supply

To lower the overall carbon emission within the UK and increase energy security and employment through the local content exploitation, there is a need to increase other supply of renewable sources of energy as well as increasing electricity output through the renewables (Graziano et al., 2017).

A study by Lecca et al., (2017), was able to establish a multi-sectoral energy-economy-environmental model which evaluate the macroeconomic and energy impacts of reduction in the offshore wind energy. The goals are to reach (22 GW by 2030) and increase GDP by 0.03 percent to 0.15 percent from baseline values, as well as employment by 0.03 percent to 0.13 percent, assuming a slight increase in UK content by 2030 (Lecca et al., 2017).

The figure 2.4 below depicts the effects of the discussed macroeconomic factors and their various levels on the ongoing transition to renewable energy, which could have a positive or negative impact.

Figure 2.4 Macroeconomic Impacts



Source: (Author).

Figure 2.4 shows that investment and employment are viewed as drivers that may have an impact on the price of fossil fuels, which may lead to less demand for oil and promote the supply of renewable energy.

Any change in the price of oil, on the other hand, will have a negative impact on the demand and supply of both oil and gas, as well as renewable energy sources.

2.7 Relationship between environmental risks and macroeconomic factor.

It is important to note the substantial disparity in the perception of risk, which is knowing the disparity between objective and subjective (perceived) risk (Sidortsov, 2014).

According to (Beck, 2013), risk does not mean catastrophe, rather risk means the anticipation of catastrophe. Beck also affirmed that risks are in the process of becoming real, as measured by the degree to which they are anticipated.

Literature from Boholm, (1996), opines that an individual's assessment of risk may vary from the "objective" estimate. Ulleberg and Rundmo (1996) cited in (Oltedal et al., 2004) defines "Objective" risk as that risk which exists separately from an individual's knowledge and worries of the source of the risk. While perceived risk is obviously a sign of real risk, particularly when they are well-established Sjöberg, (1995) cited in (Oltedal et al., 2004).

According to IRGC, (2017), risk suggests to some level the uncertainty and gravity of outcomes of any event about human valuables. Uncertainty can relate to the type of effects, the likelihood of these occurring, the severity of the consequences or the time and location.

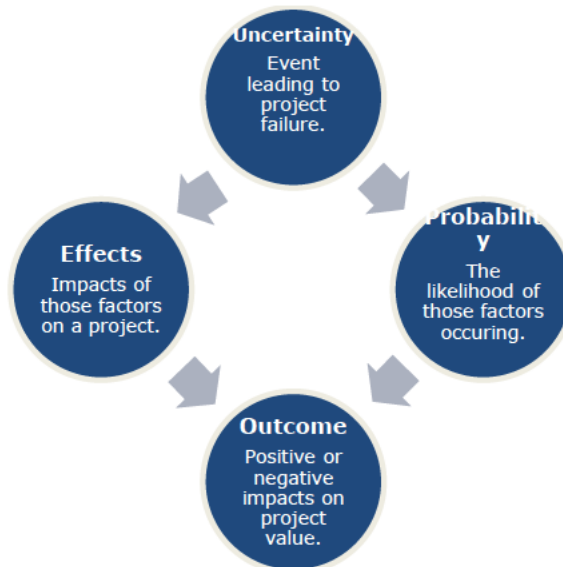
However, all indications are that the progress of renewable energy projects is all about risks, and failure to evaluate and control them will result in time, cost, and resource waste within the sector.

Bucelli, Paltrinieri, and Landucci (2018) advocated for as much risk evaluation as possible, which benefits both the organisation and the environment. This necessitates the implementation of adequate protection barriers in any project to conduct an integrated assessment of human and environmental risk. It would aid in the identification of appropriate measures to mitigate the impact of any risk actions.

It is critical to assess the likelihood of any type of risk when investigating weak signal of risk impacts in BP. This will help the organisation integrate risk management into key activities and functions (ISO31000, 2018). Risk is unavoidable, whether it is well-defined, established, subjectively or objectively, and actions must be taken in advance.

Figure 2.5 depicts the concept of risk in terms of uncertainty, likelihood, impact, and outcome.

Figure 2.5 Uncertainty, Effect, Probability and Outcome of risk



Adapted source: (Merna and Faisal, 2011)

The above diagram shows how uncertainty can have a negative or positive impact on any project, which may result from the organization's failure to meet the project objectives. This could be avoided if the organisation keeps a record of previous risk threats on the risk register.

The activities of the oil and gas sector have been focused on the threat to the human and natural environments (OECD, 2003). However, environmental risk is defined as negative effects on the human and natural environment, which the energy sector recognises as not solely "environmental," but also of a systemic nature.

The International Risk Governance Commission (IRGC) defines systemic risk as entrenched in the larger perspective of societal, financial, and economic consequences and is at the intersection of natural events, economic, social, and technological developments, and policy-driven actions. Slovic's (2000) perception of risk describes other negative effects of risk in the macroeconomic context, such as

the implications for regulation and public policy. The current transition to renewable energy is part of the Paris Agreement's Article 2.1a, which states the importance of limiting the rise in global average temperature to less than 2°C above pre-industrial levels to significantly reduce the risks and impacts of climate change on the environment (UNFCCC, 2015).

This will aid in the mitigation of potential risks and negative consequences of rising temperatures (Pachauri et al., 2014). According to Hanna and Gross (2021), the route and pace of the energy system transition are uncertain due to the possibility of discontinuous change in some areas, ranging from dominant technologies and the scale of the energy system to governance, politics, institutional arrangements, and lifestyle changes. These are weak signals that are likely possible to affect the rate of transition to renewable sources of energy in some regions, but not much impact in the western world.

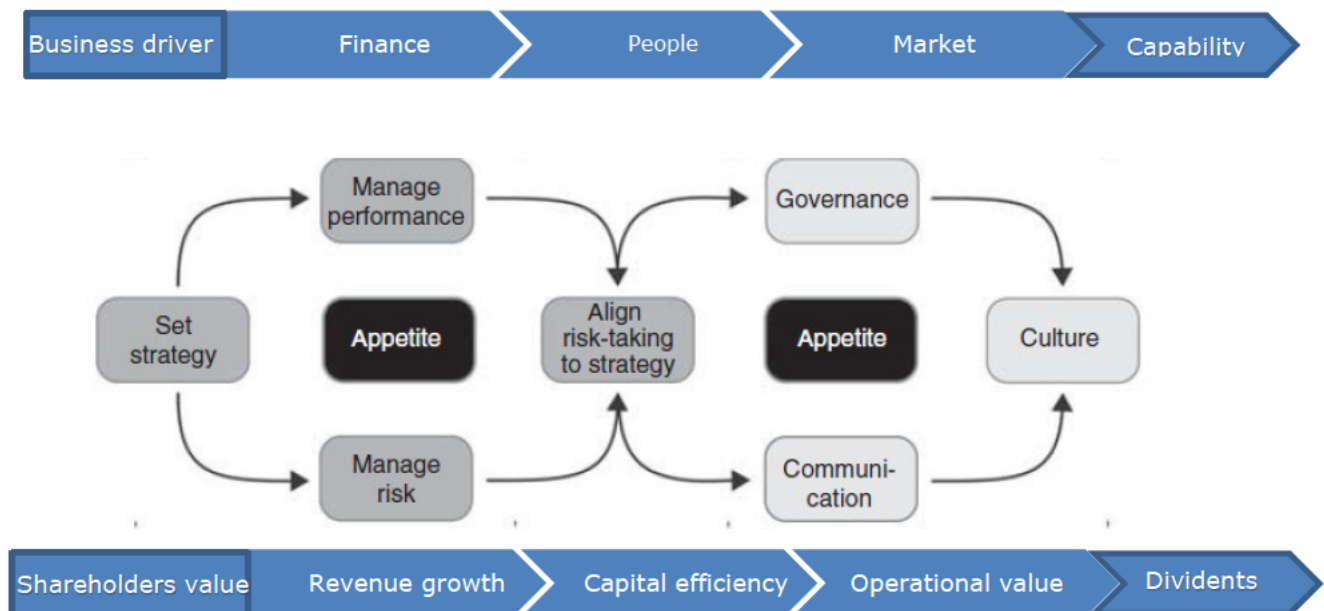
While discontinuities may happen or develop at any time, they are concern now, because of the scale of transformation required to achieve deep decarbonisation of the energy system. Some disruptive technological innovation could help to accelerate progress towards meeting carbon reduction targets, whereas other social and political discontinuities may adversely impact the rate at which decarbonisation can be achieved (Hanna & Gross, 2021).

In tackling the effect on the environmental risk which is a weak sign in the ongoing investment and transition process to renewable energy, some guidelines were taken from Risk-Based Performance Management. The energy sector should be concerned about what are the new models for risk management in every project in respect to the environmental effects. According to Smart and Creelman, (2013), risk-based performance management is a model effectively created to

control and manage fundamental risk and achieving an improved competitive advantage.

This is a powerful model and approach for organisations to incorporate risk management into their overall strategy and operational decision-making (Smart and Creelman, 2013). This will aid in the investigation of weak signals in the direction of achieving operational objectives and strategies, as any inconsistency in risk track will result in project failure.

Figure 2.6 Risk-based Performance Management model



Adapted source: (Smart and Creelman, 2013)

The model above explains the process that must be considered to achieve the investment goal. This is accomplished by examining the current environment in conjunction with the dynamic risk factors and assessing the project's inherent risk. This will provide the necessary information for identifying risk threats in renewable energy investments. Starting with the identification of value drivers, moving on to other areas of revenue growth and providing value to investors, which will entail managing risk threats and aligning risk to organisational strategy

CHAPTER 3

3.0 Methodology

To assess the risk and potential impacts of macro-environmental risk factors, as well as to investigate weak signals within the macro-environment, this study employs a case study approach, which included an examination of the British Petroleum (BP). This was accomplished by examining the most significant macro-environmental risk factors affecting BP in its ongoing diversification or transition to renewable energy. As discussed in the literature review, the emphasis is on macroeconomic risk factors and their potential consequences. This study's population will be BP employees working in the risk management, renewable energy, and investment sectors.

3.1 Case study approach

The case study approach will aid in the development of an in-depth analysis of the best possible ways to address macroeconomic risk factors that may stymie investment while also promoting the ongoing transition to renewable energy and lowering carbon emissions. Because the preceding literature does not provide any classification of risk or weak signals that may have an impact on the organisation, this approach focused on those weak signals within macroeconomic factors that have a direct impact on the organisation's strategy to make better investment decisions. To obtain useful information, a semi-structured questionnaire was used.

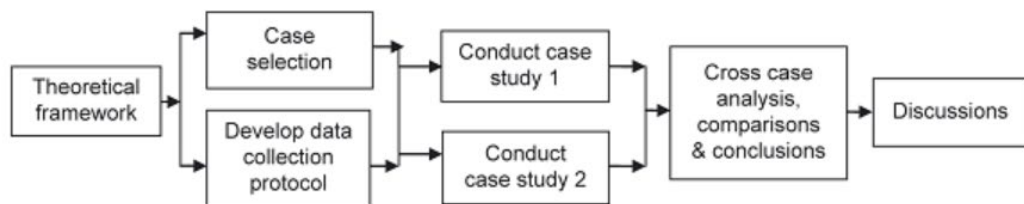
To assess the risk and potential impacts of macroeconomic factors on BP, as well as to investigate the weak signals within these factors, a case study strategy was used with the adoption of a qualitative methodology involving primary and secondary data sources.

A case study approach focuses on discovery Bryman and Bell, (2011) and assists the researcher in identifying the major challenges.

In contrast to the experiment and archival strategies, where measuring human response is difficult, the case study strategy focuses on a specific condition (Kumaraswamy, 2005).

Furthermore, Kumar (2005) supported the case study approach by stating that it helps with a viewpoint to analyse intensively various pieces of evidence that are sometimes overlooked by other research methods such as archival strategy. It examines the tendency and problem under investigation to find descriptions of significance Yin (1981), which provides sources for investigating those risk factors in the macroeconomic sector.

Figure 3.1 Case study strategy



Adapted source: (Yin, 2003).

Gummesson (2000), on the other hand, argued that case study research is a time-consuming piece of work because it is difficult to take more than one or a few comprehensive case studies within a research period. Regardless, many researchers preferred this approach because it is more beneficial to new research areas or research with insufficient existing principles (Eisenhardt, 1989).

According to Yin (1994), if the boundaries between phenomenon and framework are not clear, a case study strategy provides an experimental understanding of modern phenomena in a real-life context. Case studies provide more convincing evidence and strengthen the research (Yin 2009). This research work examined how BP is approaching the transition from oil and gas to renewables.

Rossman and Rallis (1998) backed up this approach by stating that case study through a proper examination seeks to recognise facts of a specific case or cases by focusing on precise, and thus informing the researcher's choice of approach.

3.2 The Selection of British Petroleum (BP)

British Petroleum (BP) was chosen as the case study due to the company's long history in the energy and oil and gas industries. For this purpose, the organisation's strong brand and cooperative identity were also considered.

As a British multinational oil and gas company with headquarters in London, the organisation aimed to reduce CO₂ emissions while diversifying their products into renewable sources. BP discovered oil in Persia in 1908 and has a culture of transitioning from coal to oil, oil to gas, onshore to deep water, and now diversifying into new energy sources (BP, 2021). The primary strategy is to mitigate and control climate change while also reducing CO₂ emissions.

With a well-established organisational sustainability framework, BP backed up their strategy by implementing an integrated approach that put the organization's goals and objectives into action. Most of these goals revolve around net zero operations, new energies, clean cities, clean energy, sustainable livelihoods, and a simple transition to renewables (BP, 2021).

All of this has a large impact on the macroeconomic environment, and the research is aimed at examining the warning signs.

More data and knowledge can be generated in this organisation to investigate those weak macroeconomic signals that could have an impact on BP's rapid diversification into renewable energy sources and other areas of improvement. This information was gathered using a semi-structured questionnaire, interview, and BP's annual reports, which was created by posing some questions with the goal of generating data on the research questions. This is done with no

intention of probing the organisation's detailed strategic approach to managing its external environment operating conditions.

3.3 Data sampling Technique

The research focused on the potential effects of macro-environmental (macroeconomic) risk factors on BP. This allowed the researcher to spend less time collecting data because he was unable to visit the organisation due to the current pandemic, but instead relied on BP staff for more reliable data via phone calls, interviews, and emails.

However, Saunders, Lewis, and Thornhill (2009) proposed a sampling technique that provides options to researchers when it is likely that a survey of the entire population would be difficult due to obvious limitations. In essence, this technique provides the researcher with various methods for reducing the amount of data to be collected by allowing only subsection or sector data, rather than data from all possible sectors in the institution (Saunders, Lewis, and Thornhill 2009).

Many academic studies use one of two types of sampling methods: probability sampling and non-probability sampling. To this research, a non-probability sampling technique was used, which aided the researcher's assessment collection base in selecting the best respondents to provide the required data for the research objectives. The information gathered was used to investigate the anticipated threats mentioned in the literature review, as well as how BP dealt with the consequences on the organisation's strategy.

The sampling technique used primarily included the distribution of a semi-structured questionnaire and telephone interviews to BP senior management and risk management, renewable energy, and investment specialists. The sample size was 30-40 employees from the aforementioned departments.

This is to collect some useful data relating to the organisation's macroeconomic effects during this period of energy transition. Obtaining information on BP's decision to address the macroeconomic effects on the organisation's strategy. They were contacted via email, LinkedIn, and phone call interview, as well as other convenient samples, to share their thoughts. These staff members were contacted due to their expertise in the renewable energy, risk management, and investment sectors. The questions were designed to elicit a percentage of their responses in relation to the research objectives, as well as their perspectives on the potential threat of those weak signs to the organisation.

The following questions were presented in a semi-structured format.

- What are the dominant challenges of the macroeconomic risk factors on BP in the ongoing diversification to renewable energy?
- To reduce carbon emission, what are the best possible ways to tackle those macroeconomic risk factors that could hinder investment on the ongoing diversification process to renewable energy?
- In identifying those macroeconomic risk factors, what are the possible impacts on organisational strategy?
- What are the possible weak signals to be investigated for better investment decision?
- Considering the predicted increase in global demand on energy and the ongoing process of industrial decarbonization, is there any indication that oil and gas drilling and usage may completely fade away?
- Where has the company headed in terms of renewables?
- What did they see as the obvious kind of macroeconomic effects?

- Is there anything the organization is worried about or scanning through now, like the investment cost of diversifying into renewables?
- What is the organization current main market?
- Is BP going to wind up oil and gas and move entirely into renewables?
- Will there be any form of rebranding?

These questions were derived from the above literature to provide more clarification, a better understanding to the respondents, and to answer the research questions. Questions 1, 2, and 3 aided in answering research question 1, while questions 4,5, and 7 aided in answering research question 2.

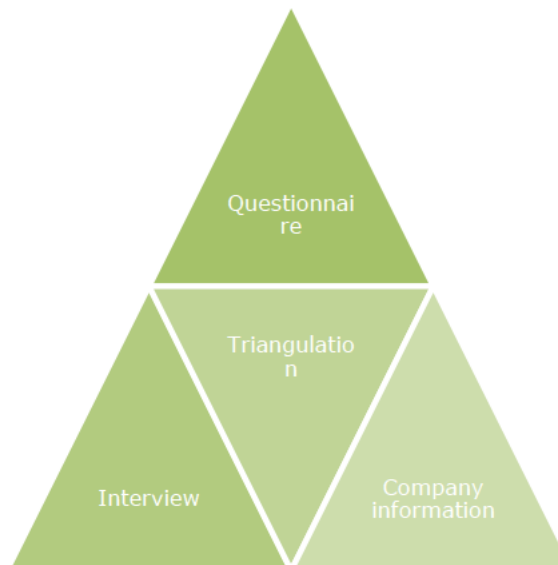
3.4 Data collection sources and procedure

Semi-structured questionnaires were used to collect data in this study. This method was chosen because it allowed for the collection of more data in a shorter period (Jon Kolko 2005).

However, the rate of response could have been low, refusal could have been high, and there was little control over the uncompleted questionnaires, particularly the posted ones, which could have been biased (kirklees.gov.uk).

Semi-structured questionnaires, on the other hand, do not allow or require close contact between the researcher and the respondents. As a result, the interview was conducted using a questionnaire and, at some point, voice chat with the interviewees for more detailed information on the case context.

Figure 3.2 Data Triangulation



Source (Author).

3.4.1 Primary data collection

The primary data is collected through a semi-structured questionnaire. The approach assisted the respondents in giving detailed information. It equally permits for flexibility in question restructuring (White, 2000). The method of the interview is semi-structured interviews because they are suitable interview technique when:

- It is crucial to understand the idea of which the interviewee made use of as centre for their ideas and thoughts regarding the topic question.
- The subject matter or topic is a complex one.
- The interviewees are undisposed to disclose the needed information due to confidential data about their organisation.

The semi-structured questionnaire was considered helpful in attaining the research questions in terms of finding the link between risk and the possible impacts of the macro-environmental (macroeconomic) factors on BP in the going transition to renewables and examining on what can be seen as weak signals within the macro-environmental (macroeconomic) factors.

This method helped the researcher avoid bias and was also advantageous if the respondents were not accessible (Kothari, 2004). The reason for using this accepted tactic was that the questionnaire was used to collect descriptive data, while interviews were possibly involved at an investigative stage which helped the researcher in getting a thorough knowledge of the research objectives.

3.4.2 Secondary data collection

Secondary data were obtained from internet sources like BP press release, and BP annual reports 2018-2020, which contained the company information.

Saunders, Lewis, and Thornhill (2009) argued that failure to modify the quality of data gotten from the sources is the disadvantage of secondary sources of data collection.

3.5 Research Data Analysis

A well-established research data clarity and assessment is the essential part in any academic research (Amaratunga et al 2002). Many procedures are used by researchers to carefully examine quantitative and qualitative data when investigating weak signals. To analyse data and data presentation, graphic description statistics of bar chart and pie chart were used. This was based on the responses of the questionnaire respondents.

Furthermore, by employing qualitative data collection methods, the analysis incorporates three flows at the same time: data reduction, presentation, and conclusion (Miles and Huberman, cited in Amaratunga et al 2002).

3.5.1 Research Data Reduction

Editing tactics were considered for semi-structured questionnaire, by categorizing the content that are very important for the purpose of

the research (Kumar 2005). In other words, data obtained from any possible recorded interviews, was properly analysed in detailed writing translation to create the framework.

3.5.2 Research Data Presentation

The data is presented to permit a cross-examination of the questionnaire and the responses from the interviewees. The data was analysed and presented through personal/researcher interpretation. This makes it easy and well developed for interpretation (Bryman and Bell, 2011).

3.5.3 Research Conclusion and Verification

This concluded the essential results in the data collection analysis and presented the data collected. This helped in developing a sound, clear and satisfactory answer in the data collected and the objective of the research, by linking them to the literature reviews.

On the other, this included some possible recommendations to share some ideas on how investigating weak signals and the impacts of macroeconomic factors on the ongoing diversification could be a great deal in mitigating the risk of Co2 emission on the environment.

3.6 Limitations and ethical issues

The research required visit to BP company in Aberdeen for face-to-face interview, but due to the current pandemic, there was a limit access to the organization facility, which encouraged safety for both the researcher and the staff of BP.

Access to some data was limited, because the organization was unwilling to disclose some sensitive information which might affect them in the competitive market environment.

In observing the ethical issues, the participants may show no interest in answering some questions if they were not properly informed before issuing of questionnaire. The participants were advised not to

answer or disclose any sensitive information that may affect the organisational competitive advantage in any way. This is to maintain the privacy of the organisation and to respect the wish of the participants.

To mitigate these ethical issues, the participants reserved the right to withdraw at any time if they feel uncomfortable and are not coaxed in any way to answer any question.

Chapter 4

Data collection Analysis and Interpretation

4.0 Introduction

Data collection was achieved through administering of semi-structured questionnaire to BP staff working within the risk management sectors, renewables energy sector, and investment sector. They were contacted through email, LinkedIn, phone calls, and other convenient samples like the BP annual reports and press release, to put up opinions.

Data was collected and interpreted in accordance with the objectives of the case context, which is to assess the risk and the possible impacts of the macro-environmental risk factors on BP and to investigate the weak signals within the macro-environmental factors with the focus on the macroeconomic risk factors and the possible impacts.

However, there were few respondents to the survey, but the research aims, and objectives were achieved through a mixed-method approach of data collection.

Due to a smaller number of respondents to the questionnaire, some data were also collected through the BP annual reports, and BP website.

4.1 Data Description

The information gathered is based on the responses of those who provided non-sensitive information in response to research questions. These data from the questionnaire, interview, annual reports, and BP's press release addressed questions about the BP transition/diversification process and strategic collaborations for better investment. The extracted data also discussed the volatility of oil prices and the affordability of renewable energy products, which

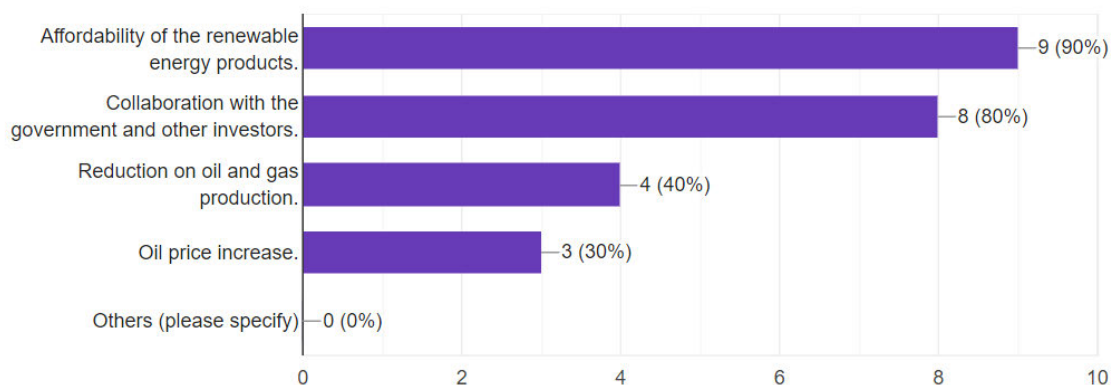
are intended to replace oil and gas to reduce greenhouse gas emissions. This included BP risk management culture and how BP reduces CO2 emissions across its entire operation to combat climate change. There was also information provided on BP's customer satisfaction strategy, demand, and supply of renewable energy products to their customers.

4.2 Questions

1. To reduce carbon emission, what are the best possible ways to tackle those macroeconomic risk factors that may hinder investment on the ongoing diversification process to renewable energy?

Figure 4.1 depicts the percentage of responses from BP employees on possible ways to reduce carbon emissions and address macroeconomic risk factors that may stymie investment in the ongoing renewable energy diversification process.

Figure 4.1 Responses on Question 1



Source (Author).

a. Affordability of the renewable energy products

90 percent of BP employees agreed that renewable energy should be made more affordable to the public, taking into account the effects of CO2 emissions on the environment as well as people's purchasing power for renewable energy products. According to the report examined from the BP 2019 annual report (page 40), energy must be

delivered in affordable and reliable ways, and it must be lower carbon, with the organisation's goal of being net zero across their operations by 2050. This is done by examining the part of environmental unsustainable use caused by the extensive use of oil and gas products, as well as how renewable energy has helped to reduce the CO2 effects on the environment. This is obviously a hot topic right now. The transition away from oil and gas (for example, for heating and car fuel) to renewable energy is widely accepted, but the cost may be a key, and in some cases, prohibitive factor. Respondents believed it would encourage renewable energy investment, reduce consumption of oil and gas products, and promote the use of renewable energy products.

As mentioned in the literature review by Tugcu and Topcu, (2018), environmental degradation caused by excessive energy consumption reduces economic growth, which is a purely negative environmental externality. This suggests that for the Western world's energy system to become more sustainable and perform better than fossil fuels, it must be economically affordable (Bulavskaya and Reynès, 2018).

The table below was created to show some of the similarities between survey and interview responses.

Table 4.1 Similarities from the survey responses and the interview responses

Survey Responses	Interview responses
<ul style="list-style-type: none"> • Affordability of the renewable energy by having in mind the purchasing power of the people and having cost as a considerable factor. • Commitment on more low carbon business through strategic collaboration. 	<ul style="list-style-type: none"> • Lower price will encourage investment on renewables and discourage the consumption of fossil fuel. • Lowering the impact of CO2 emission by investing more on offshore solar, wind and biofuels for more sustainable environment, and a strategic

	means of controlling price of oil and gas.
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The above table shows that both survey responses and interviewee responses are focused on how the low cost of renewable energy products can help people increase their purchasing power and reduce their consumption of fossil fuels.

According to the 2018 BP annual report, the company is increasing its investment activity in renewables by expanding their existing solar, wind, and biofuels businesses and developing new business models. This is part of the organisation's strategy to commit more to a low-carbon future, to reduce emissions in operations, to improve renewable energy products and services, and to create low-carbon businesses (BP annual report, 2018, page 38). Based on the recent trend toward renewable energy, BP believes that solar could generate 12 percent of global power by 2040, with the potential to increase to 20 percent to meet the Paris climate goals.

b. Collaboration with government and other investors

In response to the question of collaboration, 80 percent of respondents believed that collaboration is the key to global climate change control and greenhouse gas emissions reduction. According to some respondents, BP has created new business models through joint ventures and strategic collaboration with the government and other investors. The organisation believes it is in accordance with the Paris Agreement, whose goal is to reduce greenhouse gas emissions in the context of sustainable development (BP annual report, 2018). As much as the energy sector contributes to the UK economy, the government also determines how much the energy sector can influence the economy by enforcing or penalising any environmental effects (Widya Yudha et al., 2018).

According to one of the respondents, BP collaborated with the UK government in November 2020 on a plan for the UK to lead a green industrial revolution and achieve a net zero target by 2050. The organisation also supports the government's plan to phase out new petrol and diesel cars and vans by 2040, despite the impact on their fuel business and a significant challenge to the company's legacy business. This includes electric vehicle (EV) charging stations, which BP sees as a critical component of the organisation's new strategy and part of the UK's plan to achieve net zero emissions by 2050 and become the first industrialised nation to do so by law.

The company generally supports government policies by converting transportation systems to electrification and hydrogen, recognising that the UK government requires alternative technologies to fill the void. This collaboration also includes strong government policies to improve battery technology as well as infrastructure for ultra-fast charging and hydrogen. BP sees this as a good government strategy for achieving the transition to renewable energy (BP press release, 2020).

Data gathered from the company's website shows that BP, in collaboration with the UK government, has encouraged investment in renewable energy with the goal of making the UK a global leader in the energy transition.

By signing a strategic partnership with Equinor in September 2020, BP has also collaborated with an organisation on their first move into offshore wind. The agreement could power over 20 million homes in the United States.

According to data from the BP 2019 annual report (page 28), the company has increased its renewable energy portfolio by investing in low-carbon activities on multiple fronts. This was accomplished by investing over \$650 million in approximately 40 companies since 2007 through a joint venture and collaborations that supported technologies and innovation that could benefit BP.

According to data obtained from the company's website, BP has also taken the next step in developing a new hydrogen business by collaborating with rsted in Germany, an offshore wind leader. A collaborative project to produce 'green,' emissions-free hydrogen at BP's Lingen refinery for use in fuel production, with a key role in the development of technology to decarbonize heavy industry and transportation.

On June 14, 2021, BP formed a partnership with Statkraft and Aker Offshore Wind to develop offshore wind power to deliver offshore renewable energy to the market and expand BP's renewable business (BP news and insight, 2021).

According to the 2019 BP annual report, the company has formed a 50:50 joint venture in Brazil with Bunge Limited, a leading Agri-commodities company, with a deal to more than double their existing biofuels business (BP annual report 2019). As a result, BP is now the country's second largest bioethanol producer in terms of effective crushing capacity. This is a strategic move toward climate change mitigation and renewable energy investment that has rapidly increased demand for ethanol.

According to the 2019 annual report, BP is collaborating with 13 oil and gas companies to increase the ambition, speed, and scale of the initiatives through the Oil and Gas Climate Initiative (OGCI). This is a strategic collaboration to help reduce GHG emissions caused by humans. According to the report, this strategic collaboration among these companies will aid in the advancement of the UK's first commercial full-chain carbon capture, use, and storage project (BP annual report, 2019).

c. Reduction on Oil and gas Production

To reduce the production of oil and gas, a strategic means of encouraging the alternative energy, 40% of the respondent believed that this will also assist reducing Co2 emission and push more

investment on renewables. According to the literature review, this is by increasing the consumption and demand on renewable energy which will help to reduce the dependency of fossil fuel, guarantee energy security, and promote sustainable development of any economy as well as the environment (Alper & Oguz, 2016).

from the 2019 annual report, also shows that alternative energy (Renewables) remains the fastest-growing energy source presently and is potentially contributing half of the growth in global energy. Renewable energy has also increased its share from 4% in 2019 and has estimated to be 15% by 2040.

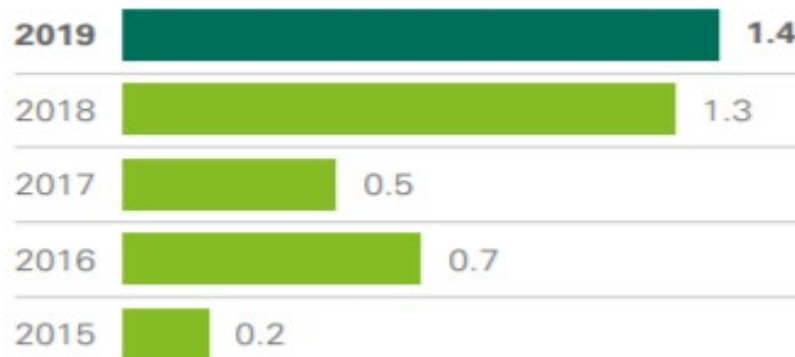
The respondents said that BP have established in alternative energy business, with a significant portfolio across renewable fuels, power, and products. The organisation in 2018 set up a low carbon ambition and targets which they referred to as Reduce, Improve, and Create (RIC) framework. What this means is that BP is set to drastically reduce greenhouse gas emission in all their operations, improve on the products that will enable their customers and consumer to minimize their emission, and create low carbon businesses.

In all indications, BP is not fully set to stop entirely the production of oil and gas in the nearest future, but rather continue to solve the problem of low carbon emission through the establishment of low carbon bio-feedstock processed at their refineries, which is also profitable to them (BP annual report, 2019). For better improvement in their products, BP set up over 30 carbon neutral retail sites, which offers different carbon products and services. They also increased the supply of their sustainable aviation fuel, which is BP bio jet to over 11 locations worldwide, this includes US and Sweden.

The 2019 annual report established that the company has made remarkable effort in sustainable GHG emission reduction, by taking action to improve energy efficiency and reduce methane emission and flaring. Figure 4.2 below shows the level of reduction of GHG

emission which would have occurred if the organisation has not made any changes.

Figure 4.2 BP Sustainable GHG Emission Reduction



Adapted Source: (BP Annual report. 2019).

The figure above show that BP was able to deliver 1.4Mte of sustainable emissions reduction (SERs) which was above the company's target of 3.5Mte for 2016-2025 period as stated in the report.

d. Oil Price Increase

S such as Mohn and Misund, (2009), have pointed out that any increase in the oil and gas price volatility will raise the value options for investment on renewables. This is in a way a control measure to reduce CO2 emission, which the present oil and gas price in both UK and Europe could be seen as an example to more push for speedy transition to renewable energy. Lee and Huh (2017), also believed that higher oil prices have caused an increase in renewable energy resources and call for more investment in that area.

In responding to oil price increase as a strategic means of reducing carbon emission and encourage investment on renewable energy, 30% of the respondents from BP staff somewhat agreed that this will also be a viable option that will assist the entire energy sector to meet the net zero target of 2050. But the question is, will this impact positively on BP and UK economy, as oil and gas continue to remain profitable and remain the UK primary energy consumption, but with

much lower emissions? This issue could come down to fossil fuel levies or taxes.

A report from BBC has shown that energy price in the UK and Europe is recently on the high side, and this is because of insufficient investment in green energy. According to the same news, Dr Faith Birol has suggested that the world leaders should incentivise any necessary investment to green energy, which IEA's annual World Energy Outlook indicated that renewable energy infrastructure need investment of \$4 trillion a year (<https://www.bbc.co.uk/news/business-58901566>).

This will help to reduce the rise of global temperature to 1.5 degrees, reduce the use of fossil fuel and switch the world sustainable energy to clean energy sources.

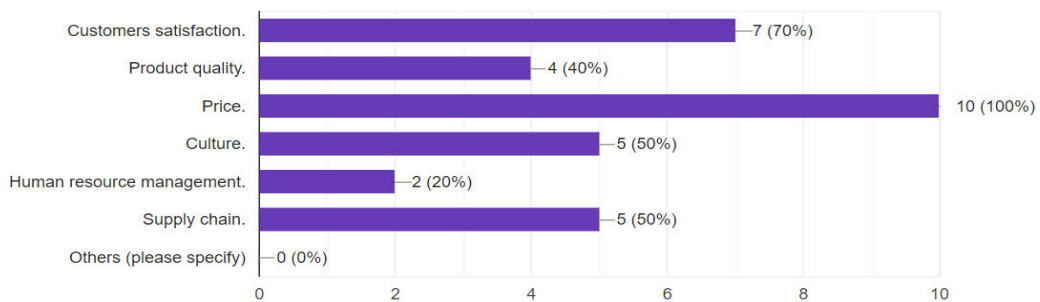
One on the respondents also talked about how BP has been in support of well-designed carbon pricing which will encourage net zero. As carbon emission continue to increase atmospheric concentration of greenhouse gas emission. BP supported the idea by the government that those companies who emit carbon should either pay tax for it or buy permit for the emission. This can be used by the government to support the energy transition.

Data gathered from the BP website show that BP also have a very important part to play in rewiring the world's energy system to low carbon. This is part of the BP's net zero ambition and strategy which the organisation is aiming to increase their low carbon investment, by growing their renewable energy business to reduce hydrocarbon production. Thus, the support for government to give a stable and long-term policy framework which will support net zero, with carbon pricing being an effective part of the strategy (bp.com,2021).

2. In identifying and tackling those macroeconomic risk factors, what are the possible impacts on BP organisational strategy?

The figure 4.3 below explained the percentage of the respondents on the possible impacts of macroeconomic risk factors on the organisational strategy.

Figure 4.3 Responses on question 2



Source (Author).

a. Customer satisfaction

The primary aim of any business organisation is to provide maximum satisfaction to their customers. This is considered as a principal concern by 70% of the respondents. The respondents somewhat agreed that transition to renewable energy should be satisfactory to the users with regards to price, low risk, environmentally friendly, accessible, and not the other way round. As proposed by the government to stop the production of petrol and diesel car by 2030, these electric vehicles should be made affordable to the people, and the charging unit made accessible in many strategic places. This will help the users, by putting them at less risk during travelling on a far journey. Responding to prices of the electric cars, a very good number of the public may not be able to afford electric cars, and this will limit their chances of owning a car in the future.

For better customer satisfaction and to meet up with energy transition demand, BP has invested over 10 thousand euro in providing their customers with convenient single digital payment

solution for services such as fuel, electric vehicle (EV) charging and car washing. This is an investment partnership with ryd's app which is aimed at meeting customers demand and satisfaction on better experience for digital payment

(<https://www.bp.com/en/global/corporate/news-and-insights/press-releases.html>).

According to the report examined from BP 2020 annual report, rapid growth in renewable energy has been supported by the continuous changing structure of the global energy. To create more satisfaction to customers, this has resulted to BP changing structure of energy demand, highlighted by changes in global market due to the transition to a lower carbon energy system. This is with more diverse energy mix for greater customer choice, more localized energy market and increasing levels of integration and competition (BP annual report, 2020, pg. 13). One of the respondents believed that with the current organisational strategy on energy transition, it will redefine customers convenience and mobility, which is driven by electrification, digital and fleets.

b. Product Quality

Macroeconomic risk factors are believed to have less impact on the product quality which is part of the organisation strategy.

This is according to the percentage of the respondents on product quality which is 40%. As channelled towards the organisational strategic activities on creation of value, which is also BP integral part of growth and return strategy; result examine from BP 2020 annual report shows that the company has built an integrated low carbon electricity in the developed and emerging market to enhance their product value.

According to one of the respondents, this was achieved through scaling of bioenergy business, focusing on biofuel and gas.

From a BP press release in November 2021, the company intend to accelerate the two and three wheeled electric mobility revolution in

Europe and Asia through a joint venture with Piaggio. This is with the development of integrated services like electric vehicle charging and battery swap. The aim is to make convenient urban travelling and at the same time mitigate the risk of air pollution and decarbonizing the city, a strategy towards product quality enhancement.

c. Price

Price is a vital factor to consider in every organisation for profit maximization, and to maintain good customer relationship. Feedback from the survey shows that 100% of the BP staff agreed that any impact on price will affect the organisational strategy on how they compete in the renewable energy market.

As stated in the literature review by (Shah et al., 2018), relating renewable energy to oil prices and the macroeconomy; the focus is on how government policy could be of need to encourage renewable energy investment. This is because renewable energy investment has not openly competed with traditional fossil fuels in price.

One of the respondents relates this to the fact that the rate of renewable energy progress remained on the low to meet up with the global emission control and target towards net zero in 2050.

With the ambition to reimagine energy and help the global target of net zero 2050, the company has generated a more resilient and diversified energy on low carbon, by reinventing into low cost faster moving organisation. According to one of the respondents, it is strategy towards responding to the environmental challenge by strengthening the organisational finances.

Evidence from an examined report in BP press release shows that the organisation with the strategy development plan has chosen to balance their long-term price environment with investment criteria. This is by aligning investments with strategy, a framework that will add value to shareholders.

Relating price to long-term impact of the current pandemic on the global economy, and potentials for weaker demand for oil and gas

products within a sustained period, it is expected that this will speed up the pace of transition to renewable energy. This has caused BP to change and lower the organisation long-term price assumption, by making it consistent with their 2050 ambition horizon (BP press release, 2020).

As part of the striking issues in the energy market, evidence established from the 2019 annual report show that BP financial performance has been affected by fluctuating price and market, exchange rate, technological changes, and the overall macroeconomic outlook. One of the respondents believed that global Politics, transition to low carbon energy sources, climate change, economic conditions globally, and OPEC influence can possibly impact on prices, demand and supply of other BP products which could have an adverse effect on their revenue, margins, profitability, and cash flows.

d. Culture

In tackling those macroeconomic factors and the possible impact it may have on BP organisational strategy, 50% of the respondents agreed that this may impact on the organisational culture. This draws attention to the primary product of the company, which is oil and gas, and how these factors will affect their strong operational safety culture, and environmental sustainability. As examined in BP 2018 annual report, BP operational rule is guided by its importance of safety and environmental sustainability which enabled the organisation to establish trust with business partners, their people, and the community where they operate.

In the current changing energy landscape, many of the respondents agreed with Helge Lund letter in the BP 2018 annual report where he stated his view of "more energy with fewer emission" which is a pragmatic approach to energy transition. They believe that those

macroeconomic factors will not affect the organisational culture since the company has strengthened their organisational culture and capability, by advancing to energy transition, embracing digital disruption to meet the expectation of the society with low carbon energy.

In responding to organisational culture, one of the respondents spoke about the organisational interest in developing their people which is a culture that continues to attract more talent to the organisation. This also encourages inclusion and diversity where people from all parts of the world could be employed and feel valued in the organisation.

As part of the organisational strategy to maintain the culture of risk management, mitigation and control, BP has a review of operational risk management and performance. To tackle those macroeconomic risk factors, BP has a group audit which provides quarterly reports on internal control and risk management, operational risk which also include health, safety, security and environmental performance and operational integrity.

e. Supply chain

To maintain a good supply chain network which is part of BP organisational strategy, 50% of the respondents somewhat agreed that a strong supply chain network will keep BP highly positioned in the competitive market. One of the respondents added that rapid growth in renewable energy which is driven by wind, solar power, and biomass has encouraged the shift and demand for more lower carbon energy.

To get their energy product conveniently to customers, BP remains focus in responding to their customers changing needs by redefining convenience and scaling up their differential offers in the energy growing markets. This is by creating a strategic convenience site for

their customers for easy access to energy products, having many retail sites in growth market and building electric charging points in many strategic locations. An example could be seen in BP effort and joint venture with Jio brand in India, to become number one in their fuel and mobility market. This is coupled with the aftermath of Covid19 effect in the overall supply chain network of the oil and gas products, which has also increased the speedy transition to lower carbon energy system and high demand of renewable energy products.

3. What do BP see as identifiable ns and macroeconomic effects?

As it has been ascertained earlier in the literature review, definition by Lesca and Lesca, (2011) cited in (Rowe et al., 2017) explained that weak signals are those unimportant or unexpected issues that can possibly impact on any organizational aims and objectives, but can be identified and resolved, then be seen as an early warning sign. The concept of detecting weak signals is very crucial because it assist business experts with the key concepts for identifying business opportunities of alternative futures (Yoon, 2012).

In responding to what BP sees as identifiable the respondents raised different factors as listed points on the figure below, giving their different opinions.

Figure 4.4 Responses on Question 3



Source (Author).

a. Oil price volatility

According to (El-Sharif et al., 2005) from the literature, any rise in oil price will cause an unexpected increase in the oil index because of the relationship between the oil index and the entire oil market.

88.9% of the respondents indicated that oil price is an obvious kind of weak sign that will affect many oil and gas company not just BP but will also change the organisation strategy toward the pursuit of net zero target of 2050.

Seeing oil price as a weak sign, Bernard Looney in BP 2020 annual report responded in this regard. In his statement "Responding to brutal conditions", BP transformed from an international oil company to an integrated energy company against the decrease in oil and gas prices, lower refining margins and unpredicted fall in demand and supply. This is a strategy to diversifying into renewables, becoming more resilient and lower carbon company.

b. Investment into renewables

Shah et al., (2018b) points out that major factor preventing investment into renewable energy is the risk over the future returns it will provide. Research by (Cicea et al., 2010) also argued that investments greatly encourage any development process and is being a raw material assisting economic growth.

In this regard, 77.8% of the respondents believed that this could be a weak sign because oil and gas is still a major source of energy in the UK, and it is mostly being used to power renewable energy.

That notwithstanding, BP has invested much on renewables, which are achieving through reimagining energy. As examined from BP annual report 2020, this will take much time for the company to complete its transition to net zero integrated energy company.

According to the report, it will take over 30 years in rewiring and replumbing the global energy system, which will cost trillions of dollars.

According to the report, BP has established partnership with Equinor in US, and with EnBW in UK, which they see these regions as the global fastest growing source of energy. Other partnership investments are with Orsted, to produce green hydrogen for their Lingen refinery, and collaborating with DiDi a platform established for building electric vehicle chargers in the world biggest market China.

c. Demand and supply of the new products

Although there may be some doubts if the demand will increase, and if the supply will be able to meet up with demand. 44.4% of the respondents believed that this will be a weak sign and a macroeconomic effect which the organisation needs to consider. But with the current speed of transition and the request of the world leaders in the just concluded COP26 climate change summit in Glasgow, which indicates that many countries are not doing enough to mitigate greenhouse gases emission. This will also push many nations to consider this time as critical as the climate change has become a global challenge.

According to the statement by Boris Johnson, "the world is at one minute to midnight, having run down the clock of waiting to combat climate change" (Rowlatt, 2021). He also insisted that the world leaders needed to move from aspiration to action to slow global warming.

The outcome will speed up the transition and induce demand and supply of the renewable energy products globally.

Responses by the respondents show that to reduce the weak signals and the macroeconomic effect on the organisation strategy, BP has been able to meet up with the current green energy demand by providing their customers with affordable and reliable clean energy. This has shown that the organisation can compete, committed to distribute and remained sustainable in adding value.

d. Change in the organisation strategy

Regarding change in the organisation strategy, 55.6% of the respondents agreed that any weak signal or macroeconomic risk factors may have some effect on the organisation strategy. This relates to some changes in risk management procedure, cost control and marketing strategy.

One of the respondents pointed out that in as much as the total transition will affect the organisation strategy considering the BP's major business, which is oil and gas, it will also be a positive effect that will encourage BP diversification into renewable sources of energy.

BP's strategy has changed, and the organisation drive is now towards net zero target. As a major energy provider in the UK, the organisation has set up plans to work with the UK government, by supporting prime minister's vision to Build back better and meet net zero by 2050.

According to the BP press release, the organisation main strategy is towards rolling out an ultra-fast electric EV charger in all BP retail sites, which will provide up to 350 kilometres of range in 10 minutes. The company has also made some move in offshore wind by signing a strategic partnership with Equinor, operating Net Zero Teesside (NZT) which is aimed to develop the UK's first decarbonized cluster and building a new hydrogen business with offshore wind leader, in partnership with Orsted in Germany.

e. Impact on the competitive advantage

Responses obtained from BP staff shows 55.6% agreed that any weak signs would somehow affect BP market competitive advantage.

According to the respondents, this largely depends on the company's technology and innovation improvement to support the transition and diversification process to lower carbon economy.

Customer's preferences, inability of the organisation to remain efficient, keep a high-profile portfolio of assets and retain the best

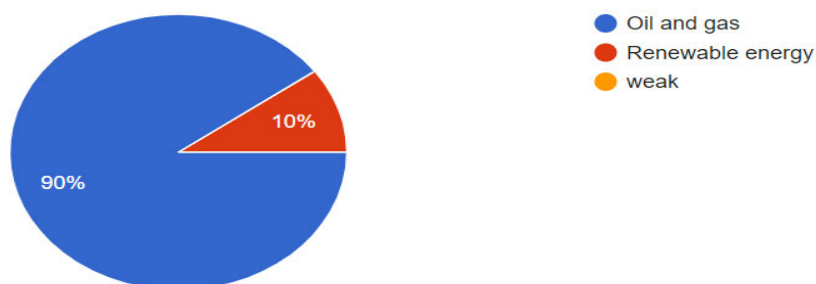
workforce can as well affect delivery of BP strategy in a highly competitive market.

Analysis from the 2019 annual report reveals that the organisation strategic process on competitive advantage would be obstructed if BP is unable to put in check development, operation, and margin cost. The report examined also shows that BP marketing strategy could be impeded if their competitors offer superior new technology, innovation, manufacturing, and renewable energy in the industry. The respondents also pointed out that BP market performance could be negatively affected if the organisation fail to actively guard their intellectual property. As the energy industry faces increasing challenge to absorb and retain diverse skilled, and experienced people in the fields of science, technology, engineering and mathematics, specialist staff, remained very important to the organisation plans (BP annual report, 2019).

4. What is BP current main market?

Analysis from the chart below (figure 4.5) shows that 90% of the respondents indicated that oil and gas remain BP current market, notwithstanding the organisational strategy on energy transition and diversification to renewable energy. 10% of the respondents also agreed that the company has made a dramatic change in transition process to renewable energy, considering the current trend on emission control.

Figure 4.5 Responses on Question 4



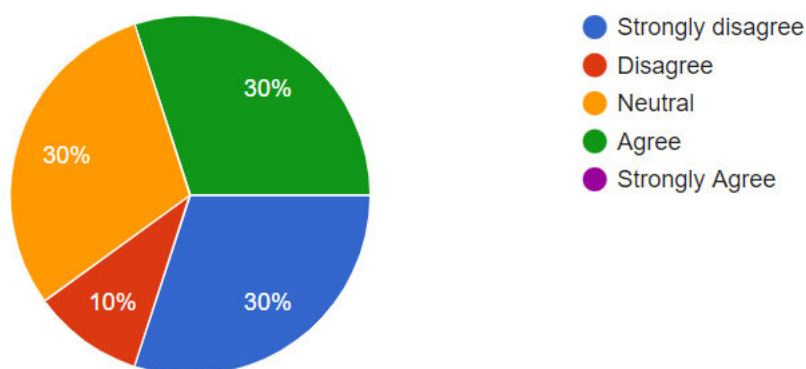
Source (Author).

In as much as BP is committed to Co2 emission control to tackle the climate change, the company still have many operations going on offshore. This can be related to the statement made by the company's CEO Bernard Looney on Monday 15th November 2021 after the just concluded COP26 climate change summit which he insisted that "hydrocarbons such as oil and gas will have an ongoing role to play in the energy mix for years. He urges for more focus on the objective, which is to reduce Co2 emission, by replacing coal with natural gas in essence reducing carbon emission. The indication is that hydrocarbons have a role to play, and global oil supply in 2050 would still amount to 20 million barrels per day (<https://www.cnbc.com/2021/11/15/bp-committed-to-tackling-climate-change-ceo-says.html>).

5. Does the renewable energy sector have the probability of creating more employment than the oil and gas sector?

The chart below (figure 4.6) shows different responses from the respondents which indicated 30% equal responses from strongly disagree, neutral and agree, while only 10% disagreed.

Figure 4.6 Responses on Question 5



Source (Author).

As pointed in the literature by (Lambert & Silva, 2012), green jobs are determined by the labour intensity of the renewable energy, cost increases and the availability of investment.

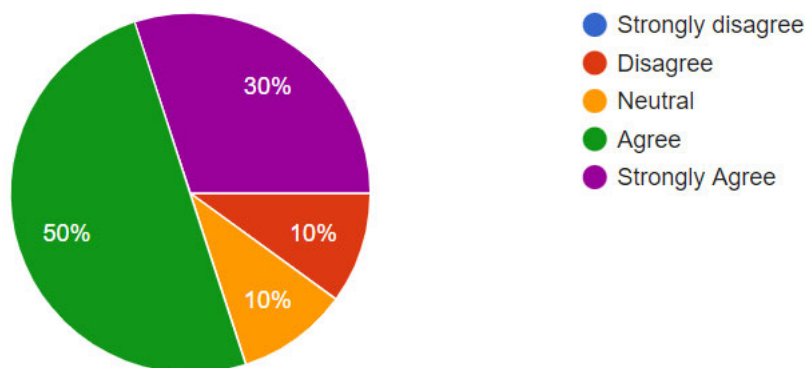
Another literature by (Bulavskaya & Reynès, 2018) discovered that renewable energy sector has the probability of creating more employment and growth for every economy. This impact is explained through a higher labour, capital intensity and maintenance costs of wind and solar technologies, compared to gas and coal plants, which enables growth opportunities.

From BP's CEO statement stated above in (chapter 70) and the agreement by over 200 countries in the just concluded COP26 in Glasgow, to "phase down" the use of coal rather than to "phase out" which has received a mixed reaction globally, it is very difficult to draw a conclusion on the employability of both sectors.

6. Is the major factor preventing investment into renewable energy the risk on the future returns it will provide?

In as much as there are doubts on the future return on investment into renewables and emission control measures based on the chart below (figure 4.7), that does not hinder investment into renewables and emission capture by the UK government and private investors. Analysis from the chart below shows different reactions from the respondents, and yet 10% respectively disagreed and remained neutral on that regard.

Figure 4.7 Responses on Question 6



Source (Author).

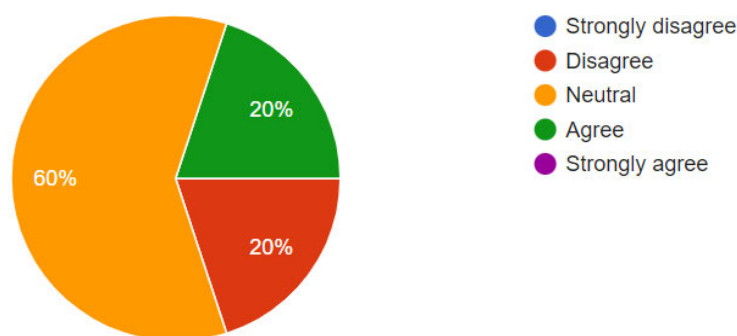
As examined from the BP press release, the company has a new collaboration to invest on the development of offshore CCUS infrastructure with six of the biggest energy companies to reduce industrial emission. This project involves BP, Eni, National Grid, Shell, and Total, joining forces together to form the Northern Endurance Partnership (NEP). The aim is to develop an offshore infrastructure that will transport and store tonnes of Co2 emission in the UK North Sea safely (BP press release, 2020). This will help to mitigate challenges of the British future industry and jobs, as well as decarbonising many industries.

To support this, the UK prime minister has also struck a £400 million deal with Bill Gates to boost green technologies. The government believed that this is a striking move toward “green industrial revolution” which is essentially to meet the climate change target before 2050 and to develop technology related to carbon capture, long-term battery life, zero carbon aviation and green hydrogen technology (The Guardian news, 2021).

7. Will the overall lowering of carbon emission within the UK increase energy security, employment, and supply of renewable sources of energy?

According to the responses from the survey, 60% of the respondents from BP staff were neutral, while 20% agreed and disagreed respectively in this regard.

Figure 4.8 Responses on Question 7



Source (Author).

One of the respondents maintained that the impact will be effective, considering the current investment and transition process by both BP, government, and private investors towards lowering of CO2 emission. The remarkable efforts made by BP on renewable energy has become a huge step towards energy sustainability and targeting a low carbon future in every part of their business.

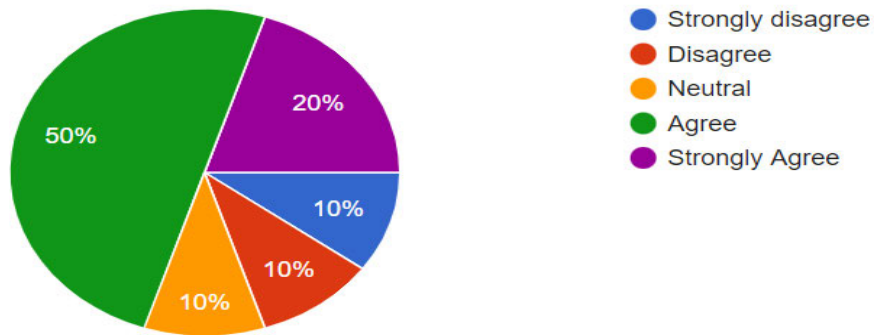
According to the 2020 annual report, the company has engaged in many investment opportunities through strategic collaboration with other firms, government, and private investors, which will also attract employment in different sections of the organisation.

In as much as 60% of the respondents remained neutral (large scale neutral), 20% of the respondents who agreed were able to point out new strategy by the organisation with the aim of increasing low carbon investment to \$5 billion a year by 2030, which is tenfold over the investment plan. According to BP press release, the company in 2019 has developed renewable generation capacity from 2.5 gigawatts (GW) to 50W by 2030. This is with the believe of the huge potential within the offshore wind market, which is growing drastically, thereby encouraging more supply of renewable energy products and employment in that sector.

8. Will weak sign on oil and gas price increase impact negatively on consumption, investment, and employment?

Responses as indicated from the chart below (figure 4.9), shows that 50% of the respondents agreed, 20% strongly agreed, while 10% reacted differently.

Figure 4.9 Responses on Question 8



Source (Author).

The indication is that any rise in oil and gas price will have an adverse effect on consumption, investment, and employment. This can be noticed in the current increase on fossil fuel and gas price as it has speeded up the transition process to renewables. This can also be related to the literature by Lee and Huh (2017), who argued that higher oil prices have caused an increase in renewable energy resources in the electrical power sector. Indicating that any higher oil price causes more push in transition and investment on renewable energy, leading to less demand/consumption on oil and increase in the demand of greener energy.

Chapter 5

Discussion

5.1 Discussion

The findings show that BP considered numerous factors in its ongoing transition to renewable energy, as well as an awareness of some weak signals, such as future price volatility in the oil and gas sector. Another factor was the high cost of R&D due to the high development costs of renewables. The literature review (chapter 2.4.1) also suggested that any increase in the volatility of oil and gas prices will increase the value options for renewables investment (Mohn and Misund, 2009). This has prompted BP to consider investing significantly more in strategic collaboration and joint ventures with other companies in renewables, which is also a strategic means of cost sharing.

The aforementioned factors are regarded as weak signals because they can have a negative impact on organisational strategy, labour capacity, investment costs, collaboration options, and profitability. This could be due to the government tightening up on some renewable energy legislation, or it could be due to global economic issues if the pandemic lasts much longer. There is a high risk of significant negative effects on oil and gas demand and supply.

Even if the consequences are unfavourable to the company, BP will not interpret these factors as strong signals because both oil and gas and renewable energy sources have alternatives. This means that if the transition process is halted due to global politics, oil and gas will continue to be the primary source of energy supply.

On the other hand, if net zero energy is achieved by 2050, renewable energy will be the global sustainable energy source, as predicted. Furthermore, with significant global oil production, oil will be available for decades.

In this regard, Alaali (2017) observed in (chapter2.4.1) that rising oil prices may create inflationary difficulties, which may lead to central banks tightening their monetary policies and raising interest rates in the long run. These interest rate changes have huge implications for businesses because they increase borrowing costs and reduce market value, reducing a company's ability to raise funds. Given the planned tax on gasoline vehicles by 2030, most oil and gas companies had no choice but to pool their resources and invest in renewable energy products such as electric vehicles.

Interacting with BP staff over the phone, who shared mutual goals, suggested that new energy sources must be profitable and reliable for shareholders to continue to support them.

Furthermore, government policies must support energy transition through incentives to businesses and appropriate legislation. Given the UK's economic reliance on the energy sector, as highlighted in the literature review (chapter 2.3.1), Victor (2019) emphasised the lack of understanding of the political economic performance and political structure of the society, which have a close relationship and interaction with one another, as the success and durability of any political structure is dependent on the performance of the economy (kamali Zonouzi et al., 2021).

These macroeconomic challenges can also be attributed to organisational connections both within and outside of organisations. Many shareholders in oil majors, for example, are pension funds looking for a steady income stream from dividends. As a result, any uncertainty in dividends and shareholder behaviour would be a macroeconomic consideration.

One of the macroeconomic factors influencing labour force in the renewable energy sector was the issue of employment. The recent development in the oil and gas sector, which is the current transition to renewable energy, has resulted in significant redundancy. As a result, some input in renewable energy investment activities, such as

general involvement in research and development, is required. According to the literature review (chapter 2.4.2), employment is determined by the labour intensity of renewable energy, cost increases, and investment availability (Lambert and Silva, 2012). This demonstrates that more hands should be on deck in all areas, particularly R&D. Because of the high investment in the renewable energy sector and its profitability, Sim, (2018) suggested evaluating the economic value of R&D investment in renewable energy. According to Bulavskaya and Reynès, (2018), the renewable energy sector has the potential to create more employment and growth for every economy due to the higher labour, capital intensity, and maintenance costs of wind and solar technologies, which enable growth opportunities.

The persistent increase in demand for renewable energy products, combined with current high oil and gas prices, will drive labour into the renewable energy sector, increasing market share and profitability. This was also seen in adapted figure 2.2, which depicts the employment rate in the renewable energy sector, indicating a high employment rate in wind energy technology with a total of 44.1 thousand jobs.

Regardless, Nissan's recent investment plan to invest over £1 billion in electric cars in the Sunderland plant intends to create over 6,200 new jobs and support up to 24,000 people in the supply chain. This is an indication that employment, which is viewed as a negative indicator in the ongoing transition, will be addressed by creating more green jobs and encouraging economic growth.

On the investment side, the key challenge was the risk of future return, which resulted in many strategic collaborations between BP and other companies, as seen in the above result. Some BP respondents who thought this was a bad sign pointed out that oil and gas are still the main sources of energy in the UK and are mostly used to power renewables. True, but this energy source is expected

to decline in the future in comparison to renewables. The question is how long oil and gas will be present. It is possible that future government decisions will drive a desire to hasten or accelerate the transition to renewable energy sources.

Given the global impact of CO₂ emissions on the environment, this will not be a deterrent to any type of investment in renewables. As mentioned in the literature review (chapter 2.4.3), with increased demand for renewable energy, there has been an exceptional amount of financing and investing in the renewable energy sector, implying that effective investing and financing in the renewable energy sector requires a good understanding of the risk-return trade-offs (Sadorsky, 2012). This is risk avoidance, and BP's strategies are to expand its finance, infrastructure, strategic management strength, and innovation to sustain and develop a strong competitive advantage.

Another significant issue was the demand for renewable energy, product availability, sustainability, and customer satisfaction. To address these warning signs, BP has begun installing electric charging stations in their various petrol stations, as well as making provisions for convenient single digital payment for electric vehicles, which will redefine customers' convenience and mobility.

Furthermore, BP's support for the government's plan to ban petrol and diesel cars by 2030 was viewed as a strategic move to increase demand for electric cars and encourage more renewable energy products, given the harmful effects of oil and gas and their by-products on the environment and climate change.

According to the findings of the literature review (chapter 2.2.4) by Alper and Oguz, (2016), increased consumption and demand for renewable energy can reduce reliance on fossil fuels, ensure energy security, and promote sustainable development of any economy as well as the environment. Increased demand and supply for renewable energy products can also attract investment and increase customer

satisfaction. According to the research, BP changed their energy supply structure, which was highlighted by changes in the global market because of the transition to a lower carbon energy system. This is accomplished through a more diverse energy mix for greater customer choice, a more localised energy market, and increased levels of integration and competition.

The case study research demonstrated the importance of a strong supply chain for renewable energy products. According to BP respondents, this is one of the most important to BP, and a stronger supply chain network will keep BP well positioned in the renewable energy market. BP remained strategic in responding to changing needs by scaling up differential offers in the highly competitive energy market to improve supply chain and get energy products to customers more conveniently. This was accomplished by establishing strategic convenience sites for their customers' easy access to energy products. BP opened numerous retail locations in emerging markets and installed electric charging stations in strategic locations.

As suggested in the literature review (chapter 2.4.5), to reduce overall carbon emissions in the UK and increase energy security and employment through local content exploitation, there is a need to increase other renewable energy supplies in addition to increasing renewable electricity output (Graziano et al., 2017). Collaboration was also a component of the organisation's supply chain strategy, which BP frequently benefited from. It should be noted that any organisation that lacks the ability to negotiate with associates risks losing customers to competitors. The partnership aided BP logistics performance, as well as environmental performance, resulting in cost efficiency and effective logistics activities (Tesfay, 2014).

BP's organisational culture is evident in their strong operational safety and environmental sustainability. This has earned the organisation a

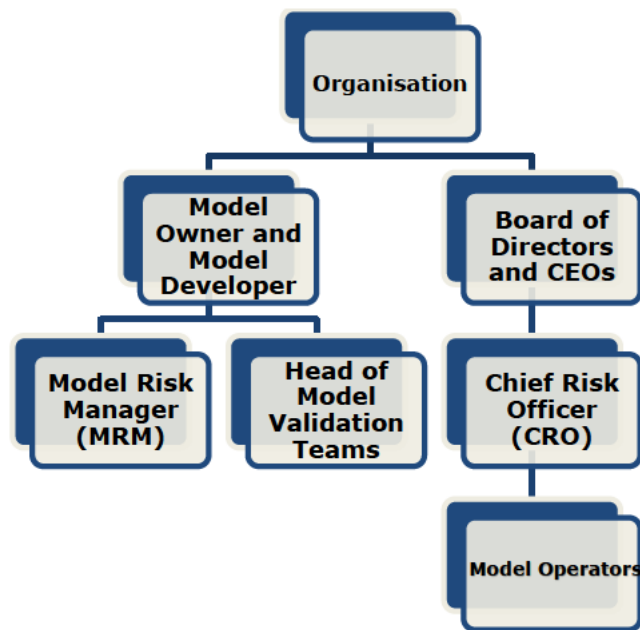
high level of trust from business partners, employees, and the community in which they operate.

Risk assessment and management should be regarded as a critical component of BP's decision-making process. This necessitates categorising risk, such as all supply chain risks and health and safety risks, because risk has an impact on organisational quality, productivity, performance, competitive advantage, and budget (Dehdasht et al., 2019).

The Covid-19, a global epidemic, has also had an impact on many organisational strategies due to political and economic factors. As much as this has posed a significant risk to many organisations, it should be viewed as a risk that will result in positive changes that will lead to organisational sustainability and growth. This is possible due to the ongoing global push to accelerate the transition to renewable energy. With the emergence of new variants of this virus, it is obvious that this may have an impact on fossil fuel consumption, as more people will work from home, resulting in less travelling, a reduction in the number of petrol and diesel vehicles on the roads, and an increase in the consumption of electricity in many homes. The organisation's energy business will remain sustainable as long as it continues to invest in renewable energy.

Furthermore, research by Mark and Jo (2018) stated that, in accordance with the Global Association of Risk Professionals, organisations should be primarily responsible for risk tracking and ensuring active risk management mitigation and control measures. The model below was created to explain the line of power in risk management models for effective managerial control. This will also help in investigating those weak signs that indicate an impending risk or threat that could lead to a failed project.

Figure 5.1 Risk Line of Authority Model



Source: (Author).

In Figure 5.1, the model owners, and designers (board of directors/CEOs) are those who use more risky models and adjust the current ones. The model designers and owners are responsible for authenticating data with a high level of knowledge and transparency so that users can easily control it. Model risk managers, as well as the heads of model validation teams and the chief risk officer, decide and authorise the suitability of new and improved models for use. It is critical to always check the suitability of every project risk model for use, with appropriate procedures to the features for which it was established. For instance, consider BP's policy decision and strategic collaboration with the government and other companies on electric charging points for EVs and other forms of electric power generation. Consider how BP will approach a new investment decision, plan, and cost. This model will assist the organisation in monitoring and determining the risk of investment, which is a decision made by the BODs and CEOs to determine if it is viable and profitable. The model risk managers and chief risk officers will then assess the overall risks,

including supply chain risk, for fitness of purpose before the organisation can use it.

This model has the potential to assist the organisation's risk management sector in investigating the likelihood of occurrence as well as possible mitigation and early control measures.

Finally, the objectives of this research were met through the implementation of risk management procedures in (figure 5.1). To achieve (objective No.1), adequate investigation into the identified weak signs in BP's transition process to renewable energy in (chapter 2.4) will assist BP in remaining strategically fit by collaborating and investing with other companies on renewable energy to meet the net zero target of 2050. Objective 2- responses from respondents provided some data that analysed BP's plans for dealing with those factors that may impede the organisation's objectives and investment plans.

Chapter 6

Conclusion and Recommendation

6.1 Conclusion

Investigating weak signals of risk impacts on renewable energy diversification is critical in any organisation's risk management activities, particularly in the energy sector. Knowing the anticipated threats and risks is a critical component of organisational investment and supply chain strategy. The incorporation of risk management, mitigation, and control into the organisational culture strengthens BP's global integration with other oil and gas companies, as well as logistics providers, in the ongoing transition to renewable energy. It is also worth noting that BP's collaboration and interdependence with the key players in the ongoing transition will help to keep the organisation strategically fit in the competitive energy sector market. To sustain a diverse portfolio of renewable energy sources/innovations, BP will need to rely on more collaborative efforts.

While oil and gas will continue to play a role in the energy mix for years to come, according to BP CEO Bernard Looney, the company has remained strategic in its commitment to reduce GHG emissions and CO₂ emissions in their general operations.

Investigating those weak signals within the macroeconomic environment, on the other hand, points to the direction of BP's adequate risk identification and mitigation process. This will result in increased efficiency and cost effectiveness in the company's supply chain activities, as well as a consistent supply of renewable energy products and lower distribution costs.

According to the case study research, renewable energy has the potential to create more green jobs than oil and gas. This can be seen in Nissan's investment plans, as mentioned in the literature review,

as well as the UK prime minister's £400 million deal with Bill Gates to boost green technologies and create more green jobs.

6.2 Recommendation

This study used BP as a case study to investigate the impact of a weak signal of risk on renewable energy diversification. Following extensive research and primary and secondary data collection, the research produced a few recommendations based on the researcher's perception of weak signal and risk, as well as the potential changes to the organization's strategy.

The research suggests that BP consider government funding as part of its organisational investment strategy and sustainability if it is not already part of the organisation's strategy.

As described in (chapter 2.6), the research recommends aligning risk with organisational strategy and re-evaluating the organization's risk management and mitigation system if this is not yet available within the risk management department for better competitive advantage. This is seen as critical in the energy industry's transition period.

If this is not done in the organisation, the research recommends that every section of the organisation, including the Board of Directors and CEOs, be involved in constant risk assessment. The indication is that a reassuring act should be performed from top to bottom to improve any model risk management functions. This procedure could be strategic policy, responsibilities, and obligations in the context of a well-established requirement to examine, authenticate, and improve control measures.

Risk is unavoidable in all of BP's investment activities, but the research recommends that a risk mitigation strategy be fully implemented with the commitment of all necessary stakeholders. If

BP is not already doing so, this has to do with regulating the prices of renewable energy products for affordability and quality control.

The research recommends that when collaborating with other organisations for better improvement, performance, and success in the energy transition, the other organisation's risk management procedure be consistent with BP's risk management strategy. If it is not already in place, this will serve as BP's unified risk management process.

Finally, the study suggests that those identified weak signs be monitored continuously and that some causes of project failure, such as time, poor information flow, and unrealistic goals, be considered. This could be accomplished by revisiting the organisation's risk register on a regular basis to reflect those dominant situations. This will help the organisation reach a milestone in its current transition to renewable energy.

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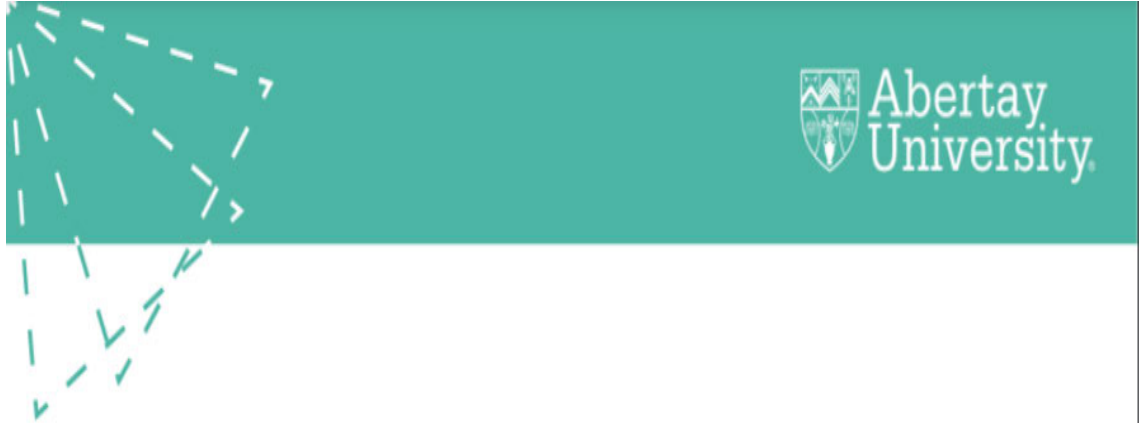
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Appendix

1.1 Research ethic approval document.



Name: CHIJIJOKE KENNEDY NKWOCHA

Project Title: INVESTIGATING WEAK SIGNALS OF FAILURE AND RISK IMPACTS ON OIL AND GAS PROJECTS IN UK

Reference: EMS4443

Status: Approved with specific conditions

Approval Date: 10.06.21

Specific conditions:

Risk assessment form (signed by the supervisor) needs to be submitted.

The Standard Conditions below apply to all approved student Research Ethics applications:

- i. If any substantive changes to the proposed project are made, a new ethical approval application must be submitted to the Committee.
- ii. The Proposer must remain in regular contact with the project supervisor.
- iii. The Supervisor must see a copy of all materials and procedures prior to commencing data collection.
- iv. Any changes to the agreed procedures must be negotiated with the project supervisor.

1.2 Information on Questionnaire Prepared and Administered.

Section 1 of 2

Investigating weak signal of risk impacts on diversification to renewable energy (case of British Petroleum).

Hello:

You are invited to participate in my survey [Investigating weak signal of risk impacts on diversification to renewable energy case of BP]. The questionnaire is for employees of BP who may deal with the company's risk management, renewable energy and investment. Approximately [30-40] people will be asked to complete a survey that asks questions about macroeconomic risk factors in the ongoing diversification into renewable energy, like [price, employment, investment, demand, and supply].

The benefit is to understand the impacts of these macroeconomic risk factors and other risks that are likely to hinder the ongoing speedy diversification of BP investment on renewable energy as a source of cleaner energy supply and encourage more on the need for clean energy. It will take approximately [12-15] minutes to complete the questionnaire.

Your participation in this study is completely voluntary. There are no foreseeable risks associated with this project. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point. It is very important for me to learn your opinions.

Your survey responses will be strictly confidential and data from this research will be reported only in the aggregate. The data will be stored in [Abertay](#) University library and will be accessed by students and staff of the university. If you have questions at anytime about the survey or the procedures, you may contact [\[Nkwocha Chijioke Kennedy\]](#) by email at the email address specified below.

[REDACTED]

Section 2 of 2

Survey Questions.

Description (optional)

To reduce carbon emission, what are the best possible ways to tackle those macroeconomic risk factors that may hinder investment on the ongoing diversification process to renewable energy? (Check all that apply).

- Affordability of the renewable energy products.
- Collaboration with the government and other investors.
- Reduction on oil and gas production.
- Oil price increase.
- Others (please specify)



In identifying and tackling those macroeconomic risk factors, what are the possible impacts on organisational strategy? (Check all that apply).

- Customers satisfaction.
- Product quality.
- Price.
- Culture.
- Human resource management.
- Supply chain.
- Others (please specify)



What do the oil and gas sector see as obvious kind of weak signs and macroeconomic effects? (Check all that apply).

- Oil price volatility.
- Investment into renewable.
- Demand and supply of the new products.
- Changes in the organizational strategy.
- Impacts on the competitive advantage.
- Others (please specify)

Is there anything the sector is worried about or scanning through now? (Check all that apply).

- Investment cost of diversifying into renewable energy.
- Oil price.
- Demand and supply of the renewable energy products.
- Skilled and unskilled labour.
- Decommissioning.
- Others (please specify)



What is the oil and gas sector's current main market?

1. Oil and gas
2. Renewable energy
3. weak

Do you think that renewable energy sector has the probability of creating more employment than the oil and gas sector?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Do you think that the major factor preventing investment into renewable energy is the risk on the future returns it will provide?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Do you think that macroeconomic factors will have some impacts on employment?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Will the overall lowering of carbon emission within the UK increase energy security, employment, and supply of renewable sources of energy?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

⋮

Do you think that a weak sign on oil and gas price increase may impact negatively on consumption, investment, and employment?

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

What are the challenges of the macroeconomic factors on the oil and gas sector in the ongoing diversification to renewable energy?

Long answer text

What are the possible weak signals to be investigated for better investment decision?

Long answer text

Any comment/suggestion on macroeconomic risk factors in the ongoing diversification to renewable energy?

Long answer text

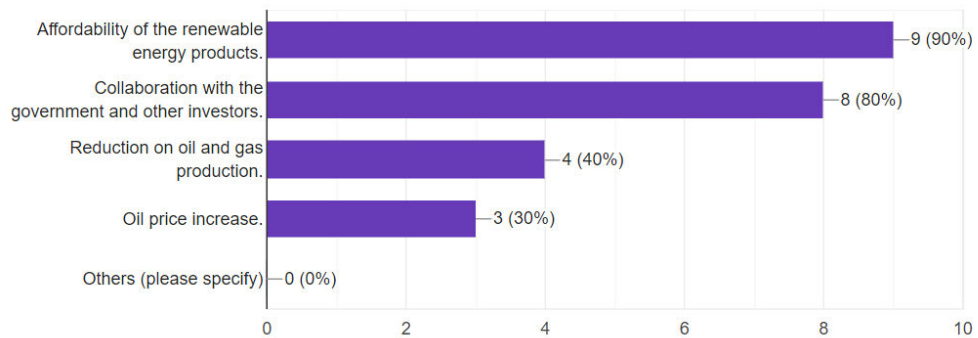
1.3 Responses from the respondents.

Survey Questions.


To reduce carbon emission, what are the best possible ways to tackle those macroeconomic risk factors that may hinder investment on the ongoing diversification process to renewable energy? (Check all that apply).

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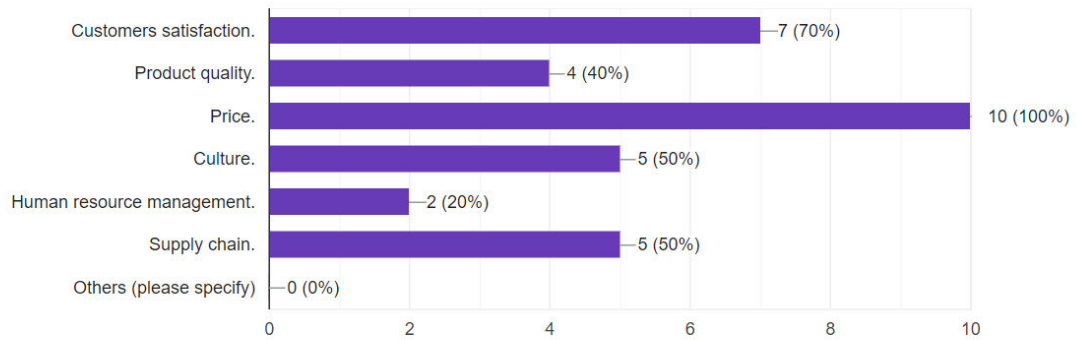
10 responses




In identifying and tackling those macroeconomic risk factors, what are the possible impacts on organisational strategy? (Check all that apply).

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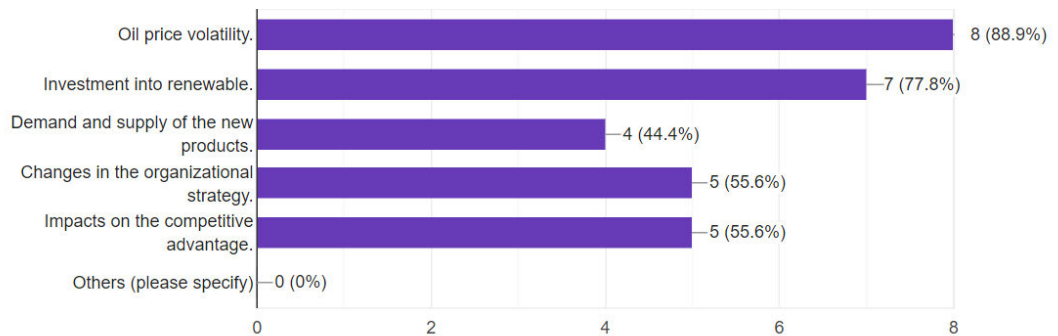
10 responses



What do the oil and gas sector see as obvious kind of weak signs and macroeconomic effects? (Check all that apply).

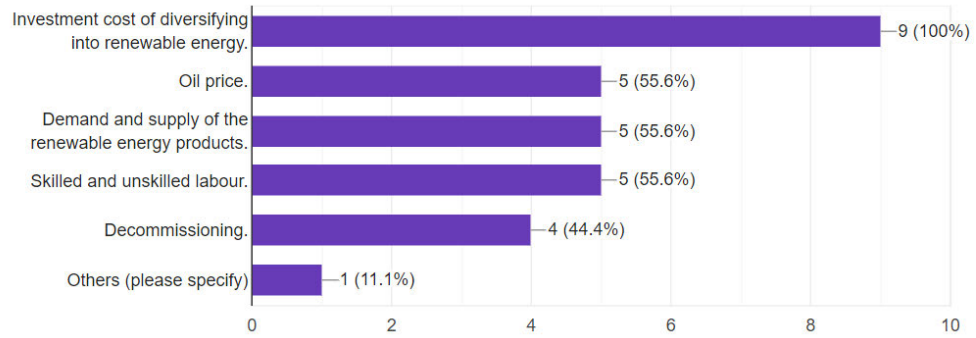
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9 responses



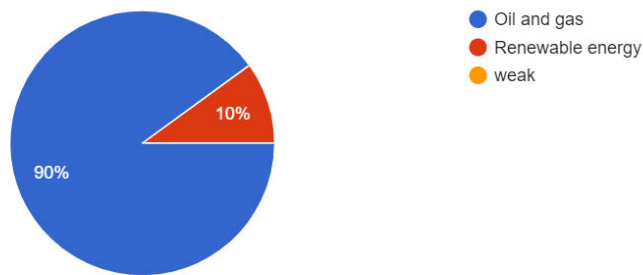
Is there anything the sector is worried about or scanning through now? (Check all that apply). [Copy](#)

9 responses



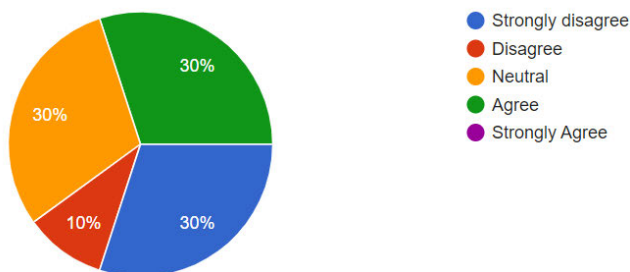
What is the oil and gas sector's current main market? [Copy](#)

10 responses



Do you think that renewable energy sector has the probability of creating more employment than the oil and gas sector? [Copy](#)

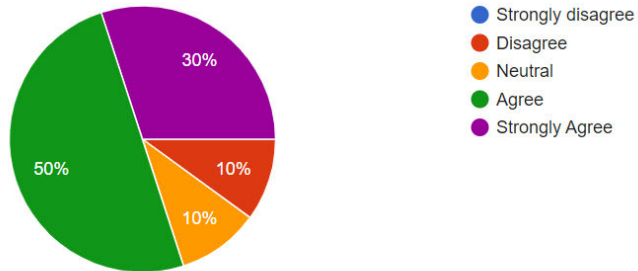
10 responses



Do you think that the major factor preventing investment into renewable energy is the risk on the future returns it will provide?

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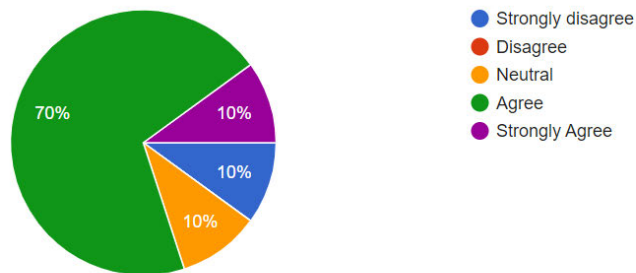
10 responses



Do you think that macroeconomic factors will have some impacts on employment?

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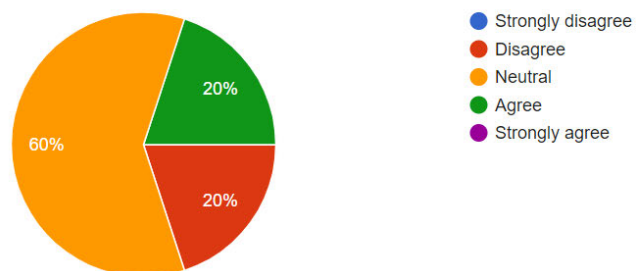
10 responses



Will the overall lowering of carbon emission within the UK increase energy security, employment, and supply of renewable sources of energy?

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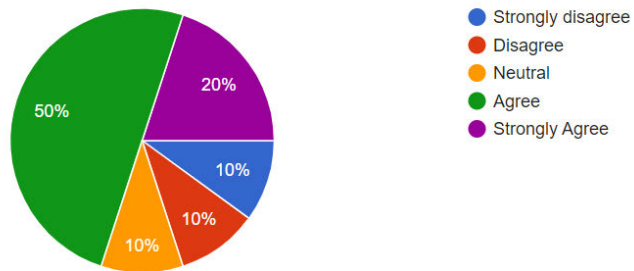
10 responses



Do you think that a weak sign on oil and gas price increase may impact negatively on consumption, investment, and employment?

 Copy

10 responses



What are the challenges of the macroeconomic factors on the oil and gas sector in the ongoing diversification to renewable energy?

9 responses

Overpaying for renewable assets, and not having a competitive advantage

Preventing the major oil and gas organisations from investing in oil and gas projects and employing sufficient staffs.

Investors attitude, capital and returns

Cost, reliability and availability

Financial, legislative and time.

Optimal and sustainable energy generation

Capital for investment and risk of devaluation of oil and gas assets

Increase in oil and gas prices.

Cost, Skill personnel and demand.

What are the possible weak signals to be investigated for better investment decision?

10 responses

Return on investment is important. Also high oil price would help the Companies pay for the energy transition to other sources.

Profit margins of renewable projects, future taxation on carbon

Unemployment
Low salary level
shortage of skilled workers

Profitability of investment in renewable energy

Return on investment

Clearer directives, consensus and detailed analysis.

Energy storage

Governmental support and availability of infrastructural development to aid renewable energy success

Governmental support and availability of infrastructural development to aid renewable energy success

Oil and gas price volatility

Employing experience oil and personnel to drive energy transition

Any comment/suggestion on macroeconomic risk factors in the ongoing diversification to renewable energy?

10 responses

Nil

The new energy sources must be profitable and reliable for shareholders to continue to support it. Also government policies must support energy transition in terms of incentives to the companies and appropriate legislation to encourage transition.

Many shareholders in oil majors are pension funds that invest to obtain a steady income stream from dividends . Uncertainty in the dividend and shareholders behaviour would be a macroeconomic to consider

Price of products, Government fundings and sustainability.

Product availability and customer satisfaction

Global consensus in execution

One of the biggest concerns in the field of renewable energy is power generation depending on the available natural resources which in most cases is location based.

Lack of global cohesion with countries relying on oil and gas for economic survival still reluctant to fully embrace renewable energy (opec member countries)

No