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Managing petroleum sector performance – a sustainable administrative design

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ABSTRACT

Countries all around the world use energy policy to achieve access to energy resources, such as natural gas and oil, which can lead to energy security and self-sufficiency as well as economic growth and geo-political advantages. As oil and gas exploration and production continues to be a priority within national energy politics in producer countries around the world, oil and gas companies and government bodies are implementing regulations to help enhance the sustainability of the industry. One of the challenges of twenty-first century is to meet demand and provide the world with enough energy in a safe and sustainable way. A range of case study data is used, from which a sample of 10 countries within Europe with similar institutional quality, political stability and regulatory platform was selected. Recommendations for petroleum sector governance and sustainable administrative design, respectively, which will positively impact petroleum sector performance and meet stakeholders' expectations, were defined. This study indicates that a country implementing separate functions in administrative design will improve petroleum sector performance and address identified key success factors which will correspondingly meet stakeholders' expectations, but most importantly, it will manage the petroleum sector in order to create wealth for the nation and ensure sustainability.

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1. Introduction

Since the nineteenth century petroleum has become the world's most important internationally traded commodity. Petroleum is an essential part of the products we use on a daily basis. Natural gas and oil have been major global energy resources for many decades. In 2013, oil accounted for 39.9% of the world energy mix, while gas accounted for 15.1% (International Energy Agency, 2015). Both of these resources play an important role in global industry, and are unlikely to be replaced in the foreseeable future.

Countries throughout the world use energy policy in order to achieve geopolitical and economic advantages and to position themselves globally. The greater their access to energy resources such as natural gas and oil, the better their position in showing their power while

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making other countries dependent. A country's ability to access energy supplies and the ways in which it uses energy crucially determine the state of its economy, its national security and the quality and sustainability of its environment (Shaffer, 2011). While the price of oil is ultimately determined by basic supply and demand pressures, international politics play a large part as well (Falola & Genova, 2005). With the current trend of politics and standardisation of different policies – especially if we look to the example of the European Union and how different policies are implemented based on European Union legislation – energy policy is fundamental to creating a country's national politics, since it is very dependent on the resources a country has, and can make a difference among countries in terms of power.

When the Organisation of the Petroleum Exporting Countries (O.P.E.C.) was established in 1960, the balance of strength between oil companies and producer countries was gradually shifted in favour of countries (Ryggvik, 2010). In the past 50 years, this has enabled countries around the world to create wealth and economic growth based on natural resources through national politics and regulations.

Industrialised countries with cheap energy resources such as the United States, Canada, and West European countries demonstrate that other countries can similarly achieve positive and sustainable economic growth, depending on the life of the resource and changes in demand. Energy resources can also provide the necessary facilitator for the development of other sectors of the economy. One of the most important sources of the real sector is the energy factor, and it has important impacts on real sector mechanisms and thus influences the economic growth process (Altunbas & Kapusuzoglu, 2011). When it comes to exploration and production of oil and gas, industrialised countries manage these resources in a way that assures the security of oil and gas company investments while decreasing a country's dependency on imports, enabling better prices to industry and society in general and having positive impacts on the state budget when it comes to fiscal regimes[1]. If the process is well managed, all stakeholders will have benefits and the country itself will have positive economic growth.

If natural resources cannot be developed and exploited to create wealth for the nation, the result may be poverty and deprivation (Quashie, 2007). This is observed in undeveloped countries, such as in Africa and the Middle East where only individuals benefit from the reserves these countries have. In countries that did not establish political stability prior to developing an oil industry, achieving economic growth and stability within an environment that is often plagued by corruption, poverty and cultural tension is very difficult (Falola & Genova, 2005). In many countries, natural resources have contributed to political instability and corruption, and in some cases also warfare (Holden, 2013).

Due to the fact that petroleum plays vital role in economic growth in oil-producing countries, it is important how countries around the world govern and regulate petroleum resources. Rents from oil and gas can contribute up to 70% of a country's G.D.P. (Kemal, 2016). Rents are regulated through fiscal regime (petroleum taxation model) and lead petroleum sector performance. A country can create wealth from petroleum resources through proper petroleum governance, and thus it is the administrative model which boosts petroleum sector performance in oil-producing countries. The regulation and taxation system should ensure that the oil revenues are exploited in a safe and profitable way, and that the bulk of the oil revenues are reaped by the state (Holden, 2013).

Sustainable development and economic growth can be achieved through the rational development and exploitation of energy resources. For a country, it is imperative to secure

stable supplies of energy in order to achieve and maintain progress in economic activity. Global competition for acquiring energy and mineral resources remains difficult, posing a challenge to countries in obtaining stable and affordable energy.

As oil and gas exploration and production continues to be a priority within national energy politics in producer countries around the world, oil and gas companies and government (state) bodies are implementing regulations to help enhance the sustainability of the industry. One of the challenges of the twenty-first century is to meet demand and provide the world with enough energy in a safe and sustainable way.

It is important for a country in general to adopt an administrative model according to which exploration and production of mineral resources such as natural gas and oil will enable sustainability, energy independence and development of other industrial sectors of the economy.

In developed countries such as Norway, natural resources have been used to benefit the country, leading to higher growth and income (Holden, 2013). Norway has achieved great success in managing its petroleum resources, and provides an example of how those resources can be administrated within government institutions in order to benefit from their natural potential and enable production and industry development out of those resources. At a very early stage, Norway implemented an administrative design according to which functions are separated within three government-controlled bodies: a commercial, a policy-making and a regulatory body (Thurber, Hults, & Heller, 2011). Within the petroleum sector, the Norwegian administrative design of separated functions is seen as the best practice model, even though it has been shown that a lack of institutional quality and political stability is not a prerequisite for good oil sector performance (Thurber et al., 2011). It is important to note that Norway was already a stable democracy when the administrative design of separated functions was implemented, and therefore it is hard to assess to what extent the Norwegian experience can be copied by countries with an entirely different political and economic phase of development (Holden, 2013). Norway accepts large costs and large risks in the system as it is today, but for a nation with lower and less liquid per capita wealth, the risk will be less welcome (Lund, 2014).

In general, there is a lot of research on petroleum sector performance, best practices and cases around the world. Moreover, a lot of research has been done on various cases within different countries, as well as research on petroleum sector effects on industry and society, but there is no single approach on how to design an administrative model in order to gain benefits for all stakeholders involved in the process and create wealth. Therefore, the main question which is elaborated in this study is how to set up an administrative design which will be efficient and acceptable for different groups of stakeholders involved in the process such as government, society, non-governmental organisations (N.G.O.s), and oil companies. In order to derive recommendations, three specific research questions, which we will answer in this study, were defined. First: is the Norwegian administrative design acceptable within different groups of stakeholders? Second: what are the conditions of the administrative design which makes it acceptable for different groups of stakeholders? Third: what are the key success factors which will enable development of a sustainable administrative design acceptable for all stakeholders?

To answer these research questions, a sample of 10 countries within Europe was selected and various case study data[2] were used in order to individually focus on each country's administrative design of the petroleum sector. The Norwegian case is used as industry best

practice, and patterns with other chosen cases from Europe were compared. The focus was on five cases from countries which are involved in North Sea petroleum production (U.K., Germany, Netherlands, and Denmark together with Norway) and five cases from countries which are involved in Mediterranean petroleum production (Cyprus, Albania, Italy, Greece, and Malta). Not all countries selected are among the top oil-producing countries due to the fact that previous research showed that in order to implement the Norwegian Model a country needs to be a stable democracy. Thurber et al. (2011) argued that countries which lack institutional quality and political stability are not able to implement the Norwegian administrative design in order to increase petroleum sector performance. Therefore, countries which are active in exploration and production to a certain extent and have similar institutional quality and political stability and similar regulatory platforms were chosen. Since European countries have similar political and regulatory frameworks, the selected countries are either European Union members or are in the stage of qualifying to enter the European Union (Albania). This research argues that the Norwegian Model will influence petroleum sector performance among countries with a stable democracy. Moreover, recommendations for sustainable administrative design were developed, and key success factors which will enable development of a sustainable administrative design acceptable for all stakeholders included in the process were defined.

In order to address the research questions, relevant theory on how Norwegian administrative design functions in relation to different stakeholders included in the process was used. Then, the research method, hypotheses and hypotheses testing with case study data were explained. Data in case study descriptions were summarised and results were presented. Finally, a broad discussion of results was completed, together with the speculations and interpretations of the results in terms of administrative design organisation and its relation to petroleum sector performance and stakeholders' expectation. The study concludes with concrete recommendations on how the administrative design should be structured and developed by reformers and policy makers in order to influence petroleum sector performance within different countries which have relatively strong institutional quality and political stability.

2. Theoretical background

Norway implemented a separated functions administrative design in 1972, called the Norwegian Model, which is seen as a prerequisite for better performance and high transparency in managing the petroleum sector (Al-Kasim, 2006). Moreover, the Norwegian Model was based on 10 points which were supposed to assure that energy resources are exploited in a way that benefits the whole society, the so called '10 commandments' of Norwegian oil activities (Ryggvik, 2010). The points on which the Norwegian Model was built were developed after comprehensive discussions and debates with different stakeholders, and were based on national governance and control of all activities, country energy independence, new industrial sector development based on petroleum which will not be in conflict with existing business activities, high technical standards and environmental protection, and infrastructure development (Ryggvik, 2010). The management of petroleum resources reflects the view among Norwegian decision makers that these resources belong to the nation, and that their development should benefit society as a whole, including future generations (Holden, 2013). Holden (2013) has argued that the quality of political

institutions, reliable public bureaucracy, little corruption and a transparent fiscal regime are essential in order to perceive a country as an attractive area for business, and thus enable economic growth led by natural resources. Norway recognised from the start that the key for profit maximisation, as well as control over its new petroleum industry, is an unwavering commitment to government participation and strict regulations (Falola & Genova, 2005).

Norway's separated functions administrative design has been analysed in depth by several authors. Al-Kasim (2006) has made an in-depth analysis of the Norwegian Model which is the so-called best practice model when it comes to petroleum sector management. The author has identified prerequisites under which the Norwegian Model functions, such as the prospectivity of the resource base, the enabling market environment, and the capability of the country to mobilise institutional, financial and technological resources. He argues that the administrative design should ensure a sustainable benefit for the nation, the primary intention of the Norwegian Model. Thurber et al. (2011) went a step further and argued that a Norwegian administrative design of separated functions will not function in countries with low institutional quality and political stability. In their study, they analysed oil-producing countries which tried to implement the Norwegian Model after witnessing Norway's great success in managing petroleum sector performance. Their study pointed out that changes in petroleum governance will be successful and bring positive effects only if there is political stability and institutional quality. This argument was further elaborated in another study pointing out that the economic impact due to changes in petroleum governance might be contingent on political conditions (Kemal, 2016). Kemal (2016) suggested that a country which creates a separate regulatory entity and makes the national oil company merely a business entity increases its aggregate domestic income by around 10%.

Norway is recognised for an administrative design model whose functions are separated among three government-controlled bodies. The policy-making body is organised within the Ministry of Petroleum and Energy (Ministry) which oversees the process of exploration and production rights. A separate regulatory body called the Norwegian Petroleum Directorate is responsible for supervision of all activities done by the oil companies and petroleum profit collection, as well as advising the Ministry on technical matters. Finally, a commercial body represented by the Norwegian national oil company is actively involved in petroleum operations in Norway and abroad.

The policy-making body has an essential role in regulatory framework development. Petroleum regulations set clear rules on exploration and production rights, technical and environment protection requirements and a fiscal regime. The fiscal regime or petroleum taxation model, which in simple terms is the government take versus the oil company take, is what makes a real difference among countries, and from which both the country and the oil company can benefit if there is optimum balance. Technical and environmental requirements are standardised as well as exploration and production rights; geological potential is given by nature, while the diversity of fiscal regimes is what makes countries unique (Johnston, 1994). Johnston (2003) argues that fiscal regime, if balanced and regulated properly in terms of government take versus oil company take, can attract significant investments in exploration and production activities and create wealth for the nation. If two countries have similar geological potential in terms of oil and gas resources, the higher the government take, the greater the probability of creating wealth for the nation. In order to determine attractiveness of the fiscal regime, government take is combined with other measures of profitability, fiscal system flexibility, revenue risk, and fiscal stability in order to

properly assess petroleum fiscal regime (Agalliu, 2011). Moreover, depending on regulation requirements, besides direct effects which are achieved through fiscal regime, indirect effects can be achieved in terms of industry and infrastructure development. Norway addressed this and boosted petroleum industry development through participation of the national oil company in exploration and production activities, as well as infrastructure development of an oil and gas pipeline system to convey petroleum deposits (Ryggvik, 2010).

A separate regulatory body is responsible for supervising all activities and regulatory requirements in order to assure that oil companies are performing their obligations according to the regulations. Their most important role is petroleum profit control, based on the monthly production and control of capital and operating expenditures of the oil companies, as well as exploration and production operations control. The regulatory body has the power to benchmark and create positive knowledge transfer between a commercial body (national oil company) and oil companies operating in the country (Kemal, 2016 and Thurber et al., 2011).

A commercial body, which in the case of Norway is currently represented by the national oil company Petoro, while historically was represented by national oil company Statoil, is responsible for industry development. Statoil is actively involved in all exploration and production activities as well as in refining, processing and pipeline operations. With Statoil, the Norwegian contractor industry was built and played an important role in Norwegian industrial development (Ryggvik, 2010). Statoil had a privileged position in Norway for 20 years, and it was placed on an equal position with other oil companies in the market when Norway entered into European Economic Area agreement with the European Union (Lund, 2014).

In successfully addressing the identified points within a separated functions administrative design, Norway has also been able to address stakeholders' expectations. Four main groups of stakeholders included in the process were identified: government, society, N.G.O.s and oil companies. All of the stakeholders identified have one thing in common: transparency of activities. Government expectations are focused on economic growth, which can be partially achieved through direct effects in terms of fiscal regime, which enables direct cash for the state budget (Ryggvik, 2010). Moreover, from a government perspective, in terms of economic growth, the main focus is on encouraging new investments in the country and foreign direct investments (F.D.I.), thus increasing the state budget through fiscal regime, direct and indirect industry development, availability of energy resources, and enabling energy independency and security (Tordo, 2013).

Societal expectations are very broad, and can influence all individuals based on the territory where exploration and production operations are being performed. Expectations include the protection and preservation of the environment, and therefore exploration and production activities are expected to be performed in a sustainable way while enabling cheap energy resources, higher living standards, and nation development in general (Ryggvik, 2010 and Tordo, 2013). Society (nation) expectations are achieved through wealth creation, which is enabled through the fiscal regime and industry development.

The primary concern of N.G.O.s is environmental preservation. The participation and influence of N.G.O.s in environmental governance has increased enormously over the last decades (Oberthür et al., 2003), and it is therefore important to include N.G.O.s in the constant development and improvement of environmental standards defined within a regulatory framework. According to the Norwegian Model, the expectations of N.G.O.s

about environment preservation were fulfilled through technological and environment protection standards and transparent administrative design for managing the petroleum sector (Ryggvik, 2010).

From an oil company perspective, it is all about security and stability of investments, which is very connected with the regulatory framework of the environment in which an oil company would like to invest: a low risk of investment and high rates of return (Randall, 2008). For oil companies this is all about investment risk assessment, which is again dependent on the fiscal regime and a transparent regulatory framework, with the assumption that there is a positively evaluated geological potential of the country.

According to the theory discussed above, it can be concluded that the points on which the Norwegian Model is based are essential for meeting stakeholders' expectations, due to the fact that they address different stakeholders' expectations as well as sustainability. These points can be grouped by five criteria which, for the purposes of this study, will be called key success factors for administrative design development related to petroleum sector performance. These factors are national governance and control of petroleum sector; clusters (industry) development; infrastructure development; environmental protection and high technical standards; and balanced government take.

3. Hypothesis development

Based on the theory addressed in the previous chapter the following three hypotheses were defined:

> **Hypothesis 1.** *Exportability of the Norwegian Model in terms of separated policy, regulatory and commercial functions between different government bodies is correlated with petroleum sector performance.*

In order to test this hypothesis for each of the 10 selected countries, whether and how separation of the functions is implemented in terms of policy, regulatory and commercial responsibilities and how it is linked with petroleum sector performance was defined. Hypothesis 1 will be strengthened by a finding that countries with higher petroleum sector performance have implemented the Norwegian Model.

An extensive case study data approach, as mentioned earlier, was used. The case study data provides an in-depth examination of the policy and regulatory frameworks governing the petroleum sector for each country, and focuses on regulation rules and responsibilities within different government bodies. For each country, it is readily seen how a fiscal regime is regulated, the government take versus oil company take compared, and which institutions are responsible for policy-making, regulatory control and commercial activities identified. Furthermore, we can examine how exploration and production rights are regulated in terms of durability and performance, how technical and environmental protection requirements are regulated, and we can consider geological potential assessment in terms of maturity, and the historical development of the petroleum sector.

In order to evaluate petroleum sector performance the study will focus on petroleum revenues which go directly to the state budget. As discussed earlier in the theoretical part of the study, the major differentiation among various countries is the fiscal regime in terms of government take when it comes to petroleum profit. Due to the fact that actual production quantities are different within sample countries and are very dependent on a country's geological potential, which cannot be influenced, the focus will be on government take

percentage, which demonstrates the capability of a country to generate profit from the petroleum sector. In addition to government take, a thorough evaluation of petroleum sector performance must take into consideration the capability of a country to develop petroleum sector activities. This capability can be measured in terms of consistency of exploration and production activities based on historical data for each country. Oil companies are attracted to invest in exploration activities where the outcome is establishment of new production facilities, and therefore countries which are able to facilitate more exploration activities have a higher probability of increasing petroleum production. This study will not focus on actual production since it is very dependent on geological potential and therefore differs between various countries. Finally, based on the findings associated with government take and consistency of exploration and production activities within sample countries, for the purposes of this study petroleum sector performance will be evaluated as good or poor.

Hypothesis 2. *Petroleum sector performance can be improved if the petroleum sector administrative design addresses identified key success factors.*

In order to test this hypothesis for each of the 10 selected countries, we will define whether the administrative design addresses national governance and control of petroleum sector activities, technical requirements, environmental protection requirements, industrial sector development through national oil company and/or local contractor companies, infrastructure development and government take for the state budget, and how it is linked with petroleum sector performance. If analysis shows that countries with higher petroleum sector performance have addressed in their administrative design national governance and control of petroleum sector activities, technical requirements, environment protection requirements, industrial sector development through national oil company and/or local contractor companies, infrastructure development and government take for the state budget, this hypothesis will be confirmed.

Hypothesis 3. *Countries with a separated functions administrative design of the petroleum sector meet stakeholders' expectations.*

In order to test this hypothesis for each of the 10 selected countries, we will define whether the administrative design addresses the Norwegian Model of separated functions and whether the administrative design addresses national governance and control of petroleum sector activities, technical requirements, environment protection requirements, industrial sector development through national oil company and/or local contractor companies, infrastructure development and government take for the state budget. If analysis shows that countries with an administrative design which addresses policy, regulatory and commercial separation of function have also addressed factors such as national governance and control of petroleum sector activities, technical requirements, environment protection requirements, industrial sector development through national oil company and/or local contractor companies, infrastructure development and government take for the state budget, while conversely, countries which did not fully implement a separated functions administrative model did not address these factors, this hypothesis will be confirmed.

4. Data and methodology

In order to test the previously defined hypotheses a comparative data approach, which provides qualitative observations of petroleum sector performance and administrative design

within sample countries as well data regarding the implementation of identified key success factors within a sample country's administrative design, was used. This begins with petroleum sector performance evaluation, and then presents observations on how the sample countries have addressed administrative design in terms of separated functions, and how administrative design reflects key success factors.

4.1. Petroleum sector performance evaluation

As described earlier, petroleum sector performance within sample countries is qualitatively evaluated according to the government take and available historical data on exploration and production activities. Government take means the percentage of profit from petroleum production activities which goes directly to the state budget, and is based on the adopted fiscal regime. Due to the fact that actual production quantities are different within sample countries and are very dependent on a country's geological potential, which cannot be influenced, the focus will be on government take percentage, which shows the capability of a country to generate profit from petroleum sector. Government take is calculated on one production field, with the same calculations input for each country such as revenues for oil produced, oil reserves, period of production and capital and operating expenditures. What makes the difference in terms of government take percentage is fiscal regime, which is different in each country in terms of regulated payments for the state budget on produced volume. For the purpose of this study it is important to see, among the selected countries, which countries are better in generating profit under the assumption that all inputs such as petroleum productions (reserves), petroleum prices, and exploration and production costs are the same, while only the taxation system is different (such as rents, royalty and similar taxes which go directly to the state budget based on petroleum produced). Inputs for government take calculations are shown in Table 1. Correspondingly, countries with greater geological potential in terms of petroleum reserves generate higher profits. Since this study is primarily focused on showing that petroleum sector performance can be increased through suitable administrative design, which is not dependent on petroleum reserve volumes, petroleum reserves will not be taken into consideration, but rather consistency in exploration and production activities through the history. All selected countries have some

Table 1. Summary of fiscal regime calculations in terms of government take for selected countries.

Country	Field size in MMbbl	Development cost $/unit	Price $/unit	Investor cash flow $mm	Investor N.P.V. @ 12.5% $mm	Investor payback @ 12.5% (yrs)	Investor I.R.R (%)	Government take (%)
Norway	10	17,25	100	167,91	57,89	5,25	32	80
U.K.	10	17,25	100	537,42	245,51	3,73	72	62
Germany	10	17,25	100	341,34	132,14	4,74	43	60
Nether-lands	10	17,25	100	216,45	93,70	3,94	56	75
Denmark	10	17,25	100	266,73	108,19	4,45	48	69
Cyprus	10	17,25	100	264,70	108,49	4,25	43	69
Albania	10	17,25	100	349,91	145,91	4,41	49	59
Italy	10	17,25	100	379,44	157,30	4,42	51	56
Greece	10	17,25	100	578,83	263,02	3,78	72	32
Malta	10	17,25	100	320,49	137,30	4,15	51	63

Source: I.H.S. Energy, Petroleum Economics and Policy Solutions (P.E.P.S.), 2016.

geological potential and are involved in exploration and production activities, and what is most important is similarity in terms of political stability and institutional quality, as explained in the introductory part of this study.

Government take data is extracted for each country individually and the countries are differentiated into two groups: countries which have incorporated into their regulations a fiscal regime model where the government take is greater than 50%, and countries where the government take is less or equal to 50%. As discussed earlier in theoretical background, studies by Johnston (1994, 2003) have shown that in implementing a balanced fiscal regime, those countries which were able to attract exploration and production activities with higher government take are in a better position to create wealth for the nation. This finding assumes that geological potential is similar due to the fact that for every barrel of oil extracted, the country will gain more petroleum profit. Therefore, for evaluation purposes, countries which have implemented a government take greater than 50% will be evaluated as countries with good petroleum sector performance, but only if the requirement of consistent exploration and production activities is met. If a country has a government take less than or equal to 50%, it will be evaluated as a country with poor petroleum sector performance. In order to achieve good petroleum sector performance, a country needs to meet both requirements when it comes to government take and consistency in exploration and production activities.

Evaluation of exploration and production activities is based on historical data for each of the 10 selected countries in terms of consistency of exploration and production activities. If a country has a history of both exploration and production activities and is consistently attracting new investments in exploration activities by awarding oil companies with exploration rights, it is evaluated as a country with high exploration and production activities. If a country does not demonstrate consistency in exploration and production activities, it is evaluated as a country with low exploration and production activities. Petroleum production data ranking within sample countries is summarised in Table 2. Data shows that North Sea petroleum-producing countries have better ranking than Mediterranean petroleum-producing countries. This ranking is based only on petroleum production, and therefore exploration activities when it comes to consistency in attracting new investments are analysed further in this study in order to properly evaluate exploration and production activities. From the data, presented in Table 2, it can be concluded that North Sea petroleum-producing countries are better positioned when it comes to petroleum production activities.

Table 2. Ranking based on total production activities for selected countries.

	Total production (mboed)			
Country	Last 5 years	Last 5 years rank	Last 10 years	Last 10 years rank
Norway	3.404	12	3.773	10
U.K.	1.615	21	2.156	18
Netherlands	1.206	29	1.238	29
Denmark	272	48	358	44
Italy	229	51	236	55
Germany	211	53	261	51
Albania	21	84	17	84
Greece	2	101	2	101
Malta	0	113	0	113
Cyprus	0	113	0	113

Source: I.H.S. Energy, Petroleum Economics and Policy Solutions (P.E.P.S.), 2016.

Finally, countries which have a government take greater than 50% and high exploration and production activities were ranked with good petroleum sector performance, while countries which do not meet both requirements have been ranked as countries with poor petroleum sector performance. The petroleum sector performance results are summarised in Table 3. As argued earlier, studies by Johnston suggest that countries with a balanced government take are more efficient in attracting investments in exploration and production activities as well as in creating wealth for the nation, since the two are linked. New investments will improve production volumes, which will increase government take in terms of petroleum profit. Moreover, it can be concluded that countries with a balanced government take are good petroleum sector performance countries due to the fact that they consistently attract new investments and exhibit consistency in exploration and production operations.

4.1.1 North Sea petroleum-producing countries

According to the available data, Norway has a government take of 80%. Petroleum production in Norway was developed in 1971, and has constantly increased since then. Norway is continually developing exploration activities and awarding oil companies with exploration rights on a yearly basis. In 2011, Norway was the world's seventh largest oil exporter and 14th largest oil producer, and the world's third largest gas exporter and sixth largest gas producer. The U.K. has a government take of 62%. Exploration and production activities in the U.K. have been on-going since 1964 and, as in Norway, the U.K. is continually attracting new investments in exploration and production activities and improving production volumes. Germany started its exploration and production activities in 1987. Production developed to date is primarily from the same petroleum reserves which were discovered in the 1980s. In recent years, there has been no significant exploration activity in terms of new discoveries. The government take in Germany is 60%. The Netherlands has a government take of 75%. Since 1959 when the first gas discovery was made, the Netherlands became the largest producer and exporter of gas in the European Union. The Netherlands produces both natural gas and oil, and is continually working on attracting new investments in exploration activities. Denmark started exploration activities in 1966, followed by production activities in 1972. Since then, Denmark has constantly attracted exploration activities and awarded exploration permits. The government take in Denmark is 69%.

Table 3. Summary of petroleum sector performance for selected countries.

Country	Government take in percentage	Exploration and production activities	Petroleum sector performance
Norway	Greater than 50%	High	Good
U.K.	Greater than 50%	High	Good
Germany	Greater than 50%	Low	Poor
Netherlands	Greater than 50%	High	Good
Denmark	Greater than 50%	High	Good
Cyprus	Greater than 50%	Low	Poor
Albania	Greater than 50%	Low	Poor
Italy	Greater than 50%	High	Good
Greece	Less or equal to 50%	Low	Poor
Malta	Greater than 50%	Low	Poor

Source: Author.

4.1.2 Mediterranean petroleum-producing countries

Cyprus initiated exploration activities in 2007 when 13 exploration permits were issued to oil companies. Cyprus is still in the exploration phase, with no commercial production. The government take in Cyprus is 69%. Albania's oil production started in the 1960s, but new investments in exploration and production activities started after the 1990s when the Albanian government attracted oil companies to invest in new exploration activities. Albania has demonstrated no consistency in enabling new exploration activities from the beginning of its petroleum sector development. The government take in Albania is 59%. In Italy, exploration activities began in 1950, and since then Italy has constantly awarded oil companies with exploration rights. Italy currently has 117 exploration permits in place and is developing new production facilities. Since the 1970s, Italy has been producing natural gas and oil, in both offshore and onshore Italy. Government take in Italy is 56%. Greece started exploration activities in the 1970s and oil production commenced in 1981. Since then, Greece has not attracted any significant investments in exploration and production activities until 2013, when Greece managed to award oil companies with three exploration permits. The government take in Greece is 32%. Malta has awarded exploration acreage and entered into agreements with oil companies since 2010, and has started to perform exploration activities according to the agreements entered. Due to the fact that Malta started its first exploration activities recently, it has not yet developed commercial production. The government take in Malta is 63%.

The petroleum sector performance results summarised in Table 3 highlight that North Sea petroleum-producing countries have better petroleum sector performance compared with Mediterranean petroleum-producing countries. As shown on Chart 1, 80% of selected North Sea petroleum-producing countries have good petroleum sector performance, while only 20% of selected Mediterranean petroleum-producing countries have good petroleum sector performance.

4.2. Administrative design and key success factors analysis within sample countries

As already addressed under theoretical background, Norway has implemented a separated functions administrative design since 1972 which differentiates policy, regulatory and commercial responsibilities.

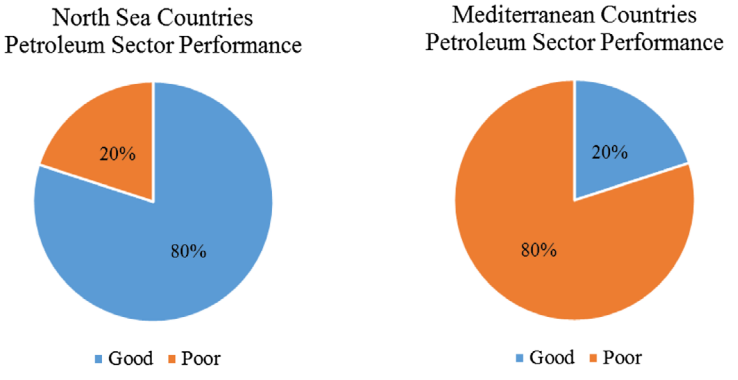

Chart 1. Petroleum sector performance for selected countries. Source: Author.

The U.K. has, to a certain extent, implemented the Norwegian Model. When it comes to policy-making and development responsibilities, these are organised under a separate policy-making body which in the U.K. is the Minister of State for Energy (Secretary for Energy and Climate Change) and is very similar to Norway where the policy-making body is under the Ministry of Petroleum and Energy. The regulatory body responsible for supervision and control of technical and environmental protection requirements as well as for maximising petroleum profit is separate from the policy-making body, and is organised within a government agency called The Oil and Gas Authority (O.G.A.). Commercial functions were historically separated and represented through British Petrol, the U.K. national oil company, which was privatised under Margaret Thatcher's government, and the British National Oil Corporation (B.N.O.C.), which was acquired by British Petrol in 1988. Today, British Petrol is a multinational company and is one of the world's major oil and gas companies. According to data published by U.K. Trade and Investment on 24 September 2014, the U.K.'s oil and gas industry is the largest industrial sector in the U.K., being a vital part of the U.K. economy which supports the employment of 450,000 people across the country and generates around £40 billion each year, including over £14 billion in exports. According to the available data related to regulatory framework structure and practical functioning, the U.K. addressed key success factors which we have identified in this study in the theoretical background (BIO by Deloitte (2014)). Governance and control of the petroleum sector are organised and structured at the national level, together with strict environmental protection requirements and technical standards, all of them being incorporated in U.K. binding laws. A part of the U.K. binding laws is a fiscal regime model which defines government take in terms of petroleum profit. From the very beginning of exploration and production operations, the U.K. insisted on using local industry and services as well as infrastructure development, which resulted in a strong petroleum industry which is today a vital part of the U.K. economy.

Germany has developed a very complex administrative design which is organised on a regional rather than a federal level. At the federal level, the Ministry of Economic Affairs and Energy has developed a mining law which addresses unified rules regarding exploration and production activities. Exploration and production rights, however, are awarded to oil companies on a regional level, and the procedure and regulatory responsibilities can differ from region to region. Therefore, there is no clear distinction between the policy-making and regulatory bodies. Even though Germany developed some of the major global energy companies (R.W.E., EON and SIEMENS), a commercial body is not regulated in Germany since Germany does not have a national oil company, and is therefore exclusively focused on oil companies operating within Germany. According to available data, Germany has very little domestic oil and natural gas production and relies heavily on imports (International Energy Agency, 2013). Regulatory framework data demonstrates that Germany has failed to address some of the key success factors identified earlier (BIO by Deloitte (2014)). Even though Germany has implemented high environment protection and technological standards as well as a fiscal regime model which defines government take in terms of petroleum profit, Germany has failed to address governance and control of petroleum sector on a national level as well as requirements and preferences of local industry involvement. However, Germany has managed to develop energy infrastructure and build strong energy industries on other energy resources (International Energy Agency, 2013).

The Netherlands has organised policy and regulatory responsibilities within different divisions under the Ministry of Economic Affairs. They are separated in terms of responsibilities for policy development and exploration and permitting production rights, as well as control of technical and environment protection requirements and petroleum profit collection. Moreover, the Netherlands has a separate commercial body which is organised as the national oil company, E.B.N., and participates in all exploration and production activities. According to the available data, the Netherlands addresses key success factors within its binding laws regarding governance and control of the petroleum sector on a national level, strict environmental protection requirements and technical standards, a fiscal regime model as well as requirements for local industry participation and infrastructure development (BIO by Deloitte (2014)). The Netherlands insists on the participation of the national oil company in petroleum operations. In addition to the national oil company, a multinational oil company, Royal Dutch Shell, was developed in the Netherlands; this is one of the world's major oil and gas companies. Shell is vertically integrated and is active in every area of the oil and gas industry, including exploration and production, refining, distribution and marketing, petrochemicals, power generation and trading, and employs 94,000 employees in more than 70 countries.

Denmark has implemented an administrative design model of separated functions within three different bodies. The policy body is organised within the Ministry of Climate, Energy and Building while the regulatory body is organised within the Danish Energy Agency (D.E.A.). The commercial body is organised within the national oil company, Danish Oil and Natural Gas (D.O.N.G.). The Danish government has a majority share in D.O.N.G. ownership. D.O.N.G. actively participates in Danish exploration and production activities. According to the available data, Denmark has addressed key success factors within its binding laws (BIO by Deloitte (2014)). Moreover, besides the national oil company, another Danish oil and gas company, Maersk Oil, was established in 1962 and is actively included in North Sea petroleum operations.

Cyprus has a separate policy and regulatory body but has failed to organise commercial responsibilities within government bodies. The policy-making body is the Ministry of Energy, Commerce, Industry and Tourism, while regulatory functions are organised within the Cyprus Energy Regulatory Authority. Cyprus does not have a national oil company. According to the available data, Cyprus has failed to implement petroleum industry development key success factors and has not organised a government body involved in petroleum operations (BIO by Deloitte (2014)).

Albania has developed a policy and regulatory body within the Ministry of Energy and Industry. There is no clear separation of policy and regulatory functions in terms of awarding exploration and production rights and petroleum profit collection. With regards to a commercial body, Albania has established the national oil company, Albpetrol, in order to have active participation in exploration and production activities, even though ongoing petroleum operations in Albania are managed by international companies operating in Albania. Albania has not addressed petroleum industry and infrastructure development within its administrative design.

Italy has organised policy and regulatory responsibilities within different divisions under the Ministry for Economic Development. They are separated in terms of responsibilities for policy development and permitting exploration and production rights as well as petroleum profit collection. Moreover, Italy has a commercial body with the multinational Italian oil

company, E.N.I., as a shareholder with 30.1% of shares. E.N.I. is one of the world's leading oil and gas companies. According to the available data Italy has addressed all key success factors within its binding laws (BIO by Deloitte (2014)).

Greece has organised policy and regulatory functions within the Ministry of Environment, Energy and Climate Change. The two functions are not separated into independent bodies. A commercial body is organised within the national oil company, Hellenic Hydrocarbon Resources Management S.A., which is not involved in existing petroleum operations in Greece. According to the available data, the involvement of national companies in petroleum operations has not been addressed within Greece's laws and regulations (BIO by Deloitte (2014)).

Malta has separate policy and regulatory bodies but has not organised commercial responsibilities within a government body. Policy and regulatory bodies are both independently organised within the Ministry for Transport and Infrastructure. Malta does not have a national oil company. According to the available data, Malta has not addressed petroleum industry development key success factors and does not have a government body involved in petroleum operations (BIO by Deloitte (2014)).

The separated functions administrative design analysis within sample countries, which is summarised in Table 4, highlights that North Sea petroleum-producing countries have implemented this type of petroleum governance, while Mediterranean petroleum-producing countries have not. As shown on Chart 2, 80% of the selected North Sea petroleum-producing countries have a separated functions administrative design, while only 20% of the selected Mediterranean petroleum-producing countries have implement this.

5. Results and conclusion

The data from the above case studies presents a summary of the administrative design of petroleum sector management within sample countries. The analysed data also summarises if a sample country has based their administrative design on key success factors which were identified in the theoretical background.

From the data analysed, it can easily be concluded that North Sea petroleum-producing countries have better petroleum sector performance than Mediterranean petroleum-producing countries due to the fact that they have implemented a separated functions administrative design and addressed the previously identified key success factors. As shown in Table 3, all North Sea petroleum-producing countries, except Germany, have good petroleum

Table 4. Summary of policy, regulatory and commercial functions organisation for selected countries.

Country	Policy-making functions	Regulatory functions	Commercial functions
Norway	Yes (separated body)	Yes (separated body)	Yes (separated body)
U.K.	Yes (separated body)	Yes (separated body)	Yes (separated body)
Germany	No	No	No
Netherlands	Yes (separated body)	Yes (separated body)	Yes (separated body)
Denmark	Yes (separated body)	Yes (separated body)	Yes (separated body)
Cyprus	Yes (separated body)	Yes (separated body)	No
Albania	No	No	Yes (separated body)
Italy	Yes (separated body)	Yes (separated body)	Yes (separated body)
Greece	No	No	Yes (separated body)
Malta	Yes (separated body)	Yes (separated body)	No

Source: Author.

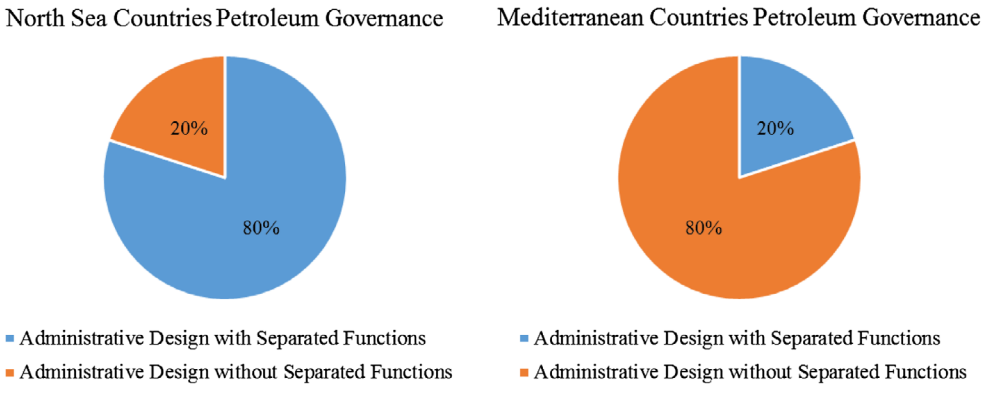

Chart 2. Petroleum governance for selected countries. Source: Author.

sector performance, and as shown in Table 4 and Table 5 all of them, except Germany, have implemented a separated functions administrative design and addressed key success factors. Therefore, it can be concluded that Germany could improve its petroleum sector performance by implementing a separated functions administrative design and addressing the identified key success factors. Moreover, most of the Mediterranean petroleum-producing countries have poor petroleum sector performance, as shown in Table 3, except Italy. Due to the fact that Italy has implemented a separated functions administrative design and addressed the key success factors, as shown in Table 4 and Table 5, it can be concluded that most of the Mediterranean petroleum-producing countries have poor petroleum sector performance due to the administrative design model, and that they could easily influence petroleum sector performance by changing petroleum governance.

As shown in Table 6, case study data supports Hypothesis 1. A positive correlation was found between countries which have, to a certain extent, implemented the Norwegian Model of separated functions administrative design and petroleum sector performance. Out of 10 sample countries, five countries together with Norway are North Sea petroleum-producing countries, and five are Mediterranean petroleum-producing countries. A separated functions administrative design is, to varying degrees, implemented in four North Sea petroleum-producing countries together with Norway, and in one Mediterranean petroleum-producing

Table 5. Summary of key success factors addressed for selected countries.

Country	National governance and control	Technical requirements and environment protection	Clusters (Industry) development	Infrastructure development	Balanced government take
Norway	Yes	Yes	Yes	Yes	Yes
U.K.	Yes	Yes	Yes	Yes	Yes
Germany	No	Yes	No	Yes	Yes
Netherlands	Yes	Yes	Yes	Yes	Yes
Denmark	Yes	Yes	Yes	Yes	Yes
Cyprus	Yes	Yes	No	Yes	Yes
Albania	Yes	Yes	No	No	Yes
Italy	Yes	Yes	Yes	Yes	Yes
Greece	Yes	Yes	No	Yes	No
Malta	Yes	Yes	No	Yes	Yes

Source: Author.

country. Based on this it can be concluded that North Sea petroleum-producing countries are more successful in implementing a separated functions administrative design model. All of the Mediterranean petroleum-producing countries which were included in this study, except for Italy, have, to a certain extent, implemented a regulatory framework similar to the one in Norway and have separated some of the functions within their administrative design, but have not completely implemented the Norwegian Model. North Sea petroleum-producing countries including the U.K., the Netherlands and Denmark have implemented a separated functions administrative design model similar to the one in Norway, and have differentiated policy, regulatory and commercial functions. It is shown that those countries in comparison with others have also demonstrated good rather than poor petroleum sector performance, which generally supports the hypothesis that exportability of the Norwegian Model in terms of separated policy, regulatory and commercial functions between different government bodies is correlated with good petroleum sector performance.

Case study data generally supports Hypothesis 2. In Table 7, implementation of the key success factors identified in the theoretical background has been correlated with petroleum sector performance. Countries which have addressed all the key success factors identified in Table 5 are labelled 'yes' and countries which have not addressed all identified key success factors are labelled 'no'. According to the data summarised in Table 7, it is shown that all countries which have achieved 'good' petroleum sector performance have implemented all identified key success factors, while countries that have not implemented all key success factors have 'poor' petroleum sector performance. Therefore, it can be concluded that countries which have addressed key success factors in their administrative design have better petroleum sector performance, and this confirms the hypothesis that countries can improve their petroleum sector performance by addressing key success factors in their administrative design.

Based on data in Tables 6 and 7, it can further be concluded that countries which have implemented the Norwegian Model have addressed all the identified key success factors, as opposed to those countries which did not implement the Norwegian Model. This is very important in terms of confirmation of Hypothesis 3. As shown in the theoretical background, stakeholders' expectations are met if the identified key success factors are addressed within a country's regulatory framework. Table 5 demonstrates that countries which have addressed the key success factors in their administrative design have met stakeholders' expectations. Case analysis on the sample countries shows that only countries which have a

Table 6. Summary of separated functions administrative design and petroleum sector performance for selected countries.

Country	Separated functions administrative design	Petroleum sector performance
Norway	Yes	Good
U.K.	Yes	Good
Germany	No	Poor
Netherlands	Yes	Good
Denmark	Yes	Good
Cyprus	No	Poor
Albania	No	Poor
Italy	Yes	Good
Greece	No	Poor
Malta	No	Poor

Source: Author.

Table 7. Summary of key success factors and petroleum sector performance for selected countries.

Country	Key success factors	Petroleum sector performance
Norway	Yes	Good
U.K.	Yes	Good
Germany	No	Poor
Netherlands	Yes	Good
Denmark	Yes	Good
Cyprus	No	Poor
Albania	No	Poor
Italy	Yes	Good
Greece	No	Poor
Malta	No	Poor

Source: Author.

separated functions administrative design have also addressed all identified key success factors in their administrative design. This supports Hypothesis 3, and therefore suggests that countries with a separated functions administrative design meet stakeholders' expectations.

The foregoing results and discussion shows that a separated functions administrative design which is differentiated within policy, regulatory and commercial body has the ability to address the identified key success factors which, in turn, has an impact on petroleum sector performance. Moreover, countries with better petroleum sector performance have a separated functions administrative design. This study clearly demonstrates that North Sea petroleum-producing countries are more successful than Mediterranean petroleum-producing countries in administrative design development and petroleum sector performance. It can also be concluded that North Sea petroleum-producing countries are very similar in terms of how they manage the petroleum sector, and are more successful in comparison with Mediterranean petroleum-producing countries. Moreover, Mediterranean petroleum-producing countries can be differentiated between Italy, which has implemented a separated functions administrative model, and Cyprus, Albania, Greece and Malta. Cyprus, Albania, Greece and Malta have incorporated the Norwegian Model in their regulatory framework to some degree but not fully, and have significant room for improvement in terms of petroleum sector performance. It can be concluded that Mediterranean petroleum-producing countries have poor petroleum sector performance due to the deficiency of the administrative design model which they have implemented, and thus the petroleum sector performance could be positively improved by implementing the separated functions administrative design in which the identified key success factors are incorporated (Norwegian Model). This is also applicable for Germany, since the study shows that Germany has poor petroleum sector performance compared with other North Sea petroleum-producing countries and is the only country which did not implement a separated function administrative design. Moreover, it can be concluded that changes in petroleum governance through implementation of a separated functions administrative design will positively impact petroleum sector performance in countries with a stable democracy which have institutional quality and political stability.

This study, which was done on a basis that a country has institutional quality and political stability, indicates that a country will improve petroleum sector performance and address the identified key success factors by implementing a separated functions administrative design. This will not only meet stakeholders' expectations, but will, more importantly, manage the petroleum sector to create wealth for the nation and ensure transparency and sustainability. It can be concluded that without a sustainable administrative design for managing the

petroleum sector, a country is like a sleeping beauty; it will awake to its full potential once it has implemented proper administrative design.

Notes

1. Fiscal regime or the petroleum taxation model is based on various financial terms which an oil company needs to pay to the country if performing exploration and production activities. Fiscal regime is usually shown as a government take versus oil company take when it comes to petroleum profit. Government take means percentage of profit from petroleum production activities which goes directly to the state budget, while oil company take means percentage of profit which remains within the oil company. Fiscal regime is something which differentiates countries in terms of attractiveness for the oil companies when doing evaluation analysis in terms of entering into business in a particular country. There are 145 countries around the world which have specific fiscal and contractual terms for engaging with oil companies for the conduct of petroleum exploration and production operations. These arrangements, known generally as fiscal regimes, can be divided into two categories: production sharing and royalty tax based. This classification of fiscal regimes is simply an industry convenience, as there is often substantial variation between contracts or terms within a given regime type. The fundamental difference between the two systems comes down to the ownership of the produced petroleum. Neither type of regime is better or worse than the other due to the fact that from an economic perspective the same objectives can be achieved under different regimes.
2. For case study analysis the most recent data provided by three different management consulting companies was used. Data which was published in 2015 by Ernst and Young consulting company in *The Global Oil and Tax Guide* and which summarises oil and gas tax regimes in 84 countries was used for fiscal regime analysis. For administrative design analysis, regulatory framework and exploration and production operations data which was published in 2014 by B.I.O. by Deloitte consulting company in a final report prepared for the European Commission *Civil liability, financial security and compensation claims for offshore oil and gas activities in the European Economic Area* was used. As a backup for both, fiscal regime and regulatory framework data published in 2016 by I.H.S. consulting services for sample countries published in Global Exploration and Production Services reports was used, as well as available data from the Petroleum Economics and Policy Solutions (P.E.P.S.) database.

Disclosure statement

No potential conflict of interest was reported by the authors.

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