ESTABLISHING REGULATORY FRAMEWORK FOR OCEAN THERMAL ENERGY-DRIVEN DEVELOPMENT IN MALAYSIA

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I declare that this thesis entitled "*Establishing Regulatory Framework for Ocean Thermal Energy-Driven Development in Malaysia*" is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in the candidature of any other degree.

Signature :

.....

Name : Mohd Haris bin Abdul Rani

Date : May 2018

To my darling wife, Nurnazida Nazri, without you, my life would be an empty box in

a sea of nothingness.

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to repay all contributions made.

ABSTRACT

Malaysia is an oil-producing country but her oil and natural gas reserves are

limited, and these sources will be exhausted in the near future. This is a serious

problem for the country. It is estimated that Malaysia would be an importer of

electricity energy by 2019 due to the increasing domestic energy consumptions.

Studies on technological feasibility and economic gains from Ocean Thermal Energy

Conversion (OTEC) activities are very promising. Thus, these factors have led the

government in seeking for alternative ocean renewable technology such as OTEC in

the 11th Malaysia Plan. However, studies had shown that lack of regulatory

provisions would only lead to failure of new developments, impacting negatively

towards social, economic and environments. The objective of this research is to

establish a reliable and exhaustive regulatory framework for OTEC future

deployment and development in Malaysia. It employs analysis of legal rules besides

qualitative approach; deductive and inductive analysis, in determining the adequacy

of the laws; establish the OTEC regulatory framework; appraise any legal

impediments towards promoting OTEC deployment and development. The outcome

of this research results in the establishment of a comprehensive OTEC regulatory

framework which covers all aspects of OTEC activities. As part of the analysis

conducted, the research furthermore identified various inadequacy of the current laws

of Malaysia in properly regulating OTEC intended deployment and its related

activities. The research suggests a legislation model as a contribution, which is

translated into the formulation of a new proposed bill for OTEC in Malaysia. This

will provide a direct information to lawmakers in formulating their own

comprehensive renewable energy laws (or policies) on OTEC. Other than that, the

research enhances current knowledge on conducting research on regulatory

framework for other renewable energy while allowing expansions of the existing

academic references on energy laws subject, particularly on ocean renewable energy

worldwide.

ABSTRAK

Malaysia adalah negara penghasil minyak tetapi rizab minyak dan gasnya adalah terhad, dan sumber-sumber ini akan habis dalam masa terdekat. Ini merupakan masalah yang serius bagi negara ini. Dianggarkan bahawa Malaysia akan menjadi pengimport tenaga elektrik menjelang 2019 berikutan peningkatan penggunaan tenaga domestik. Kajian tentang kemungkinan teknologi dan keuntungan ekonomi dari aktiviti Ocean Thermal Energy Conversion (OTEC) adalah sangat memberangsangkan. Oleh itu, faktor-faktor ini telah mendorong kerajaan negara ini untuk mencari alternatif teknologi laut boleh diperbaharui seperti OTEC dalam Rancangan Malaysia ke-11. Walaubagaimanapun, kajian menunjukkan bahawa kekurangan peruntukan peraturan hanya akan membawa kepada kegagalan perlaksanaan pembangunan. Seterusnya, memberi kesan negatif terhadap sosial, ekonomi dan persekitaran. Objektif penyelidikan ini adalah mewujudkan kerangka kerja pengawalseliaan yang boleh dipercayai dan menyeluruh bagi penempatan

dan

pembangunan masa depan OTEC di Malaysia. Ia menggunakan analisis peraturan

undang-undang selain pendekatan kualitatif; analisis deduktif dan induktif, untuk

menentukan kecukupan undang-undang; menubuhkan rangka kerja kawal selia

OTEC; dan menilai sebarang halangan undang-undang ke arah mempromosikan

penggunaan dan pembangunan OTEC. Hasil kajian ini adalah penghasilan

penubuhan rangka kerja pengawalan OTEC yang komprehensif yang merangkumi

semua aspek aktiviti OTEC. Sebagai sebahagian daripada analisis yang dijalankan,

kajian ini juga mengenalpasti pelbagai kekurangan aspek undang-undang semasa di

Malaysia bagi tujuan penempatan dan aktiviti yang berkaitan dengannya. Selain itu,

penyelidikan ini juga meningkatkan pengetahuan semasa tentang penyelidikan

mengenai rangka kerja pengawalseliaan untuk tenaga boleh diperbaharui yang lain

sambil membenarkan pengembangan rujukan akademik yang ada pada subjek

undang-undang tenaga, terutama mengenai tenaga boleh diperbaharui di seluruh

dunia.

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LIST OF ABBREVIATIONS

EEZ - Exclusive Economic Zone

EEZ Act - Exclusive Economic Zone Act 1984

EQA - Environmental Quality Act 1974

FiT - Feed in Tariff

ICJ - International Court of Justice

IMO - International Maritime Organization

ICZM - Integrated Coastal Zone Management

IPP - Independent Private Producers

IRENA - International Renewable Energy Agency

NGO - Non-governmental organisations

NOAA - National Oceanic and Atmospheric Administration (United States)

OECD - Organisation for Economic Cooperation and Development

OTEC - Ocean Thermal Energy Conversion

OTEC Act - Ocean Thermal Energy Act of 1980 (United States)

OTEC Bill - Ocean Thermal Development Bill (Malaysia)

OTEDD - Ocean Thermal Energy–Driven Development

OTENAS - OTEC Nasional Berhad

PDA - Petroleum Development Act 1974

PEMSEA - Partnerships in Environmental Management for the Seas of East Asia

PETRONAS - Petroleum Nasional Berhad

RE - Renewable Energy

MDTCC - Ministry of Domestic Trade, Co-Operatives and Consumerism

SDS-SEA - Sustainable Development Strategy for the Seas of East Asia

SEA - Strategic Environmental Assessment

SEDA - Sustainable Energy Development Authority

TRIPS - Agreement on Trade-Related Aspects of Intellectual Property Rights

UNCLOS - United Nations Convention on the Law of the Sea

UNCLOS I - United Nations Conventions on the Law of the Sea of 1958

KETTHA - Ministry of Energy, Green Technology and Water

CHAPTER 1

INTRODUCTION

1.1 Chapter Overview

The objective of this chapter is to introduce the general background of the study and the importance of this research. Issues which basically originate from the question of whether there is enough law to regulate a new economic activity in an effort to employ a renewable, greener, cleaner and more sustainable energy resource for Malaysia; Ocean Thermal Energy Conversion (OTEC) will be answered. OTEC activities are termed as Ocean Thermal Energy-driven development (OTEDD) to represent the spectrum of activities which comprises of upstream, middlestream and downstream activities from OTEC technology. OTEDD is on its way, gearing towards actual implementations within the coming years in many countries throughout the world.[1] Needless to say, such an activity will attract billions of ringgit in investments[2] and income generation[3]. Yet, surprisingly, there are no studies to verify the adequacy of law in regulating such intended activity. This gap is indeed very significant because any failure to properly identify or indicate any sorts of

[1] There are so far several operational plants; Korea - 20kW OTEC pilot plant (since 2013) (OTEC News, 2017); United States – Hawaii (since 2015) (OTEC News, 2017); Japan – Okinawa (since

2013) (OTEC Okinawa, 2017); - Kumejima (since 2003) (Wageningen University & Research, 2017).

[2] For example, the U.S. Navy and the Department of Energy, Lockheed Martin has invested $15 million over the past three years toward the technology needed for and the design of a 10 megawatt prototype plant to validating the technologies necessary for small to large scale (100 MW or greater) commercial sized OTEC power plants (Lockheed Martin, 2017).

[3] Income from a 15MW OTEC plant is estimated to generate USD17 million/year and reach a payback period of 12 years upon initial investment of USD160 million, an internal rate of return (IRR) of 12.6% (Mizuan, 2017).

weaknesses in the existing laws can amount to serious flaws in the regulatory framework and could have disastrous effects on all parties involved.

This chapter aims to present this argument in order to highlight that there should be valid concerns over the question whether there are shortages of policies, law and regulations over OTEDD in Malaysia. Failing to take cognizance on this matter, shall results in injustice and biases, directly or indirectly, to various stakeholders. The quest for such confirmation is crucial for assisting a smooth process of implementations on OTEDD activities and ultimately toward the success of renewable ocean energy in Malaysia. In short, this chapter is to convince the importance of this study and justification of this research in investigating the research problems raised.

1.2 Research Background

Research background enables an overview understanding of the subject to be researched by looking at how the problem arises and how a particular research becomes important. Legal issues encircling OTEDD activities developed as a result of the probable intention of the government in venturing into OTEC technology for Malaysia, since Malaysia aims to venture into new renewable energy (herein after referred to as RE) sources. In this particular case concerning OTEC, it will somehow develop into the creation of a new significant economic activity. Concerns over the readiness of legal framework to address this new activity cannot be put aside as many economic failures come from the unpreparedness of the law to regulate such activities which will be discussed in Chapter 2 under the theoretical discussions.[4]

Figure 1.1 below, shows the dynamic of realising this new activity. As OTEDD moves towards reality, from non-existence, the legal issues encompassing

[4] Chapter 2; 2.3 – Theoretical Analysis

OTEDD activities become evident and obvious. They need proper evaluation and

scrutiny, hence, the need for this research.

Figure 1.1: Factors affecting OTEC development in Malaysia

Therefore, looking at the bigger picture, as in any new intended activity creations, it would certainly progress from the “push” and “pull” dynamics. This understanding is crucial to enable a better understanding of the legal concern and its importance.

The first push factor in materialising commercialising OTEC plants relates to the world energy demand. According to the World Energy Outlook 2014, our global primary energy demand would be 37% higher in the year of 2040 (International Energy Agency, 2014). This is a clear signal over the ever increasing demand of

global energy. The current global supply of energy is being produced by harnessing

natural source and is rapidly depleting creating a sustainable development issue

(Schilling Chiang, Lichun, 2011; United Nations, 2015). Oil prices persist to be the

main factor in determining global economic performance for the last 50 years and

would drastically affect a greater adverse economic effect if oil prices are surging

more (Khan, 2017).

Secondly, continued burning of fossil fuels; oil, coal and natural gas which

generate the infamous greenhouse effects and pollutants that are harmful to both the

earth and human populations. Total carbon emissions from energy consumption are

estimated to increase by 25% between 2013 and 2035 (British Petroleum, 2015).

Greenhouse effect also has raised the global sea water level, the fastest level ever,

over the last two centuries (Tularam & Reza, 2017). Global Greenhouse gas

emission in the atmosphere has now exceeded 400 parts per million for the first time

in several hundred millennia (International Energy Agency, 2013). The Paris

Agreement is one significant move taken by The United Nations where 195

signatories countries agreed to enhance the implementation of preventive measures

to hold and lower gas emissions worldwide (United Nations Framework Convention

on Climate Change, 2015; United Nations Treaty Collection, 2017). The decision

came despite the recent US decision to withdraw from the agreement, which

according to Nicholas Burns, Professor of International relations, Harvard University

as “disaster decision both on the science of climate change” (CNN Live, 2017), and

ultimately one have to realise that there is no such thing as “clean fossil fuel”

(Stevens, 2017). Nevertheless, all other countries are stating that they are going

ahead with the agreement, ensuring a noble step in ensuring the health of the oceans

and the environment. The need to counter such issues pushes OTEC to be a practical

and sustainable solution as it does not produce any kind of gas omission.

Third, is the phenomena of “peak oil” propounded by MK Hubbert (Figure 1.2 below) in which, he predicted that the oil production (extraction) for the US would reach its peak[5] and would then drastically declined immediately afterwards.

The oil production would curve in a “bell-shaped” symmetrically where the other half would reflect a terminal decline[6] scenario of oil productions (Hirsch, Bezdek, & Wendling, 2005)[7]. This prediction goes in line with oil production scenario

mentioned by several major oil companies, for example, Exxon, saying that since all

the easy oil and gas around the world has been discovered, the task is to now find

[5] According to Hubbert's estimation, the peak oil would occur in the year 2000, however when would it occur is still not known with certainty. Nevertheless, predicting oil peaking is problematic leading to experts believing that it would occur soon i.e. within 20 years. [6] Often confused with oil depletion; peak oil is the point of maximum production, while depletion refers to a period of falling reserves and supply. [7] Also refer to (Hirsch, Bezdek, & Wendling, 2005), a report made for the US Department of Energy at http://www.netl.doe.gov/publications/others/pdf/Oil_Peaking_NETL.pdf

and produce oil from more challenging environments and work areas[8] (Gray, 2015).

Although Shell states that, it is also clear that there is not much chance of finding any significant quantity of new cheap oil. Consequently, any new or unconventional oil is going to be expensive (Z. Robinson, 2012). This would, in turn, increase oil prices making it susceptible towards negative global economy (Deffeyes, 2010; Simmons, 2011).

(Armstrong, 2016)

Figure 1.2: Peak Oil Theory

In addition, it was later discovered that this phenomenon is not only occurring in the US but happening worldwide to all the major oil producing countries. Actual decline occurs in major oil fields in Saudi Arabia (Kallis & Sager, 2017), Kuwait (Li & Molina, 2014), Mexico (Hausmann & Rodriguez, 2014). Globally, it is observed that oil production already declined in 33 out of the 48 largest oil-producing countries (Renner, French, & Assadourian, 2015). A sustained decline in global conventional production is, therefore, probably before 2030 and there is a significant risk of this beginning before 2020 (R. G. Miller & Sorrell, 2014; Sorrell, Miller, Bentley, & Speirs, 2010). The effect can be seen as per Figure 1.3 below.

[8] Oil may come from “conventional” or “unconventional sources”, though varies in usage of the term, generally means (according to Hubbert’s categorisation); crude oil that are producible by methods available in 1962: which excluded oil manufacturing from oil shale or mined from oil sands.

(Peakoiltas, 2016)

Figure 1.3: Peak Oil and shortages of world oil production

This theory was later extended to all finite resources other than oil where supply of energy from these multiple sources would decline, and terms like peak gas (Whitney & Behrens, 2010) [9], peak coal (Flores, 2013; Golding & Golding, 2017)[10], peak water/hydro power (Lachuriya & Kulkarni, 2017) [11] and peak uranium (Nuclear) (Bret, 2014) [12] will occur when reaching maximum production and suffer gradual decline afterwards. Meanwhile, the demand for energy continues steadily upwards with an increase of development and population leaving a gap which needs to be replaced. Here, RE would be the best replacement as they are infinite and

environmentally friendly. The scenario is, therefore, best represented by Figure 1.4

below.

[9] Hubbert anticipated gas as a natural resources would peak in production but will have enough reserves before the rate of production will face its terminal decline phase. [10] Data demonstrate that coal production is going to peak around 2020 despite the world coal reserves able to be produced many year thereafter. [11] Hydro power energy generation (electricity) rely with the number of available water source which is up to now are nearly fully utilised. [12] The point in time that the maximum global uranium production rate is reached as Uranium-

235 is a finite non-renewable resource in addition to the method of harnessing its energy is still lacking.

(Cornell University, 2017)

Figure 1.4: Effects of Peak Oil Theory

The Minister of Oil of Saudi Arabia, Sheikh Ahmed Zaki Yamani, a very prominent figure in OPEC, commenting on the production of oil and its future in 1973 said, *"The Stone Age came to an end, not for a lack of stones and the oil age will end, but not for a lack of oil*"

(Ahmed Zaki cited in Aldagheiri 2016)

While Steven Chu, the 2013 Noble Price winner in Physic also made similar statement *"The Stone Age did not end because we ran out of stones;*

we

transitioned to better solutions".

(Hulick, 2016)

The same phrases uttered by Alan Greenspan, where he summarised on the

issue of the world soon running out of oil by stating;

“If history is any guide, oil will eventually be overtaken by less-

costly alternatives well before conventional oil reserves run out.

Indeed, oil displaced coal despite still vast untapped reserves of

coal, and coal displaced wood without denuding our forest lands”.

(Greenspan, 2017)

This scenario observed in Figure 1.5 below where humans’ development is

not founded by the availability of the sources at each particular period but rather is

based on the advancement of humans’ knowledge and technological expansion.

Figure 1.5: Human Technological Evolution

These two profound people have greatly captured the macro effects of Hubbert's theory in having the greater foresight on the effect it would have towards the world energy scenario. Shell did acknowledge in 2004 that they had improperly accounted their reserves, misleading investors into thinking it had more energy reserves than it actually has. It does not matter the various different point of views they have, the bottom line is that the production of conventional oil, natural gas and other fossil fuel sources plus some non-fuel sources like Nuclear and Hydro would eventually decline once they have reach the peak sometime between 2010 and 2040.

This is the energy gap that would eventually need to be replaced as the world energy

demand would not decrease but instead multiply with the number of world populations[13].

The next push element is the negative effect of fossil fuel. In avoiding such negative effect, alternative source of energy as compared to the current fossil fuel energy is gaining preference (Talus, 2015). RE is a viable replacement of natural fossil fuel energy as the over-reliance on fossil and nuclear fuels eventually will endanger the very existence of humanity (Hansen et al., 2013). This global warming phenomena and climate change plus the pollution are now major global issues. The world is faced with a crisis that requires total transformation in the way we create energy; shifting to sustainable energy which flows freely from the sun, the wind, the tides, and the centre of the earth. Sustainable energy is welcomed because of its minimal negative impacts, either in the production or consumption, on health and the environment, which can be delivered uninterruptedly to coming generations (Omer, 2017).

In contrast, by looking at the pull factor or positive elements, OTEC being an

old technology and yet newly revived is a method of harnessing alternative energy

from the temperature differences of the sea (Boehlert & Gill, 2010; Hoogwijk & Graus, 2008; Masutani & Takahashi, 2001; Pelc & Fujita, 2002; Sukhatme, 2011).

This technology is very useful as it generates continuous undisrupted base load electricity energy supply and if not utilised the energy can be converted into hydrogen. On top of energy producing capabilities, there are other significant downstream activities that could be used to generate economic advantage like producing drinkable deep sea water, natural cooling system, ability to grow temperate produce at sea level, producing high-value cosmetic products, very conducive environment to conduct aquaculture fish produce and farms (Marziah, Azhim, Mahdzir, Musa, & Jaafar, 2015). OTEC has seen its test facilities over

[13] Primary energy consumption is estimated to increase by 37% between 2013 and 2035
(British Petroleum, 2015)

several countries in the world. Figure 1.6 below shows the current installations of

OTEC plants (operation and under construction) with several planned and proposed

locations. 98 nations and territories with OTEC access has been identified (Asian

Development Bank, 2014). Giving it a great potential for

explorations.

(Banerjee, 2017)

Figure 1.6: OTEC around the world

It was successfully implemented though it was a small scale testing facility in

Hawaii. The United States of America (US) is sensitive enough to reflect the need

for an alternative power source for them to create proper laws on OTEC. As a result,

in 1980 the Ocean Thermal Energy Act was introduced to regulate OTEC activities

in the US and supervise as
such.

Finally, the world ocean plays a crucial role in sustaining numerous

communities around the world. This makes ensuring the sustainability of the marine

environment crucial. Across the globe, there have been many serious threats to

health and vitality of the oceans. Among them are the destructive fishing practices,

marine pollution, the negative impact of climate change, disputes over fishing rights,

deep-sea oil exploration, and minerals extraction issues (Secretary-General Ban Ki-

moon, 2009). Efforts must be taken to find concrete solutions and addressing the

issues. OTEC could be able to ease such treats through its downstream activities of

ocean aquaculture by allowing production of high value fish farming near the base of

OTEC plants and land aquaculture where deep sea water fish like salmon and lobster

and other fish like *fugu* fish, abalone, seaweeds and species such as oysters, clams,

salmon, lobster, abalone, and trout can be raised in containers supplied by OTEC

deep sea water.

In detailing the feasibility of OTEC which involve the process of generating

energy from water with temperature difference of 20 degrees Celsius at sea level and

the temperature of the deep sea found at the depth of 1000 meter. OTEC plants use

the hot water on the surface of the sea as a source of heat (heat source) for the

bubbling liquid ammonia (liquid or the like) that turn into gas at a temperature at sea

level. This will rotate the gas turbo-generator to produce electricity. This gas is then

liquefied again in the condenser to cold water, as a heat sink, which is pumped up

from the deep sea, and in the process also produces clean water

Some OTEC demonstration plant has been built on the coast in various

countries show that the technology is proven and has been used to generate

electricity. Since the discovery of the potential renewable energy through

temperature difference of the ocean in 1881, OTEC plant was built in Cuba in 1930,

Abidjan in Ivory Coast (1956), Hawaii (1993) and Chennai in India (2002). At

present, some ocean thermal energy project was further developed ahead, to stage

large-scale commercial demonstration. This include plants in Hawaii (2011) and in

Japan (2013) and some new plants to be developed in Hawaii, Guam and Tahiti in

the Pacific Ocean; Diego Garcia and La Reunion in the Indian Ocean; and

Martinique in the Caribbean Sea and in some places in the ocean tropics and

subtropics.

Approach to the development of OTEC is quite different for each country and

is based on market supply and demand. For example the United States is to focus on

energy generation, Korea is a technology provider to the OTEC world, Japan is focused on the development of aquaculture and drinking water, France and the Philippines emphasize on the production of energy and Malaysia will continue to concentrate on the production of clean water and drinking water, aquaculture development and energy, including hydrogen.

The phenomenon of temperature difference of 20 degrees Celsius in the air at sea level and at sea in Malaysian waters are also available at the Gap Seabed Sabah (Sabah Trough) with an area of at least 34,000 square km. These findings are the results of a follow-up study on the project Malaysian Marine survey of the South China Sea (MyMRS) from 2006 to 2008 carried out under the National Committee of the Continental Shelf under the Secretariat of the National Security Council and with financial support from PETRONAS.

MyMRS Study results found that Malaysia has the potential to generate 105,000 MW of power in Sabah Trough. This enormous capacity is to be generated from the area having potential an area covering 131,120 square kilometres.

OTEC's industrial development is at potential to attract capital investment of

US $ 500 billion. Energy generation and some by-products of the sea in this area has

the future for electricity generated and can also be converted into hydrogen energy

which is the cleanest energy and 'green'. The world market for hydrogen fuel is

estimated to be worth more than US $ 1 trillion equivalent (£ 3.2 trillion).

Ocean Thermal Energy Corporation (OTE Corp.) of Lancaster, Pennsylvania

in the United States have strong financial resources and a variety of technologies that

can accelerate the development of deep-sea thermal energy source and they have

expressed the desire to invest in Malaysia. On May 16, 2012 a meeting was arranged

between Y.A.B. Prime Minister of Malaysia and Chairman of the Company OTE

Corp. in New York. The result of this discussion Y.A.B. the Prime Minister directed

that legal and policy framework to be developed for OTEC and suggested that OTE

Corporation is authorized to help any agency in conducting a ‘feasibility study’ for

developing OTEC plant in Malaysia.

A number of initiatives were undertaken in collaboration with various

ministries, central agencies and other interested States since 2009 to realize the

construction of deep sea thermal energy sources in the East Malaysian waters as per

Table 1.1 below. It is to be noted that to date there were more than 100 meetings and discussions with various parties[14] and the finalisation of a pre-feasibility report made on the Pulau Layang-Layang location by DCNS and UTM OTEC in May 2017 (Tidal Energy, 2017).

Table 1.1: OTEC Initiatives in Malaysia from 2009 to 2013

No Date Activity

1. 13 April 2006 - 7 Nov 2008 Kajian Marine Research (MyMRS) conducted a research in the South China Sea including Sabah Trough. 2. 24 Sept 2009 Presentation to the Deputy Minister of Ministry of Science, Technology & Innovation on the Prospect Towards Sustainability; Ocean Thermal Energy 3. 3 Nov 2011 Presentation to the Minister of Energy on Ocean Thermal Energy Development; Prospect off Sabah. 4. 10 Jan 2012 Presentation to the CEO of MIGHT on Ocean Thermal Energy Development; Prospect off Sabah. 5. 22 Feb 2012 The 91th meeting by the Board of Directors of MIMA leads the initiative for the development of OTEC in Malaysia 6. 10 Mei 2012 MIMA hold a meeting with Stakeholder on OTEC development. 7. 16 Mei 2012 The meeting between The Prime Minister with Chairman of OTE Corp Company in New York. The result of this discussion The Prime Minister has agreed and suggested that OTE Corp be authorized to assist in carrying out the Possible Review for the Development of the OTEC Project in Malaysia. 8. 6 Jun 2012 Presentation to the Minister of Co-operation on Ocean Thermal Energy Development; Prospect off Sabah. 9. 8 August 2012 MIMA Board of Directors' Meeting to 93, whereby MIMA reviews the OTEC Policies and Legislation in Malaysia as well as prepares the Draft of the Cabinet Paper on behalf of the Minister of Transport. 10. 11 Sept 2012 Presentation to PEMANDU - Energy Group on Ocean Thermal Energy Potential in Malaysia 11. 3 Jan 2013 UTM builds the OTEC Excellent Centre (UTM OTEC) 12. 2013 UTM enters Memorandum of Understanding (MOU) with the Institute of Ocean Energy, SAGA University and UTM & Xenesys Incorp. in Japan 13. 8Julai 2013 Presentation to PETRONAS Group on Proposed Supply of Electrical Power and Potable

[14] This is based on the interview input from PU1 who for confidentiality issues, do not want further detailed disclosure to be made of OTEC current activities (from 2013 to 2017), as the matter is actively pursued by the government of Malaysia.

Freshwater from OTEC and OTEC Development; Prospect in Malaysia 14. 9 July 2013 Presentation to Economic Unit Planning (EPU) on Ocean Thermal Energy Development; Prospect off Sabah. 15. 17 July 2013 Presentation to the Ministry of Education recommends Concessions to UTM for OTEC development under the

2012 Regional Sea Act and Exclusive Economic Zone Act 1984.

On the 3rd of January 2013, UTM's - UTM Ocean Thermal Energy Centre

(UTM OTEC) was established.

Since its inception, UTM Ocean Thermal Energy Centre (UTM OTEC) has

taken various initiatives and various activities including the impact of policy and

advocacy for investment promotions in the commercialization of technology in

ocean thermal energy
sources.

As a result of these efforts, in addition to introducing the subject of the sea

for the first time in the 11th Malaysia Plan, several Special Purpose Vehicles (SPVs)

have been established.

On the 20th of April 2016, UTM Ocean Thermal Energy Centre (UTM

OTEC) has secured financial assistance in the form of Indirect Offset totalling 10.4

million euros that was used to carry out a pre-feasibility study as the beginning of

preliminary feasibility studies. EIA report needs to be generated to obtain findings

that can be used in the process of approval for the development of deep sea thermal

energy source in Sabah
Through.

As conventional energy sources in the country which is the largest petroleum

and gas is almost depleted predicted or very difficult to be extracted, efforts are

underway to diversify energy sources, particularly exploring the potential of energy

production from renewable sources (renewable energy). With the discovery of a

relatively wide area in Sabah Trough potential to generate 105,000 MW power

capacity which is able to attract capital investment of at least USD 125 billion for

electricity generation, hydrogen production is a boon and business opportunities that

should be sought after immediately.

Where development of OTEC as a power source would lead to a Key

Economic Area (New Key Economic Area (NKEA)) which would able to contribute

to the improvement of income for the country and reduce the flow of money out of

the country through the activities of commercialization of the product water (to a

minimum and uses industry), aquaculture (tiger prawns, fish, weed) health products

and cosmetics and energy (hydrogen) and batteries and
so on.

OTEC is a source of renewable energy as an alternative to land and sea

transport system with the production of vehicles powered by hydrogen and hydrogen-fuel.

OTEC is able to contribute to the Government's commitment in implementing policies, especially green technology by reducing carbon emissions intensity of 40 per cent to GDP in 2020 compared to 2005 (as a baseline).

To realize the construction of OTEC countries, four (4) main activities are to be carried out of getting [the water column (water column rights)] [concession]; OTEC feasibility study for development; demo power plant construction and technical development of physical infrastructure and ancillary products for commercialization activities.

In terms of the justification for such a project, terms benefits shall be obtained by the state, universities and research institutions, local industry and community / community of OTEC development efforts.

(A) Country

From the perspective of the development of renewable energy, OTEC has a better prospect, realistic and competitive with other energy sources and by reducing

dependency on energy resources, especially non-renewable petroleum and gas.

OTEC reduces the reliance of fuel import. The Government has disclosed that Malaysia is a beneficiary of declining crude oil prices because the country is a net importer, and not exporter, of the commodity and petroleum products, if liquefied natural gas (LNG) natural gas (LNG) was not in the equation (The Star, 2017).

OTEC will reduce the capital expense to Power Company and Government in the generation of electricity and OTEC will be able to stabilise utilities pricing. The Malaysian power generation industry in Peninsular Malaysia alone had spent more than RM15bil per annum to meet the demand for electricity and this amount could spike this year due to high prices of fuel and coal. It raised questions whether the tariff rebate of 1.52sen kWh announced by the government in 2017 will be maintained as fuel costs soar (The Star, 2017).

Furthermore OTEC is stable in utilities pricing because it retains its overhead cost by not relying on oil or coal therefore reducing the burden on existing utilities by providing significant energy cost savings allowing for power usage to be

increased affordably. This significant changes and benefit can be seen in the figure

below when OTEC power generation plant cost is compared to oil production based

electricity plant. Figure 1.7 below is a study conducted to compare the cost saving of

OTEC 100MW plant compared to a 100MW oil based power generating plant where

for over a period of 21 years would allow OTEC to save USD5 billion in the cost of

electricity power generation.

(Mizuan, 2017)

Figure 1.7: Cost comparison of a 100 MW OTEC and Oil based plant.

OTEC commercialization of products is able to generate substantial revenue

for the state as well as a positive side effect on the national economy through

technology transfer and development of various ancillary industries. For example,

OTEC development in Kume Island in Japan has produced encouraging investment

returns with so many by-products of OTEC. Figure 1.8 below is the distribution

chart which is based on the income generated from OTEC Deep Sea Products (Deep

seawater) in 2009 on Kumejima Island in Japan. The OTEC activities there has

increase the standards of living for Kumejima residences when Kumejima becomes

the largest market share of Sea Grapes and Kuruma Prawns in Japan generating 20

million yearly revenue when utilising OTEC technology (Ikegami, 2017)

(Ikegami, 2017)

Figure 1.8: Revenue distributions from OTEC Kumejima in 2014

Increase the export earnings of Malaysian-made products to the world class

and this impact on the Branding (Malaysia Brand) and is able to put Malaysia as a

country that successfully develop and add value to local natural resources of the deep

sea.

Make the island and Pulau Layang-Layang as Bandar Baru (New City / Valley) based on Green Technology (Green Technology) and the adoption of innovation culture.

(B) Research Universities & Research Institutions

Expand the production of new knowledge, intellectual property and technological innovation.

Enhance the development and commercialization activity and the development of OTEC Technology Innovation.

Contributing to the new curriculum and various references (Case studies) can improve the quality of learning and experience graduate through research.

Produce more researches and publications in the field of OTEC. Intensifying strategic alliances, particularly at the international level through active involvement of the research and commercialization of OTEC.

Increased revenue for UTM especially with the increasing number of students

and through the involvement of UTM OTEC Sdn. Bhd. in plant construction

business management and commercialization of OTEC technology.

(C) Local Industry

The existence of local industry sectors including energy, healthcare,

pharmaceuticals, agriculture, aquaculture, water, environment, education,

information technology, biotechnology and tourism and provide new business

opportunities for investors and companies at home and abroad.

The increasing number of local companies, particularly on the island and in

the vicinity of Sabah and Sarawak with the building of infrastructures and world-

class facilities.

Improving the statistic of workers coming into all various multi-sectors to

increase the number of customers in Pulau Layang-Layang and Pulau Banggi Island.

Later, Layang-Layang Island will have one community life, economic activities,

social activities, agriculture, and fisheries.

(D) Public / Community

OTEC plants producing clean water in large quantities to meet the needs of

the population of 20,000 people per MW of electricity generated. This means, when

OTEC power generating capacity has reached 1500 MW of production, there will be

clean water to accommodate the needs of 30 million
people.

The supply of clean water to the local population can improve public health

and marketing of mineral water of the sea will give high return on
capital.

Deep sea thermal energy is environmentally and eco-friendly, especially in

terms of community safety, occupational health, handling and disposal of radioactive

waste. For example, water from the sea sucked by OTEC plants, contain nutrients

from organic materials in the sea floor that can be used for the benefit of marine

culture. Saline water from the sea (deep waters) will not be released to the open sea

(open waters) but use to generate additional electricity via a scheme of different

levels of salinity (salinity differential). In this process, precious metal such as lithium

metal can be isolated through beneficiation process.

OTEDD would provide employment opportunities to the local community and can help reduce poverty among the local population as well as to raise the standard of living in terms of learning, transportation, public utilities, tourism, the environment will be conducive and so on.

The above are some main factors directly impacting OTEDD activities. Nevertheless, OTEC technology implementations do cross other factors which are of legal significance, particularly in respect of issues of maritime rights, sovereignty and international law.

For example, the United Nations has and in many instances shown to be the paramount medium of world dispute body entrusted with not just sustainable development but global peace agenda and one of the main contributions is by holding the first United Nations Convention on the Law of the Sea (UNCLOS I) in 1956. The process of negotiations and discussions went on over several decades and ultimately achieved a mutual agreed “constitution of the sea” (Basse, 2017), governing issues such as setting parameters, maritime navigation, deep seabed mining, islands and structure status, protection of the marine environment, exclusive

economic zones, continental shelf jurisdiction, scientific research, exploitation regime, and dispute settlement. These matters are fundamental toward shared responsibilities for the protection and preservation of marine environment so that the ocean can continue to sustain us from the present until the future. Due to this interest over RE growth, the need for a local, regional and global regulatory frameworks on ocean energy management for common and mutual benefits is vital. OTEC, therefore, takes centre stage as its development in general, is usually located far out at the depth of the sea needed for the technology to take effect.

Given that in today global setting, with regards to dwindling of easy accessible resources. Many countries look at the ocean for additional resources in compensating such concern. Hegemony, being current trends of dominance and control applied by many countries around the globe, extends to the control over the seas. The role of government control has been examined from a great range of studies. The concerns of this thesis, however, is mainly about issues like governmental control, environmental concerns, livelihood of fisherman, international obligations. These issues are pertinent to the question of the need for regulatory control of OTEC development.

With regards to governmental control, one of the oldest and simplest

justification for government control is the ability for them to give protection to the members of its society.

Thomas Hobbes' Leviathan (Hobbes, 2017) describes about the condition of continuous insecurity if there is no proper government control in providing the society with the safety of law and order that would protect its citizens against internal conflict and foreign opponents. Issues of not having government control over any activities could expose the country to issues like economic downturn would then destabilise the country's political, economic, social and environmental positions. National social and economic needs are identified and expressed by people themselves, by politicians; community groups and sometimes by the experts, like those involve with development and policy planners. These needs are translated into activities which formulates into plans, policies and development actions. The control enable constructive planning which are basically derives from the need to satisfy these needs on the ground of rationality and be the technical framework. This crucial step is towards having an integrated development planning that would relate and involve other social and economic planning and reflects the overall management of the activity. OTEC development must be controlled in order for the government to

formulate plans, policies and development actions which enables a better integration

of OTEC activities and the overall national development
plan.

The overall OTEC development planning also takes place within a legal

context. At this stage, serve it to state that the legal context provides the justification

for undertaking OTEC development planning which will fall under the powers and

duties of agencies responsible for the planning function - the Prime Minister's

Department which is to determining the services of all divisions are implemented

according to policy, legislation/regulations and current guidelines on a particular

matter. The legislation will sets out the procedures to be followed, the conditions

under which they may be carried out and the matters to be covered in executing both

the development planning and development control functions. The law will enable

provision for revising plans and policies thereby ensuring such particular

development, which in this case, OTEC are always current and relevant to the

country's development needs.

Furthermore, the law would help to address and provide remedies on affected

persons from the planning and development decisions/activities and would also

include penalties for those who fail to comply with the provisions of the legislation.

These issues are to be addressed in considering OTEC activities in Malaysia.

Likewise, in addressing the need for international obligations, Malaysia, under the principle of international law as a framework for the practice of stable and organized international relationship and to ensure mutual protection of the seas and sovereignty, has ratified the United Nations Convention on the Law of the Sea (UNCLOS) declaration on the 14th of October 1996. The Exclusive Economic Zone (EEZ) as being an exclusive sea zone under the regulatory framework of the UNCLOS gives mandate and rights of all states to explore and use marine resources located within 200 nautical miles from the state baseline.

In addition, the Malaysian Government has enacted the Exclusive Economic Zone Act 1984 and Continental Shelf Act 1966 which establish the Malaysian sovereign rights over exploration, exploitation, management, and conservation of marine resources. It further provides Malaysia with ample means to enforce jurisdictional powers over the establishment and the use of artificial islands which include its installations and structures, marine scientific research and the protection and preservation of natural environment. This is further strengthened with the enactment of the Territorial Sea Act 2012 (Territorial Sea Act 2012). Due to its

ability to explore and cultivate new sea areas, Malaysia has gained abundance sources of income from offshore oil extraction plants off the coast of Sabah, Sarawak, and Peninsular.

Given the multiplicity of claims by several countries over the development area of OTEC, namely the Spratly Islands, it has magnified the urgency of reviewing the current available regulatory framework in restraining hegemonic influence over the sovereignty of Malaysian waters.

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Turning to the importance of regulations, lessons can learned from the lack of proper regulations are Arthur Andersen, Adelphia, Enron, and WorldCom. They seem to indicate the inability of the law to control economic activities. Millions of investment money were lost through malpractices and negligence. Indeed, law could not be seen as the only tool in ensuring good behaviour but not having sufficient laws are less bad than not knowing whether the law is adequate or not. This would be a major demerit. Law has a duty to control and regulate society conducts. Imagine what would it be like if there is no law regulating the Enron issue, to begin with? In addition, Enron entails that rushing out a new law without proper investigations will definitely have its defects.

This lacuna can be utilised by many to gain a leverage and to avoid the grip

of law. In their paper, R. David Mclean, Tianyu Zhang and Mengxin Zhao (2012)

states that the predictions of investment are much stronger in countries where there

are increased investor protections and this significantly ensure in obtaining external

finance to fund their investments. OTEC investments should be significantly

protected by the law in avoiding extensive losses.

In mentioning further on legal regulations, the Petroleum Development Act

1974 (Act 144) (PDA) and Atomic Energy Licensing Act 1984 (Act 304) are two

legislation created for the regulation of both energy; petroleum and nuclear in

Malaysia. The PDA gives full authority in creating a specific corporation; the

Petroleum Nasional Berhad (PETRONAS) as the custodian to take full authority

over petroleum without the need to be control and regulate directly by any regulatory

body save for an advisory body; the National Petroleum Advisory Council and the

Act. This law gives power directly to the Prime Minister to make such regulations as

appose to the majority of other Acts which either give the power to the Yang di-

Pertuan Agong or Ministers. On the other hand, the Atomic Energy Licensing Act

1984 is an Act which was created specifically for Atomic Energy. Though nuclear is

not RE, this Act serves to highlight that even though the technology is yet to be implemented in Malaysia, laws created are of futuristic legal provisions nature, in its aims and purposes.

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With respect to the concerns to control matters concerning sovereignty as well as issues pertaining to the ability to maintain and preserve all aquatic flora and fauna, Malaysia has ratified UNCLOS on the 14th October 1996 and came into force on the 13th November 1996 (Division for Ocean Affairs and The Law of The Sea, 2017). The convention among others allows Malaysia to claim its marine rights and enforces its territorial sovereignty over sea areas mentioned in the said convention.

EEZ establish the sovereign rights over exploration, exploitation, management, and conservation of marine resources. It further provides Malaysia with ample means to enforce jurisdictional powers over the establishment and the use of artificial islands which include its installations and structures, marine scientific research and the protection and preservation of the natural environment.

Due to its ability to explore and cultivate new sea areas, Malaysia has gained

an abundant source of income from offshore oil extraction plants off the coast of Sabah, Sarawak, and Peninsular. This abundance of resource gives rise to issues such as royalty and exclusive rights; as although territorial waters are a matter of sovereignty of the nation, but given the socio-political and geographical location of the activities are off the coast of individual states might be of concern in addressing such issues over the commercialization of deep sea water there.

While the world ocean plays a crucial role in sustaining numerous communities around the world. Across the globe, there have been many serious threats to the health and vitality of the oceans. Among them are the destructive fishing practices, marine pollution, the negative impact of climate change, disputes over fishing rights, deep-sea oil exploration and minerals extraction issues. Efforts must be taken to find concrete solutions and addressing the issues. In maintaining ocean sustainability, United Nations entrusted in sustainable development and global peace engaged the issue in the 1958 Conference on the Law of the Sea (UNCLOS I), where the signing of several Conventions; the Convention on the Territorial Sea and the Contiguous Zone; the Convention on the High Seas; the Convention on Fishing and Conservation of the Living Resources of the High Seas; the Convention on

the

Continental Shelf. The process of negotiation and discussions went on over several

decades and ultimately achieved a mutual agreed “constitution of the sea” (Basse,

2017), governing issues such as exclusive economic zones, setting limits, navigation,

island and marine structures status, continental shelf jurisdiction, deep seabed mining

exploration, the exploitation of marine resources, protection of the marine

environments, conducting scientific research, and dispute resolution mechanism

(Caminos, 2017).

These issues are of fundamental importance toward a shared responsibility

for the protection and preservation of the marine environment so that the ocean can

continue to sustain us from the present to the future. The EEZ as being an exclusive

sea zone under the regulatory framework of the UNCLOS gives mandate and rights of all states to explore and use marine resources located within 200 nautical miles[15] from the state baseline whereby OTEC activities are likely to be within such range[16].

It is also to be noted that there are very few legal data or materials available

on the topic of OTEDD activities globally. This shortfall is further compounded by

the fact that OTEDD activities have never been applied in Malaysia and there had

been no local legal studies conducted yet on this issue. The issue whether there is

enough legal consideration in terms of regulation in ensuring OTEDD activities to

conform to the requirement of legal responsibilities, making the answers to the issue

being paramount to the whole development. As stated by Dr. Marvin Resnikoff

(Reson, 2013), who in 1974 help the Attorney General of the New York State take

the Nuclear Regulatory Commission to court regarding liquid plutonium handling

flying out of Kennedy Airport which by law is to only mandated to be in canisters

that simply have to withstand a drop of just 30 feet, was later changed by Congress

in 1980 to be mandatory to be placed in plutonium canister so that would withstand

airplane crash similar to black box. He further commented on the incident by saying

"...the Nuclear Regulatory Commission doesn't have all the answers... [t]o your

questions".

[15] Article 57, UNCLOS 1982: Breadth of the exclusive economic zone; *the exclusive economic zone shall not extend beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured.*

[16] OTEC proposed location for Pilot Plant would be at Pulau Layang-Layang which is located 162 nautical miles from the Malaysian baseline.

The same goes for discussions conducted in the US which have resulted in a creation of a specific law on OTEC there. Even that, the material and discussions are old as they are made in the 80's and especially when it merely concern with licensing of OTEC rather on the evaluation of its activities, except on matters of environmental protections.

In summary, this study seeks to explore and justify the preparedness of the available laws in regulating OTEDD activities through of its research findings. This is because, OTEC research project and associated programs create a new venture in promoting advanced ocean technology, which can be categorised into upstream activities where exploration and production of electricity, middlestream activities like production of hydrogen, ammonia, and downstream activities of producing various products as a spinoff products from the OTEC technology development itself. Figure 1.9 below lists the spin-off of OTEC technology which comprises of deep sea drinking water, mariculture, aquaculture, health and cosmetic, temperate produce, high-value products and lithium production (Marziah et al., 2015). In addition Figure 1.10 further itemises other capabilities of downstream activities from an OTEC plant.

(Bakar, 2015)

Figure 1.9: OTEC technology spinoff products

(Banerjee, 2017)

Figure 1.10: OTEC plant - downstream activities

Thus, since legal issues exist in relation to scientific exploration and

exploitation of OTEC particularly when there is yet to be a legal research being conducted in light of the enormous economic scale involved, merit equitable reassurance. Furthermore, concerns over the protection of the marine environment and impact from any development, having a possible adverse negative impact towards sustainability of the marine ecosystem is certainly favoured. Lastly, the legal issue of safeguarding national interests in maintaining its territorial waters and ownership warrants suggestions on possible and practical recommendations in terms of new regulations to the government in the implementation of an OTEC.

Therefore, in conclusion, this research is needed because of the need to clarify such situations using substantive data analysis that would be able to accept or reject the research hypothesis which states that, ensuring adequate regulatory provisions within ocean RE regulatory framework is crucial in enhancing and success of OTEC implementation in Malaysia plus ensuring justice and fairness to all parties affected and involved in the development activities.

1.3 Research Problem

Presenting a clear and informed research problem would enable not just about finding the precise solution to the problem(s) raised, but provides “a rationale

or need for studying a particular issue" (Maxwell, 2007), thus enabling the research

to be conducted in a more systematic manner. Hence, the need in justifying why

Malaysia need to have such legal framework on OTEDD in the first place, when it is

believed that she has already secured all the necessary energy (electricity) needed for

the growth of the country.

Granted that Malaysia is an oil-producing countries, her oil and natural gas

reserves are not infinite and these resources will ultimately be exhausted in the

future, which is going to be a serious problem for the country and the national

interest. This is especially when the current energy of electricity is contributed

mainly from the burning of non-renewable sources like oil, gas and coal.

It was estimated that Malaysia would be an importer of electricity energy by

2019 owing to the ever increasing domestic energy consumptions. In the National

Energy Security Conference 2012, it was acknowledged that with the current status

of energy demand and supply balance, Malaysia is projected to be a net energy

importer by the year of 2019. This would indeed be a grave condition for the

Malaysian energy security scenario (Figure 1.11 below).

(Nordin, 2017)

Figure 1.11: Energy Demand-Supply Balance

Studies on technological feasibility and economic gains from OTEC activities are very promising. Thus, these factors have led the Government in seeking exploration of alternative ocean renewable technology such as OTEC in its 11th Malaysia Plan. However, studies had shown that lack of regulatory provisions would only lead to failure of such new developments, impacting negatively towards social, economic and environments.

First and foremost, the reason why there is a need for a law to regulate an industry that is yet to be established, plus the possible proposal of a new draft of

the

legislation, specifically for OTEDD, is to look at the PDA.

It was formulated to transform a domestic-based national oil company, into a

fully integrated oil and gas multinational corporation that had seen many significant

milestones charted. From the initial 15 workers to 53,000, it has ventured the

upstream and downstream activities of petroleum and gas, worldwide (Petronas

Berhad, 2016). It enables to provide for exploration and exploitation of petroleum,

whether onshore or offshore, by a corporation in which will be vested the entire

ownership in and the exclusive rights, powers, liberties, and privileges in petroleum,

and to control the carrying on of downstream activities and development relating to

petroleum and its products.

Even though oil exploration had first started in 1919 in Sarawak, but since

then, there was also exploration in other parts of Malaysia such as like in the waters

of Terengganu and Sabah. Therefore, a concerted effort in managing such activities

is needed. Purposely, this law was created, in order to facilitate the consolidation of

all petroleum activities in Malaysia into one entity, responsible for the overall

coordination and functions of oil exploration and commercialization activities

within

Malaysia. This involves taking advantage of the profitability factors in oil pricing, moving away from traditional method of concession approach towards the Production Sharing Contracts, growing economic nationalism to have more governmental intervention in economic sector, achieving the aim of the New

Economic Policy by creating Bumiputera businesses and entrepreneurs, are some of

the factors for the establishment of PETRONAS through the formulation of the PDA

(Mehden & Troner, 2007). The government of Malaysia was also made to understand that foreign concessionaires did not properly inform their activities, discoveries, and developments which resulted in such information unable to be briefed properly to members of Parliament (Leon Howell & Morrow, 1974).

Leslie Lopez (Lopez, 2003) in her article commented that PETRONAS as a

national oil company that operates like an international oil company might be facing

issues of balancing between enterprising and politics. The legal provisions provided

in the PDA put the Corporation to be subject to control and directions of the Prime

Minister who may, from time to time issue such directions as he may deem fit.

Therefore, the main purpose of OTEDD is very much similar to the

purpose of the PDA, given the fact that it is a new development activity with massive upstream and downstream exposure. It should not be put to wait for more than half a decade, just to have a specific law regulating its development. Given the issues that might arise with the government having often exposed PETRONAS to political meddling over the years, resulting in the redirection of its core business to those inclined to political masters (Victor, Hults, & Thurber, 2012), having a law for OTEDD can stop exposing various possible entanglements in the future.

Secondly, by witnessing any development in Malaysia or anywhere in the world, there must be some regulatory mechanism or system in placed prior to its development either prior of later in the stage. Never there is, in any new development, left with a vacuum of non-regulations or laws. There will be some kind of regulations which would precede the development either in the existing laws or regulations. For example, a registered company cannot start a company legally without the approval of some superior agencies; the regulatory agency which regulates businesses and in Malaysia we have the Companies Commission Of Malaysia (CCM) where Companies Act 2016 [Act 777] is the prevailing law on company registration in Malaysia. Then, there is the environmental laws which govern all types of activities impacting the environment. The law that was enacted to regulate all activities is the Environmental Quality Act 1974 [Act 127], empowering

the Minister of Environment and Department of Environment (DOE) to take charge

on matters involving the environment; either in approving or penalising those who

conduct activities without the approval of the department. Without the CCM and

DOE approval, a new development like OTEC cannot take
place.

One example where the Parliament enacted a new law prior to the subject

matter existence is the Atomic Energy Licensing Act 1984 [Act 304]. The law was

enacted in 1984 when there was no nuclear development then and even today but the

law was enacted anyway with the anticipation that should the need arises then there

will be a law that could regulate such activities rather than relying on other

supplementary laws or awaits a particular law to be passed by the Parliament. This is

also the case of OTEC in the United States. Until today there is no commercial

OTEC plants but without the law, the promotion of the activities and related

development in research cannot be properly
done.

The problem with OTEC is that given the nature of the development which is

huge both in investment and its impact, it cannot allow just any regulatory parties or

any laws in Malaysia without the need for a specific law to regulate it further. The

DOE laws and regulations are not suffice. Unless there is pre-existing law available

to cater for OTEC activities then OTEC development cannot take place. The current

discussion on laws regulating renewable energy is very vague. There is no mentioning of OTEC as renewable energy in any laws in Malaysia.[17]

When discussing the area of renewable energy the only available law to date

on RE is the Renewable Energy Act 2011 [Act 755]. However, it is to be noted that

this particular act mainly covers the “feed-in tariff” (FiT) for the commercialization

of RE in Malaysia. It does not go further to encompass the scope of development,

implementation, and commercialization of renewable sources of energy including the

use (land and sea), project development and finance issues encountered by

[17] The proper discussion on the issue will be discussed in Chapter 5, under 5.3 (Statutory Analysis).

developers of RE projects. Thus, considerations to a more robust inquiry about the

current legal provision over RE law and OTEDD are

welcomed.

As businesses like OTEDD will involve massive capital investments, involving billions of capital funds, guarding the investors' interest would be a priority. What better way is there than to ensure proper protection from the creation of a new legislation to achieve such goal. A proper law will further provide confidence and security to potential investors, be it local or foreign.

Enriching potential investors' knowledge toward evaluating various legal impacts of OTEDD activities is crucial for its success. Without sufficient knowledge, private and public investors, local or foreign are sceptical on investing. This is true when investments are the most crucial elements in ensuring the success of OTEDD activities. Without financial support, OTEDD activities are merely a dream. Securing their investments through proper legal provision is important.

This study in every aspect supports the National Renewable Energy Policy which emphasises the core of the policy on RE is the strategic thrust 1 that aims to introduce legal and regulatory framework (refer Figure 1.12 below). It is clear that the main core of Malaysian RE Policy is the introduction of a legal and

regulatory

framework. This is a clear aim set out by the policy created by the Prime Minister's

Office of Malaysia.

(SEDA, 2017)

Figure 1.12: Malaysian National Renewable Energy Policy

This strategic thrust is directly in line with the five strategic pillars of the new

energy policy under the Tenth Malaysia Plan 2011 – 2015 for a reliable, high-quality

and cost-effective supply of energy (including RE) where it is fundamental to attract

new investments as well as encouraging existing industries to expand into high

value-added activities.

The strategic thrust as per Figure 1.13 below, corresponds with the five

strategic pillars, based on the forecast of energy needs for Malaysia.

(EPU, 2017)

Figure 1.13: Strategic Pillars of New Energy Policy

The problem with OTEDD is that it is a newly proposed economic activity to be introduced in Malaysia but is seen as not having the proper presence of a regulatory mechanism to regulate its activities, thereby forming a possible barrier to its implementations. Studies have shown that regulatory barriers is one of the most important barriers prevailing over all stages of development; research & development, manufacturing and development/deployment (Dalton, Rousseau, Neumann, & Holmes, 2009; Lubieniechi & Smyth, 2016; Sen & Ganguly, 2017). Hence, this understanding is critical towards OTEC development proposal in Malaysia, especially when it would involve investments amounting to hundreds

of

millions of ringgit, making the intention of commercialising OTEC technology

practical, if financial gain is to be realised (Luis A. Vega, 1992). This is akin to the

famous statement made by Warren Buffett as the second wealthiest person in the

United States, and the fourth wealthiest in the world; ‘First Rule of Investing’, is

never to lose money (Hagstrom, 2014). Therefore, the possibility of profitability and

success of any new economic development is thereby closely connected to the ability

of regulations in providing proper protection to investments.

As a result, development is therefore only practical and feasible whenever

investors are confident of their investment in terms of the available laws to protect

and secure their vast investments. This is merely logical, given the high cost and the

competition in terms of prices with electricity generated from fossil fuel. This is

particularly important when OTEC has been able to provide not just the production

of electricity but also on secondary activity. As highlighted by Vega (Luis A. Vega,

1992), the first generation of OTEC plants is capable of producing electricity and

desalinated water in order to offset the relatively higher cost of electricity. Therefore

the security towards investors' capital investment could only come from not just a

mere provisions of the law which allows such activity to take place but goes further

by bringing confidence through a comprehensive regulatory framework. In addition,

it is not just merely the investors benefiting from such framework but beneficial to

all other stakeholders who are involved with such activity, which this thesis is trying

to address. The impact could be seen from looking at the immense proportions

of

economic activities that will be generated and thus a sound economic

implementations is a must to ensure adequate regulations in encouraging local and

foreign investments (McLean et al., 2012), protecting the natural environment

(McGuire & Lynch, 2017) ensuring Soft Energy Path (Xu & Ni, 2017) and providing

adequate security to stakeholders. It is said that, without proper regulations, the

cohesiveness of economic success and social integration are futile (Ross, 2017). Any

kind of prolonged existence without a suitable regime of regulations might lead to a

possible collapse of any given economic activity (Gabrielson, Hall, Meyer, &

Schlosberg, 2016; Hausmann & Rodriguez, 2014; Iizuka & Zanlungo, 2016). The

issues of disorganization and the overlaps in authority, functions, and decision-

making have negative impacts and would result in business decisions, taking

as a business undertaking for attaining profitability plus economic and social benefits

from commercialising its activities.

Thus, sustaining an economic activity is, therefore, vital to the well-being of

not just everyone related to that activity, but to every single member of that society,

be it nationally or globally. No single activity nowadays can be said not to be

affecting everything else. It is the reality of our current global social makeup. OTEC

being a development, would not only bring positive impact but could also bring

negative result as pollution and environmental impact concerns are real. Basically

these writers are trying to arrive at a conclusion that is about the imperative need for

a soundproof mechanism that would ensure justice for all stakeholders both local and

international. For, without justice, there is no real need for an economic activity to be

implemented if in the end it is not just the collapse of such activity but the results of

injustice in one way or another towards all members of that society.

Justice cannot be said to be done until it is seen to be done. Mere assumptions

alone is not enough. Suppositions based on the existence of various laws in regulating any new economic activity is considered inadequate unless a research is conducted to verify its adequacy. This is especially true when such an activity would have great potential impact (both positive and negative) towards the whole society.

There should not be a wait for incidents like the Torrey Canyon disaster for being the worst oil spill back in 1969 to trigger the need for a review on the conventions on marine pollution from ships, 1969 conventions on civil liability and intervention on the high seas, and the 1973 convention on the prevention of pollution from ships. Furthermore, the incident has become the highest shipping tragedy at that time, where claims by both, the British and French governments towards the ship owners was to be the biggest oil claim in marine history. Not forgetting that the impact on the environment where it was estimated 15,000 sea birds were killed, along with huge numbers of marine organisms. Much damage was also caused by the heavy use of so-called detergents dispersed by 42 vessels sprayed over 10,000 tons of these dispersants onto the floating oil and on beaches.

Like the saying, “preventions is always better than cure, therefore, this

legal

plus qualitative research is needed to justify all the issues mentioned above. Data

discovery of all available relevant and related legal provisions connected to the

OTEDD are essential to be discovered, in formulating an ideal regulatory framework

to control and regulate OTEDD activities effectively in Malaysian waters.

Then there is the question of why the need for the law prior to getting the

government interest over this new endeavour.

OTEC project is very important to ensure the rights of consumers of the

maritime waters of the water column throughout the country, to secure and free the

nation from external threats. If there is no strong measures to defend the sovereignty

and maritime rights in the country, then it will affect the security and peace of both

countries and the region.

(A) Legal Implications

Although new laws and regulations for OTEC should be enacted; Territorial

Sea Act 2012 and Exclusive Economic Zone Act 1984, is deemed sufficient.

In the territorial waters (territorial sea) and under the Territorial Sea Act 2012, the power to make regulations is under the jurisdiction of the Prime Minister

in accordance with section 7 of this Act:

> *"7. The Prime Minister may make regulations as may be necessary*
>
> *or expedient to give effect to the provisions of this act entirely."*

Under the Exclusive Economic Zone Act 1984, Malaysia has the following

rights;

> *"4 (a) sovereign rights for the purpose of exploring and exploiting,*
>
> *conserving and managing the natural resources, whether living or*
>
> *non-living, of the seabed and subsoil and superjacent waters, and*

> *on other activities for the economic exploitation and exploration of*
>
> *the zone, such as the production of energy from water, currents*
>
> *and winds; "*

and if allowed by section 5 of this Act "... someone ... could in the exclusive

economic zone or rig explore or exploit any natural resources, whether living or non-

living; carry out any research work, digging or drilling; conduct any marine

scientific research; or construct or authorize and regulate the construction, operation

and use of - (i) any artificial island; (ii) any installations or structures for the

purposes provided for in section 4 or for any other economic purposes; or (iii) any

installations or structures which may interfere with the rights of Malaysia in the zone

or continental shelf. "

In Malaysia, there are other laws: the Energy Commission Act 2001,

Sustainable Energy Development Act of 2011 and the Renewable Energy Act of

2011. None of these laws have specific statements on the subject "ocean thermal

energy". However, the law as well as two laws that deal with the country's maritime

jurisdiction are sufficient to control any project proposals related to ocean energy,

including OTEDD. With the definition of "renewable energy" under the three

relevant laws on renewable energy, ocean thermal as renewable source of renewable

energy is not listed.

Although the term renewable energy is not mentioned and not listed under

the law, the definition is broad enough to include the subject of "ocean thermal

energy", "renewable energy" which means energy which is not depleted when used

and includes energy obtained from energy sources such as biomass, hydropower,

solar power, geothermal power, wind power, waves and tides. The word "like"

suggest that any other forms of renewable energy, including ocean thermal energy,

can be included.

Similarly, under section 2 of the Renewable Energy Act 2011 the word "hot"

referred to in the definition of "renewable energy installations" and "renewable

energy installations" mean "assembly that generates renewable energy and includes

any facilities and installations technical converts the mechanical, chemical, thermal

or electromagnetic energy directly into electricity". Therefore, any installation of

thermal power plants are governed by this
law.

In another situation, the Sustainable Energy Development in 2011, the

subject of "continuous power" means "energy, generation, allocation and use, is that

it meets the needs of the present without compromising the ability of future

generations to meet their needs, and include renewable energy". Since "ocean

thermal energy" is a form of "renewable energy"; therefore, this law
applies.

Another example, the development of the past and present in and outside Pulau Layang-Layang since 1981 has never been "challenged" by any sovereign state, even though some of these states have argued [in general] [usually] the sovereignty of Malaysia in the southern part of the South China Sea.

Legal considerations above are hereby fully equipped for the purpose of this pre-feasibility study stage. However, there are other laws that need to be considered in the feasibility study stage of the project: the Fisheries Act, Shipping Ordinance Malaysia, the Environmental Quality Act 1974 including EIA Order, Petroleum Development Act 1974, 1990 Electricity Act Maritime Enforcement Agency Act 2004, the Palo Maritime Zones Act 2006, the Continental Shelf Act 1966, the National Land Code 1965, the Occupational safety and Health Act 1994, Factories and Machinery Act 1967, the Merchant Shipping Ordinance 1952, the Land Public Transport Act 2010 (Act 715), the Road Transport Act 1987 (Act 333), Industry Act 1975 (Act 156), the Excise Act, 1976 (Act 176), the Customs Act 1967 (Act 235), the Employment Act 1955 (Act 265), the Immigration Act 1959/1963 (Act 155), the Minimum Retirement Age Act 2012 (Act 753), the Minimum Wage Order 2012 and

the Workmen's Compensation Act 1952 (Act 273).

(B) Implications of Energy

Ocean thermal energy generation in Malaysian will provide another source of energy in addition to electricity, fuels and hydrogen. Energy development can also develop other sources such as the production of clean water, mineral water culture

high-value marine (high-value marine culture) and lithium metal used to make lithium hydride. Hydrogen is also used to generate electricity with fuel cells.

It was estimated that Malaysia would be an importer of electricity energy by 2019 due to increasing domestic energy consumptions. In the National Energy Security Conference 2012, it was acknowledged that with the current status of energy demand and supply balance, Malaysia is projected to be a net energy importer by the year of 2019. This would indeed be a grave condition for the Malaysian energy security scenario.

Studies on technological feasibility and economic gains from OTEC activities are very promising. Thus, these factors have led the Government in seeking

exploration of alternative ocean renewable technology such as OTEC in the 11th

Malaysia Plan. However, studies shown that lack of regulatory provisions would

only lead to failure of such new developments, impacting negatively towards social,

economic and environments. OTEC development and energy creation can be an

answer address the
issue.

Furthermore, OTEC development can also contribute to the reduction of air

pollution through the use of hydrogen by sea and land vehicles. Not only that, the

increase of skilled manpower on energy from the OTEC development will bring

about a further benefit to the
country.

1.4 Research Objectives

The above discussions entail the following objectives for this research:

The first objective is to establish a reliable and exhaustive regulatory

framework for OTEC future deployment and development in Malaysia. This would

enable identifications to be made on all regulatory aspects concerning OTEC

activities.

The second objective is to analyse, appraise and differentiate the regulatory framework by reviewing all current legal and non-legal documents, both local and international, to determine and identify various inadequacy or impediments concerning current laws of Malaysia concerning OTEC development.

1.5 Research Questions

Based on the above-mentioned concerns relating to the need for regulation in embarking into a new economic industry, the researchers seek to find answers to both research questions concerning OTEDD regulatory framework in Malaysia;

First, to what extent would these laws enable for the establishment of a regulatory framework to govern OTEC activities in Malaysia? Such evaluation is from analysing the current legislation and establishing a comprehensive and extensive regulatory framework on OTEC in Malaysia.

Secondly, what appraisal could be made over any legal impediments within such regulatory framework towards promoting OTEC deployment and

development

in Malaysia? The answer to this question may lead to countermeasures being

undertaken toward the promotion of OTEC development in
Malaysia.

1.6 Research Hypothesis

Contrary to Svantesson (2014), who thinks that legal researchers should do

away from creating a hypothesis as not fitting legal research, the researcher

nevertheless adopts a hypothesis in this research thesis. This is because, based on the

research background, problems and questions discussed above, the researcher

believes that by adopting a hypothesis would further enhance the overall

perspectives of the research (Shields & Rangarajan, 2013; Wagenaar & Burris,

2013). As hypothesis merely reflects the specific statement of prediction over a

research, the research hypothesis is as
follows:

Ensuring sufficient laws within the ocean renewable energy regulatory

framework will increase economic activities like OTEDD to be successful in the

administration of justice towards all

stakeholders.

This is done also in light of a declaration made by Aldous Huxley (Huxley, 1994) about hypothesis being one of the greatest discoveries of modern times, thus the researcher thinks that the hypothesis would provide a basis for advancing investigations and verifications, perhaps creating a possibility for a notable theory to be formulated in the future. For the moment, it is hoped to give a definitive point and direction of this research. In any hypothesis situation, positive hypothesis tests would be more effective than negative hypothesis tests in both inductive and deductive research (Blaikie & Priest, 2017). In a positive hypothesis test, a person generates or examines evidence that is expected to have the property of interest if the hypothesis is correct, whereas in a negative hypothesis test a person generates or examines evidence that is not expected to have the property of interest if the hypothesis is correct. Thus by choosing a hypothesis approach the outcome of this research is hoped that it will contribute significantly towards a theory of law; the “unity of law” envisioned by philosophers like Kelsen or Hart (Kelsen 2008; Hart 1961; Kelsen 1945). This anticipation continues to current days where Lunstroth (2013), for

example, continues to argue that various approaches of philosophy and jurisprudence

are inadequate to clearly describe the law. A reliable thesis could help contribute

significantly towards an encompassing meaning of the law.

Furthermore, a hypothesis is not only about what it means to the researcher in

terms of legal concept, principle, rules but how it relates to currently accepted

perspective and the desired outcome expected (Hoecke, 2011) and his faith to test his

belief. The basic of such choice came through observing the first research questions

which are basically explanatory in nature, therefore, rendering this thesis a

fundamental legal research thesis.

The hypothesis, however, does not attempt to be reflective of those from

natural sciences where it will be subjected to falsifiability testing namely the theory

of empirical falsification of Sir Karl Raimund Popper (Popper, 1959). In which,

according to Musgrave (2011), most philosophers did not agree with him. This may

be due to its rigidity of rejection criteria that stop the process of inquiries of

knowledge from progressing further. After all, not all research is about hypothesis

testing; exploratory inquiries or purely descriptive research are some examples to

consider (Hoecke 2011, p.18). This is true when looking at the 2nd research question

which is descriptive in nature.

This situation is further supported when the hypothesis is exposed to

situations that are as complicated as in a legal system rather than a simple speeding

car accident case which supports a simple probability outcome (Cheng, 2013). The

hypothesis formulated for this thesis clearly acknowledges that scenario where there

are various elements that would affect the outcome of the research. They cannot and

not appropriate be subjected to testing using scientific methodology but instead a

human and social science approach (Thornton, MS, & S, 2017).

To conclude, by formulating a working legal hypothesis in this thesis, it is

hoped that it will make sense of the relationship and harmony on the body of law

especially when it confirms further to other parts of the law in term of reliability,

thereby perhaps may eventually attain validity and generalizability.

1.7 Research Purpose

As basic research could be performed in many ways such as exploratory, descriptive, or explanatory; nevertheless, explanatory research is the most common and the one this research is based upon (Barth, Michelsen, Rieckmann, & Thomas,

2015). While the main purpose of this interdisciplinary legal research (Chynoweth, 2008) is to convince, prove and attracts lawmakers attention on a new RE regulatory deployment over an intended development on OTEDD and its activities within Malaysia. This information can greatly assist Malaysian authorities, namely governmental departments and agencies, particularly, to the Malaysian Maritime Agencies and Attorney General Chamber in assisting lawmakers in devising new or additional legislation to enhance current rules and regulations in this area. As without such in-depth knowledge, a practical and coherence regulation would not suffice to administer a new economic activity such as OTEDD. Since there is no in-depth study conducted prior to this study, this research would enable significant contribution to the body of knowledge especially to the literature on regulation and the Law of the Sea in matters concerning to OTEC in Malaysia.

Such research would give insight to potential local and international

investors

by giving them the data needed and evidence to do preliminary investigation analysis

with regards to the current legal provision available within Malaysia concerning

OTEC and eventually help them decide on their capital investments in OTEC plants

within Malaysia. For example, Chip Bottone, the Chief Executive Officer of

Connecticut's biggest manufacturer on fuel cell (OTEC may be able to supply

hydrogen fuel source to fuel cell) commented on the investment in energy fuel cell

today, "...the bigger the project the more attractive the financing is" (Wnpr, 2015).

Thus the importance of investment protection is a
reality.

This research enables stakeholders to get reliable imperative data and input to

enrich their knowledge and help to contribute actively towards the formulation of an

all-encompassing regulatory framework for OTEC Malaysia. To the many

governmental agencies for their evaluation of current legal position and estimate the

impact of cross authorization between the various governmental agencies in

maritime setup.

This research finding could be used as a guiding principle to the enhancement

of future and further research on OTEDD activities and any other activities related to

it. The data collected are therefore available for researchers, lawyers and scholars to

peer review the mechanism of this OTEDD research and tracing how the

recommendations from such reviews are implemented in the OTEDD elsewhere.

1.8 Research Aims

This study set out to find out the truth which is hidden and of which has not

been discovered as yet. OTEDD being an intended new development in Malaysia do

not have specific regulation created for its specific activities, therefore this research

aims to discover the truth whether there is a really a need to create specific

regulation for OTEDD. It is also the aim of this research to formulate suggestions

about the potential specific regulation for
OTEDD.

The ultimate aim of this research is in concluding the thesis, the researcher

wants to be able to contribute towards the development of a comprehensive legal bill

that would properly regulate OTEDD activities in
Malaysia.

1.9 Research Significance

The findings will also assist the lawmakers, namely the Attorney General's

Chamber in devising new regulations or provisions in this area. It may also assist in

engaging and facilitating the dispute resolution mechanism over the islands and

waters by disputing countries over the international waters in respect of OTEC

development and research. Needless to say, this study will benefit the Malaysian

Government as to the certainty in making policies and decision making in new areas

of sea exploration and development of which related and affected agencies and

authorities would have a clearer guideline in conducting and empowering themselves

in their duties in creating new laws and regulations on OTEDD as being part of

Malaysia's RE Portfolio.

Preventing possible legal entanglements of parties between the Federal

Government and States in implementing OTEDD within EEZ of Malaysia especially

areas off Sabah can be avoided. The clarity of the provision of laws is of utmost

importance to resolve any kind of disputes. Issues concerning right, duties, claims,

royalties, concessions can be sorted out with the in-depth analysis of the available

laws concerning Ocean Thermal Energy Conversion as a source of RE law in

Malaysia.

Internationally, where issues of sovereignty are involved, this research would

enable an informative platform to be created for the content of the research covers

several sovereignty issues and the Malaysian government would be able to use such

findings to equip themselves in the discussion over the issues of sovereignty of the

sea surrounding the proposed activity. This informative knowledge would ensure any

disputes to be resolved in a diplomatic and reasonable manner in line with the

international dispute settlement
mechanism.

This research will contribute in supplementing specific research data and

findings to all related public agencies in formulating any additional rules or

regulations encompassing all legal aspects of OTEDD activities in Malaysia.

Providing alternative perspective or solution in resolving current issues of

sovereignty concerning OTEDD activities within Malaysian
EEZ.

Since the research is a study of RE law in Malaysia. Assisting relevant

agencies in coordinating their duties in engaging and facilitating local dispute

resolutions mechanism especially over agencies jurisdictional matters could be made. The information on OTEDD activities can assist these agencies in formulating clearer guideline in conducting and empowering themselves in their duties.

The environment being the main concern is the destruction of our natural environment is severe that has impacted on current and future generations.[18] The proper analysis the law overseeing the sustainability of our environment is, therefore, crucial especially involving a new economic activity that might have a direct impact on the environment especially the sea. Though it is said that 80% of the ocean pollution comes from land (NOAA, 2015) but the degradation concerns over marine pollution of flora and fauna of the ocean from OTEDD activities must be investigated. However, since this is being a legal research, legal investigation of the law will provide sufficient data to determine whether OTEDD activities will conform to the standards of legal protection of the environment and in this case the ocean itself.

Stakeholders are those individuals, corporates, governments, and bodies, local and international which would benefit or would suffer from the direct or indirect, on or by, the activities of OTEDD activities in the Malaysian waters. It is to

answer the question of major legal imperfection that would render towards unfair and unjust outcomes to all stakeholders. These security elements are crucial to have a balanced economic growth to those not only directly involved in the OTEDD activities. As much as this research contributes to the current body of knowledge, it gives the researcher the ability to acquire deeper knowledge into conducting further in-depth research towards determining the functions of law within today's society and economic environment. This is because the researcher felt that the function of law in today's environment are often marginalised, especially with the over emphasis on liberalism and realism approach usually adopted by the society of today. This research enables the opportunity to contribute significantly to this body of knowledge.

[18] Disasters have spread throughout the land and sea, because of what the people have committed. He thus lets them taste the consequences of some of their works that they may return (to the right works), Quran 30:41; Corruption has appeared on land and sea because of what the hands of people have earned, He thus lets them taste the consequences of their works that they may return, Bible (Romans, 41)

The outcome and results of this research will provide grounds for further

research to other researchers. Enabling further expansion of the impact of law in relation to OTEDD activities. Again it would further enhance the body of knowledge in that area and also increase the available materials on RE law, locally and abroad.

This could be then be used to make further suggestions and improvement towards strengthening the function of law in regulating conducts of members of society, therefore, ensuring proper administration of justice all members of the society, especially towards increasing the importance of law in relation to regulating activities concerning OTEC.

Lastly, in creating new law involves a comprehensive and detailed study on the subject to be carried out in order to investigate the weakness and strength of the proposed law. Any specific new law to be formulated for OTEDD activities involves a similar process. This research would help in providing relevant and related data for legal drafters to incorporate such finding data and information into their task of creating a law which is encompassing all aspect of legal issues and would not leave any lacuna that could weaken the strength of such law.

1.10 Research Expected Outcomes

Since this research is a basic research aimed at advancing fundamental knowledge on a regulatory framework on OTEC. It is focused on negating or supporting principles of regulation over this new technology in its implementation in Malaysia. With regards to the originality of the contribution of knowledge, based on the expected outcome of the research, the research aimed to contribute in formulating a new legal perspective to OTEC activities through amendments to current laws and by adding new laws to strengthen the OTEC objective.

This is because it is expected that the outcome of this research would clearly entail the dire need for creating a proper new law specifically on OTEDD activities.

Even though the research might discover that there are currently existing laws to regulate and monitor such activities but since they are expected to be scattered in

various legislation and also ambiguous in their interpretations, making them not sufficient and precise laws. The law must be definitive and clear. All types of ambiguity and disorder found in this thesis could only lead to a comprehensive

solution where legal confusion and conflicts that must be put to rest. Since the anticipation of various aspect of the legal investigation and primary data from an in-depth interview conducted probably will show that there is indeed a need for proper legal regulation on OTEDD activities. This will act as a pre-emptive solution in a complex society that we lived in today where the development of law is lacking behind the nation's economic development and progress.

Therefore it is anticipated that the discovery from the research in terms of legal impediments would eventually justify in proposing the creation of an accurate and specific law in regulating OTEDD activities in Malaysia. This expected outcome would be in line with the statement already made within the research purpose, aim, objective and significance of this study.

1.11 Research Area

The research area of this thesis is primarily and exclusively about law and its interdisciplinary relationship with other areas of discipline where in this thesis is with economy and technology. It focuses on the area of energy regulations and law.

However, in order to achieve this evaluation of the OTEDD law related issue, a look

at the laws concerning RE will be conducted. This would give an overview of the government outlook on the resources of energy in Malaysia. It will then narrow down to RE Law and finally focus in depth related to laws pertaining OTEDD activities. Therefore the researcher, taking the legal realist stand from the discussion on paradigm,[19] looking at the nature of the study and the best method in tackling both

[19] Refer to 1.14 on research paradigm.

research questions, choose the interdisciplinary approach as it would greatly assist

him in reinforcing the understanding and interpret the importance of regulations created by the government to a given economic activity. Interdisciplinary as defined

by the National Academy of Sciences, the National Academy of Engineering, and

the Institute of Medicine of United States;

> "*Interdisciplinary research is a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental*

understanding or to solve problems whose solutions are beyond the

scope of a single discipline or field of research practice."

The understanding is crucial for the development of a new and reliable understanding in order to give a correct and precise analyzation of a given problem.

50

Figure 1.14: OTEDD Research Map – Interdisciplinary

Figure 1.14 (above) shall reflect the interdisciplinary research (IDR) of this study to allow the researcher as an individuals to gather and integrates all information, data, techniques, tools, perspectives, concepts, including theories of regulatory framework from two disciplines; law and social science in advancing his fundamental understanding in order to solve OTEC regulatory framework problem as it is only practical to not just rely on the law but also social science where the law has to actually function whose solutions are beyond the scope of a single discipline or area of research practice (Institute of Medicine, National Academy of Engineering, National Academy of Sciences, 2004).

This similar note was in fact highlighted very much earlier by the Organisation for Economic Cooperation and Development (OECD) Centre for Educational Research and Innovation;

"Interdisciplinarity is a noun describing the interaction of two or more different disciplines. This interaction may range from the having simple communications about ideas to the mutual integration of organising concepts, methodology, procedures, epistemology, terminology, data, and terms organised into a common effort on a common problem with continuous intercommunication among the participants from the different disciplines"(Education Resources Information Center, 2017).

Based on the research questions of this research, the researcher suspected that by adopting the legal research approach is the best in establishing the reality of the law, as it would be naive to suggest that the law could always mirror social reality (Schrama 2011). A system of comparison could however work; human science with social science as their goals are the similar (Boer, Gier, Verschuur, & Wit, 2006),[20]

[20] Type 3 – Integration of objectives The concept of integrating objectives indicates that, in

type

3 integration the different research projects will be combined at the end into one entity, which results in a separate model fed by the different projects. The interaction between the

especially when the research is about phenomenon involving a mixture of two or more research discipline where the philosophy of this type of studies, can be summarised as “gathering knowledge for the sake of knowledge; [which] is curiosity” as described by the 11th century French abbot; Bernard of Clairvaux (Steensland & Goff, 2014). In recent understanding of knowledge, the outcome of this research is mainly about establishing a comprehensive answer to the questions of why what or how where it would enable a bridge between legal and sociological research (Schrama, 2011), furthermore interdisciplinary researchers are able to present their research in a more understandable way because they have learned to explain their research to different disciplines (Boer et al., 2006). The research area will be discussing areas concerning theories of regulations, government duty, RE, Soft Energy Path, OTEDD, OTEC, customary international law, the laws of the sea, UNCLOS, Federal and State jurisdictions and EEZ are some of the main focus area intended to be analysed. The mentioned area will not only give the depth needed for conducting an investigation but provide the opportunity to conduct a more rigorous

study on the subject of renewable energy law in Malaysia.

Assumptions 1.11.1

> Assumptions are self-evident truths; to accurately evaluate a truthful person

is through judging whether he is a more socially responsible person than another is

by using a moral compass to judge (Aristotle, 2013; Arjoon, 2005; Etzioni, 2012;

Marvasti, 2003). Therefore since the strategy of this research is conducted not only

legal research but using qualitative research methods as well, it shall assume

participants in the in-depth interviews conducted based on their qualification,

standing and employment with various governmental agencies are truthful to their

professionalism and ethic. It is also assumed that these participants act honestly,

frankly and accurately as possible in answering the questions based on their true and

> projects has a common goal: to fit into the joint result. In this method, the research projects do not originate from one model, but they jointly contribute to the final phase. (Boer et al. 2006, p. 13)

personal experience to the best of their individual abilities. The researcher takes

this

assumption as this research being an interdisciplinary legal research study will be of

value-laden documents to the actual implementers of the outcome of this study, the

agencies related to OTEDD.

Scope 1.11.2

Scope in research is an important element that gives focus to the research

process as a wide scope will result in large amounts of information for investigation

(Pressley et al., 2013). Since the research study is based on basic research (generates

new ideas, principles, and theories, which may not be immediately utilized but

nonetheless form the basis of progress and development in different fields), its main

focus, therefore, is primarily to advance fundamental knowledge about the world,

which in this case OTEDD. It focuses on refuting or supporting theories that explain

the observed phenomena.

It goes through both the legal research and qualitative means that include in-

depth interviews with participants namely officers of the governmental bodies and its

agencies in Malaysia. The intended parties would be high ranking legal fraternity

officers attached ministries and
institution.

As the scope is not towards generalizability but merely exploratory, the data

mainly originate from Malaysia which comprises of acts and regulations with

additional views on renewable policies and relevant cases (if any). In addition, while

doing the comparative analysis of the scope of the law, the researcher use act and

international cases that originate from outside Malaysia, mainly the US and

International Court of Justice, The Hague and United Nations to add into the process

of analysing and gathering data in order to get the depth of answering both research

questions.[21]

[21] Please refer to subchapter 1.5

The research is mainly concern about the formulation of the necessary regulations in the country (Malaysia) regarding OTEC activities conducted within the waters of Malaysia, Therefore, it would not venture into areas outside of Malaysia, like the possibility of OTEC deployment in international waters. The reasons are for such inquiry to take place not only take longer time and energy but

most importantly would be offsetting the focus of this research plus do not an

improvement in terms of data and information needed to formulate Malaysian laws

on Malaysian waters. Though it is also agreed that such activities will in one way or

another fall under matters like overlaying claims of the body of waters (conflict of

jurisdiction) which is obviously an international perspective. In that particular

situation then this research takes it into itself to do necessary investigations on that

issue and must take it into study and
deliberation.

The researcher maintains a two-fold approach as his attempt to gather all data

needed. First, he focuses on using the traditional and basic legal research is called

Doctrinal approach (Watkins, 2013), as a tool or method to probe the problems by

identifying them using the legal doctrine as its foundation and basis of argument and

is also named as “black letter law” which refers to the provisions of the law over

matters that are called in questions. This approach is usually used by the court to

settle courts legal cases which originate from hundreds of years ago (Wing,

McConville, & Chui, 2007). The researcher then adopts this method in finding

answers to the problem questions of this thesis by probing the provisions of all

relevant and related laws to the research area. Laws in which that is made available

both locally and in international jurisdictions, to act as evidence in his argument

over

the answers to the research
problems.

Secondly, concentrates on producing data from qualitative methodology

through in-depth interview technique as his legal research tool to gather another set

of data separate from the doctrinal method. The strong point of a qualitative method

is the ability to gather a standpoint view of a less rigidity of information which is

close to the understanding the truth about regulations by the ability to evaluate its

weaknesses and strengths. The qualitative methodology offers tools for researchers

in discovering and investigating complex phenomena within their contexts. Applied

correctly, will produce valuable means to develop interventions. This then gives the

researcher opportunities to suggest amendments and changes to the current law in

order to give it more functionality and practicality in its true applications within the

scope the law intends it to be. OTEDD would benefit greatly if the research could be

able to establish up to that stage which the researcher believes that qualitative

approach could aptly provide.

By having both methods of approach, the research does not tender any

other

means of methodology as it would take up precious time and the data already

expected to be gathered is enough to conduct triangulation process and verification

of data analysis to test the validity and remove any shortcomings in the limitations of

this research.

Delimitations 1.11.3

Delimitations are deliberate choices made by the researcher for the study

enabling further explanations about the scope of study (Daniel & Sam, 2015; Sim &

Wright, 2000). It to explain why certain aspects of the area are preferred and why

some others were excluded.

This research is conducted from the assumption that there is a need for

additional regulations to control the new economic activities of OTEDD, therefore

the main focuses would be on the current regulatory framework on OTEDD itself.

This is to be done by looking at the overall regulatory framework of OTEDD

available elsewhere in the world and compare the existing available laws in

Malaysia. Secondly, the research will investigate regulations on any new

economic

activity within Malaysia and abroad preferably area of similar or of those near to the

area of study. All this is planned while keeping in mind that there are sub-areas of

this study comprises of the specific legal branch which is of importance such as

administrative, environment and copyright and data protection that are closely

related to OTEDD. They are not going to be studied specifically but in an overall

scope structure. This is mainly due to the lack of time that the researcher is given to

study them.

Nor will this thesis venture to investigate to the depth of regulatory

implementation by the administrative organs of the government (by-laws), as it

would only extend the nature of time and energy to complete the task at hand plus it

would not be able to produce much-needed knowledge about the concept and

policies of the ruling government towards the need to create proper law for

regulating an economic activities.

It is also to note that this regulatory research conduct investigation at the

stage whereby there are already or it is assumed to be existing policies pertaining the

intention in materialising the actual commercialization of OTEC activity towards

deployment and feasible industry stages. Thus, the study will not concentrate on the

policy and feasibility factor for coming out with a policy over OTEC. This would

allow time to be concentrated towards the core of the study which is to identify and

create specific regulation for OTEDD and deployment in Malaysia.

Limitations 1.11.4

One profound limitation, which goes beyond the control of this research

would be about the inability of literature encompassing OTEC subject, especially on

the regulative scope. Thus older literature referred to within the thesis is

unavoidable. Nevertheless, the researcher tries updating recent development in legal

and regulation of OTEC to compensate such setback to keep the reference within an

acceptable range of years for a thesis.

The other limitation for which the researcher has no direct control off is

regarding the stipulated duration of the study of which the research is limited in time,

forcing him to be more focus on the main general concepts rather than individual

sub-topics which might be of inquiries. Being broad is the focus of a grounded

theory, of which is not the intention of this study, which is an interdisciplinary legal

research. However, this research maintains that it will focus on upholding the

standard of rigorous that is needed for validation and confirmation of the intended

results when it does discuss them. Matters like intellectual law are set aside in total

while on environmental law and administrative laws are analysed from provisions of

the law (doctrinal) rather than interviews (qualitative). Again as stated, matters

concern the above headings if discussed would be as rigorous as possible to maintain

credibility. It is a conscious and deliberate move by the researcher to maintain focus

and not to side track from the main focus of the research which is mainly to answer

both research questions; to answer the question of major legal imperfection that

would render unfair and unjust outcomes to all stakeholders. This specific area could

be an opportunity for another researcher to embark on later period, perhaps before

such statute on OTEDD is
proposed.

The foreseeable limitation will probably be the number of respondents for the

semi-structured in-depth interview as some respondents might not want to reveal

certain information which could be deemed as confidential. In addition to some

confidentiality issues might be dealt with in respect to undertaking must be in place.

The foreseeable limitation will probably be the number of respondents for the

semi-structured in-depth interview as some respondents might not want to reveal

certain information which could be deemed as confidential. Some confidentiality

undertaking must be in place, no environmental impact assessment studies will be

carried out as the research do not intend to venture to that extent.

1.12 Research Period

The whole research planned is covering the whole available provisions

granted under the study grant provided by Malaysia-Japan International Institute of

Technology (MJIIT) which is for the duration of 3 years. The period of study is

broken into phases as according to the below mentioned Gantt chart as per Figure

1.15 below.

Figure 1.15: Gantt chart

The Gantt chart is one important element in ensuring continued monitoring of

any progressive development of a research conducted in a proper manner and within

time (Maylor, 2001). First introduced by Karol Adamiecki and later Henry Gantt, the

chart gave the monitoring needed in the completion of any projects by tracking

project schedules. The researcher acknowledges there was a slight delay in the

progress but is keen in catching up with the planned schedule as mention in the

diagram above.

1.13 Research Paradigm

Egbert & Sanden (2013) advocate making paradigm explicit whereby

both

the researcher and reader have a basis of their interaction on the study being conducted. A paradigm is “a worldview, a way of ordering and simplifying the perceptual world’s stunning complexity by making certain fundamental assumptions about the nature of the universe, of the individual, and of society” (Ratcliffe, 1983; Thomas, Kuhn, Thomas, & Kuhn, 1970). It has in recent years commonly found in qualitative research reports (Egbert & Sanden, 2013).

In that light, the researcher is taking the stand that research is about finding out the truth; a legal realist position[22], as compared to the postmodernist or positivist for which they believe that truth does not exist (Campanario & Yost, 2017). This stand is basically based not merely on the researcher’s legal education and training background, it is about proving answers with substantive evidence to all legal issues in order to know the truth as discussed above. If the truth is not conclusive, the substantial proof would be sufficient. Thus truth is a form of a subjective condition which exists and can be found from analysing data collected. Discovery of things can be made through the “categorization with scientific measurement of the behaviour of people and systems” (Larsen et al., 2017). Qualitative-quantitative debates, for example, are not methodological but merely over different paradigms (P. M. Wright,

2017). With a proper paradigm, justification can be made for the action of the researcher from the beginning of the research, until the end.

In observing this William Ickes, a distinguished Professor from the University of Texas of the Department of Psychology states that:

> *"...different paradigms are based on fundamentally different assumptions about the nature of the phenomena being studied and the kinds of methods that are best suited to this task."*
>
> (Ickes, 2002)

In reality, all researcher is biased because of they all, like it or not, have a predisposition to the certain paradigm and by revealing the researcher biases, thus, bring clarity and directionality of the research (Schoth & Liossi, 2017).

Nevertheless, paradigm brings insight about the nature of whatever is an attempt to be express or investigate. Recalling the men with the elephant poem by Rumi where different person describe differently of an elephant in the dark, research

[22] Realist; the quality of a person who understands what is real and possible in a particular situation and is able to deal with problems in an effective and practical way. In Merriam Webster Online, Retrieved August 14, 2016, from http://www.merriam-webster.com/dictionary/realist.

takes place from a multitude of perspectives where there are multi-dimension of interpretation of a subject matter which takes place based on what ones interpret them (Hummel, 2016). There is no right or wrong as they are seeing the issue from their personal perspectives using whatever concept and method to achieve practical goals in a real world context. It is universal and real. Therefore looking at regulations, there is no definite view about its functions and the purpose of which it should achieve. It is subjective based on the person looking at regulations and what they want to achieve as long as the researcher could minimise the bias by telling the truth.

The ontological questions of regulation; the researcher believe with proper regulations emanates harmony, fairness, justice, and equality. Justice, fairness, and equality are world bound. This is what motivates the researcher in conducting this

particular research. It acknowledges regulations could ensure justice, fairness, and

equality to all stakeholders. A nation without regulations society surely will collapse

(Samli, 2017) Too much power to a single body by means of regulations will be

open to abuse (Corbett Report 2010). However, it is not the erroneous of regulations,

but of those who refuse to create them or refuse to execute them with just, fairness

and equality it deserves. When this happens, it could eventually negative the

outcome. We have seen many countries especially the socialist or even monarchies

collapsing due to the strictness of regulations that was imposed onto the society

causing them to revolt. Thus, it is more of to strike a balance between non-

regulations and regulations itself.

Secondly, *epistemology* being the theory of knowledge investigate and try to

understand what separates “justified true belief” from mere opinion (Moreira-dos-

Santos & El-Hani, 2017). It differentiates knowledge acquired through the evidence

against belief which relies on faith. In discussing methodology proper explanations

on the researcher paradigm about the reality of regulations (ontology) and

knowledge about regulations (epistemology) are commendable before moving on to

the methodological questions; about how data can be acquired (Egon G Guba &

Lincoln 1994).

Since this research covers two discipline, the humanities, and social science,

paradigm supports the establishment of the theoretical and conceptual framework of

the research (Egbert & Sanden, 2013). It is unfair to judge choices of a researcher's

paradigm (Castellan, 2010). And since there is no single accepted way of conducting

research, factors like ontology and epistemology of researcher plays a major role in

the choices of the research process (O'Leary,
2017).

As research must be conducted in a rigorous and systematic way (Becker &

Blaas, 2012; Creswell, 2014, 2015), it has long been claimed to be characterised by

their distinct ontological, epistemological or methodological perspectives (E. Guba,

1990), making them distinct from each other. In the mentioned areas, is difficult to

maintained researchers" objectivity.

Moreover, the scientific community is often confined to some sort of

perceive ideas and beliefs deeply entrenched in their mind as students of science (J.

Y. Myers & Abd-El-Khalick, 2016) but need to have a *paradigm shift* in allowing

novelties to take place. The researcher again has to agree with such. Real

research

about the unknown is not happening because of the continuous attempt to force nature to be more conceptual boxes supplied by professional education. Some prominent scientists like Steven Weinberg and Ernst Mayr who are known to be profoundly irritated by Kuhn idea acknowledged that even in the area of biology have attempt in the 20” to the 60” to neglect biology from the philosophies of science where the logical positivists and physicalists state that it does not fit their

methodology (Mayer, 1988).

1.14 Chapter Summary

In conclusion, the chapter has introduced the research problem on OTEDD,

as well as present the research gap, concerning the adequacies of regulations and its

effects from various literature studies. This research gap is further discussed in the

second chapter with the intention to further enhance the study. It is hoped that with

the evidence provided throughout this first chapter has convinced readers with the