Exxon Valdez Oil Spill: What We Can Learn To Avoid Second Mistake In Transportation Of Oil?

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INTRODUCTION

The increasing demand of the crude oil for transportation was booming since their discoveries in 1900s. The use of car, automobile and truck promote the oil company to racing against time to deliver sufficient quality oil product for the automobile and industrial demands. The un-ethical behaviour such as short-cuts and limited operation budget lead to the disaster such Exxon Valdez in 1989. Why big and good reputation of such Exxon led to the disastrous events which contribute significant impact to the environment?

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Why 1989 Exxon Valdez become the hallmark of the modern oil spill in the world? During 1990, there are no specific oil pollution guideline to protect the environment from the operation of oil industries. This led to un-fair business when it comes to the environment protection during the accident happens. The impact of the oil spill probably not important to human as this issues way beyond the reach of human aspect directly (Dorsett, 2010). In 1989, the Exxon Valdez tragedy already teach the enforcement officer, oil producer and policy maker about the wrong policy and action can led to disaster which will never fully recover.

However, after decades, the proved of the oil spill in Exxon Valdez making a statement that oil spill can impact the human life directly. Since the accident, the production and fishing industries nearby the coastal line was declining and the beautiful beach become un-attractive in nature which led to the isolated condition among human. In 2010, Martin & Simon, report that the bankruptcy occur due to the declining fishing activities, as the result of the oil spill.

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The increasing demand of the oil industries from produce like Exxon cannot solely be blame for the root cause. Significant increases for oil needs was the major evidence to suggest that the demands was increasing over time. Based on the Oil Market Intelligence (Intelligence, 2012), since 1987, the new world of oil demand increase in yearly average.

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Oil that coming from the oil spill are relatively composite of many chemical. Some of the crude oil contain harmful chemical and organic pollutants that may vary their volatility and chemistry towards the biochemistry of the animals or biological agents.

Direct ingestion of the oil coming out from the Exxon Valdez situation prove to be toxic for any mammals and birds nearby the coastal line of impacted areas. The external route of exposure via feathers and skin can also being absorb into their skin which later on become damage and the layer of the skin become unprotected through whether and external infection. With the condition of the Alaska was cold in nature, the insulation of the animal was ruin and thus lead to hypothermia and sudden death due to multiple affects from the toxic elements until the thermoregulation of the heat tolerance.

Recent study by National Oceanic and Atmospheric Administration (NOAA) (Shigenaka, 2014) also suggest that the embryo of the eggs from fish or aquatic animal will not survive or mutated after a small fraction of chemical especially oil penetrate their outer layer of skin on eggs. Even the clean-up seems to be helpful, however, this technique poses other threat especially when couple the technique of hot water or
chemical removal. Primary objective of this article was to understand the root cause of oil spill in Exxon Valdez and suggest appropriate control measures to prevent similar event from happening in Malaysia. This article only focusing on the literature review document and available report only. The ideas shared probably not represent the real situation things happen during the case but sufficiently justify to provide insight overview of the environmental ethics behind the oil spill tragedy.

ENVIRONMENTAL ETHICS ISSUES RELATED TO EXXON VALDEZ

Oil Transportation

It’s started since 1950, where the booming of the oil production and use for the transportation industries. In Canada, the main transportation of the oil from the near rig to the country was using the pipeline. In order to meet the demands and efficiently transfer the oil from the rig to the processing and users, the oil was transfer and bring to the mainland in Canada through the seas using oil tankers. This can minimize the risk and also the cost as the pipeline will expose to the extreme Canada whether and permit the efficiency of oil transfer.

The use of tanker however, face the huge challenger for the oil company to strictly follow the guideline and rules from the coast guard and relevant authorities. To convince the authority and the state regulation, top management had develop details arrangement of the oil transfer using tanker with relevant code and standard practices. This include the contingency plan for oil spill occurrence in the nearby shoreline or associated route through the mainland of Canada (Energy, 2014).

Exxon and related oil companies, manage to convince relevant oil spill contingency plan and the execution of oil transfer through tankers. In early 1980, because of the industrial push and industries pressure, the government permit the use of the tanker for the transportation, however, several issues related to the plan of contingency had not been tested for their efficiency and simulated plan.

Similar pattern observed for many industrial and oil production country in transportation of the oil through the tankers, many developing nation like Malaysia, and coastal line offshore facilities utilize the Floating Offloaded technique (Super Tank as storage facilities). The idea, was to pre-process the raw oil capture and collected from nearby rig before transfer through huge vessel for specific transfer and use. The FSO believe to be as risk reduction mechanism where the total of oil being held for certain time, permitted the transfer directly from well to the ship in the coastal region. This technique however, may not applicable in Alaska region due to the unpredictable whether condition and the harsh extreme cold environment with iceberg play a major threat to the FSO.

How Exxon Valdez Episode Severe Impact to the Environment

There are five key that already being address by the National Transportation Safety Board determined that the probable root causes of the spill for the Exxon Valdez:

i. The failure of the third mate to properly manoeuvre the vessel, possibly due to fatigue and excessive workload;
ii. The failure of the master to provide a proper navigation watch, possibly due to impairment from alcohol;
iii. The failure of Exxon Shipping Company to supervise the master and provide a rested and sufficient crew for the Exxon Valdez;
iv. The failure of the U.S. Coast Guard to provide an effective vessel traffic system;
v. The lack of effective pilot and escort services.

Based on this five factors, the summary of the outline towards the accidents can be discuss in following paragraph. In Exxon Valdez tragedy, no direct human life except four human death recorded associated with the clean-up process during the disaster period. Natural loses was to huge to be imagine including the aquatic life, wildlife and aesthetic values of Prince William Sound. During the accident, Captain Hazelwood drinking, and there are common bad practices of the company to push the workers (sailing team) to meet the demand of the oil transportation in such a rush. This lead to the stress in work while handling such risk cargo in the seas.

The pilotage given by Murphy (Pilot) the ship without present of the Hazelwood (skipper), against the policy of the Exxon require two officers in the bridged during the manoeuvring in narrow channel of Valdes. This indicate the lack of communication from the port authority and the company that lead to the improper manoeuvring of the risky vessels. Along the chain of reaction, after pilot departed from the ship around 11.24 PM, skipper take in charge, and informed the Vessel Traffic Centre to increase speed and diverted into the separation lane scheme. This separation line scheme provided by the authority to guide the huge vessels to maintain their safe position during challenge manoeuvring. Around 11.54 the captain left the bridge with the Third Mate, Cousin (this officer should be with 2nd Officer, LeChain). Only one officer in charge the manoeuvrings the ship. This lead to the poor judgment made by the single officer to mitigate or early detecting any mishap during manoeuvrings the vessels especially with the limited visibility (at night)

Cousin become a victims of occupational hazards that lead to human error by impact of environmental factors such as long work hours, poor work conditions (exposure to toxic fumes during the arrangement of oil related chemical during dock operation), monotony and sleep deprivation. Automation that create manning issues, reduce the manual workload but increase the mental loads of the human.

The accident recorded happening around 12.04 AM and the skipper able to notify the authority for the help. The poor coordination from the Coast Guard which respondent at 12.30 Coast Guard received the distress signal, and activate National Contingency Plan (NCP). The nearby terminal already being notify, but no action was taken appropriately to response immediately towards the oil spill from Exxon Valdez.

Exxon did not deploy the contingency plan immediately, because assume the responsible was taken by the state/federal jurisdiction. Action arrive 25 of April 1989 at noon after the accident. During the past few hours, even the NCP activated, no equipment and response can be deploy due to the policy which created because state and federal did not have. This situation lead the disastrous event when the weather already disperse all the oil that spill from the vessel to nearby coastal areas and beaches. During the event, the use of dispersant was controversy this lead to the non – official use of dispersant for the containment of the oil spill from Exxon Valdez. Canada did not participate the Bonn Agreement, which led to the use of dispersant, however, due to lack of communication and proper National Contingency Plan operation (NCP) the dispersant was use. The usage further impact the natural habitat of the marine life and aquatic life (John, Dooley, Heiman, & McClintock, 1990).

Failure of Contingency Plan

How observation was carried out? Contingency failure of the Exxon Valdes episode. Main ideas of this disaster strike was when the Exxon fail to provide sufficient man-power and resources in mitigating the oil spill in early occurrence of the accidents. The failure of the government and state laws in preparing the resourceful agencies and plan B approach, come to disasters, where they (government) fully rely on the capacity of the private firm to mitigate the issues (which they created). The National Contingency Plan (NCP) seems to be a normal Standard Operating Procedure (SOP) as piece of document and not able

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to be executed. In Exxon Valdes cases, the failure of the backup plan regardless of the support from the company making the disaster permit and widely spread to impacted areas.

By the third day of catastrophic oil spill occurrence, the environmental agencies, government official fail to recover precious moment to contain the issues which then lead to the disasters that majorly impact the wildlife and the aquatic life in the coastal areas. In the first week of disaster, the miscommunication and directive action of the issues, lead the chaotic version of containment which then spreading the coastal areas into the fishing zone. The help of inter-government agencies like meteorological department fail to collaborate in term of prediction and pre-identified the potential areas that impacted, made this cases become more severe.

The combat of oil spill begin with mismanagement and chaos especially in term of equipment arrangement. Coast Guard and Navy personnel was one of the government agencies that truly helpful in providing assistant in Exxon Valdez oil spill episode. The use of skimmer and dredger that being converted into the skimmer suggest the new approach in emergencies situation to handle such spill in the rough seas. Containment able to protect some hatcheries location near the fisherman village that also able to protect the salmon from the exposure to concentrated oil.

### Community Response Towards the Oil Spill

In the midst of managing the spill after 72 hours by the Exxon, the wind and whether took place to impact the nearby shoreline and adjacent areas near the Prince William Sound coastal areas. The oil structure was broken apart and re-join back thus impacted nearby location including fishermen villages and aquaculture that focusing on the salmon fish. Some of villagers and fishermen was prepared and ready with their boom to contain and segregate the incoming pollutant sea waters. Skimmer also being use to ensure the collected oil will be extracted out. This indicate the willingness of the community to fight against the issues of oil spill occur nearby their areas which can impact their source of income and economy.

Later on this accidents lead to the community protest towards the Exxon company for the compensation related to the environmental pollution that cause the economy down turn related to poor fishery aspect due to inhabitable condition for period of time. Based on this issues, the ethics of company that create hazards to the environment seems very important to ensure the sustainability of the other impacted community towards the activities that generate their own benefit.

### STRATEGY OF CLEAN UP OILL SPILLS AND WAY FORWARD

#### Strategies for cleaning up oil spills

When the oil was spilled into the water body at seas, the most important aspect to clean is using the correct efficient technique. Generally there are nine (9) ways of cleaning the oil spill occurred thorough out the world. Some of this technique can be coupled with other modern technique and thus depends on the equipment availability and manpower;

i. **Using Oil Booms**

Oil booms is a technique of capturing the oil spills using the characteristic of the oil in floating on the surface of water. There are many kind of boom suitable to contain the chemical when the spillage is taken place. After the oil boom deploy, the sum of oil can be extracted using skimmers or other mechanical equipment to remove it from water body.

ii. **Using Sorbents**

Sorbent in general term like a sponge in absorbing oil to their surface areas. The use of sorbents have benefit in reducing the chances of the oil from remaining in the water body. However, this technique poses challenge when the composition of oil mix with the organic content which then lead to the insufficient surfactant areas to be absorbed efficiently by the sorbent media.

iii. ** Burning In-situ**

The simpler technique for oil spill recovery and restoration was the burning in-situ. This technique prove to contain and limit the consequences of the oil impacted zone towards the aquatic life and beaches. However, this technique can create the issues of air pollution and extremely not liable when dealing with the huge spill in complex location. The toxic gases emitted from the burning of this oil can further becoming secondary health issues for human and animals nearby impacted areas.

iv. **Using dispensers**

Dispenser was the technique utilized the mix of fertilizer to help the specific bacteria to “eat” or digest the oil that spill in the water. This technique proven to be most efficient and less risk to marine and aquatic life. However, the use of dispenser will lead to unknown toxic effects for rare species of marine life and small animals, thus the strategy should be planned correctly.

v. **Skimming**

Skimming is the mechanical process of extracting oil from the surface of the ocean/ water. The lighter characteristic of the oil making it possible to float and easier the process of skimming the oil residue on the water body.

vi. **Using Hot water and huge force**

This method using the hot water to push the oil spill back into the water and then the skimming process will help to do the rest. The issues of huge force and hot water are their mechanism can impact the factional sizes of colonize that important form small animals to growth. This deposition will then gone after the cleaning was done and thus limit the habitat of the animal to colonize and maintain their species survival.

vii. **Using Manual labour**

Manual labour can be one of the most important technique especially when involve with many volunteers or community involvement. This include the use of shovels and simple equipment to generally extract or remove the oil from the water and isolated it from the impacted areas.

viii. **Using Technological aid**

Using technology in this ideas was by utilizing heavy machinery. The sand and rocks that impacted by oil spill can be removed and clean or extracted in laboratory. This technique was costly and also can damaging the natural habitat of the animals to survive.

ix. **Using natural methods**

In natural means, the oil will be carry away by wind or tides. The concentration of the oil will be reduce and the impact of the primary location will be distributed throughout the world. The particle and chemistry of the oil can be evaporated naturally after exposing to the sun and carried away by the wind. This is one of the technique where the natural condition can “dilute” the oil in the localize area. However, the challenge of this method due to the unpredictable condition of the weather and there rate was too slow without proper elements of controls.

The simplest method of dealing with the oil spill clean-up operation is to make use of the components of nature like the sun, the wind, the weather and the tides. The particles of the oil spill, in due course of time evaporate because of the constancy of these elements. This also forms the most cost-efficient and the slowest method of cleaning up oil spills.
Management of Post Disaseter in Alaska

The After decade of oil spill in Prince William Sound, scientist develop and continuously monitored the habitat and biological composition after the Exxon Valdez disaster through Environmental Sensitivity Index (ESI). This mechanism help environmental scientist to explore and map the tabulation of biological nature and their impact on the oil spill before and after the episode. Using the geospatial and temporal mapping technique, this ESI promising in providing sufficient data to estimates loss and severity of the oil spill occurrence in Exxon Valdes for example.

There are major negative and positive effects of the Exxon Valdez oil spill. Relevant issues beside the animal and biological habitat was the economy through multiple source of income to the community nearby. One of the issues related to the negative feedback will be the tourism industries. After the disaster, there are decreasing resident and non-resident vacation in term of the traffic flow in the affected areas such as Kodiak, Cordova, Home and Valdez. This directly due to the visitor services that unavailable especially for accommodation, charter boats and air taxis (Mills, 1992). Majority of the investor was felt their business due to the impact of the oil spill. The clean-up chaos create labour shortage in visitor industry due to traditional services industry workers seeking high – paying spill clean-up jobs. As result the heritage and cost of doing business in visitor industries was left behind and outdated.

Many booking or cancelation and related planned and events throughout the Alaska areas near the impacted zone was cancel. This impact the fishing game and other tourism attraction mainly in Alaska community and visitors. All sightseeing areas and beaches was destroy and not able to be sustain by the resorts. Impact from this declining visitor and lack of “cleaner” areas contribute to poor business economic flow of the visitor to Valdez and nearby areas. All this issues adding the severity of the Exxon Valdez impact in term of the summer vacation spending decreasing in the affected areas. Estimation over 5.5 million US dollars’ worth of money were demolish due to the effect of the oil spill during that period and continuously for a decade (Azam & Hafeez, 2018; Preston, Thorgrimson, Shidler, Gates, & Ellis, 1990). Fishing lodge and marine activities was restricted and unable to provide sufficient quality habitat for fish and aquatic livestock. This issues, led to poor catchment and bad perception of visitors to come to the nearby impacted areas.

Even there are many negative feedback due to the oil spill accident in Alaska by Exxon Valdez, another opportunity strike. Related business in spill-related recovery and major spill clean-up was booming in multiple areas, attracting more services such as boat renting, recreational vehicle and air taxis. Even the number of tourist and visitor decline, the use of the services in the Alaska was dominated by the clean-up service industries. The image of the Alaska becoming famous in bad shape (this contribute to equal negative and positive) for perception of experts. Majority of the small animal survive towards the years. However, larger mammals or birds and special sensitive species was hardtop be found due to the changes of the environment. Some species also recorded for recovering period over the last few decades.

Ethical Issues Related to the Cleaning (effects of cleaning the oil spill)

After the accident related to environmental disaster in Exxon Valdez accident, the Environmental Protection Agencies (US EPA), under the NOAA (Office Response and Restoration), there are significant chances and strategies that had been deploy to improve risk mitigation in the future. One of the related strategies was directly related to the oil spill clean-up. There are many lesson learn from the Exxon Valdez disaster which suggest the USEPA and NOAA to limit the use of aggressive clean-up method such as hot-water washing that can severely impact the biological and natural habitat of animal within communities (Langangen et al., 2017).

Beside that the use of water to flushing out the contaminant was proven to remove the tiny particle of nutrient that important for small organism to successfully colonize. This permit their growth and taking time to redeposit for the small organism to function as normal condition.

Adult animal that survive shown significant disruption an impaired of their reproductive biology. This lead to the poor survival of offspring and species sustainable within community. Oil deposit within the sandy beach can relatively remain fresh and expose to the animal directly which later own cause toxic due to multiple reaction related to hydrocarbon reaction like Polyromatic hydrocarbon (PAH) that proven to be carcinogen for animals (EVOSTC, n.d.).

During the extraction of oil in the beach and nearby shoreline, the use of heavy equipment such as excavator and bulldozers relatively ruin and damaging the solid foundation of the sand that become natural habitat for certain small animals. With this issues, the general makeup of the shore and beach will be taken years to recover and become its natural presentation. The deep penetration of the clean-up making the weathering condition of the animal slower thus limited their deposition near the beach which lead to the un-survival nature of the animals.

Malaysian Oil Transportation: How to Improve?

Based on the Exxon Valdez tragedy, numbers of ideas and approach we can further enhanced to promote better environmental protection in the events of development in Malaysia. The current knowledge that we can learn are divided into four general ideas namely authority and government agencies, engineering technology, research and development and alternative method development.

For the first argument in the authority and government agencies, Malaysian, should empower and making their regular activities beyond normal duties. The example of failure from the Coast Guard response towards the pilot aing the huge risky vessels remarks very important issues. The government agencies in Malaysia namely Agensi Penguatkuasaan Maritime Malaysia (APMM) and Jabatan Laut Malaysia (JLM) should be extended and proactively towards managing the risk of the vessels transporting the national ocean and coastal areas. The APMM and JLM should use sophisticated updated technology in monitoring and provide sufficient pilotage especially on the risky vessels. Besides, the marine organization, ship and transportation agencies should be taken into serious assessment of risk management and contingency plan for using their vessel in Malaysia water territory.

In addition to that, the Ministry of Transport should working not in silo especially when involve in sharing coastal line, mutual understanding between nation and international boundaries should be establish and regular simulation and exercise should be conducted to prepared the officers and vessels toward the proper enforcement and guidance for private company especially in preventing oil spills in our country. Navigational support and proper hydrographic chart should be updated and shared to the vessels to immediately help the officers in maneuvering complex shoreline. Besides, the maritime school and related institution should emphasize good discipline when trained their officer cadets in piloting the vessels.

Second ideas, was the engineering and technology development should be embedded in shipping design and the risk of handling hazardous agent should be place as priority. This include the licensing and permit given for the huge vessel when travelling across the country. Engineers and ship designers should emphasize on the “back - up” plan design especially involved in risky material transportation. This include the oil tanker, and related vessels. Clear navigational condition and updated version of early sign detection device should be in-place for the complex huge risky vessels.

Beside that the ship design and engineers should work in hand with the maritime institute and related agencies, to provide professional guide, new design and affordable technology for the ship safety equipment especially in avoiding collision between ships and ground
hazards during maneuvering. The auto pilot and navigational equipment should be linked and able to be monitored by the authority similarly like the communication tower for the aircraft pilot should be implemented. If this component can be integrated, the events like Exxon Valdez can be prevented from happening again.

Third ideas for Malaysian to learn from the past, is the implementation of continuous research and development for marine, shipping industries and relevant oceanic studies. Based on the NOAA research, there are numbers of expertise already in place during the disaster of Exxon Valdez. Tidal study, biological studies and many other related studies should be initiated by universities to help the engineers and users of the ship in transporting hazardous agents on the seas. Monitoring and continuous geological research should be conducted to help the navigator understand the pattern of the sea beds. Research on the oil spill technology, should be tested and regularly prepared during the oil spill events. Holistic nature of risk assessment should be in place when conducting the oil spill management and contingency plan.

The fourth ideas for the Malaysian, will be the use of alternative method for energy. All of this issues arise because of the use of petroleum product and the bumbling of the industrial era. If the crude oil needs can be adjusted and replace with cleaner and sustainable source of energy, perhaps the demands of the oil can be control, thus the product can be safely transport not in bulk. Petroleum product was the major source of energy for automobile and generating electrical power, if this paradigm can be shifted, the needs for the transportation of this product can be limited thus, saving the ocean from their spillage.

CONCLUSION

In conclusion, oil spill tragedy like Exxon Valdez can be prevented if everyone play their role seriously in understanding the need to respect the nature and environment. The government, private company, policy makers and ship operator need to improve their professionalism and care about environment in order to appreciate the nature. Similar tragedy can be prevented with good efficient regulation, enforcement, technology driven and professionalism in carrying out duties. There are at least 16 ideas to prevent similar accident from happening again (ut not limited to);

i. Limit the tank volume for the specific journey to carry the items. The journey must be made limited to identified journey to reduce any risk of accidents;

ii. The zoning of the specific responses during the emergency must be efficient to reduce/ immediately take action towards any accidents;

iii. The specific role of accident commander to response for specific emergencies. This document treaty or understanding must be written;

iv. The need to maintain the diligent, motivation and focus on work. This related to occupational hazards management and duty & responsibility for specific jobs especially during critical condition (narrow channel/ during night/ bad weather);

v. Joint – function body/ sensitivity element from the nearby coastal custody body (Coast Guard) to closely monitored and regular follow up for any big vessel passing through the sensitive areas/ near shore;

vi. Create culture of prevention in term of managing high risk condition. This include regular practices of the drill, and training, including all aspects especially in the occupational safety and health issues;

vii. Improve of the navigational systems and other maneuvering equipment for early detection, good spots of hazards avoidance and else;

viii. Improve the transatlantic transportation through land mechanism in delivery the product to the continent from another continent. Even it’s hard and expensive but the risk of endangering any accidents can be avoidance;

ix. Upgrading the regulation to ensure the absolute power to the state to control the transportation of the product;

x. The improvement majorly needed in the pilotage of the vessel. This include the responsibility from the state and federal department to equip officer in charge to help/ giving the way of providing efficient pilotage for the vessel (especially risky vessels);

xi. Design of the ship should be constructed or modified to suit the current risk that the vessels was carried. In this case, the double hull design should be used rather than simple single hull design;

xii. Third mate officer in charge during the pilotage of the narrow channel was not sufficiently train. This could be mitigate by proper simulated condition and special licensing for officer in duty for pilotage the ships especially carrying the sensitive chemical loads;

xiii. The team of managing the pilotage (in ship we call Special Sea Duty – When approaching hazardous situation, example during pilotage narrow channel) was not organize in good manner. This was found from the poor management of the Exxon;

xiv. Improvement of the coastal officer technology. In this case, the Coast Guard, should be equip by the high end technology of radar based detection or infrared capabilities, to spot any weird movement of the ships. Like the tower controlling the airplane in the airport;

xv. Improvement of the directive vessel officer should be carry out together with the proper automatic detection system by GPS to detect any deviation made by the officer in charge to ensure the vessels maintains its course;

xvi. The improvement of the officer on duty to report any pressure given from the company was need to be created.

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