

# The Challenge of Insurance in the Context of Oil Transportation by Sea

Brahim Idelhakkar

Institut Supérieur d'Études Maritimes ISEM Casablanca.Morocco

b.idelhakkar@yahoo.fr

**Abstract-**The operation of the major industrialized economies is largely dependent on the availability of oil resources. Production and consumption sites of this raw material are often in total geographical disconnection. Oil shipping remains the least expensive mode of transportation. This activity is risky and complex. Risky", since accidents are a source of environmental and economical damages; considerably important enough to obscure the rare nature of such disasters. Complex", because there are many actors and intermediaries, often of different nationalities and are sometimes difficult to be identified.

In the energy fields, the service provider company like the shipment of oil from exploration site to the market is often faced with signing a contract of marine insurance.

Such an agreement yields to certain sensitive standards. Facing the risks of sea crossing of a highly risked energetic product as oil and its derivatives, the insurance contract is a very useful and often presents more difficulties that should be qualified.

How is the environment integrated in our market economy? The traditional approach, consisting of regulating the most possible, has shown its inability to solve environmental problems. A new approach, which is more flexible and more efficient in combining regulatory and economic instruments, should lead to improve both economic and ecological results to fight against pollution.

**Keywords-** Risk; Tanker; Externality; Oil Pollution; Market Benefits; Environmental Regulation; Insurance

## I. INTRODUCTION

The increasing globalization of the economy has largely been authorized by the maritime transport and its rapid evolution, both in the organizational and the technological change; such as transport prices.

While transportation activities are of great economic value, especially the transportation of energy products by sea, they also carry many negative effects on the environment: emissions of greenhouse gas, local air pollution, pollution water, damage to biodiversity due to pollution, habitat destruction, etc. The current situation is unsustainable and new policies are needed. It must in particular encourage technological advances especially for oil tankers in particular to improve energy efficiency.

Crude oil must be moved from the site of production to refineries and refineries to consumers. These movements are realized with different modes of transport.

Crude oil and refined products are transported in water by boats and barges or tankers or oil tankers called.

These tankers are used to transport refined products. The large variety is the Very Large Crude Carriers (VLCC), they are used in international trade of crude oil. The size of tankers that can be used in any type of trade (commercial voyage from a port of origin and destination) depends on the length of the tanker, the volume of the tanks and the capacity of loading and unloading of the ports.

The larger vessels are used because they reduce transport costs of a barrel of crude oil.

## II. THE TRANSPORT OF OIL BY SEA IS THE WAY THE MOST CONVENIENT

Oil and gas exploration and production and associated energy infrastructure projects take place across the globe in a diversity of environmental and socio-economic settings from the Arctic to the humid tropics. Energy industry activities are also inherently complex and risky. They involve a variety of environment, health and safety and social issues that need to be carefully managed alongside geologic, political and economic risk factors.

Although shipping is considered one of the means of transport that causes little harm to the environment, it may have important effects if standards are not observed or are not enforced.

The exact nature and duration of any impacts from an oil spill depend on a number of factors. These include the type and amount of oil and its behavior once spilled; the physical characteristics of the affected area; weather conditions and season; the type and effectiveness of the clean-up response; the biological and economic characteristics of the area and their sensitivity to oil pollution. Typical effects on marine organisms range across a spectrum from toxicity (especially for light oils and products) to oil pollution. The shipping company must manage after identifying risks and knowing how to transfer them to insurers, sovereign states, take offs to the maritime adventure, as the sea still remains a wild world. ducts) to smothering (heavier oils and weathered residues).

### III. RISK EVALUATION OF OIL MARITIME TRANSPORT

The operation of oil tankers represents a significant risk to the environment due to the severe consequences of oil spill. Tankers are the largest contributor by vessel type to worldwide spill volume.

The economic risk in oil shipment here is nautical risk (boarding, stranding), fire, explosion, hull breach, and the risk of pollution: the stronger risk aversion.

Legal risk is: based on the concept of responsibility and on the legislation coming into effect over the international plan, conventions, OPA, Oil Pollution Act..., Brussels conventions of 1969 and 1971 and the MARPOL convention.

Two conventions of Brussels determine the legal framework. Civil liability of the oil carrier corresponds to the convention of 29 November 1969; that asks him to compensate victims of pollution damage (108 million Euros). The second agreement signed on 18th December 1971 calls for the creation of an international fund for compensation against damage caused by hydrocarbons pollution (IOPC funds, FIPOL).

The MARPOL convention has bound in its terms, starting from 05th April 2005, ship-owners to send decayed tankers over 25 years old to breakage.

The preliminary risk approach: developed at the beginning of the 1960s in the United States; it is the identification of risks by the definition of the means (prevention, protection and procedures, etc).

It is to draw up a dashboard with all factors that affect overall safety of a ship carrying oil. This will particularly lead us towards the application of the rules relating to maritime navigation.

This preliminary approach to risk is also based on the lessons of history. The maritime accidents that happened yesterday can be tools and basic parametric models of the control panel defined above. Risk control must allow several objectives: first to enter the security aspects, identify risks then prescribe immediate corrective actions in the best conditions of efficiency, delay and cost.

However, in the case of marine oil transportation, we have stressed that it is a question of the coverage plan with two dependent risk sources. And the implementation of the oil vessel body risk may result in the risk of oil pollution of the seas and coasts. If the first risk is fully covered by regular insurance, the second is not.

### IV. ENVIRONMENTAL PERFORMANCES IN THE FIRM

Risk management related to energy industry has become increasingly complicated due to factors as government regulation, public policy, financial concerns, and the scarcity of energy resources. To answer these questions, the firms involved often implement risk management strategies of energy. Risk management of energy involves the process of identification, assessment and prioritization of risks associated with uncertainty in energy markets. The control of energy risk may provide insurance to large markets for firms such as producers of oil and gas, electricity suppliers and gas. It can also give confidence to insurance companies, banks, and producers who work with energy corporations.

The link between environmental and economic performance has been widely debated in the literature for the last ten to fifteen years.

We argue that not only the level of environmental performance, but also the type of environmental management with which a certain level is reached, affects the economic results. The firms should focus more on causal relationships of eco-efficiency, ie the effect of different approaches to environmental management on economic performance.

### V. ECONOMIC REFLECTIONS ON THE ENVIRONMENT

Economic reflections on the environment are relatively recent: The broader issues of management of scarce resources (oil) or renewable (fisheries) are an even more recent concern, but toward which the public is sensitized, as evidenced the rise of environmental concerns. That of global warming has considerable economic and political issues (Kyoto Protocol ...).

Managing risks associated with the energy industry is becoming increasingly complicated due to factors such as government regulations, public policy, financial concerns, and energy resource scarcity. In order to address these issues, impacted companies often implement energy risk management strategies. Energy risk management involves the process of pinpointing, evaluating, and prioritizing risks associated with uncertainty in the energy markets. Controlling energy risks can provide greater market assurance for companies like oil and gas producers, electric providers, and gas utilities. It can also give confidence to the insurance companies, banks, and manufacturers who work with these energy companies.

### VI. THE QUALITY MANAGEMENT OF MARITIME INSURERS

Companies are often increasingly anxious about the vulnerability of results by the balance sheet. With regard to increased costs or declined turnover- reason of discount- companies are often faced with a number of risks and they have to know how to manage them.

To remain competitive, they must: reduce costs, manage cash flow, smooth operating results against volatility, identifying risk parameters, etc.

In the energy fields, the service provider company like the shipment of oil from exploration site to the market is often faced with signing a contract of marine insurance.

Such an agreement yields to certain sensitive standards. Facing the risks of sea crossing of a highly risked energetic product as oil and its derivatives, the insurance contract is a very useful and often presents more difficulties.

Insurers are accused of lacking rigour to insure ships under standards.

It is justified to advocate the participation of insurers in the management of the oil transport quality. The marine hull insurers and public liability are the only ones affected, in terms of oil carrier, taking into account the hull risk and public liability risk for marine pollution. The insurance policy towards under standard ships is to get rid of them by leaving the serious risks. How?

By becoming more coercive on the imposed insurance clauses, insurers have introduced, in conjunction with the brokers, a clause that provides for the exclusion of vessels over 20 years, and the access to the classification registry. Tankers' hull insurers benefit from the support of London Joint Hull Committee, who introduced the policy.

#### VII. OIL POLLUTION AND MARINE ENVIRONMENTAL LAW

How is the environment integrated in our market economy? The traditional approach, consisting of regulating the most possible, has shown its inability to solve environmental problems. A new approach, which is more flexible and more efficient in combining regulatory and economic instruments, should lead to improve both economic and ecological results to fight against pollution.

In the early 1970s, governments began to intervene in the field of environmental protection by using a regulatory arsenal and direct controls. Parallel to this legislative process, a new economic- approach appeared. It came out from the theory of externalities, by which the phenomena of pollution and environmental degradation are due to the lack of an adequate pricing of environmental resources: if we give a full price for these assets, their users (especially polluters) will take the necessary measures to limit their consumption and deterioration, rather than wasting them when they are free.

Therefore, it is convenient to first examine the theory of externalities, which is the basis for the economic approach to the fight against pollution. Then we'll see how this theory gives rise to economic instruments for environmental protection.

#### VIII. THE CONTRIBUTION OF THE THEORY OF EXTERNALITIES

We can define the externalities (or external effects) as follows: an external effect occurs when a person's activities affect the functions of production or the welfare of others who have no direct control over that activity (Kolm, 1971); external effect is an external economy or an external diseconomy whether it is favourable or not to the person who undergoes it. In the environmental economy, the negative externalities occur most often.

The externality characterises a situation where the economic action of an agent provides advantages (positive externalities) or disadvantages (negative externalities) to one or many other agents, such interdependence finds no adjustment on the market.

A company that pollutes a river creates negative externalities to all residents and businesses located downstream of the pollutant firm. When a tanker empties its tanks in the international waters or when toxic smokes degrade the air quality, officials embarrass fishermen and inhabitants without spontaneously setting any price for such nuisances.

In case of externalities the price system ceases to carry on its function of information and incitement, it does not guide the agents towards more socially optimal decisions which may lead to various forms of inefficiency in the organization \ activities of production and consumption.

#### IX. THE MARKET FAILURE IN THE PRESENCE OF EXTERNALITIES

Generally, prices correctly measure the social values of a property that is the supplement or reduction of potential welfare for the community no matter what their production or use is by a particular agent. The price system is a kind of common denominator that summarizes all the interactions between agents and allows an assessment of collective welfare; competitive price system guides agents to an efficient use of available resources to the community.

There are, however, cases where prices do not play this role that the theory assigns to them, and where the costs and benefits differ from private costs and benefits to the community. These are situations where the decisions of consumers or producers of an agent directly affect the satisfaction or benefit of other agents without evaluating the market and make the agent pay or remunerate for this interaction: we talk of externalities.

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towards more socially optimal decisions and results in various forms of inefficiency in the organization of activities, production, and consumption.

Those affected by the externality in the case of external economies, do not pay the price in return for the benefits they enjoy as if they are in contrast affected by the activity of the mover of the externality; they have no power to make restitution.

Production is optimal in the presence of externality because some costs are not taken into account. All social costs of an activity giving rise to external economies will not be supported by the responsible, and his activities will likely be extended.

Energy and environment are essential for sustainable development. The United Nations Development Programme (UNDP) helps countries to share best practices, by providing innovative policy advice and linking partners through pilot projects that help the poor to develop their sustainable livelihoods.

Marine ecosystems are extremely fragile. They are complex and require a structured environment to survive. Scientific measurements show that these systems are disturbed by human activities on land and at sea. Their short-term impacts are now evident, but the overall long-term impact cannot be measured because of the complexity of marine ecosystems. Therefore, it is essential that marine pollution is considered as a global problem and must be taken up in its entirety, taking into account the fact that it knows no borders. To begin an assessment that would reduce the risks incurred by the marine environment, it is essential to identify what may be risks.

#### X. EXTERNALITIES AND THE REGULATORY APPROACH

An important solution to the problem of environmental pollution is based on a conception of the kingly state. It advocates to the use of administrative regulations of activities causing externalities through taxation permissions

We shall introduce here the concept of Pigouvian taxes, named after the British economist Arthur C. Pigou (1877-1959) who first, proposed to tax externalities in the environmental field. It aims to internalise the external costs or damages that the firm imposes on society and the environment. With this tax, bear in mind, is not a tax but a price, the producer takes into account not only its individual costs of production but also its social costs (externalities) caused by its operations. The problem of course is to quantify the damage in monetary units. This estimate is very difficult in practice and the Pigouvian tax, optimal theoretical tool, cannot be applied in this form. The concept, however, provided a theoretical basis for economic instruments increasingly used in OECD countries, such as taxes, fees, deposit systems, the financial markets or the creation of a permit to issue (rights to pollute). All these instruments have the advantage of giving a price to the pollution and thus lead to a better allocation of resources.

However there are two opposite views here, on the one hand, economists in favour of active intervention of the state (tax or regulatory approaches) and on the other hand, economists advocating free negotiation between polluters and the polluted (Contractual approach, and mechanism of pollution rights).

If there is uncertainty about the future effects of a suspicious activity, the precautionary principle is applicable only to avoid irreversible catastrophe. This principle is to take protective measures without waiting for scientific certainty (to the greenhouse effect, immediate ban on CFCs, for example).

A lower overall cost of fighting against pollution in relation to the establishment of pollution norms: tax is individually applied to the activity level of each firm, while the norms are uniformly applied, without taking into consideration the marginal costs of each firm.

Compared to the standard, the tax is a permanent incentive to reduce emissions. So when the state imposes an emission standard, the polluter-friendly law has any ambition to achieve this standard. In this case, the polluter has no incentive to do better than the standard (except for matters of commercial images).

In contrast, the tax provides a double permanent incentive struggle against pollution and technological innovation in this field. On the one hand, the tax induces a further reduction of emissions so that technical progress no longer benefits as a single polluter, but the community too. On the other hand, in the presence of tax, technical progress allows the polluter to perform a dual economy (Cost-saving treatment and tax saving).

#### XI. THE FREE NEGOTIATION BETWEEN THE AGENTS

Ronald Coase, demonstrating that government intervention is not automatically required; he also highlights the true foundation of such an intervention. The state action is justified when the high number of partners and / or complexity of externalities involve entail transaction costs so that no mutually beneficial agreement and establishing the optimal allocation of resources cannot be spontaneously negotiated.

The Coase Theory also is read as follows. If property rights are fully defined, if transaction costs are zero and if the information concerned is perfect agents, negotiation among these agents enables a situation of Pareto-optimal. In addition, if the distribution of property rights does not generate income effect, the optimum obtained will be the same, whatever the structure of property rights is.

The invalidity of the income effect related to the allocation of property rights: suppose that the Stationery initially owns a River. If this right is removed to be attributed to the water treatment plant, it sees its economic situation improve (increase in its income in the broadest sense). Say that the income effect is zero; this change has no effect on its marginal willingness to pay for a less important pollution. Under these conditions, bargaining between the two firms will lead to the same result (Pareto optimal) as Stationery has the right to pollute the river or the treatment plant has the right for a clean river. Coasian solution to the problem of externalities is a “market procedure of the internalization of externalities, which means that a market of externality rights has to be created. This procedure relieves the state to intervene, apart from ensuring respect for property rights.

So as this bargaining can take place, it is necessary that the rights of agents are clearly defined. In the case of the factory that pollutes a river, it is about who owns the rights to the river water. Do they belong to river users, who are then entitled to a clean river? Or do they belong to the company, which then has the right to pollute the river? If property rights are well defined, then a Pareto-optimal situation may result from free negotiation between the agents involved in the externality.

## XII. RESPONSIBILITY OF INTERNATIONAL MARITIME ORGANIZATION

The dilution framework of responsibilities and the lack of transparency that characterize the financial rules of the sea under the International Maritime Organization (IMO) IMO has effective and efficient mechanisms in place for the elaboration, development and adoption of international treaties, rules and regulations and their implementation through the tacit acceptance procedure adopted for amendments to most fundamental international conventions.

IMO provides technical assistance to developing countries – individually and collectively– for establishing effective national Port State Control capacities, or regional mechanisms of co-operation for Port State Control activities.

We particularly believe that the absence of an unlimited, coherent and preventive responsibility of a national regime to be applied to oil transport by the sea, both at national and international levels, allows the maritime actors and their shippers to bear an inconsistent risk with the preservation of the environment which remains viable in case of disaster.

Unlike the UN agencies, the IMO does not work on the principle of one state – onevote but according to the relative weight of States in respect of maritime transport.

Consequently, flags of convenience such as Liberia, Panama, Malta and the Bahamas, which represent 40% of maritime traffic, make out a law of it. The rules of the IMO Maritime suffer from this backing of the lobby of private operators, ship owners, chatters and major petroleum owners. Flags of convenience are countries that offer tax advantages, a social right and a discount on almost total laxity in regulation (inspection of ships, etc.). Rather than fight against their existence, the EU relations with this system are troublesome.

The risk of pollution is taken into account by several conventions. The TorreyCanyon accident in 1967 and its media have been critical. It was the first major oil accident, after which the International Maritime Organization, affiliated to the UN, has been initiated by the adoption of several international conventions.

The first is the MARPOL Convention of 1973/1978, which establishes rules designed to prevent and minimize pollution caused by ships, whether accidental or due to routine operations. Beyond these agreements, we must also recognize the voluntary efforts of industry, either the ship-owners or oil companies.

## XIII. CONCLUSION

The damages of the spill are equal, by definition, to reduced ecosystem services affected by pollution. This definition led to wide acceptance of the concept of damage as it integrates the downturns experienced by the market sectors depending on the quality of the environment (fishing, shellfish aquaculture, tourism).

We particularly believe that the absence of an unlimited, coherent and preventive responsibility of a national regime to be applied to oil transport by the sea, both at national and international levels, allows the maritime actors and their shippers to bear an inconsistent risk with the preservation of the environment which remains viable in case of disaster.

An important solution to the problem of environmental pollution is based on a conception of the kingly state. It advocates to the use of administrative regulations of activities causing externalities through taxation permissions.

The asymmetry of information is the origin of the marine insurance’s higher costs and it results in hazardous moral problem which is an “unwanted effect” i.e. a non desired result and a tiresome regulatory system or a contract with a major legal flaw which opens wide possibilities of abuse, or even fraud, to those who want to take advantage of the regulation/the contract by diverting its spirit. The hazardous moral is the voluntary ability for someone to strategically take advantage of an unpredictable situation ignored by the system designers.

To resolve this issue, we believe that the insurer can include typically, in such contracts a bonus and a franchise. Under such conditions, it is possible to firstly suggest a strong premium and a low franchise contract which is chosen by the failing

carriers, and a low premium and strong franchise contract, chosen by good carriers. We would call the first contract: participatory constraint and the second one incentive constraint.

#### ACRONYMS

- IMO** International maritime Organization  
**OPA** Oil Pollution Act  
**MARPOL** marine pollution  
**(IOPC funds)** The International Oil Pollution Compensation Funds  
**IFCP** FIIPOL International fund for compensation for pollution  
**OECD** Organization for Economic Co-operation and Development  
**VLCC**: Very large crude carrier  
**IEA** International Energy Agency  
**SOLAS** The Safety of Life at Sea, known as  
**UN** United Nations  
**UNDP** The United Nations Development Programme

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