

SAFE AND RELIABLE MARITIME TRANSPORT CHAINS OF DANGEROUS GOODS AND HAZARDOUS WASTES

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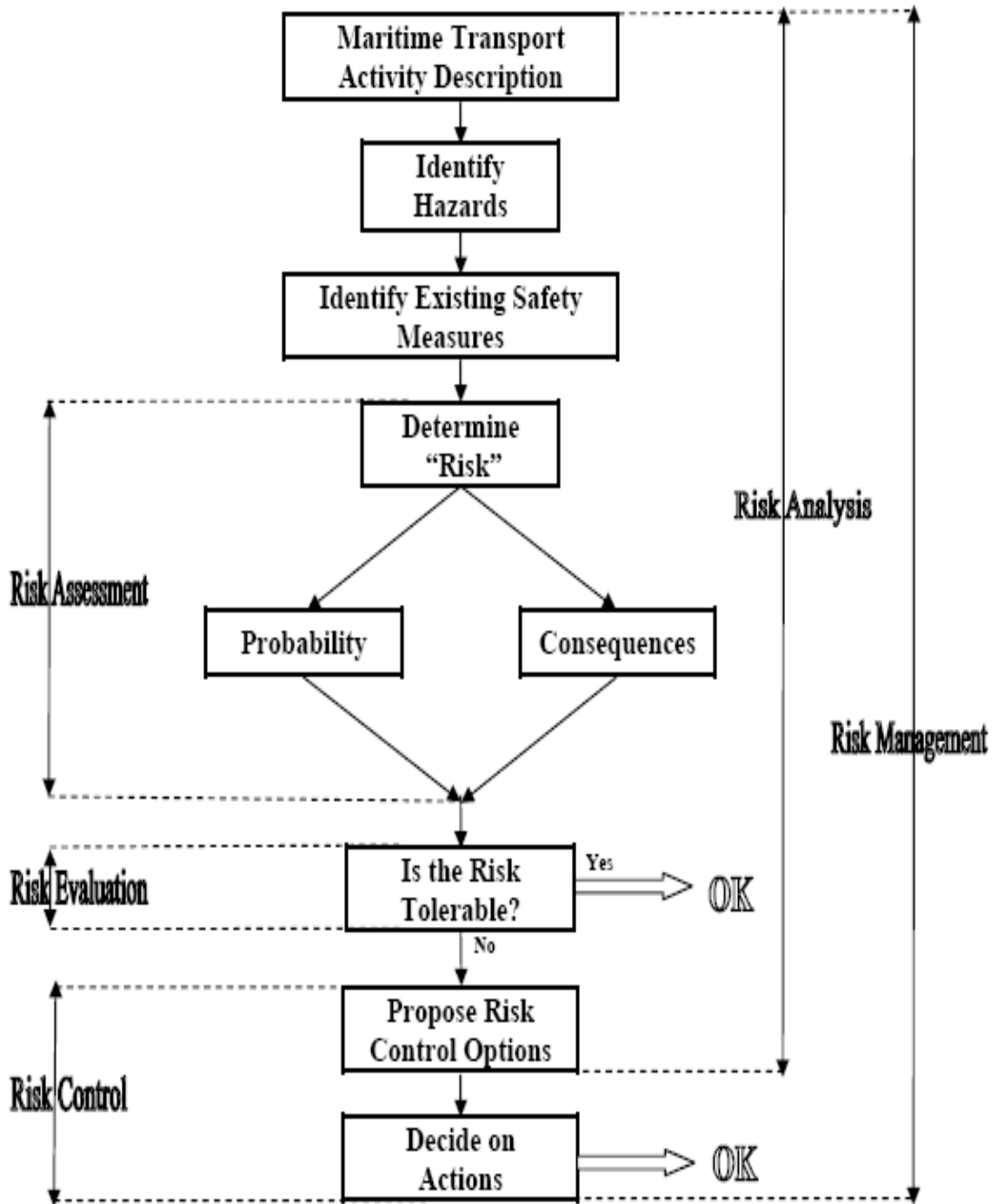
Dangerous goods (DG) or hazardous wastes (HW) can have the potential to cause harm to people, property or the environment where there is a release or the threat of release of DG or HW by accident, incident or failure, representing hazards such as explosion or radioactivity, etc. causing adverse affects on human health and safety, the marine environment and properties. Obviously, even though there is no release of DG or HW, incidents and accidents can have impacts in terms of delays and expenses associated with emergency response personnel responding to the incident and/or evacuations.

Dangerous goods (DG) and Hazardous wastes (HW) can be transported by water/ships in two forms: *Bulk* and *Packaged*. Many different types and sizes of ships, including general cargo ships, container ships, and Ro-Ro cargo ships are carrying DG and HW. When the packaged form of DG or HW is considered, they can be carried together with non-dangerous materials and passengers' onboard cargo/passenger ships. Relevant principal rules are set in the International Maritime Dangerous Goods (IMDG) Code, which are recommended by International Maritime Organization (IMO) and United Nations (UN).

A review of the available empirical data on consequences of DG and HW incidents showed that the type of data most often available was for human consequences (injuries and deaths). Data on property damage, financial consequences (for example from delays and/or evacuations) and environmental impacts were limited. This is identified as an area where more information is required to improve risk assessment. The safety/security of maritime transportation of DG and HW is a concerning issue for public and private stakeholders. Such concerns are mainly from the high and still increasing amount of DG and HW, devastating acts and theft, severe effects of accidents, in particular, those accidents that may involve toxic, explosive and radioactive materials and substances, and in general belief that risks associated with DG and HW should be better managed.

The main risk management process components for maritime transportation of dangerous goods or hazardous waste can be considered to include description of maritime transport activities, hazard identification, existing safety measures identification, selection of accident scenarios, estimation of probabilities and consequences, and risk determination, risk evaluation, risk control and making decision. Characterization of hazards and risks could be both qualitative and quantitative, and both descriptive and mathematical, consistent with the available data, and should be broad enough to include a comprehensive range of options to reduce risks.

Figure below is presented to show the main steps of risk management process proposed for maritime transportation of DG and HW.



KEY WORDS: Risk Management, Dangerous Goods, Hazardous Waste, Maritime Transportation, Safety and Reliability, Accident/Incident.