

Methodology essay examples

[Environment](#), [Disaster](#)



CHAPTER III

Introduction

The high incidence of oil spills have led to the adoption of different clean up techniques that help in the remediation process. However, the adoption of a specific method for the remediation of oil spill requires the systematic reviewing of the different literatures available and meta-analysed by the researchers. According to Graham (2010), the range of the different clean-up efforts varies widely depending on a number of factors that include oil type and density, water temperature, the volume of spill, proximity to shorelines, waves, currents, weather and speed of response among others. The systematic reviewing of the research studies involving oil spills and meta analysing the different approaches and methods can guide the research methodology in future for further development in the area.

Systematic Review of the Literature

A systematic review is significant to research with uncertain outcome of the intervention effectiveness. According to Petticrew & Roberts (2006), the comprehensive identification, appraisal, and synthesis of the relevant studies on a given topic is a systematic review. They have suggested the important seven steps that pertain to a proper systematic review. They are 1) defining the research question or hypothesis clearly; (2) determination of the studies needed to carry out the studies; (3) location of the studies by comprehensive literature search; (4) screening and assessment of the located studies according to the inclusionary criteria; (5) critical appraisal of the studies to

be included in the systematic review; (6) synthesis and assessment of the studies for homogeneity; and (7) dissemination of the review outcome.

Objective of the review

The objective of the review is to compare the different cleanup techniques for the remediation of oil spills and help in the determination of the most effective cleanup technique that would help in the remediation of the oil spills in the Niger delta. On the study of the different clean up techniques, the meta analysis of the data obtained from the different methods would help in the determination of the effective method for cleanup of the oil spills and help in the reduction of the impact of the oil spills on the environment of Niger delta.

Different cleanup techniques in the remediation of oil spills

The different cleanup techniques adopted for a particular spill depends largely on the oil type and the different conditions present at the location and time of the spill (Zabbey, 2004). According to Egbe (2010), there are two main categories of the processes used for remediation (Egbe, 2010). They are Short-term processes and Long-term processes.

Short-term processes include mainly the cleanup techniques that are brief and include the physical and chemical methods, while the Long-term processes are those techniques that are applied for longer time for effective cleanup of the oil spills.

Zahed, Aziz & Isa (2006) have elaborated on the different physical methods that are used for cleanup. They include use of booms, skimmers, low pressure flushing, In-situ burning, stripping of surface sediments, adsorbents,

mechanical removal, washing of shorelines, tilling, etc.

Chemical methods involve the use of different chemicals like dispersants that are surface-active agents capable of breaking down the slick of oil into small droplets whereby it is transferred into the water column where it undergoes rapid dilution and is easily degraded.(Lessard & Demarco, 2000).

Long-term processes include mainly the cleanup techniques that involve the use of microorganisms, the process known as bioremediation.

Bioremediation has been defined as “ the act of adding materials to contaminated environments to cause an acceleration of the natural biodegradation processes” (OTA, 1991).

Almost 50 oil spill remediation techniques were found by the review to the articles from 2005 until present; hence, proper review of all the materials regarding the topic is essential for the selection of the relevant materials that present the information required concisely. For the systematic review, the main question is the criteria for the inclusion and exclusion of the relevant materials on the topic.

Criteria for the inclusion and exclusion of the studies relevant to the review

The inclusion and exclusion of the different studies related to the topic involves the context of relevant discussion of the topic in the studies. In the studies related to the oil spills, the methods of prevention of oil spill or the different causes of oil spill are irrelevant to the topic. Hence, the literatures concentrating their discussion in this area are excluded from the review. The literatures, in which the discussion has the focus on the different cleanup techniques involved in the remediation for oil spills are included in the

review.

In the literatures focusing on the different cleanup techniques for the remediation of oil spills, the relevant application of the latest technology in the process is essential. The methods that were undertaken for cleanup in the remediation process many decades ago that are irrelevant to the current scenario are excluded from the studies.

Apart from the above criteria, an idea about the suitability of the different cleanup techniques in the situation of the Niger-delta is essential as the particular cleanup technique used for the remediation of the oil spills are dependent to a large extent on the climatic conditions of the location of the oil spill apart from the type of oil, etc. Hence, Shell in Nigeria (2012) have found the suitability of the application of the remediation by natural attenuation i. e. bioremediation considering the equatorial climate of Nigeria and the disadvantages of the physical and chemical methods in the cleanup of oil spill in the remediation process.

Hence, proper eligibility criteria are very essential for the inclusion and exclusion of the different studies relevant to the review.

Meta analysis

Meta analysis is the statistical approach to combine the data collected by the systematic review. The systematic review of the different literatures helps in the identification of the different cleanup techniques for the remediation of the oil spills and the limitations of the different techniques. This in turn will help in the selection of particular techniques, which will help in the selection of the cleanup techniques that can be used for the remediation of oil spills in

Niger-delta. The Meta analysis provides concrete evidence in support of the selected technique that can be used for research.

The main criteria of Meta analysis is the cost-benefit (CB) analysis (Guerriero & Cairns, 2003), which helps in the evaluation of the benefits (increase in welfare) and the costs (decrease in human well being). The aim of this analysis is maximisation of net social benefits: $\text{Max } B(Q) - C(Q)$. The CB analysis helps in the environmental regulation to determine the acceptable levels of risk, which is maximisation of the difference of cost and benefits. The evaluation of the health benefits can be approached quantitatively by using three types of data: 1) environmental data for identification of the pollutants hazardous to health in the sites by estimation of health effects due to pollutant exposure; 2) epidemiological data that identifies and quantifies the health effects associated with the regulatory intervention by the number of health outcomes averted by site cleanup; and 3) economic data to assign monetary value to negative health outcomes, by the multiplication of the number of deaths averted per year by the value of a statistical life.

After the quantification of the health benefits, the quantification of the cost of the cleanup techniques for remediation is essential that decides the stringency of the cleanup procedures and standards and the authority responsible to bear the cost of remediation. The remediation expenditure can be split into three categories: the transaction cost borne by the agencies, removal actions and long-term remediation cost.

The meta analysis of the techniques also involves the time adjustment as most of the remediation techniques continue over long period of time, hence

the estimation of future costs and benefits must be analysed. The cost-benefit evaluation of a particular technique decides the adoption of that technique in the remediation process i. e. the benefits must exceed the cost. The possibility of risk and uncertainties in the adoption of a particular technique in the remediation process affects the CB analysis. Hence, in the adoption of a particular technique, the risk and uncertainties must be included as they may generate unexpected changes in the analysis.

Data Collection

Search strategies used for the systematic review

Different search strategies were employed for the systematic review such as Literature searching, electronic database searching, hand searching of the different relevant journals on the topic, internet searching in different relevant sites and the searching of the reference lists given at the end of different relevant journals, reviews and literatures. For the search strategy, the use of key words employed in different combinations helped in the search to prevent the exclusion of potential sources relevant on the topic.

Conducting and documenting the search and selection process

During the data collection procedures, proper maintenance and storage of the records is essential that helps in tracking of all the searches involved in the review that include: 1) Time periods searched; 2) Databases utilized; 3) search engines searched; 4) number of hits; 5) amount of time searching; 6) key words used; 7) professionals contacted; and 8) professional organizations contacted.

Data Analysis

The screening of the potential relevant materials to select the studies or the literatures that can be included in the systematic review is very essential. This screening involves a number of steps such as screening based on the title, abstract and full text. The screening in combination with the eligibility criteria of inclusion and exclusion of the studies helped in the selection of the relevant literatures and sorting them into two groups: Quantitative and Qualitative. The grouping is based on the type of the studies involved in the literature relevant to the topic.

Quantitative research

Most of the literatures, reviews, and journals involve the author performing the quantitative methods regarding the research topic and the results are presented accordingly giving elaborate idea about the topic. However, in some of the articles referred involve the author presenting and analysing the data regarding the experiments related to the topic that are performed by some other party or the literatures, in overall, do not involve any quantitative study regarding the topic. Hence, after the collection of the relevant materials or data regarding the topic, it is essential to analyse if the literatures involve any quantitative studies or are qualitative in the treatment of the topic.

Treatment of Qualitative research

In any systematic review, along with the quantitative research, qualitative research is also very important that may give ideas about the specific topic and help in further studies. The qualitative analysis of the different methods

used for the remediation can help in the development of a logical point of view for looking at the suitability of the method rather than the support of quantitative evidence. The qualitative approach helps in the overall analysis of different methods in terms of logic and practicality that may not be always supported by quantitative evidence.

Limitations of Research

Any sort of biasness present due to the software and the publication analysis must be avoided to conduct a proper systematic review on the topic of research, which is very crucial for the authenticity of the literature, review, or journal. The systematic review of all the relevant data or material regarding the topic must be totally unbiased in all respects and relevant to the topic providing sufficient information regarding the topic.

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