

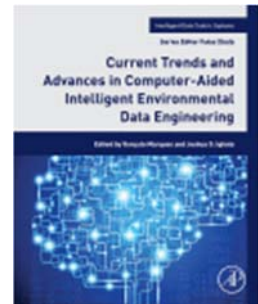
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## Chapter 16 - Intelligent and knowledge-based waste management: smart decision-support system

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### Abstract

Numerous studies have indicated that the extraction of hydrocarbons from the subsurface is accompanied by the production of large volumes of solid and liquid wastes. An increasing body of literature suggests that various hazards and risks are intrinsic to both exploration and production operations. Waste management is one of the most critical factors controlling environmental pollution and safety in hydrocarbon exploration and production fields. The presence of oily materials in the waste makes it a potential environmental pollutant if not properly handled. Overall, the oil and gas industry operates in the most hazardous of situations and conditions. Nonetheless, it is necessary to maintain controlled working conditions. While some waste-handling practices are adopted in some regions, some factors such as geological, economical, and environmental regulations require a unique set of waste management options. A suitable and smart waste management model should be designed to accommodate even the least environmental impacts with technical and economic feasibility. Artificial intelligence (AI) and expert systems provide new opportunities for harnessing the scarce and often scattered pieces of valuable knowledge and experience in solid waste management, which at present is in the possession of a privileged few. This study evaluates the gaps in expert systems in oil and gas waste management and disposal. Expert systems are poised to take over the no less essential tasks of the ill-structured and less-deterministic parts of the planning, design, and management processes concerning oil and gas waste management. There are two primary sources for wastes of resources for waste management systems: underusage of raw materials, which result in inaccurate predictions of desired outputs and overuse of resources that arise because the necessary information would have been acquired from other sources. These irregularities lead to waste of resources, such as human, machine, and time that have tremendous implications on the cost, availability, and human resources. A framework to address these challenges is proposed, and a systematic review of the literature was carried out to examine current oil and gas industry waste management technologies and research to determine and highlight how they can support these expert systems. This study shows the technical limitations and also reveals a variety of oil and gas waste measurement, collection, and

conversion technologies that can be integrated through the application of the Internet of Things.. This chapter introduced and explained waste management systems in the oil and gas industry as well as detailing a composite network of corporate integration methods for solid and liquid waste management. Furthermore, suggestions on how to ensure the implementation of an efficient waste management scheme were discussed in order to overcome potential barriers to their performance.

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