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**DEVELOPMENT OF A DECISION
SUPPORT SYSTEM
FOR LANDFILLING APPLICATIONS
IN SRI LANKA**

by

Asanga Manamperi

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A thesis submitted to the Faculty of Engineering at the University of Moratuwa,
in partial fulfillment of the requirements for the degree of Master of Science.

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Declaration

This thesis is a report of research work carried out in the Department of Chemical and Process Engineering, University of Moratuwa, Sri Lanka between January 2004 and July 2006. The work included in this thesis is part or whole has not been submitted for any other academic qualification at any institution.

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Abstract

With increasing awareness of the harmful effects of solid waste mismanagement such as wild dumping, open burning and uncontrolled landfilling, many local authorities in Sri Lanka are now willing to invest in Engineered Sanitary Landfills. However, the lack of know-how and expertise is a great barrier for the rapid implementation of this approach in Sri Lanka. In addition, the expertise is not cheap when it comes to a narrow domain such as engineered sanitary landfilling and in most cases, local authorities cannot afford to employ such experts, within their budgets.

The aim of this research is to develop a decision support system that will help the local authorities in Sri Lanka to better manage and implement the landfilling projects. A decision support system is a computer program that provides expert advice as if a real person had been consulted. These systems capture and deliver knowledge that is not easily represented using traditional computing approaches. It could be used by Local Authorities in planning and implementing landfill facilities. It can act as a training tool for the staff while avoiding the cost of hiring a human expert.



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The central core of the knowledge base of BESTFill was acquired from the published text books and manuals. This knowledge consists of well established facts, rules, theory and guidelines that had been practiced over many years. The knowledge base was divided into four categories as site, technology, safety and post closure. The production rules were applied for the site related questions (site selection etc.) and objects or frames were used for other divisions, namely technology, safety and post-closure.

A unique feature of BESTFill is that it contains several sub modules by which the user can obtain a comprehensive background knowledge on landfilling and integrated solid waste management. The sub modules were named as literature, info desk, training tool, photo gallery, landfill rapid assessment tool, economics & costing, regulations and reports. An effort was made to make the system more

user friendly, by using several user interfaces. The user does not require possess advanced background in mathematical programming and computing methods.

The BESTfill decision support system was validated in two steps. The first step involved the internal validation of the system through program debugging, error analysis, input acceptance and output generation. The second step involved in validating the system under a real application situation. The landfill site at NuwaraEliya was considered as the most appropriate site for the field validation of the system since it comprises the basic essential criteria of an engineered sanitary landfill.

BESTfill will serve as a guidance tool for landfilling applications in Sri Lanka. It is useful in planning, implementing and trouble shooting at various stages of landfilling for the designers and operators. It helps the user to obtain every single aspect of landfilling from the planning stage to the closure and post closure maintenance. The main beneficiary of the system will be the local authorities in Sri Lanka, which amounts to 311. In the development process it has been specially taken into consideration by analyzing the requirements, capabilities, weaknesses of the local authorities as the main target group of the system.



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