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## The Use of Advanced Computer Based Management Systems by Large Saudi Companies for Managing Remote Construction Projects

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### Abstract

Remote projects have their unique problems that are caused mainly by the remoteness of the project. Little research was undertaken particularly in the gulf region concerning this issue and it has highlighted few unique communications and management problems such as the loose control, lack of human resources, infrastructure and experience. This research investigates the current problems that the Saudi Aramco and other large companies in the Eastern province, Kingdom of Saudi Arabia (KSA), experience regarding the management of remote construction projects. The field study consists of a questionnaire survey and interviews, and it shows a number of management problems that have profound negative impact on remote projects' performance and process. The study inspects how Advanced Computer based Management Systems (ACMS) would help in sorting out a number of present projects' management problems.

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*Keywords:* Remote construction projects; Communication and management; Computer based management system; Kingdom of Saudi Arabia

### 1. Introduction

In spite of rapid progress in the project-management field, a number of negative issues still affect management of construction projects. These issues include use of inappropriate tools and systems for communication,

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coordination, and management. For example, Yang et al. [1] suggest that intense need for project information and effective communications by the project team cannot be met by traditional communications and information management systems since these systems have shortcomings and are incapable of fulfilling project duties and objectives. One of these shortcomings is that traditional systems provide limited access to information, which is considered one of the key barriers to successful project management practices (Vadhavkar et al., [2]; Pena-mora et al. [3]). Many of these project failures are caused by inadequate organization and management of the construction process (e.g., a weak coordination of processes and uncertainty about available information) [4].

Remote construction projects exist in many regions throughout the world such as the Sahara desert, Antarctic regions, the Arabian Peninsula desert, etc. The dilemma in managing remote projects is highlighted by Deng et al. [5], Kestle and London [6, 7], Kestle [8], McAnulty and Baroudi [9], and Thorpe [10]. These authors have pointed out that the remoteness thus the loose control is major cause of the management problems. They suggested possible causes such as the lack of human resources, infrastructure and experience of how to manage these remote projects. Remote Saudi construction sites have unique problems such as staff shortage and serious delay in sorting out a number of project queries and problems (Justanyah and Sidawi [11], Sidawi 2010a&b[12, 13] and Sidawi [14, 15]).

In the KSA, some large companies such as Aramco and Royal commission of Jubail (RCJ) have a number of remote construction projects. These projects are of different sizes i.e. medium, large to very large. They are in remote locations and some operate in undeveloped and environmentally sensitive regions. They are far from the supervision team office, the contractor's office, and major urban concentrations. During construction, all project parties experience countless difficulties and cumbersome management problems. These potential problems negatively affect project quality and cause substantial delays and increases in costs.

The literature review suggests that some of these management and communications problems can be sorted out by the use of ACMS such as mobile, Web-based Project Management Systems (WPMS) and BIM. These systems use wireless, satellite, Internet-based, or mobile tools and networks and it helps - to a certain degree - construction industry firms manage the increasing complexity of normal construction projects. They have also helped fulfill project objectives such as quality, scope, time, and cost. Sustainable practices and measures would also help in sustaining the quality of projects, eliminate waste, and minimize the cost. This research investigates the management of remote projects by ARAMCO and other large companies in the Eastern province and how ACMS would help in improving the management practices.

## **2. Review of current remote projects management practices**

The dilemma of managing remote projects is highlighted by Deng et al. [5], who mentions that the extensive physical distance between project participants, sometimes extending over national boundaries, is the primary cause of delays in decision making. The project team has to not only tackle traditional management problems but those that specifically occur as a result of the remote locations of these often environmentally sensitive sites [6, 7, 8]. These sites are often far from logistic support and suffer a continuous shortage of materials and specialized labor [6,7]. Kestle [8] investigates the management problems of remote projects. Kestle [8] reports lack of project pre-planning, certainty, and/or clarity concerning project process integration. There were also misinterpretations and miscommunications of project results and needs issues. A centralized decision-making process and lack of delegated authority to field personnel often hindered progress and communications at critical emergency response and recovery stages. Kestle & London [6] suggest a framework for the design management of remote sites. The framework emphasizes the following management functions: serving, controlling, organizing and economizing.

McAnulty and Baroudi [9] conduct a survey of top and mid-tier construction contractors with experience in remote construction projects in Australia. They find that contractors experience difficulty attracting and retaining skilled workers; working in remote locations has a negative impact on an employee's family life. It is difficult to procure and access materials and equipment in remote areas and severe climatic factors in remote areas have a negative impact on productivity. There is lack of infrastructure and communications. The researchers suggest a number of possible solutions such as the need for appropriate material management systems and design cost information specifically for remote construction works. They recommend that unique types of costing issues should

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