EVALUATING RISK MANAGEMENT IN INDEPENDENT WATER AND POWER PLANT PROJECTS IN SAUDI ARABIA

Yousef Alsulaiman[1], Graeme Bowles[2] and Stephen Ogunlana[3]

School of the Built Environment, Heriot-Watt University, Edinburgh, EH14 4AS, UK

Worldwide countries are striving to meet demands for water and power, which have been estimated as likely to increase at a rate of 7 percent per annum over the coming decade. Water and power plant projects following the Independent Water and Power Plant (IWPP) approach have typically involved a plethora of risks, as they have been reliant on long-term arrangements to transfer project risks, traditionally borne by the government, to the private sector. Since about 75% of IWPP projects in Saudi Arabia (SA) have failed to meet specified objectives, effective risk management (RM) implementation is key to the success of any public and private project. Practitioners, who are key informants in this subject area, have related their experience about RM in IWPP projects in SA through semi-structured interviews, and analysed these through the grounded theory approach. This study gathers and collates data to present findings in a propositional diagram that is fully grounded, based on practitioners' experiences that extend to the ineffectiveness of implementing RM in water and power projects, specifically in IWPP projects in SA. Findings indicate that IWPP parties have implemented RM in an informal way. In addition, there is a general lack of RM knowledge in the SA water and power industry. The paper concludes with an emergent diagram illustrating major phenomena, categories, and subcategories affecting the implementation of RM in IWPP projects in SA.
Keywords: IWPP project, risk, Saudi Arabia, water and power.

INTRODUCTION

With the growing demand for water and power service provision and the tight budgeting by governments, the IWPP approach is a promising option to resolve the twin issues of water and power provision. However, no construction project can be undertaken without an attendant element of risk; thus, RM is an essential consideration in project management when seeking to improve performance and project efficiency (Kelly 1993). To insure success in an IWPP project, the risks associated with the project first need to be clearly identified, evaluated and managed (Hsiao 2000).

[1] ya48@hw.ac.uk
[2] g.bowles@hw.ac.uk
[3] S.O.Ogunlana@hw.ac.uk

This paper aims to support a novel theory, by illuminating a particular phenomenon in the area under study, which aims to identify the elements leading to ineffectiveness when implementing RM in IWPP projects in SA. Three main subjects, namely, RM (RM), water and power plant (WPP) projects and public private partnerships (PPP) in the global context, and SA in particular, are linked together to reflect the contributions of each in fully enhancing performance in regard to time, cost and quality in independent water and power plant (IWPP) projects.

LITERATURE REVIEW

RISK MANAGEMENT

It is widely accepted that risk attends all construction projects; whilst this can be managed, minimised, shared, transferred or accepted, it cannot be ignored (Dallas 2006). Due to the significant changes witnessed within the construction industry, particularly in terms of procurement methods, as clients allocate greater risks to the private sector, RM has become a necessity, requiring organisations to examine the entire lifecycle of a project. Furthermore, one of the main barriers to the success of such projects is the lack of a formalised approach to RM (Tah and Carr 2000; Ke *et al*. 2010).

It is crucially important for both public and private sector organisations to understand the various risks associated with projects if they are to guarantee long-term success for projects. Furthermore, for each risk it is essential to address the likelihood of risk and the ability of the organisation to reduce the incidence and impact of the risk (Wang *et al*. 2004). Managing risk has two major objectives: to avoid the downsides of risks and to exploit opportunities.

Smith *et al*. (2006) point out that while all projects are subject to risk, unfortunately, many project managers have yet to routinely include project RM as a key process. The management of risk is a continuous process that should span all phases of a project. However, poor project performance will emerge if the procedure for addressing risk is inadequate. Many studies have illustrated that the number of successful projects would be far higher if more organisations had included RM as an integral component of project management (Smith *et al*. 2006).

Current Risk Management Practice in Saudi Arabia

Based on multiple studies into the implementation of RM within the SA construction context, it was found that RM has not been successfully applied uniformly throughout the diverse stages of previous SA construction projects. Falqi (2004) compared the UK and SA in terms of delay to construction project performance, and reported extensive delays affected SA construction projects; typically reported delays which were considerably longer than those in the UK. Poor implementation of RM was found to be one of the most significant reasons for delays. Similarly, Alotaibi (2009) found in his study of SA construction projects that the main reason for failure to meet deadlines and cost targets when executing construction projects is the poor application of RM. Al-Ghafly (1995) identified sixty causes of delays in utility projects in SA, citing poor RM as an important principal factor.

However, the current literature has illustrated that there are an insufficient number of feasibility studies to assess the practice of RM in water and power projects in SA adequately; despite the general research on inadequate observance of RM practices. Combined with this lack, there are also no previous studies regarding the practice of RM in IWPP projects in the SA context. This may be attributable to the short history of IWPP projects in SA. Hence, this research is important when trying to uncover RM practice in IWPP projects in SA.

WATER AND POWER PLANT PROJECTS

The majority of the current water and power plant projects in the global context, and in SA in particular have been conducted by the public sector, which finances and operates projects and contracts with the private sector for design and construction. In the USA (the 2nd largest producer of desalinated water), less than 20% of the population is served by the private sector. SA (the world's largest producer of desalinated water), is home to only 3 private projects, whereas there are 33 public projects. The reason for this is that the water sector was one of the most recent sectors to be opened up for privatisation. According to Davis (as cited in Prasad 2007), private sector participation (PSP) in the water sector has been "late and light" compared to the privatisation of other sectors such as telecommunications and transport.

The involvement of the private sector has required a partnership between the public sector and the private sector, to support the financing, design, development, construction and operation of water and power projects. In the Middle East, this is called an Independent Water and Power Plant (IWPP), which is one of the various forms of PPP (VTU 2009). Figure 1 displays the relationships between WPP, PPP and IWPP, which is the focus of this study. In SA, there are 15 water and power plants in operation, only three of which were constructed under the IWPP scheme; the remainder are run under the auspices of public finance and operation (SWCC 2011). However, the World Resources Institute (WRI 2011) stated that in March 2004, SA had announced a plan to launch ten IWPPs by 2016, requiring a total investment of $16 billion.

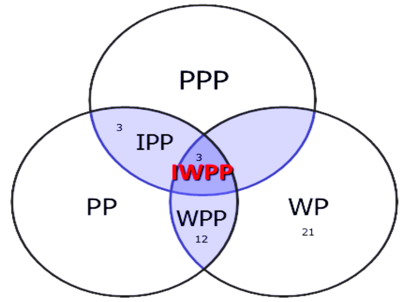

Fig 1: The research concentration areas

This research focuses on the planned IWPP projects and examines a variety of water and power plants and experiences if these, as it is apparent from the literature that this is a relatively new area to the SA construction industry. The first such project was the Shoaiba III project, which came online in 2009 (WEC 2011).

RISKS IN INDEPENDENT WATER AND POWER PLANTS

A feature of IWPP projects is that they encounter a plethora of risks during the project lifecycle; some of these risks are unique and specific to the IWPP. This is because it has unique characteristics, which require many organisations to work together over a long period; each with its own policy and culture, and overseeing complex processes. Furthermore, there are a large number of parties from the public and private sectors involved in a typical project, leading to a need for the generation of many documents and agreements to support an IWPP project.

Although some IWPP projects have performed well, many have failed. Completing projects on time and within budget is seen as an indicator of good performance; however, the project lifecycle of the IWPP approach is subject to many variables and volatility, which derives from many sources. These sources include: the short history of IWPP, a lack of experience of IWPP arrangements between involved parties, complexity in terms of the involvement of various stakeholders, limited competition, a long negotiation and concession period, long term financing, environmental conditions, technology issues, complex interface between water and power, and unpredictable events, which can be classified as risky (Wibowo and Mohamed 2008; Cheung and Chan 2011).

Whereas, in the global context, many researchers have sought to identify the performance level of IWPP projects and identify possible reasons for their failure، and risk factors posing major impediments to success, it is worth noting that in the SA context, little or nothing has been reported on the performance evaluation of IWPP projects. This is due largely to the newness of the scheme in the country, where three projects are only now entering the operational phase.

Furthermore, previous studies have proven that IWPP projects are problematic and result in poor performance in SA and internationally. Studies have shown the failures of these projects could be attributed to improper risk identification, analysis and mitigation. Therefore, paying additional attention to risks should assist industry practitioners to minimise the probability of poor performance (Falqi 2004).

RESEARCH METHODOLOGY

The primary task of this research is to uncover data pertaining to RM in the context of water and power projects in SA, to address the dearth of studies in this area. Fellows and Liu (2008) suggested that questionnaires, as a means of data collection are inadequate tools for acquiring the type of in-depth knowledge required. Therefore, the researchers selected the semi-structured interview method, based on and adapted form of grounded theory, for this study.

Grounded theory derives its name from the fact that the theory is developed from the data, rather than the other way round. Understanding of how complex phenomena occur, and the resulting concepts that emerge from it are grounded in the reality of those phenomena. The data determines the final shape of the theory and this approach is most likely to provide a good fit for the situation detailed in this research. Researchers should also aim to gather field data and discover theory based on a hierarchical structure of categories (Corbin & Strauss 1990).

Rubin and Rubin (1995) suggested that qualitative interviewers need not try to simplify, but should instead aim to capture some of the richness and complexity of their subject matter, and then explain it in a comprehensible way. During the interviews, the participants are to be encouraged to speak using their own terminology as related to the research topic, and are asked to clarify and extend their comments (Fontana and Frey 1994).

DESIGN OF THE INTERVIEWS

This research was designed to build a new theory to illuminate the particular phenomenon under study; in this case, this was to discover which elements lead to the ineffectiveness of implementing RM in IWPP projects in SA. A grounded theory methodology does not provide detailed information regarding interview techniques or styles. Therefore, the informal interviews conducted for this research were based on qualitative interviewing techniques, which promoted a flexible outline of topics and questions (Patton 2002). The factors, taken into consideration for the interview, included strategies for guiding answers from generalised to more specific cases.

SAMPLE AND DATA COLLECTION

Grounded theory is often used to investigate complex phenomenon where little understanding exists; hence, the selection of participants is particularly important. Variations in samplings are often suggested leading to a broad diversity of information-rich participants in the research setting (Patton 2002). Purposeful, variation sampling, by contrast, is used to ensure that there is diversity in the information gathered. For the purpose of this research, the interviewees were chosen on the basis of their experience and knowledge of the phenomenon under study. The essence of the sampling method was to collect data from those interviewees who were best able to answer the questions, rather than sampling a predetermined group of participants or settings (Glaser 1978). The interviewees selected provided a rich source of information on RM in water and power projects in SA.

Seven interviews were conducted; these were with key informants from the organisations who were thoroughly familiar with RM. The focus was on WPP and IWPP approaches; the WPP approach was investigated due to the long experience of this in the public sector has earned. On average, the seven interviewees had eleven years' experience in the construction of IWPP projects. For reasons of confidentiality, the respondents' names are not disclosed. (See table 1).

Round	Interview NO.	Organisation Role	Organisation Name	Participant Position	Experience	Interview duration.
1	Int. 1	Government Official	Saline Water Conversion Corporation (SWCC)	Project Manager	10 Years	49 min
	Int. 2			Follow up & Planning Engineer	11 Years	55.4 min
	Int. 3	Consultant	Fichtner company	Site Engineer	9 Years	39.3 min
	Int. 4	Project Promoter (SPV)	Shuaiba Water and Electricity Company (SWEC)	Project Manager	14 Years	65.5 min
	Int. 5		Shuqaiq water and Electricity Company (SqWEC)	Executive Engineer	9 Years	53 min
	Int. 6	Contractor	Doosan Heavy Industries	Assistant Manager	16 Years	44 min
	Int. 7	Facilities Provider	Marafiq Company	Operational Manager	11 Years	41 min
	Total					347.2 Min

Table 1: interviewees' detail

The above table reports the data from the first round of interviews. More rounds of semi-structured interviews will be considered in ongoing research, until saturation of information is reached. The first round aims to deliver a broad overview of the area under study and to establish the emergent theory; the second, and subsequent rounds, are directed toward critical junctures or significant points and events affecting the targeted subject under study. The interviewees in the case of the first round interviews were identified from the researcher's experience and colleague's recommendations.

FINDINGS AND DISCUSSION

The emergent data is presented in a diagram summarising the emergent theory. Additionally, the researcher supports all phenomena and categories with supporting data acquired from practitioners. The analysis that was carried out explored some initial phenomena found to have affected RM implementation in the water and power projects in SA. Thus, the following phenomena were explored: lack of awareness, risk factors, and operational and support. The results from the first round of the study provide an initial foundation of theory and a starting point for the research. The entire phenomena and all the features, which emerged from the grounded data analysis, are illustrated in Figure 2.

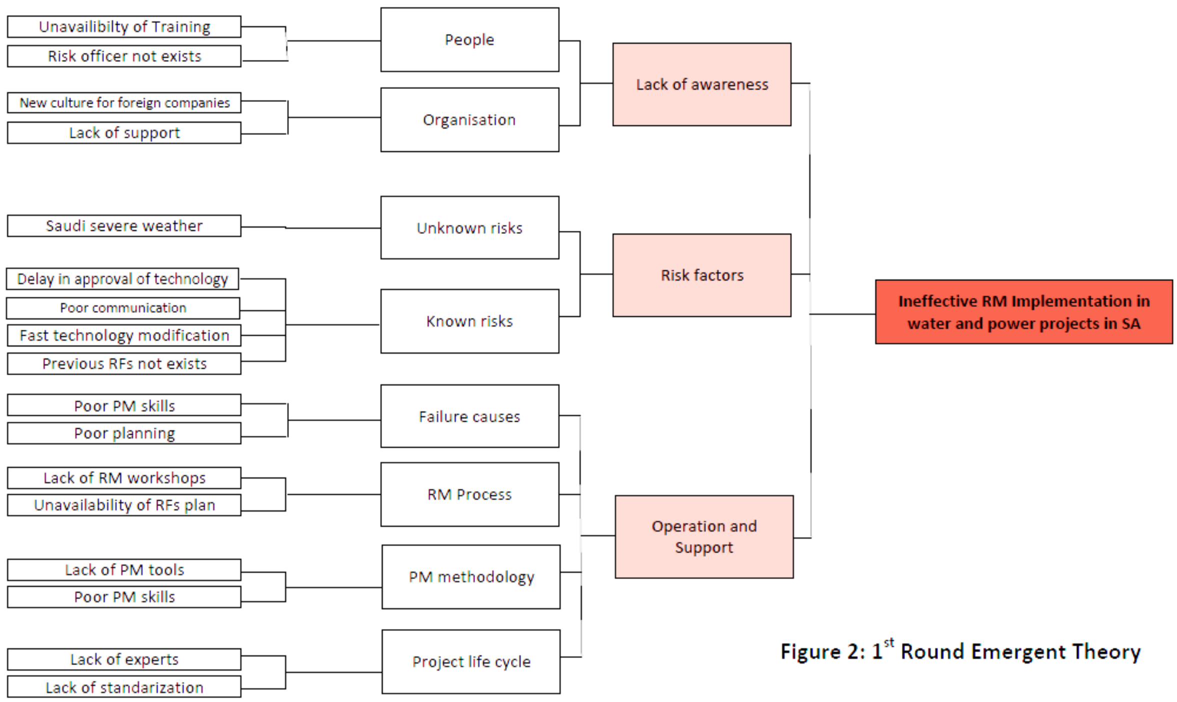

Figure 2: 1st Round Emergent Theory

Each of these phenomena, categories and subcategories is described individually in the table below with quotations from practitioners given to illustrate how the data was grounded.

Table 2: Phenomenon 1: Lack of Awareness

Categories	Subcategories	Clarification & Practitioners' Quotations
People	(a) Training (b) Risk officers	*"A lot of effort in increasing staff awareness with regard to risk management should take place at the level of the individual dealing with it."*
Organisation	(a) Foreign companies (b) Lack of support	*"I would say that all water and power firms need to set up a strategy to treat the lack of awareness…. If they can't come up with a clear plan for solving the awareness problem, they may continue to suffer negative results during the project."*

Table 3: Phenomenon 2: Risk Factors

Categories	Subcategories	Clarification & Practitioners' Quotations
Unknown risks	(a) SA severe weather	*"Previous WPP and IWPP projects, that have suffered delays or been over budget, based on project output, have shown the reasons behind this failure to be a number of unknown risk factors."*
Known risks	(a) Delay in approval (b) Poor communication (c) Fast technology modification (d) Previous risk factors not present	*"Having known the practical risk factors that the SA water and power plant projects face will help not only to meet the projects objectives, but will also increase the knowledge for related people."*

Table 4: Phenomenon 3: Operation and Support

Categories	Subcategories	Clarification & Practitioners Quotes
Failure Causes	(a) PM skills, (b) Poor planning	*"Indeed, mismanagement in the project often leads to the project taking much longer than planned and costing more than budgeted, and this is due to the poor skills of the project managers."*
RM Process	(a) Lack of RM workshops (b) Unavailability of RFs plan	*"RM is implemented in an informal way, which means they do not follow the standard process."*
PM Methodology	(c) Lack of PM tools (d) Poor PM skills	*"Managing the scope of the project, risks, the work plan, etc. requiring a special procedure in order to attain full control of them."*
Project Lifecycle	(e) Lack of experts (f) Lack of standardisation	"*In the project's life cycle it is necessary to continuously identify causes that may have a detrimental effect on the project and to analyse possible adverse consequences and prepare responses to them."*

CONCLUSIONS

The data that emerged from the practitioners has been analysed using the grounded theory method. The researcher developed an initial foundation for the theory and a starting point for PhD research. Rich data was collected, providing a clear understanding of the topic. The research began with a general overview then delved more deeply into the topic to uncover the causes of problems, also why previous projects failed to meet their objectives and how they can reach ideal RM implementation based on the opinions of the interview respondents.

The main results emerging from practitioners were:

- An initial conceptual theory that emerged from the grounded data analysis, which showed the entire phenomena, categories, and subcategories leading to the ineffectiveness of RM implementation in WPP projects in SA.
- This round reported crucial practical risk factors specific to water and power projects, which affect project objectives.
- The current implementation of RM in water and power plant projects in SA is considered informal.
- Practitioners agreed that the effective implementation of RM will be able to resolve the existing water and power projects failures, whereas poor implementation of RM affects project objectives.
- SA suffers from a lack of knowledge and experience in dealing with RM in IWPP projects.
- There is a lack of RM training for staff in all the project parties.
- Providing the appropriate RM resources, training and awareness programs to staff is critical for building an effective organisational culture.
- RM awareness is important for everyone in the project – it is important that everyone is aware of their surroundings and the potential risk they face.

The work undertaken above has defined the boundaries of existing knowledge on RM as pertaining to WPP/IWPP projects in SA, with more focus on WPP, due to its longer history.

Implications for future work

The identification of risk factors called for further work to be undertaken to explore information about the causes of these practical factors, to determine practical factors from more experienced people, and also to confirm these factors from other experts. In addition, practitioners who work in different organisations, each one having their own role, explored the proposed theory; more investigation will confirm or disprove the phenomenon, categories, and subcategories. Furthermore, the researchers need to collect further data through undertaking a second round (and a third if needed) in order to begin to address any unravelling of relationships between the subcategories and categories associated with the selected phenomenon.

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