

# A conceptual model for project management of exploration and production in the oil and gas industry: The case of a Brazilian company

Jesus Leodaly Salazar-Aramayo <sup>a,\*</sup>, Roseane Rodrigues-da-Silveira <sup>b</sup>,  
Mariana Rodrigues-de-Almeida <sup>b</sup>, Tereza Neuma de Castro-Dantas <sup>a</sup>

<sup>a</sup> Programa de Pós-Graduação em Ciência e Engenharia do Petróleo, Universidade Federal do Rio Grande do Norte, Av. Salgado Filho, 3000, Natal, RN, Brazil

<sup>b</sup> Pós-Graduação em Engenharia de Produção, Universidade Federal do Rio Grande do Norte, Av. Salgado Filho, 3000, Natal, RN, Brazil

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## Abstract

The objective of this study was to obtain a better understanding of factors that influence Exploration and Production (E&P) project management success and corporate financial performance. The study follows structural equation modeling (SEM) methodology to achieve greater understanding of the intricate network of relationships between variables involved in E&P project management. A comprehensive theoretical framework was needed to formulate the conceptual basis of research. Observation of the real world and practical experiences were also important. To that end, we conducted a case study in a large Brazilian oil company. Field research was essential because of the lack of similar studies in the oil and gas sector. The model developed is a theoretical construct known as a structural and measurement model (set of latent variables, observed variables and hypotheses, depicted in a path diagram). This model contributes significantly to the company because it is a global representation of the main factors for improving E&P project management. However, the findings should be interpreted with caution because adjustment and validation of the theoretical model were not performed.

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## 1. Introduction

Projects are essential to the success of any company, combining activities that lead to new products and services, improved procedures, implementation and development of new business. Successful projects increase sales and reduce costs, improve quality, customer satisfaction and the work environment, among other benefits. As a result, a growing number of companies have recently begun to use project management as a key strategy for remaining competitive, increasing the possibility of value creation in their business (Lewis, 2000).

The consensus among several authors (Dinsmore and Cabanis-Brewin, 2006; Kerzner, 2010) is that the current scenario favors the application of project management as a formal methodology (fierce competitiveness, more demanding clients, technological advances, shorter deadlines).

According to the Project Management Institute (PMI, 2008), project management is the application of knowledge, skills, tools and techniques to carry out project activities. The challenge in large companies is to provide guidelines for managing project activities and a consistent procedural framework, both for individual projects and across projects. This enables leaders from all specialties to work together and communicate with one another.

Examples of complex, high-risk projects are the exploration and production (E&P) of oil and gas, occurring worldwide in diverse geographical and socioeconomic environments. On the

\* Corresponding author. Tel.: +55 84 94611836; fax: +55 84 33422401.

E-mail address: [salazarjesus@hotmail.com](mailto:salazarjesus@hotmail.com) (J.L. Salazar-Aramayo).

one hand, risk exists due to geological uncertainty regarding reservoir structure, characteristics of the cap rock and the volume of hydrocarbons (Jahn et al., 2008; Motta et al., 2000; Suslick and Schiozer, 2004; UNEP, 1997; Weijermars, 2009); on the other hand, there is economic risk as a result of uncertain cash flow (future cost and prices) and the likelihood of finding and producing in sufficient volume (Motta et al., 2000; Suslick and Schiozer, 2004; Wagner and Armstrong, 2010; Weijermars, 2009). Postali and Picchetti (2006) emphasize the irreversibility of E&P projects as a critical additional element, that is, future implications of decisions are relevant because of the long life cycle of these projects and the specificity of resources involved. Furthermore, due to its global presence, economic importance and environmental sensitivity, the oil and gas sector is subject to pressure from different stakeholders, increasing its complexity. Thus, it is helpful to outline models that more accurately represent the complex and multidimensional reality of E&P projects in order to facilitate their management. By aligning the factors that influence project success, we found a gap in studies regarding the interaction between these factors and their respective impact on performance in the E&P sector. The objective of the present study is to obtain a better understanding of factors that influence management success and corporate financial performance of E&P projects. For that purpose, we conducted a case study in a Brazilian oil company, describing critical variables in order to measure project management success and corporate financial performance. Formulation of the conceptual model applies structural equation modeling (SEM) to achieve greater understanding of the intricate network of relationships between variables involved in E&P project management.

## 2. Literature review

### 2.1. The importance of project management and project governance to achieve project success

A project is a complex effort involving interconnected activities, with the purpose of achieving an objective, and a temporary, non-repetitive process (Dinsmore and Cabanis-Brewin, 2006; Khatib, 2003; Lewis, 2000; Nicholas, 2004; PMI, 2008). Managing a project implies planning and monitoring its execution, enabling objectives to be achieved. Project management no longer has a specific focus (managing projects), but rather has become an organizational skill that permeates all levels of the company (business process) (Kerzner, 2010; Kerzner and Saladis, 2009; Lewis, 2000; Nicholas, 2004; PMI, 2008; Westland, 2006). The need for project management is no longer debated, but rather what form it will take (methods, tools, personnel, among others) (IPMA, 2006).

A number of authors (Dinsmore and Cabanis-Brewin, 2006; Kerzner, 2010; Kerzner and Saladis, 2009; Nicholas, 2004) have suggested analyzing the institutional structure, thereby facilitating project management efforts. This latter issue is related to the concept of “project governance”. Bekker and Steyn (2007, p.5) define project governance as “a set of management systems, rules, protocols, relationships and structures that provide the framework within which decisions are made for project development and

implementation to achieve the intended business or strategic motivation”. A specific organization would have its own model of “project governance”. A study conducted by Bekker and Steyn (2008) concludes that it is not possible to generalize a project governance model, since different projects might require different approaches. Yilin et al. (2008) state that project governance works indirectly on project management performance. Furthermore, Bekker and Steyn (2008) observe the need for formal project governance to achieve better project performance.

A project is considered successful when it is carried out within the desired deadline, budget and quality level, meeting the expectations of the primary stakeholders. At this point, the work of Cooke-Davies (2002) is particularly relevant in distinguishing between “project management success” and “project success”. Specifically, project management success is measured against the widespread and traditional measures of performance (cost, time and quality) and project success is measured against the overall objectives of the project. This implies that project success cannot be measured until after the project is completed. By contrast, project performance can be measured during the life of the project. The IPMA (2006, p.40) defines project management success as “the appreciation of the project management results by the relevant interested parties”. Thus, “project management success” is synonymous with “project management performance”, because the interest is in assessing management performance and not project results.

As shown in Fig. 1, project management lies within the internal project environment and is one of the responsibilities of the project manager. Project success depends on perceived values of agents who are in the external environment. In this respect, project governance offers an “atmosphere” within which decisions are made for project development and implementation to achieve the intended business motivation. Munns and Bjeirmi (1996) suggest that the natural tendency of the project management team will be to focus on completing the project within the set criteria of cost, time and quality (project management success), because the emphasis of project management techniques is towards meeting specific, short-term targets. There is less importance placed on satisfying long-term strategic objectives related to project success. As we move from project management success through project success to corporate performance, a new set of processes and practices comes into the picture as being crucial to achieving consistently successful projects (Cooke-Davies, 2002).

### 2.2. The E&P sector in the oil and gas industry

The economy, particularly in industrialized countries, depends on oil and natural gas (Postali and Picchetti, 2006; UNEP, 1997; Weijermars, 2009) and in order to meet this demand, the oil industry operates at high intensity levels worldwide. The industry consists of two segments: upstream, including exploration and production (E&P), and downstream, which deals with refining and processing crude oil and gas, as well as their distribution and commercialization. The tendency in coming years is towards an increase in the volume of activities to meet growing needs.

Experts (Jahn et al., 2008; Manzano and Monaldi, 2008; Motta et al., 2000; Postali and Picchetti, 2006; Suslick and Schiozer,

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