

Chapter 13

Exploring the Dynamics of an Energy Service Venture

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ABSTRACT

This paper describes the development of a system dynamics model for exploring and learning about the dynamics of an energy service company (ESCO) which business is based on energy performance contracting (EPC). The simulation of that model provides a helpful basis for analysing and explaining the development of key variables, and for accelerating learning on the managerial processes that are critical for the success of the venture. The simulation of the modelled firm produces an overall insignificant market value added mainly due to long sales cycles, indicating a low probability of success. The model is sensitive to changes in the word-of-mouth contact rate parameter which suggests that effective management interventions should consider initiatives that accelerate word-of-mouth among EPC adopters and prospects.

INTRODUCTION

Energy performance contracting (EPC) projects focus at the deployment of comprehensive solutions for improving energy efficiency. EPC is a contractual arrangement between the beneficiary and the provider, an energy service company (ESCO). This type of contract would help to overcome financial constraints to energy efficiency investments by paying off initial costs through the future energy cost savings resulting from reduced energy consumption (Marino et al., 2010).

However in many European countries, like Portugal, this market is still underdeveloped, far from its promised potential (Bartoldi et al., 2014; Marino et al., 2011). Only a small number of entrepreneurs have engaged in EPC ventures and many of those new companies have reported severe difficulties. At the business level an important question remains – What policies, entrepreneurial strategies and managerial processes might increase the success of EPC business ventures in the Portuguese market?

This paper presents an exploratory study about the dynamics of launching an ESCO venture by means of system dynamics modelling and simulation. This research focuses on how to develop a sustainable

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EPC industry from an energy service venture perspective. The key question is to understand the critical factors involved in a ESCO startup and the dynamic interactions among those factors that will drive the economic success of that business venture and consequently increase the widespread adoption of EPC. To explore and gather insights on this question, a system dynamics model representing an ESCO venture in the Portuguese EPC market was created. The simulation of that model provides a helpful basis for analysing and explaining the development of key variables, and for accelerating learning on the managerial processes that are critical for the success of the venture.

CLOSING THE EFFICIENCY GAP THROUGH ENERGY PERFORMANCE CONTRACTING

With the growing awareness of the serious consequences of climate change due to increased greenhouse gas (GHG) emissions, which are related to the energy consumption, many countries around the world have enacted policies to enhance energy efficiency. For example, in 2006, the European Commission (EC) published the Action Plan on Energy Efficiency, which aims at reaching a 20% energy efficiency improvement by 2020 (EC, 2006). Despite the improvement in energy efficiency over time, there is still great potential for further energy savings in most sectors (Deng et al., 2012; Worrell et al., 2009). Previous studies conducted in different countries and sectors have identified several barriers to energy efficiency (Rohdin et al., 2007; Sardinou, 2008; Thollander & Ottonson, 2008; Trianni et al., 2013, among others). Thus, realizing this potential requires the introduction of effective energy efficiency policies. According to many energy efficiency advocates and policy makers, most of this energy savings potential can be effectively reached through performance contracting and energy efficiency measures, and the main mechanism to achieve this goal is the development of a commercially viable and competitive market for EPC services provided by ESCOs (Steinberger et al., 2009; Painuly et al., 2003; Vine, 2005; Bartoldi et al., 2006; Soroye, 2010).

The Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on Energy End-use Efficiency and Energy Services (Energy Services Directive) (EU, 2006), repealed and replaced by Directive 2012/27/EU (Energy Efficiency Directive) (EU, 2012), established the following terminology:

- **Energy Performance Contracting (EPC):** A contractual arrangement between the beneficiary and the provider (normally an ESCO) of an energy efficiency improvement measure, where investments in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement;
- **Energy Service Company (ESCO):** A natural or legal person that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises, and accepts some degree of financial risk in so doing. The payment for the services delivered is based (either wholly or in part) on the achievement of energy efficiency improvements and on the meeting of the other agreed performance criteria.

Under an energy performance contracting, the ESCO defines and implements a project to deliver energy efficiency, or a renewable energy project, and uses the stream of income from the cost savings, or the renewable energy produced, to repay the costs of the project, including the costs of the investment (Bartoldi et al., 2006).

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