

Chapter XXVI

Telecommunication Investments Analysis: A Multi-Criteria Model

Georgios N. Angelou
University of Macedonia, Greece

Anastasios A. Economides
University of Macedonia, Greece

ABSTRACT

Recognizing the inadequacy of traditional quantitative cost-benefits analysis for evaluating telecommunication investments, researchers suggest real options (ROs) for controlling and valuating telecommunication business activities. However, ROs are based on the concept to delay investment for collecting more information and learning more about business conditions and during this delay another competitor may act gaining significant competition advantage. In addition, RO models are strictly quantitative and very often telecommunication investments may contain qualitative factors, which cannot be quantified in monetary terms. In addition, ROs analysis results in some factors that can be treated more efficiently when taken qualitatively. This work deals with quantitative and qualitative analysis and integrates ROs and Analytic Hierarchy Process (AHP) into a common decision analysis framework providing a multi-criteria model, for analyzing telecommunication investments in the deregulated business field.

INTRODUCTION

Telecommunications markets all over the world recently have been, and still are, undergoing drastic changes, fuelled by market reforms and technological progress. State-owned monopolists have been privatized and markets have been liberalized. These transformed markets have attracted

entrants in many varieties. Some entrants roll out complete networks, while others build only partial networks or perhaps offer services without having infrastructure themselves but having access to the networks of incumbent operators.

The valuation of telecommunication business activities is a challenging task because it is characterized by high-level uncertainty. In addi-

tion, these business activities are not possessed exclusively by a single firm but rather are shared by many competitors. The main challenge for a potential provider (investor) is to roll out its business activity at the right time and the right scale. The time and scale depend on telecommunication services penetration, network infrastructure cost, area characteristics, applications offered, expected tariff evolution, customers' willingness to pay, demand forecasts, evolution of expected market shares and investor's technical skills.

Although the traditional cost-benefit analysis expressed in money terms such as investment cost, revenues, and Net Present Value (NPV) are significant factors to be taken into account in the analysis process, it is by no means sufficient for capturing the complexity of the problem in its entire. It is not able to accommodate the flexibility, for example, to defer and to abandon an investment plan at certain discrete pre-specified points in time.

Real Options (ROs) address this inadequacy and offers management the flexibility to take actions, which can change aspects of the business activity over time. ROs have been proposed for business analysis and risk management (Trigeorgis, 1996).

ROs applications to risk management and investment evaluation of telecommunication business field have mainly focused on a single and a-priori known option. However, these options are not inherent in any telecommunication investment. Actually, they must be carefully planned and intentionally embedded in the telecommunication investments in order to mitigate its risks and increase its return. Moreover, when a telecommunication investment involves multiple risks, by adopting different series of cascading options we may achieve risk mitigation and enhance investment performance. Given the investment's requirements, assumptions and risks, the goal is to maximize the investment's value by identifying a good way to structure it using carefully chosen real options (Benaroch, 2002).

However, ROs application in telecommunication business field raise some issues that require attention. ROs models are strictly quantitative, while telecommunication analysis may also involve qualitative factors. In addition, ROs analysis itself brings to the "surface" a number of factors that cannot be quantified, at least easily, by existing ROs models and methodologies.

In this work we discuss all these issues and include them in a multi-criteria perspective providing specific decision analysis models. We consider that a holistic methodology is required in order to assist executives and decision makers in formulating problem parameters, understanding their interactions, estimating their contribution to the overall business value and so valuating effectively new telecommunication business activities.

We discuss limitations of the quantitative analysis, in the specific field proposing qualitative factors that can be combined in a multi-criteria analysis. For integrating quantitative and qualitative factors in one utility function we adopt Analytic Hierarchy Process (AHP).

The proposed analysis provides a better understanding of the telecommunication risks and the various qualitative factors inherent in such investments, enabling these investments to be deployed more optimum and valued with higher accuracy. Our main contributions are the following:

- We integrate financial quantitative, qualitative and risk factors as provided by the ROs and competition threat in an Analytic Hierarchy Process (AHP) structure.
- We provide a risk management framework for telecommunication investments based on ROs thinking.

Our aim is to find the business deployment that achieves a balance between risk control and performance maximization under competition.

The rest of the paper is organized as follows. In Section 2, we provide background for the involved

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