Chapter 9
Uncertainty in Industrial and Technological Diversification Processes:
Stability of AHP–Absolute Measurements Results

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ABSTRACT

Industrial and Technological Diversification (ITD) is one of the few strategies available to companies that are aiming to respond to the requirements and challenges of the contemporary economic climate. The interdependencies derived from globalization mean that businesses must diversify their portfolio of products and increase the number of markets in which they operate. The large numbers of scenarios, actors and criteria (tangible and intangible) that can be considered make ITD processes highly complex and provoke uncertainty concerning the robustness of the conclusions extracted by means of the existing ITD methodologies. Based on the methodological framework proposed by the authors in previous works, this chapter analyzes the suitability of diversification processes by studying the stability of results in order to gain more knowledge about the associated uncertainty. Using the AHP with absolute measurements as the methodological support and modifying the attributes´ weights and categories, simulation techniques assess the stability of the suitability diversification scorings.

INTRODUCTION

Diversification seems to be an appropriate strategy in several respects; the main objective is to provide the company with a reduction of the global risk derived from dependence on one or several activities and the exploitation of synergies in different business and markets. This supposes a competitive advantage derived from the sharing of resources and capacities. However, although beneficial for some companies, the strategy has some drawbacks, such as the risk caused by changing in the company's business and the consequent organizational difficulties that may lead to managerial problems (Cantwell et al., 2004). When diversification occurs incrementally in the company, the number of possible interdependencies between resources grows geometrically (Hill & Hoskisson, 1987). These interdependencies increase the probability of combining incompatible resources (Hales, 1999) which can generate sub-optimal performance results (Teng & Cummings, 2002).

The decision to undertake a diversification processes is a highly complex one, given the importance of existing opportunities and potential risks. The development of appropriate methodologies for the analysis of the suitability of technological diversification and a detailed study of the uncertainty associated with the stability of results obtained for specific methods and tools are required.

With the objective of aiding companies in the development of an industrial and technological diversification (ITD) process, the authors suggest a methodological framework which is structured in three phases (Moreno-Jiménez et al., 2012; Muerza et al., 2014): (1) Evaluation of the technological diversification suitability; (2) Selection of the technological diversification strategy; and (3) Implementation of the diversification strategy. This framework has been designed in such a way that it can be applied to companies from all industrial sectors.

The methodology studies the suitability of a company Technological Diversification Process (TDP) (Larrodé et al., 2012) by means of the multicriteria decision making technique known as the Analytic Hierarchy Process (AHP), more specifically the AHP with absolute measurements. This stage allows an initial identification of the suitability of producing or creating a new product or service for a new market and this can reduce the uncertainty implicit in the process.

Once the suitability of the diversification process is verified, the next stage is the confirmation of this suitability and the information that has been used. An AHP model that identifies the main criteria, subcriteria and attributes concerning the technological and organization potential of the company is used; the two-step procedure reveals the different types of uncertainty.

The objective of this chapter is to analyse the stability of the results that correspond to the multicriteria evaluation of diversification suitability. The results are obtained by using the AHP with absolute measurements in the second stage of Phase 1 of the methodology and they are confirmed in the first stage of Phase 2. Three sensitivity analyses are performed to assess the stability of the results:

1. A sensibility analysis of the global priorities of the attributes included in the hierarchical model. Variations of 10% and 20% of the attributes' global priorities are considered.
2. A sensibility analysis of the categories associated to the attributes in the AHP-rating option. This analysis contemplates variations in categories inside the range provided by the initial (or reference) category, plus or minus one level.
3. A conjoint sensitivity analysis of the two parameters: the attributes' global priorities and the categories.

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