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INTERIORIZING THE IMPORTANCE OF THE INNOVATION CONCEPT IN THE STUDENTS OF THE DEGREE OF CIVIL ENGINEERING

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Abstract

The construction sector is still central to the Spanish economy, despite the ongoing economic crisis. The collapse of the sector in 2007 was due to the severe impact of the international crisis. Without taking external factors into account, an analysis of its collapse suggests that its recovery was, among other reasons, hindered by low levels of competitiveness and high levels of inefficiency; an observation explained by poor levels of company innovation in the sector. In this sense, the concept of innovation has been identified as the main driver in the struggle for greater competitiveness, bringing with it competitive advantage and facilitating sustainable growth, so as to thrive in such a demanding market as the Spanish construction sector. In this regard, aware that Civil Engineering degree students will assume future responsibility for the management of construction sector companies, it is very important for students at this level to have internalized both the importance and the relevance of the concept of innovation and to see it as a synonym of competitiveness and business performance in the sector. With this aim in mind, an innovation evaluation model is presented in this paper for companies in the Spanish construction sector, to be applied in practical classes on the "Business Organization" study module of the Degree in Civil Engineering. Students are expected to understand how the variation of the key innovation-related indicators affects the performance of these companies, and to visualize those indicators in analytical and graphical forms. The model is presented on an Excel sheet, so that once the students enter the input data, it will generate the Innovation Index (II) of the company under study. The results are graphically presented so that the strengths and weaknesses of each company can be quickly and easily discerned. Discussion and debate can then be promoted among the students on the selection of areas of action to try to improve this aspect.

Keywords: Innovation, construction, civil engineering, business organization.

1 INTRODUCTION

The construction sector has played and is still playing a very important role in the development of the Spanish economy, despite the crisis that has been affecting it. Housing construction, rehabilitation, construction of production facilities and the construction of infrastructure and public works are important elements for the modernization and maintenance of the economy. In addition, it is important to mention the 'drag' effect on other market segments, such as construction materials, facilities and telecommunications companies [1].

When analyzing the state of the sector in Spain, its referential position should first be mentioned in the construction sector at a European level, over the period 2002-2010; the sector generated an average GDP of 10% and employed around 11.2% of the working population [2]. The importance of this sector has not been limited to its direct effect on the economy, but is amplified by the so-called tractor effect that it exerts on other economic activities, which doubled its total effect [1].

However the initial upward trend was significantly reversed in 2006, as a result of a reduction in demand, a response to the enormous quantity of new housing on the market. At the end of 2009, new unsold housing stock amounted to 688,044 units, in a country with 45 million inhabitants. The number of companies in the sector fell by roughly 38% from 246,271 in 2006 to 152,562 in 2010 [3].

In contrast, construction companies in Spain have historically been characterized in many analyses of the sector by a high degree of inefficiency (68%), derived from poor levels of innovation [4]. It is important to point out that the productivity of the construction sector is 30% lower, in terms of production per hour worked, in comparison with the mainstream manufacturing industry. In addition, at least 15% of construction costs are used to correct construction errors [5].

innovation as a concept and as a synonym for competitiveness and business performance in the sector.

To that end, an innovation evaluation model for companies in the sector has been presented in this paper with the objective of applying it in practical classes on the "Business Organization" study module of the Civil Engineering Degree.

The proposed model has been applied in two case studies, belonging to two different subsectors. In a comparison of the results, the supplier of prefabricated concrete products was found to have the highest Innovation Index (II) value at 0.703. It should be noted that this figure is quite high, taking into account the size of this company, with a staff of only 22 people. This good result is due in part to a management commitment to innovation, reflected by the fact that it has an institutional budget for R&D activities, in addition to the high value obtained in the Innovation Intensity indicator. Finally, it may be mentioned that the traditional construction company obtained the lowest values in all dimensions, despite it having the highest turnover and number of employees. This fact is in line with the characteristics of these types of companies, which operate under difficult market conditions often based only on price and deadline.

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