Research on innovation and technology transfer in the Chilean construction industry

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Abstract

Innovation and technology transfer are activities of high relevance in this time of accelerated changes and global competition. Chilean construction is immersed in this reality and should develop its capacity to carry out these activities in the most effective and efficient possible way. However, for different reasons not well known, the Chilean construction industry has not been able to take advantage of the benefits of innovation and technology transfer. Research is being carried out to critically study innovation and technology transfer processes in the Chilean construction industry, to evaluate the current situation and to propose policies and systems based on three features: international experiences, innovation and technology transfer concepts and the culture and traditions of the Chilean construction industry. The expected results of this research are the proposition of innovation and technology transfer mechanisms suited to the construction industry both at the industry and company level and the proposal of public policies regarding these activities in the construction sector. This paper provides a brief of the research and the activities currently under way.

Keywords: innovation, technology transfer, construction industry, Chile, research.

INTRODUCTION

Innovation and technology transfer are activities of great importance in this time of accelerated changes and global competition. The Chilean construction doesn't escape to this reality and should develop the capacities in order to carry out these actions in the most effective and efficient possible way. However, for several reasons, the construction industry has not acted with determination in order to make a profitable use of these activities, mainly due to the lacking of knowledge on the form of carrying them out and to the lacking of integration between their actors and participants.

Due to the above-mentioned facts, a research proposal has been presented with the purpose of studying the processes of innovation and technological transfer in the Chilean construction industry in a critical form, in order to evaluating their current situation and the effectiveness of the activities currently under way. As a result of this evaluation, the research will propose policies and systems of innovation and technology transfer for construction, based on a comparison with international experiences, on a theoretical conceptual modelling of innovation systems and on the cultural reality and traditions characteristic of the construction sector. It also seeks to propose mechanisms and alternatives in order to strengthen the adoption, implementation and transfer of new technologies to the Chilean construction industry in general. The proposals that will be generated from this research work will address both, the general level of the construction industry and the particular level of a construction organization or company.

In order to carry out this research a frame of reference will be developed for the analysis of possible innovation systems for construction inside the general context of existent innovation and technology transfer systems in the country. The research effort is also aimed to identify the main agents of the construction sector that participate or should participate in these activities and the mechanisms to integrate their efforts and interactions. In this way it is sought to structure efficient and effective mechanisms to achieve an action of innovation and technology transfer of significant importance for the development of this important economic sector.

The results of this investigation will benefit the construction industry, by having systematic and robust information for decision-making concerning the policies and necessary systems for adequately strengthen the development of the sector and the competitiveness of the Chilean construction companies. Additionally, it will provide the organizations and companies of the sector of ideas, mechanisms and systems for the generation of innovations and in order to carry out a successful transfer to their activities. In this way it is hoped to cooperate in the performance improvement of the national construction industry.

BACKGROUND

During the last decade, the concepts of technological innovation, technological transfer and systems of innovation have been discussed thoroughly in the world, motivated by the concern of countries, organizations and companies for achieving better standard of life and levels of competitiveness at a world level.
Construction is one of the main economic activities of any country, having a significant importance in the economic national growth. It also has a significant impact on the standard of life and in the capacity of a society of producing other products and services and in the commercialisation of them. Being the construction an old and traditional activity, their performance has been determined strongly by the traditions and the local culture of each country as well as by the geographical own characteristics. Construction provides housing, buildings and productive works, infrastructure and other products and associated services. In Chile, these characteristics are the same and with the additional importance for a country that is still developing and where resources are significantly scarce in order to assist all the multiple necessities that the country requires.

Before continuing with this formulation, it is convenient to define a series of terms in order to facilitate and standardize the understanding of the topic:

- **Technological Research**: it is the process of search and development of a knowledge body with the purpose of producing technological innovations in the company.
- **Innovation**: it is the process of search, recognition and implementation of a new technology in order to improve the efficiency of the functions of a certain company (Laborde and Sanvido, 1994).
- **Innovation System**: it is a net of institutions, private and public, that interact between them in order to create, adopt, modify and diffuse new knowledge and technologies.
- **Construction Technology**: it is the combination of construction methods, materials and teams, personnel, the construction processes, and the several interrelations that define the way of carrying out a certain operation in construction. (Tatum, 1987)

The construction sector in Chile is inserted inside an atmosphere of deep and quick changes, produced mainly by a series of forces. Between them one could mention the social, legal, regulatory, political, environmental, competitive and technological forces. For this reason, companies and the sector in general, should incorporate the advances and developments that exist in the world in an urgent form in order to be able to adapt themselves to the new demands that these forces impose and to produce a significant improvement of their performance. Within the main changes seen today in the sector are the demand of more functional buildings, more sophisticated facilities, improvement of the conditions of life and of work, more respect for the environment, better standards of quality and reduction of costs and improvement of productivity.

The innovation and technology transfer that refer to the process of search, identification, development and adaptation of new technologies for the production of goods and services turn out to be then two essential activities for the success of the sector and their organizations. However, in order to achieve a high effectiveness of these activities, it is also important to have a system of innovation for construction that promotes and strengthen it with a high profitability.

**RESEARCH DESCRIPTION**

The main objective of this research effort is to carry out a critical analysis of the state of the innovation and technology transfer systems and mechanisms applied in the construction industry in Chile. It also looks for proposing possible mechanisms and alternatives in order to strengthen the adoption, implementation and transfer of new technologies by and to the Chilean construction in general. In order to achieve this general objective, it is planned to attain the following specific objectives:

1. To carry out a diagnosis of the current situation of innovation and technology transfer in the construction sector in Chile.
2. To carry out an international comparison of the innovation and technology transfer systems in construction.
3. To develop a framework for the analysis of possible innovation systems in construction inside the context of the existent or projected national innovation system.
4. To identify the main construction sector agents who participate or should participate in this activities and their interactions.
5. To propose mechanisms and systems for strengthening innovation and technology transfer in construction, including the generation of policies in this respect.
6. To propose mechanisms for the generation, adaptation and implementation of technology innovations at the level of construction organizations and companies.

The work hypotheses stated for this research are the following:

1. The construction industry is characterized for a reduced innovation and technology transfer activity, due to its characteristics and to the lack of appropriate mechanisms for these purposes.
2. Innovation and technology transfer could contribute with a significant improvement of the construction industry performance.
3. Innovation and technology transfer systems in construction could be described and modelled, in order to analysing them and propose improvements.

4. The international experience on innovation and technology transfer in construction could be used as a guide in order to establish mechanisms and systems for strengthening innovation and technology transfer in the Chilean construction industry.

5. It is possible to improve the effectiveness of the generation and implementation of innovations and technology transfer both at the levels of the industry as a whole and of construction companies, through efficient and structured mechanisms.

The research proposal aims to develop the necessary knowledge for making operational each one of the hypotheses and achieving the stated objectives. The realization of this research considers the following methodology:

1. Literature revision
2. Diagnosis of current situation
3. Interaction with international group through CIB TG35
4. Generation of mechanisms and systems of innovation and technological transfer: Based on the information generated until this moment, an structure of several alternatives of mechanisms and systems of innovation and technological transfer for the Chilean construction industry will be developed considering the following aspects:
   - Forms of innovation and technological transfer
   - Cultural aspects and of tradition of the Chilean construction industry
   - Drivers of innovation for construction companies and organizations
   - Financing mechanisms for innovation and technology transfer
   - Lists of the main actors for innovation and technology transfer
   - Policies for innovation and technology transfer in the Chilean construction industry

5. Proposition of mechanisms for innovation and technology transfer in construction organizations and companies: the following activities are considered in order to achieve this objective:
   - Identification of processes of innovation and technology transfer carried out in construction companies and organizations
   - Analysis of successful and non-successful processes to determine issues that strengthened innovation and technology transfer as well as the aspects that hindered these activities
   - Structuring of a model for implementation based on the information obtained until this moment, the international experiences and the identified conceptual aspects
   - Generation of an implementation methodology adapted to the conditions and characteristic of construction organizations and companies
   - Validation of the methodology based on current experiences

CONCLUSIONS

This work has briefly described a research effort currently carried out in Chile on the topic of innovation and technology transfer in the construction industry. The purpose of the paper is to get feedback from other researchers that are working in the same or related topics in an attempt to exchange experiences and to receive new ideas for improving the current and future research work.

REFERENCES
