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*Factores e índices de
competitividad para las
compañías constructoras:
resultados en Chile*

Competitiveness factors and indexes for construction companies: findings of Chile



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Abstract

Globalization and industry competitiveness has led to an urgent need for an effective competitiveness management strategy. Thus, companies require a better understanding about the definition of competitiveness, factors for determining it, and indexes for measuring it. This paper provides the results of an exhaustive literature review about competitiveness. It summarizes those factors which affect construction companies' competitiveness and indexes to measure it. From these results, a structured classification for competitiveness factors and indexes was developed and a survey was applied to Chilean general con-

tractors' top-managers. This resulted in a ranking of factors that most affect company competitiveness and indexes most suitably reflect their competitive position. The results provide the contractors' current competitive priorities in Chile. It was found through the factors and indexes chosen as the most relevant that price remains as the main criterion for contract award. In spite of this fact, top-managers are aware that other kind of factors could become more relevant in the future. The results can be considered for construction companies in developing countries to guide decision-making about competitive strategies.

Key words: competitiveness, general contractors, Chile.

Resumen

La globalización y la competitividad en la industria han generado una necesidad urgente por una estrategia efectiva para la gestión de la competitividad. Para ello, las compañías requieren un mejor entendimiento sobre la definición de competitividad, los factores que la determinan, y los índices que la miden. Este artículo provee los resultados de una exhaustiva revisión de la literatura sobre este concepto, y presenta aquellos factores que determinan la competitividad de las compañías constructoras y los índices que la miden. A partir de estos resultados se desarrolló una clasificación estructurada de dichos factores e índices y se aplicó una encuesta a gerentes generales de contratistas generales en Chile. Esto resultó

en un ordenamiento de los factores que mayormente afectan la competitividad de sus compañías, y los índices que mejor reflejan su posición competitiva. Los resultados muestran las prioridades competitivas actuales de los contratistas en Chile. Se encontró que el precio permanece como el principal criterio para la adjudicación de contratos, y esto se ve reflejado en la elección de los factores e índices más relevantes. A pesar de ello, algunos gerentes generales están conscientes que otro tipo de factores son los que se podrían convertir en los más relevantes a futuro. Los resultados obtenidos pueden servir para guiar la toma de decisiones sobre estrategias competitivas de compañías en países en vías de desarrollo.

Palabras clave: competitividad, contratistas generales, Chile.

Introduction

The construction industry is one of the most important industries in many countries as it typically represents a substantial percentage of the gross domestic product (GDP) (Ericsson and Henricsson, 2005; Flanagan et al., 2005a). The current market situation, marked with a fierce global competition, has triggered the need for companies to be more competitive in order to survive. This hyper-competitive age, in addition to the more traditional construction management difficulties in this sector, has created the need for an explicit management of competitiveness (Ambastha and Momaya, 2004).

The topic of competitiveness has gained interest of both practitioners, who must consider the competitive environment that influences their actions, and researchers, who have been trying to improve the understanding of this phenomenon. Consequently, the study of competitiveness should take an approach that yields benefits to both practitioners and researchers. As stated by Flanagan et al. (2005a), it is vital for nations to increase their knowledge and understanding of competitiveness in the construction industry.

Flanagan et al. (2007) notes the need for more research to help firms formulate competitive strategies and tactics. More generally, managers need to know what variables affect competitiveness and how these results are interrelated. This knowledge would help decision-makers during the strategic management process, defined by Langford and Male (2001) as the manner in which strategists determine the objectives of the firm and make choices to achieve them within the context of the resources available and firm's mission.

This research presents the results of a study to determine the critical variables that define the competitiveness of Chilean general contractors. Critical variables comprise both those that are sources or determinants of competitiveness (i.e. factors) and those that reflect and measure the competitive performance (i.e. indexes).

Although relevant factors and indexes for competitiveness have been found in literature, the main purpose of this study is to identify those considered as the most relevant for Chilean contractors, which will at the same time help top-managers focus their efforts and allocate their limited resources in some few areas in order to maximize their competitiveness (Lu et al., 2008). Through the study of Chilean contractors, this study will provide a basis to examine contractors in all developing countries around the world.

This paper presents the most relevant elements of a more comprehensive study. These elements comprise the concepts of competitiveness (i.e., the different dimensions of competitiveness at firm level) and a compendium of factors and indexes considered relevant for construction companies' competitiveness. Subsequently, it describes the methodology applied to find the most relevant factors and indexes for Chilean general contractors, and analyzes the obtained results. Finally, it addresses the most important conclusions and directions for further studies.

Background

Concept of competitiveness

Despite its widespread use, there is no consensus on the definition of competitiveness (e.g. Flanagan et al., 2005a; Lu, 2006). Table 1 provides several definitions found for this concept with critical elements that can provide a better understanding of its definition in totality.

The definitional elements in Table 1 indicate that competitiveness is a broader concept than those related to performance or efficiency. Competitiveness relates to having better abilities and capabilities than competitors, and it involves both results achieved in the past and the perception of future potential of a company.

Competitiveness at the firm level

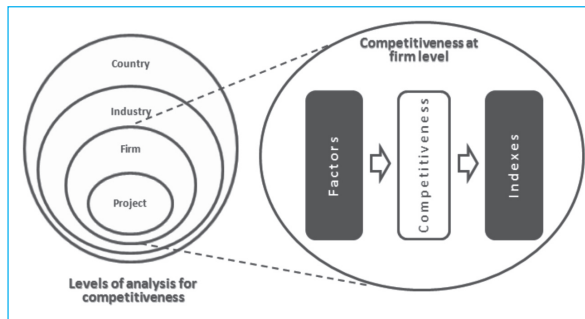
Competitiveness in the construction industry can be analyzed at several levels: country, industry, firm, and project. However, several authors have called attention to the relevance of competitiveness at the firm level. Christensen in "Micro Foundations and Macro Competitiveness" (1999) argues that nations can compete only if their firms can compete. Porter (1990) establishes "it is firms, not nations, which compete in international markets." Other authors like Dangerfield et al. (2008) and Ambastha and Momaya (2004) have also supported its relevance and practicality.

At the firm level, it is possible to identify two main types of variables: (1) factors that determine the competitiveness performance of a company; and (2) indexes which measure and show the competitiveness position reached by the firm (see Figure 1).

Table 1 Elements that are relevant for defining competitiveness

It is a concept more powerful than traditional economic indicators such as profitability, productivity or market share	Lu, 2006
It is a cause, an outcome, and a means	Waheeduzzan and Ryans, 1996
Associated with achieving an objective	Flanagan et al., 2005a
It is relative to competitors	Buckley et al., 1988
It belongs to the eye of the beholder (it means different things for different people)	Waheeduzzan and Ryans, 1996; Flanagan et al., 2007
Not only reflects past performance, but also allows the perception of potential...	Buckley et al, 1988
It must satisfy the needs of clients	Momaya and Selby, 1998
It must satisfy the needs of the personnel	Momaya and Selby, 1998; Invancevich et al., 1994
It is related to superior quality	Momaya and Selby, 1998
It implies continuous improvement	Flanagan et al., 2005b; Lu, 2006
It is associated to high productivity	Flanagan et al., 2005a & b
It implies a better profitability	Flanagan et al., 2005b
Innovation	Momaya and Selby, 1998
Value for shareholders	Momaya and Selby, 1998

Figure 1 Variables that affect competitiveness at the firm level



Competitiveness factors, in turn, can be split into endogenous and exogenous. Endogenous factors are those which are internal to the company; therefore, management can act on them in order to achieve its goals. Examples include leadership, training, and innovation. Exogenous factors originate outside the

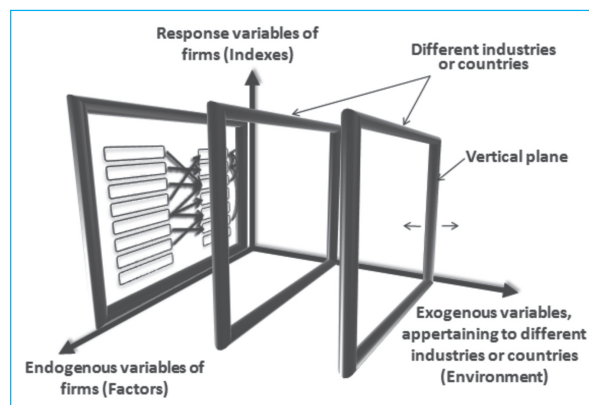
company and management has little, if any, influence over them. Examples include regulations, number of competitors, interest rates, and public investment. These exogenous factors form the environment in which companies have to compete, resulting in a different competitive atmosphere for each individual country.

Indexes, for their part, allow measuring the different aspects (i.e. results) covered by competitiveness, such as profitability, project performance, market share, and client satisfaction. When measuring competitiveness, the following must be accounted for: (a) competitiveness, as a very wide concept, has been seen difficult to be captured just in a single measure (Buckley et al., 1988; Flanagan et al., 2005a; Flanagan et al., 2005b); (b) it is relative to competitors; and (c) it has a high level of subjectivity. For that reason, each index should have a different relevance depending on the specific interests of each client and/or the priorities of each company.

Figure 2 shows graphically these three types of variables as dimensions of an analysis of competitiveness. One

dimension belongs to endogenous factors, another for indexes (i.e. business results), and the third accounts the exogenous factors (i.e. environment). A competitiveness study of specific firms (assuming they are operating under the same circumstances), would be represented by a vertical plane on the graphic. The endogenous variables and the indexes will be analyzed under the same exogenous factors. If environmental circumstances are different or change, the analysis has to be moved along the exogenous factors axis.

Figure 2 Dimensions for the analysis of competitiveness at the firm level



Competitiveness factors at firm level

Factors influencing competitiveness can be found in several sources and with different names, such as Critical Success Factors (CSFs), attributes, or parameters. Each of them helps determine the success, competitiveness and/or performance of a company.

A comprehensive list of factors has been developed from the relevant literature. All of them are important drivers for competitiveness. This literature review includes, but is not limited to, studies about competitiveness, performance, success, bidding criteria, competitiveness frameworks, business models, and total quality management (TQM) studies.

Fifty-eight endogenous factors have been identified as relevant for competitiveness in at least two different sources. The factors have been grouped by affinity into seven categories: (1) strategic management; (2) project management; (3) human resources management and organizational culture; (4) innovation, research and development (R&D), and technical/technology factors;

(5) financial capacity; (6) institutional and business relationships; and (7) bidding factors. Table 2 lists the endogenous factors in categories and arranges them in descending order on the basis on the number of sources that cite them. The number of times a factor is cited could be an indirect measure of its relevance. This study uses this indirect indicator and confirms the factors relevance through interviews with Chilean construction companies' top-managers.

A thorough review of the literature identifies more than thirty exogenous or environmental factors. However, this study cites only eleven as relevant using the criterion that a factor must appear in at least two different sources (see Table 3). Authors such as Rumelt (1991) support their inclusion stating that both industry and firm effects are important in shaping business results. Venegas and Alarcon (1997) state the need for incorporating these types of variables when analyzing firms is highly relevant.

Competitiveness indexes at firm level

The use of performance measures through indices has been in operation since at least the beginning of our century (Chandler, 1997). Nevertheless, the performance indexes have traditionally concentrated on financial performance, tending to measure only what was easily measurable. Since the late 1980s, increased global competition has forced companies to consider non-traditional measures (Kagioglou et al., 2001).

Competitiveness is a complex concept and, according to the elements in its definition, it comprises several performance measures (i.e. indexes). These indexes can be grouped by nine categories: (1) financial indicators; (2) non-financial productivity; (3) traditional project performance indexes; (4) client satisfaction; (5) market share; (6) society satisfaction; (7) personnel satisfaction; (8) future capabilities; and (9) bidding effectiveness. Table 4 provides a comprehensive list of competitiveness indexes obtained from literature.

The previous factors and indexes comprise a comprehensive set of analysis metrics to study competitiveness in the construction industry. Consequently, the objective of this study is to validate what does the literature present through determining which factors and indexes are the most relevant for Chilean contractors' top-managers. These findings allow for a better understanding of the underlying mechanisms that regulate competitiveness for these companies in developing countries with similar characteristics.

Table 2 Literature review about endogenous competitiveness factors

[illegible]

Table 3 Literature review about exogenous competitiveness factors

EXOGENOUS FACTORS											TIMES REFERENCED
	Yates, 1994	Ericsson and Henricsson, 2005	Lu, 2006	El-Diraby et al., 2006	Dangerfield et al., 2008	Flanagan et al., 2005a	BNQP, 2008	Venegas and Alarcón, 1997	Henderson and Mitchell, 1997	Phua, 2006	
ENVIRONMENT	● ● ● ● ● ● ● ● ● ●										10
Regulatory or legal restrictions	●			●	●	●	●	●	●	●	8
Number and kind of competitors (local or international)						●	●	●	●		4
Environmental regulations				●	●		●				3
Interest rates (magnitude and stability)		●				●		●			3
Shortage of quality subcontractors and labour	●							●		●	3
Health and safety regulations						●	●				2
Inflation (magnitude and stability)		●						●			2
Public investment	●										2
Economy growth								●	●		2
Education and training level of workforce						●		●			2
Political issues				●	●						2

Methodology

As seen in similar investigations, the typical procedure to identify the relevant competitiveness elements (i.e., factors and indexes) is through the experience of practitioners involved in the selected market (e.g., Lu et al, 2008; Ericsson and Henricsson, 2005; Yates, 2004). As stated by Lu et al. (2008), this approach is particularly effective when dealing with qualitative elements. Thus, in order to get the judgment of top-managers, a questionnaire was developed and applied via face-to-face interviews to ensure a clear understanding and to avoid misinterpretations of instructions or concepts. In addition, we were able to obtain valuable comments about specific factors or indexes or about their grouping; justifying the addition of factors or indexes not included previously.

The questionnaire's instructions asked top-managers to choose approximately half of the factors or indexes considered as most relevant for each category. For example, if there were twelve factors within a category, the interviewee had to mark six of them as the most relevant. Participants were allowed to mark five or seven as long as they could differentiate the most relevant from those that were less relevant. Blank spaces were provided at the end of each category in case interviewees wanted to suggest a non-included factor or index. Examples from the questionnaire are included in Appendix I. The questionnaire was applied

in Spanish, the local language, and was translated into English for international readers. The relevance of each factor or index was obtained by adding the amount of votes given by the top-managers.

It is worth noting that this research did not use a numeric scale for assessment, which would ask to assess the relevance for each aspect using a multi-point scale (e.g. Dikmen y Birgönül, 2003; Kale y Arditi, 2002 y 2003; Luu et al., 2008; Lu, 2006; Phua, 2007). A multi-point numerical scale was not applied because all factors and indexes were already deemed important (via the literature review), and answers from the top-managers could tend to be similar, thus preventing discrimination towards the relevant ones. El-Diraby et al. (2006) overcame this problem by deploying the analytical hierarchy process (AHP). However, this process is not applicable to this research due to the large amount of variables needing assessment. The forced-ranking scale system was also avoided, because it would have taken longer than the method presented in this research, and top-managers would not have time to complete such an interview.

The questionnaire was piloted, as suggested by Buckingham y Saunders (2004), to assess its consistency, time to complete, and ease of understanding. Few changes were proposed and the questionnaire was adjusted accordingly. As a representation of the Chilean construction industry, forty-four top managers of

Table 4 Literature review about competitiveness indexes

CATEGORIES / INDEXES	Phua, 2006	Kale and Arditi, 2002, 2003	Ambashta and Momaya, 2004	Cheah et al., 2007	Bassioni et al., 2004, 2005	Flanagan et al., 2005a, 2005b, 2007	Lau et al., 2008	Venegas and Alarcón, 1997	Buckley et al., 1988, 1990	Kaplan and Norton, 1993, 1996	KPI Working Group, 2000, 2007	BNQP, 2008	Kaplan and Norton, 2000	Oliver, 1997	Conti, 1997	Jenkins and Johnson, 1997	Porter, 1990	Shen et al., 2004	Des and Robinson, 1984	TIMES MENTIONED
FINANCIAL INDEXES	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●			●	15
Productivity of investments (ROE, ROA, ROI)	●	●		●	●	●	●	●	●	●	●			●	●			●		13
Profit margin and profit growth				●	●	●	●	●	●	●					●	●		●		10
Revenue amount and revenue growth				●	●	●	●	●	●	●			●		●	●				9
Cash flow / Liquidity				●	●	●	●		●					●						4
NON-FINANCIAL PRODUCTIVITY			●	●	●			●	●	●	●	●	●	●	●		●	●		11
TRADITIONAL PROJECT PERFORMANCE INDEXES		●		●				●	●	●	●	●	●	●	●		●			9
Quality				●				●	●	●				●			●			6
Time				●				●	●	●	●			●						5
Cost				●				●	●	●				●						5
Health and safety				●				●	●	●								●		4
Reliability of performance								●	●									●		3
CLIENT SATISFACTION				●	●	●		●	●	●				●						7
Satisfaction with service				●				●	●					●						4
Value for money perception								●	●	●				●						4
Delivery time								●	●					●						3
Quality of relationship								●	●					●						3
Satisfaction with product				●					●					●						3
Competitive price								●	●											2
MARKET SHARE (growth and size)				●	●	●	●	●	●	●				●						6
SOCIETY SATISFACTION				●	●			●	●					●						5
Environmental consciousness								●						●						2
Community support											●			●						2
Respect for laws and regulations											●			●						2
PERSONNEL SATISFACTION				●				●	●					●						4
Work place				●							●			●						3
Organizational atmosphere				●							●			●						3
Personnel motivation									●					●						2
Career prospect and employee development											●			●						2
Job satisfaction								●						●						2
FUTURE CAPABILITIES				●				●	●											3
Research and development program or investment								●	●											2
Cost reduction abilities								●	●											2
Cutting edge technology (operational or managerial processes)					●			●												2
BIDDING EFFECTIVENESS	●								●											2

general contractor companies were approached for an interview. Twelve top managers agreed to participate. The managers represent high-level personnel in some of the largest Chilean contracting companies. Although the survey population is relatively small, the questionnaire is being used only as a validation and filter for the literature review findings. All of the factors and indices have a strong theoretical basis in the literature as described previously. Interviews were carried out from September to October 2009.

Results

Tables 5 and 6 present the factors and indexes as voted by more than 60% of the top-managers. Tables 5 and 6 also show the percentage of votes relative to the total of each category and the cumulative percentage for each factor or index, which provide an idea of how those factors or indexes explain their own category. The discussion that follows provides comments made by top-managers about factors and indexes. Those comments revealed much more than the numbers themselves in regards to the competitiveness criteria used in the Chilean construction industry.

Competitiveness factors

This sub-section discusses the most relevant factors affecting competitiveness for each category (shown in Table 5), and relevant comments from the interviewed top-managers.

Strategic management. Leadership and company image and reputation were considered the most relevant factors in this category, voted by more than 80% of top-managers. Considering leadership as a decisive factor indicates that many assume management has an important role affecting performance. Regarding company image and reputation, top-managers indicated that this factor can have a greater influence over clients, in spite of the Chilean construction industry being orientated towards price as the primary contract award criterion. Some top-managers, who have a more marked client focus, agree with this idea and are constantly trying to keep a superior image in order to give clients a lower perception of risk.

Client focus received 75% of votes, which means that top-managers value good client relationships and work to keep them satisfied in order to gain loyalty. Approximately 30% of top-managers specifically expressed an interest in gaining a competitive advantage through client relationships. The most common practices related to this are: diligent selection

of projects to bid on; personalized service; continuous client satisfaction surveys; transparency; conflict avoiding; and even earning less profits in order to increase clients loyalty. Top-managers know that price is the most important criterion for awarding contracts, but they also realize that today more and more clients (public and private sector) are becoming aware that other types of factors give them more value than just price.

Quality focus was voted by 67% of the top-managers, who mentioned that neglecting quality is not an option. Some of their comments were: "doing things well is less expensive"; "quality is not negotiable"; "it is an issue that it must be considered"; and "it is a constant concern". Some of those top-managers, who did not include quality focus as relevant for strategic management, mentioned it as relevant in the project management category.

Project management. From top-managers' perspectives, with a more strategic focus on project management, contract management has been considered as the most relevant factor (92% of votes). Contractors, as mentioned individually, are more aware of how to avoid conflicts through very clear and well-defined contracts, with clauses assigning risks to those who can better handle them. The relevance of this factor is also related to client focus because contracts are an instrument to avoid conflicts and to keep a positive and productive relationship.

The next most voted factor for project management was health and safety management (83%). Top-managers are well aware of the importance of this topic and they consider it intrinsic to any project.

Human resource management and organizational culture. There was consensus among top-managers about the relevance of teamwork, with a strong interest in maintaining a team spirit within their companies. In fact, one of the top-managers remarked on the willingness of sacrifice and adaptability of their personnel as one of the more important strengths of his company. This same company also has policies which encourage showing respect for anyone at any level. Others factors such as training, incentive and rewarding system, and personnel engagement and motivation got 83% of votes.

Financial capacity. A healthy and stable financial status was recognized by all of the top-managers as one of the most important factors for competitiveness. Second was the ability to secure financing (75% of votes), although some remarked that their companies rely primarily on their own capital.

Table 5 *Most relevant factors for Chilean contractors*

Categories and their factors	Votes	Pct.	Cum. Pct.
Strategic management			
Leadership	83%	14.3%	14.3%
Image and reputation	83%	14.3%	28.6%
Customer focus	75%	12.9%	41.4%
Quality focus	67%	11.4%	52.9%
Strategy establishment and implementation	67%	11.4%	64.3%
Operations management	67%	11.4%	75.7%
PROJECT MANAGEMENT			
Contract management	92%	14.9%	14.9%
Health and safety management	83%	13.5%	28.4%
Cost Management	75%	12.2%	40.5%
Risk management	75%	12.2%	52.7%
Labor management	67%	10.8%	63.5%
Human resource management and organizational culture			
Team work	100%	16.7%	16.7%
Training	83%	13.9%	30.6%
Incentive and rewarding system	83%	13.9%	44.4%
Personnel engagement and motivation system	83%	13.9%	58.3%
Innovation, r&d, and technical and technological factors			
Technical and technological abilities	100%	34.3%	34.3%
Innovation (products, services, or inner processes)	92%	31.4%	65.7%
Construction plant capacity	83%	28.6%	94.3%
FINANCIAL CAPACITY			
Healthy and stable financial status	100%	50.0%	50.0%
Financing ability	75%	37.5%	87.5%
INSTITUTIONAL AND BUSINESS RELATIONSHIPS			
Relationship and alliances with owners	83%	29.4%	29.4%
Relationship and alliances with suppliers	75%	26.5%	55.9%
Relationship and alliances with subcontractors	67%	23.5%	79.4%
BIDDING FACTORS			
Company experience	100%	33.3%	33.3%
Ability to compete in price	75%	25.0%	58.3%
ENVIRONMENT			
Number and kind of competitors	83%	14.9%	14.9%
Shortage of qualify subcontractors and labour	83%	14.9%	29.9%
Regulatory or legal restrictions	67%	11.9%	41.8%
Economy growth	67%	11.9%	53.7%

Institutional and business relationships. Top-managers emphasize three types of relationships institutional and business relationships: (1) relationships and alliances with clients (83%), which corresponds with the relevance given to client focus in the strategic management category; (2) relationships and alliances with suppliers (75%), which is supported by literature regarding scale economies and partnering; and (3) relationships and alliances with subcontractors (67%), which is similar to supplier relationships, but with the additional complexity that they physically take part in project processes and have great influence on costs, quality, and time. Top-managers also voiced their concern regarding subcontractor management, and trying to find more effective and efficient ways of working with them.

Innovation, research and development, and technical and technological factors. Technical and technological abilities were the most important factor in this category, with consensus among top-managers. Lack of technical expertise in certain projects represents a reason to not compete for them, as a top-manager stated. This explains why top-managers are concerned with employing experienced personnel and current technology that will allow them to exceed the required specifications in projects.

As a result of competitiveness, product, service and process innovation (voted by 92%) is a relevant topic for most contractors because it creates a competitive advantage. In this regard, several actions have been taken by top-managers, such as attending international construction conferences as sources for ideas to be innovators in the use of equipment and processes, using special formworks to raise productivity, having personnel assigned to find new technology or processes, developing equipment prototypes, and creating reward systems to encourage initiatives to improve productivity.

Construction plant capacity received 83% of votes. While one top-manager expressed that one of their company's strengths was to do very big projects, several other top-managers experienced a loss of control when they tried to exceed their normal construction volumes. This reflects that some companies can be limited by their own technical, technological, or even management capacities.

Bidding factors. All top-managers agreed that company experience is the most relevant factor for this category. However, they also agree that the most important criterion for bid assessment is price (voted by 75%). Price reflects a short-term attitude of clients because other relevant factors that cannot

be quantified are set aside. It was noted by top-managers that this can become a vicious cycle because there are contractors who have the same approach. Nevertheless, the strategic approach oriented to the client adopted by several top-managers proves that this is changing, or at least, an interesting submarket where clients take into account other intangibles, such as quality, reliability, service, technical ability, reputation, and ethics, exists.

Environment (i.e. exogenous factors). Eighty three percent of top-managers voted that number and type of competitors (local or foreign), and shortage of qualified labor and subcontractors were the two most important factors in this category. These exogenous factors could be a result of the global economic crisis that was affecting normal operations of construction companies at the time of the survey. Some top-managers agreed that the sharp drop in the availability of construction projects coupled with developers temporally becoming contractors resulted in a significant increase of contractors bidding for the few available contracts. A top-manager explained that before the crisis occurred contractors had to compete against three or four companies, and that now during the crisis, they are competing against ten or more. A lack of qualified labor and subcontractors can be viewed as a consequence of the country's social and cultural situation and due to the low level of professionalization of most of the subcontractors.

Regulatory and legal restrictions, and economy growth were the next most voted for factors (75%). The former, as stated by one interviewee, has been increasing annually, as well as the excessive paperwork delaying their companies' actions. Economic growth has become a critical issue during the economic crisis as the construction industry historically has been very sensitive to economic fluctuations.

Competitiveness indexes

This sub-section discusses the most relevant indexes measuring competitiveness for each category (shown in Table 6), and also includes some comments given by the interviewed top-managers.

Financial indexes. Top-managers chose three indexes as the most representative for measuring the financial status of a contractor: (1) profit margin (gross profit/total revenue – 67%); (2) cash flow or liquidity (67%); and (3) return on equity (ROE – 50%). Most managers remarked the relevance of ROE and consequently it will be considered for further stages of this research.

Non-financial productivity. Productivity due to labor, machinery and equipment is traditionally checked by all companies at the project level, however, at the firm level, 83% of top-managers did not have productivity indicators. They were more interested in financial productivity (e.g. ROE).

Client satisfaction. As previously discussed, a concern exists about client satisfaction in strategic management and top-managers have agreed with the three aspects that mostly represent this category: (1) satisfaction

with service provided; (2) satisfaction with on-time delivery; and (3) satisfaction with the product itself. Each of these was voted by 83% of top-managers. Many managers mentioned providing satisfaction through service by providing personalized service, avoiding conflicts, frequent satisfaction surveys, etc. All of these actions helped to make the client feel comfortable with the contractor. No additional comments were made about the other two indexes, but, accordingly to the amount of votes, they are equally important.

Table 6 *Most relevant indexes for Chilean contractors*

Categories and their indexes	Votes	Pct.	Cum. Pct.
Financial indexes			
Profit margin	67%	21.6%	21.6%
Cash flow / Liquidity	67%	21.6%	43.2%
Productivity of investments (ROE)	50%	16.2%	91.9%
Non-financial productivity			
Client satisfaction			
Satisfaction with service	83%	24.4%	24.4%
Delivery time	83%	24.4%	48.8%
Satisfaction with product	83%	24.4%	73.2%
Market share			
Society satisfaction			
Respect for laws and regulations	83%	40.0%	40.0%
Environmental consciousness	67%	32.0%	72.0%
Bidding effectiveness			
Contract volume growth	83%	43.5%	43.5%
Percentage of contracts won	75%	39.1%	82.6%
Future abilities			
Cost reduction abilities	92%	32.4%	32.4%
Cutting-edge technology applied to projects	83%	29.4%	61.8%
Personnel satisfaction			
Personnel motivation	92%	30.6%	30.6%
Career prospect and employee development	75%	25.0%	55.6%
Organizational atmosphere	67%	22.2%	77.8%
Traditional project performance indexes			
Cost	83%	23.8%	23.8%
Quality	75%	21.4%	45.2%
Time	75%	21.4%	66.7%
Health and safety	75%	21.4%	88.1%

Market share. Most of the top-managers assessed both size and growth indicators of market share as not relevant for their strategies. Rather, most focus on surpassing their own established minimum construction volume in order to have a presence in the industry and to cover their fixed costs. Their goal is to have controlled growth without a loss of control in project management. Most of them expressed to be mainly focused on profitability instead of construction volume.

Society satisfaction. In relation to this category, top-managers believe that the most relevant indexes are the respect for laws and regulations (83% of votes) and environmental consciousness (67%). In spite of these concerns being seen as mandatory, they should be encouraged and supported by managers' policies, resulting in higher quality standards and not just fulfilling the minimum obligatory standards. Despite the fact that community support obtained just 58% of managers' votes, it is of great relevance for those companies that are continuously developing projects in rural areas.

Bidding effectiveness. Top-managers have given more votes to contract volume growth (83%), because they want, at least, to have a growth rate higher than inflation. The percentage of contract awarded (75% of votes) is also a top-managers' concern, therefore several of them are trying to focus their efforts on projects where their companies have more chances win the award. Even during times of economic crisis, when top-managers try to be very selective about their bids, effectiveness percentages have fallen from around 40% to 15% based on experience from two top-managers interviewed.

Future abilities. Another relevant index to measure competitiveness is what companies are capable to do in the near future (i.e., their potential). In line with this and according to the prevailing Chilean industry, top-managers valued the ability to reduce costs (92%) and apply technological advances to project execution (83%). The former reflects the top-managers' belief that price will continue being one of the most important bidding criteria, as reducing costs will increase their profit margin. Valuing technological advances shows the top-managers' concern for innovating and acquiring cutting-edge technology to keep ahead of competitors and gain a competitive advantage.

Personnel satisfaction. In order to measure personnel satisfaction, top-managers consider two aspects as the most relevant: personnel motivation (92% of votes), and career prospect and employee development (75%). In general, top-managers agree that personnel satisfaction, and mainly their inner motivation, is particularly relevant for company's performance.

Traditional project performance indicators. Quality, time, cost, and health and safety were all considered equally as relevant for competitiveness. Top-managers had problems choosing just three of them, so we will take them all for subsequent stages.

Conclusions and further work

Understanding the relevant attributes of competitiveness provides the basis to identify and to categorize those elements that define it. Analysis of the competitiveness of a company comprises three main elements: (1) endogenous factors; (2) exogenous factors; and (3) indexes. Together these elements define a firm's competitive position and provide the necessary elements for further analyses aimed at improving long-term performance and future competitiveness of construction contractors.

The preceding research and validation interviews reveal relevant information regarding competitiveness in the construction industry with a focus on Chile. Although price is the main criterion for contract award in Chile, top-managers are well aware that other factors will allow them to compete and even to excel in a global environment. At strategic level, the importance lies on the focus on client and quality. The concern for personnel is centered on teamwork and on safety and security management. From a financial standpoint, the goal is to have a healthy and stable financial status, and to develop closely held relationships with owners, suppliers and subcontractors. Technical and technological abilities, together with innovation, are acknowledged as elements that will allow a contractor to develop construction projects.

The interviews asked top-managers in the Chilean construction industry to reflect on the way they measure competitiveness. Financially, the most important indexes are profit margin, liquidity, and ROE. Non-financial productivity is not relevant for Chilean top-managers. Customer service, time and the product itself are most tied to client satisfaction. Social responsibility is gaining importance, which is reflective of a global trend. Most top-managers agree that both cost reduction abilities and cutting-edge technology will help them secure a better competitive position in the future. Overall, the traditional project performance indicators (cost, time, quality, and safety and security) are considered very important to assess the competitiveness of any company.

Results and conclusions obtained from this study will be used to create a model showing the relationship between the greatest relevant factors and indexes of

competition for Chilean contractors. The purpose of the model will be to find the factors that most impact competitiveness indexes allowing top-managers to focus their efforts and resources. According to Lu et al. (2008), there is a practical need to find a smaller group of vital factors to improve competitiveness.

Another opportunity for this research, derived from the systematic measurement of the indicators, is to capture trends and generate a dynamic model

for competitiveness. This periodical measurement would be a good starting point to analyze long-term competitive performance. Practically, there is a need to develop a competitiveness measurement system with actual data for internal use at companies, similar to the Balanced Scorecard (Kaplan and Norton, 1996) but with the approach presented in this paper. It would allow companies to monitor and to analyze trends with their own competitiveness factors and indexes.

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appendix I. questionnaire

This is an example of the questions employed in our survey.

General instructions: How important is each of the following factors for competitiveness of Chilean contractors?

Institutional/Business relationships

Specific section instructions: Mark with an X the three more important factors in this group.

- ☐ Relationship with society
- ☐ Relationship and alliances with suppliers
- ☐ Relationship and alliances with competitors
- ☐ Relationship and alliances with clients/owners
- ☐ Relationship with government entities
- ☐ Relationship and alliances with subcontractors
- ☐ Other:
- ☐ Other:

Innovation, R&D, and technical/technology factors

Specific section instructions: Mark with an X the three more important factors in this group.

- ☐ Relationship with society
- ☐ Relationship and alliances with suppliers
- ☐ Relationship and alliances with competitors
- ☐ Relationship and alliances with clients/owners
- ☐ Relationship with government entities
- ☐ Relationship and alliances with subcontractors
- ☐ Other:
- ☐ Other: