Methodological proposal to assess management practices for incorporating benchmarking into the chilean construction industry

Metodologia de avaliação das práticas de gestão para incorporar a avaliação indústria de construção chilena

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ABSTRACT

The Chilean construction market has grown considerably in recent years. This progress has generated strong competition among companies, which has forced a constant search for new strategies to generate a continuous improvement of their processes, to achieve better overall results. Among strategies for continuous improvement, it is possible to find tools such as Benchmarking, which involves knowing your own and your competitors’ performance, to meet the gaps. This research is aimed to develop a methodology for evaluating management practices of construction companies based on interviews which could be used as complement of the previous one developed by the Production Management Centre of the Catholic University of Chile at 2014, which was based on questionnaires. Research methodology consists of a literature review, revision of data collected during previous Benchmarking, definition of criteria to be considered in the new methodology and finally developing a questionnaire to
interview managers or department heads to visualize how companies manage aspects such as production planning and scheduling, suppliers and innovation, among others. This is related to previous methodologies used to evaluate management practices worldwide in areas such as education, retail, manufacturing and health. A pilot experience was carried out on two construction companies to assess performance of the new tool in terms of application form, evaluation form, practices evaluated, among others. The interviews were conducted with key positions in the management of the company in areas such as production, quality, suppliers and others. The application of the new methodology allowed to observe major organizational differences between both companies and to understand aspects related to the interviews, such as: time of application, validation questions used, selection of respondents, among others. Previous experience will be used to correct and improve possible mistakes to be used in the future.

**Keywords:** benchmarking, construction management, management practices.

**RESUMO**

O mercado chileno de construção cresceu consideravelmente nos últimos anos. Este progresso tem gerado forte concorrência entre as empresas, o que tem forçado uma busca constante de novas estratégias para gerar uma melhoria contínua de seus processos, para alcançar melhores resultados globais. Entre as estratégias para melhoria contínua, é possível encontrar ferramentas como Benchmarking, que envolve conhecer o seu próprio desempenho e o desempenho dos seus concorrentes, para suprir as lacunas. Esta pesquisa tem como objetivo desenvolver uma metodologia de avaliação das práticas de gestão das empresas de construção baseada em entrevistas que poderiam ser utilizadas como complemento da anterior desenvolvida pelo Centro de Gestão de Produção da Universidade Católica do Chile em 2014, que foi baseada em questionários. A metodologia de pesquisa consiste em revisão de literatura, revisão de dados coletados durante o Benchmarking anterior, definição de critérios a serem considerados na nova metodologia e, finalmente, desenvolvimento de um questionário para entrevistar gerentes ou chefs de departamento para visualizar como as empresas gerenciam aspectos como planejamento e programação de produção, fornecedores e inovação, entre outros. Isso está relacionado a metodologias anteriores usadas para avaliar práticas de gerenciamento em todo o mundo em áreas como educação, varejo, manufatura e saúde. Foi realizada uma experiência piloto em duas construtoras para avaliar o desempenho da nova ferramenta em termos de formulário de inscrição, formulário de avaliação, práticas avaliadas, entre outras. As entrevistas foram realizadas com posições-chave na gestão da empresa em áreas como produção, qualidade, fornecedores e outros. A aplicação da nova metodologia permitiu observar grandes diferenças organizacionais entre as duas empresas e compreender aspectos relacionados às entrevistas, como: hora de aplicação, questões de validação utilizadas, seleção dos respondentes, entre outros. A experiência anterior será usada para corrigir e melhorar possíveis erros a serem usados no futuro.
Palavras-chave: avaliação comparativa, gestão da construção, práticas de gestão.

1 INTRODUCTION

In recent years the construction market in Chile has grown significantly. This condition originates intense competition among the companies. The search for competitive advantage demands the use of tools to update their ways to do business. Improving management and production processes requires reliable information that leverages corporate executives’ decisions. However, getting reliable information is not an easy task. Specially, the evaluation of qualitative measures, like management practices, requires considerable time and effort and may have a direct impact on the accuracy of evaluation results (Jin, Deng, Li, & Skitmore, 2013). This complication is based on the absence of methodologies and tools to obtain reliable information about the work of construction companies. A useful tool when looking for ways to improve business performance is benchmarking. Benchmarking is the systematic process of measuring the performance of an organization versus that of the recognized leaders to identify best practices leading to superior performance when adapted and used (CII, 2016). Many benchmarking efforts have been developed in the construction industry worldwide, with the aim of establishing the best practices that lead to successful companies. In particular, collaborative benchmarking exercises have proven to be efficient by accelerating improvement processes in participating companies (Costa, Formoso, Kagioglou, Alarcón, & Caldas, 2006).

In Chile, during 2001 and 2002, the first National Benchmarking System (SNB) led by the Technological Development Corporation of the Chilean Chamber of Construction (CDT) with the collaboration of the Pontifical Catholic University of Chile via the Production Management Centre of the Catholic University of Chile (GEPUC) (CDT, 2002) was developed. This assessment exercise used 11 performance indicators to measure aspects related to the following: costs, schedules, project scope, quality, labor, planning, among others. The National Benchmarking System was later supplemented by a Management
Assessment System, which sought to incorporate qualitative elements of management that complement the quantitative performance indicators included in the SNB. The collection of qualitative data to evaluate the management dimensions established for this system was obtained through surveys carried out on Central Office and Construction staff (Ramirez, 2002). Subsequently, at least two management benchmarking exercises among construction companies have been carried out (Ramírez, Alarcón, & Knights, 2004) (Castillo, Alarcón, Salvatierra, & Alarcón, 2015). The methodologies used in these cases have been based on perception surveys to companies’ members, wherein problems related to time and resources to obtain feedback from participants were detected. In addition, the information obtained by surveys will always be subject to risk of bias provided by respondents and their perceptions about the subject under study.

Seeking to optimize the use of resources and time, as well as reliability in obtaining information about management practices of companies, international experience highlights the development of efficient methodologies as those used by Bloom & Van Reenen (2010) in the World Management Survey (WMS). In this methodology a semi-structured interview with open questions and a scale is used to measure the development of management practices in companies. Its use has allowed establishing differences in the management of companies around the world of various productive sectors in areas such as education, retail, manufacturing and health. However, it has not been applied in the construction sector yet.

The aim of this study is to develop and test an adaptation of the methodology used in the WMS, in order to gather information on management practices in the construction sector. A pilot methodology based on interviews about 15 dimensions (management practices groups) to managers of two Chilean construction companies was applied. The interview was addressed to managers with knowledge about the implementation of business management practices. Thus, establishing management differences among the participating companies was achieved. Additionally, the method was efficient in the use of resources and time compared with the application of surveys, which are included in previous
experiences of benchmarking mentioned above. Practices implementators’ opinions are obtained accordingly, and information is deemed as good quality. Even so, it will be necessary to validate the information obtained through the application of new interviews in the same companies or using staff surveys that collect their perceptions regarding management practices in these organizations.

2 BACKGROUND

2.1 WORLD MANAGEMENT SURVEY

In 2002 the World Management Survey (WMS) started a research program supported by the development of a survey method to systematically measure management practices through various companies and countries (worldmanagementsurvey.org, 2016). The objective of these studies are evaluating the differences in management practices of companies to the point of comparing companies in different countries, and partly explaining productivity gaps among organizations by these differences and other aspects as profitability, survival rate, etc. Initially, this methodology was applied in manufacturing; however, to date it also covers the areas of health, education and retail. For example, in the manufacturing industry, these practices are grouped into four dimensions: operations (three practices), monitoring (five practices), goals (five practices), and incentives (five practices) (Bloom & Van Reenen, 2007).

2.2 METHODOLOGICAL ASPECTS OF WMS

The methodology developed is a telephone interview to a manager of the company, who should be actively involved in its operation and properly informed about the internal practices of the organization. The applied methodology collects information on 18 management practices grouped in 4 management dimensions through a series of questions. Each management practice may achieve a score of 1 to 5, where 1 is the lowest achievement and 5 indicates the best achievement, i.e., the associated score represents the level reached in a given practice, in which the ideal is to reach a value of 5, since it represents the best performance. Each management dimension is evaluated based on open
questions, whose answers will allow the interviewer to associate a value of the aforementioned scale. The methodology used is referred to by the authors as a "double-blind" technique, based on the following considerations:

- Managers are mentioned only that they will be interviewed regarding management practices. Therefore, they are neither mentioned that the information gets a determined score nor that there is a scoring grid.
- Interviewers ignore the company’s performance. Therefore, the only information provided is the company’s name, the industry it belongs to, and phone number.

On the other hand, sources of influences on responses are thoroughly avoided and a successful response rate is expected to be achieved by means of the following:

- Approval by the company’s top management involved in the study.
- Interview is promoted as part of a research on business management with a Lean approach.
- Inquiring about sensitive issues such as the financial information of the company is avoided. This is obtained from independent sources or accounting information thereof.
- Interviewers are trained to be persistent and efficient in their acts in order to achieve accurate assessment.

This methodology also considers other aspects that may influence the interview’s quality, such as time of day, day of the week, the interviewer’s identity and characteristics of the respondent. The information collected is analyzed statistically for differences among the companies’ management practices. In order to minimize bias of both respondents and interviewers, Bloom & Van Reenen (2010) recommend:

- In the case of respondents: choosing appropriate interviewees, blind interviews, open-ended questions instead of closed ones, absolute scales rather than subjective ones, asking for examples, characterizing respondents.
- In the case of interviewer: blind interview, permanent monitoring of
score assignment, a common location for conducting interviews, managing skills, incentives and supervision.

2.3 ADAPTATION OF WMS’S METHODOLOGY FOR THE CONSTRUCTION SECTOR

The methodology proposed in the present research is based on the experiences of Bloom and Van Reenen over the last 13 years, and it follows the same guidelines, i.e., it intends to evaluate certain critical dimensions of management by interviewing companies’ managers. The information obtained from the interview allows subsequent scoring of each of the practices. The score is established in a range of 1 to 5, which corresponds to the company’s worst and best performance respectively for the evaluated practice.

General Considerations:

- 15 management dimensions (groups of practices) were defined by practitioners (Orozco, Serpell, & Molenaar, 2011). These were assessed taking as reference previous Benchmarking experiences carried out by GEPUC (Castillo et al., 2015).
- The interviews were conducted via telephone or in person to a manager or area leader who has a global view of the company’s management practices and knows how projects are managed and what the company’s policies and strategies are. The interview was recorded in order to obtain a cross-assessment in which the interviewer and other members of the assessment team that did not participate in the interview are able to intervene.
- A structured interview based on open questions is used with the aim of generating a conversation, in which clear and relevant information regarding the company’s management is obtained.
- Each management dimension is evaluated with scores ranging from 1 to 5 based on three previously defined levels which are exemplified in the assessment grid. Base 1 score represents the least desirable development level while base 5 score represents the best performance.
• A score is then assigned based on the recordings. In this case contribution of three professionals who individually evaluate and then agree on the assigned score is required. Their criteria are made clear, and the final score assigned to each practice is settled.
• The following data is registered: age, time spent in the company, time spent in the current position, day of week and time.
• The interviewee should not know the purpose of the interview in advance as this exercise is part of a management research study that is not intended to assess current management practices. Hence, optimistic bias in responses is avoided since the interviewee might respond according to expected correct answers.
• Respondents are not asked about financial data or performance of their projects.

3 ASSESSMENT QUESTIONNAIRES

The designed questionnaires were constructed based on those used in 2014, considering 15 management dimensions that were prioritized by managers from 9 construction companies (Castillo et al., 2015). To illustrate this, one management dimension (Production) is displayed in Table 1, and the elements contained in the questionnaire are explained.

<table>
<thead>
<tr>
<th>Production [1]</th>
<th>Score 1:</th>
<th>Score 2:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Search for production processes improvement. [2]</td>
<td>The company is not concerned about improving productive processes; there are neither plans nor</td>
<td>The company has ideas to improve production management, but these measures are not really</td>
</tr>
<tr>
<td>Evaluate the company’s relevance of an efficient production management to achieve the goals set.</td>
<td>initiatives to improve productive processes.</td>
<td>relevant.</td>
</tr>
<tr>
<td>Score: 1 2 3 4 5</td>
<td></td>
<td>[4]</td>
</tr>
</tbody>
</table>

Source: authors.

Table 1. Sample management assessment questionnaire.
[1] Dimension to be evaluated: It corresponds to the dimension of management that is intended to be assessed with the questionnaire. In the example this dimension corresponds to Production Management.

[2] Practices to be evaluated: It corresponds to those areas through which the dimension with its respective target will be assessed, as well as an area to assign a score from 1 to 5 considering the basic scores. Scores 2 and 4 are considered as midpoints between basic scores 1-3 and 3-5 respectively.

[3] Interview Questions: It corresponds to the set of questions by which information to assess the corresponding aspect is sought after.

[4] Base scores: Three base scores are defined (1, 3 and 5) to provide criteria for evaluating organizations in each aspect per dimension. They must be assigned based on the obtained answers. Detailed information on all questionnaires is available on (Opitz, 2015).

4 PILOT STUDY

Pilot assessment was conducted in a collaborative benchmarking exercise of two Chilean construction companies, to evaluate the methodology developed and identify improvement opportunities for future adjustments. Companies which have been applied this methodology will be referred to as construction company A and construction company B.

4.1 INTERVIEWED PERSONNEL SELECTION

Initially the interviewed professionals were selected based on the organization chart reported by each company. The professionals were ratified by internal facilitators of each company. It should be noted that in some cases the same professional answered more than one dimension in the study. Selected positions for pilot study are detailed in Table 2.
Table 2. Interviewed Personnel in Pilot Companies.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Positions: Construction Company A</th>
<th>Positions: Construction Company B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health and Occupational Safety Risk</td>
<td>Risk Prevention Officer</td>
<td>Risk Prevention Manager</td>
</tr>
<tr>
<td>HR and Learning</td>
<td>Human Resources Manager</td>
<td>Human Resources Manager</td>
</tr>
<tr>
<td>Production</td>
<td>Construction Manager 1</td>
<td>Construction Visitor</td>
</tr>
<tr>
<td>Deadlines and costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning and Programming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk</td>
<td>Construction Manager 2</td>
<td>General Manager</td>
</tr>
<tr>
<td>Leadership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relationship with the client</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corporate Goals</td>
<td>Corporate Affairs Manager</td>
<td>Operations &amp; Logistics Vice Manager</td>
</tr>
<tr>
<td>Organizational Change</td>
<td>Organizational Development Manager</td>
<td></td>
</tr>
<tr>
<td>Suppliers</td>
<td>Suppliers and Purchasing Manager</td>
<td>R &amp; D + i Manager</td>
</tr>
<tr>
<td>Technology</td>
<td>Development and Programming Manager</td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td>Risk Prevention Manager</td>
<td></td>
</tr>
</tbody>
</table>

Source: authors.

Interviews were conducted in person. Only one interview was conducted by telephone (interview with the R & D+ i Manager of Construction Company B)

4.2 PROFILE OF INTERVIEWERS

In some cases, the evaluators know the companies evaluated in the pilot study to some extent as they have participated in activities such as research and consultancy. Additionally, the 3 evaluators have different experience levels regarding their knowledge about management, work experience and knowledge of the companies. The following general profiles of evaluators can be established.

- Evaluator 1: He/she must be currently graduating from a civil engineering program and has participated in methodology development and design of the questionnaires in addition to fulfilling the role of interviewer in this pilot experience. His/her knowledge of the companies studied is practically zero; therefore, an absence of bias related to knowing the involved companies can be expected. On the other hand, his/her experience in company management and assessment is lower and it is understood only by the work presented here.
• Evaluator 2: He/she must hold a MA degree in construction management and has two years of experience in research and consultancy. His/her role has been limited to issuing an assessment after listening to the interviews conducted. His/her level of management knowledge is much higher, with some years of experience working for GEPUC. His knowledge regarding the companies involved is not direct since he/she has only general information on the companies involved.

• Evaluator 3: He/she must hold a MA degree in construction management and 10 years of experience. His/her role has been limited to assess the interviews; however, his/her knowledge of the companies is in some way higher since he/she has participated in counseling aimed at improving productive projects and planning tools such as Last Planner.

4.3 PILOT PROCESS ASSESSMENT

Since some evaluators had certain degree of knowledge of the companies, it was necessary to establish individual and group assessment bodies. First, management practices were evaluated individually by the professionals mentioned above. Afterwards, two meetings were conducted to compare the scores assigned individually. In cases in which major differences were detected, a joint assessment was conducted to assign scores by mutual agreement, or to close the gap significantly. This was done based on the analysis of responses and the assignation of the scores. After re-evaluating and discussing the points with greater differences, the scores assigned by the researchers were averaged.

In Construction Company A, the interviews were conducted over a period of three days, while in Construction Company B interviews were conducted over a period of four days. All dates were previously scheduled according to the respondents’ availability. All interviews were recorded for later evaluation, and they lasted between 8 and 30 minutes for each management dimension, being proportional to the amount of items considered on each (those presenting more elements lasted longer). As some people responded for more than one dimension, interviews lasted about 1.5 hours in some cases.
4.4 PILOT ASSESSMENT RESULTS

In Figures 1 and 2 the results obtained after applying the methodology in the aforementioned companies are shown. Benchmark values (V), shown in the diagrams below, correspond to the following: 

\[ V = \frac{\sum_{i=1}^{n} P_i}{5n} \]

where Pi are the scores assigned to each management practice and n is the number of practices on each dimension management.

Figure 1. Results of management assessment methodology by interviews, Construction Company A.

Figure 2. Results of management assessment methodology by interviews, Construction Company B.
The previous figures reveal clearly significant differences between the internal practices of each organization, and in turn it is possible to compare them.

In the case of Construction Company A, the dimensions that reached the lowest value corresponded to "Quality", "Communication and information", "Corporate goals", "Suppliers" and "Risk". On the other hand, in Construction Company B the lowest scores or percentages were obtained for the dimensions "Risk" and "Human resources and learning". Moreover, the maximum values were obtained for Construction Company A on "SSO", "Cost and Schedule", "Planning and scheduling ", "Organization and change" and "Leadership". In the case of Construction Company B the maximums corresponded to "Quality", "Relationship with the client", "Planning and scheduling" and "Technology".

By respondents it has been confirmed the existence of a set of at least 15 dimensions of management priority for managers of construction companies, unlike other industries which have been prioritized fewer (worldmanagementsurvey.org, 2016). This is due to the particularity of the construction industry, project-based and with a wide variety of processes that do not occur in other industries (Costa et al., 2006).

The methodology is effective from the point of view of resource use, compared with the massive application of staff surveys as in the case of Castillo et al. (2015). However, it requires a greater number of interviews due to the number of dimensions of management, when compared with Bloom & Van Reenen (2007). Moreover, there were achieved reliable evaluations, based on the opinion of the managers in charge of the implementation of practices. Also, by assigning scores at the discretion of the evaluation team. This way we are aiming to reduce the impact of evaluation process in the responses and evaluation results.

5 LESSON LEARNED FROM THE PILOT ASSESSMENT PROCESS

A joint assessment was established by averaging the scores that each evaluator assigned separately based on the evaluators’ degree of prior knowledge regarding companies participating in the pilot study and to ensure similar double-blind interview reliability. On the other hand, in some cases when relevant
differences among the evaluators’ criteria arose, these results were discussed in order to achieve a consensus. According to the evaluators’ pilot experience, the differences in the criteria were attributed to the following:

- The lack of an initial meeting to discuss the assessment guidelines in order to establish common assessment criteria and to answer questions about score assigning.
- In several cases the scores were not properly referenced or related to questions; therefore, answers to some questions did not allow proper score assignment.
- In addition, in some interviews, the interviewee did not answer from the point of view of the company but from his/her own. For example, this is the case of some construction management areas since these are handled independently, rather than following a shared vision of the company.
- On other occasions, it was not possible for the respondent to provide specific answers.

All the above aspects influenced the evaluators in assigning very different scores in some cases. Alternatively, it is recommended to improve assessment scores’ description according to the following:

- Establishing the assessment area for each of the management questions, by using a phrase that indicates a 1, 3 and 5 score.
- Using keywords associated to each of the 3 levels in the assessment.

6 CONCLUSIONS

Methodology application on the two companies participating in the pilot study allowed establishing management differences between the two organizations. In addition, it was possible to visualize the operation of key issues related to the interview as application time, validation, respondents’ selection effectiveness, among others. Therefore, it is possible to infer that the methodology adaptation into the construction sector helps to understand how
organizations are managed in terms of the aspects evaluated, since first-hand information is obtained regarding what and how things are done in the company. Because Benchmarking is a methodology for continuous improvement, ongoing assessments based on the methodology developed in 2014 are expected to be performed steadily (1 time every 2 years, for example).

Continuous application of these methodologies will also allow to establish the elements thereof, which should be improved or updated over time, or to better adapt to what is expected to know in a future benchmarking study to be performed.

Finally, the proposed methodology can be applied to any construction company; therefore, mass application would ideally generate a large database, which will further clarify the way national companies are managed and establish in more detail the management level these could achieve in various fields today and in the future. One of the challenges that arise at the conclusion of this study is the adaptation and / or validation of practices considering the unique features of other countries to make this evaluation system a permanent practice.
REFERENCES


