

ORGANIZING TO INTRODUCE LEAN PRACTICES IN CONSTRUCTION COMPANIES

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ABSTRACT

This paper describes organizational issues addressed by seven companies in their attempt to introduce “Lean Construction” practices and techniques in their organizations. Seven Chilean construction companies are currently developing a collaborative research and implementation effort to improve their competitiveness in the local and international market. These companies have committed to develop several activities together: a) The implementation of methods to identify and reduce waste in construction projects, b) The development and implementation of a performance measuring system for internal and external benchmarking, and c) Implementation of the “Last Planner” concepts in their project planning systems. The paper provides an overview of the research and implementation activities and then focus on organizational and management issues faced by the companies during this project. The organizational approach of each of the companies is described together with their successes and failures, in an early stage of the project. These findings are compared with others reported in the literature in an effort to identify the ingredients of the most successful strategies.

KEY WORDS

Change management; lean construction; human resource management, improvement organization.

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INTRODUCTION

A collaborative research project that includes participation of seven construction companies, the Technological Development Corporation (CDT) of the Chilean Chamber of Construction and researchers of the Catholic University of Chile is currently underway. The general objective of the project is to develop systematic actions of research and implementation of changes that may allow companies to achieve higher levels of efficiency in the competitive Chilean construction market. These companies have committed to developing several activities together: a) The implementation of methods to identify and reduce waste in construction projects (Alarcon, 1997), b) The development and implementation of a performance measuring system for internal and external benchmarking (Alarcon, 1996) (KPI, 2000), and c) Implementation of the “Last Planner” (Ballard and Howell, 1998) concepts in their project planning systems.

The paper provides an overview of the research and implementation activities and then focuses on organizational and management issues faced by the companies during this project. It describes organizational issues addressed by the companies in their attempt to introduce “Lean Construction” practices and techniques in their organization. The organizational approach of each of the companies is described together with their successes and failures, in an early stage of the project.

The collaborative approach of the project seeks to guarantee interactive learning among the participants in the project and to facilitate transfer of research and implementation results to the participating firms and to the Chilean construction industry. The research team provides training and guidance for implementation of the different methodologies within the companies. This team is also responsible for monitoring and collecting research data, analyzing the results obtained and summarizing lessons learned.

The internal organization of the companies is responsible for implementation of the methodologies and for transferring the new practices within the companies. Unlike a consulting approach, the research team has little direct influence on the improvement process of each participating company. The companies are fully responsible for implementation of all the improvement actions. This characteristic of the project imposes an important challenge to the internal organization of the companies that are required to deal with all the difficulties of managing changes in their organization.

The paper describes the different ways in which the companies have reacted to the need to manage the research and implementation program within their organizations and analyzes the aspects that seem to be key for a successful implementation. Clearly, each organization has reached different degrees of success in achieving project and individual goals. This paper discusses some of the main aspects of the organization that have impacted project activities.

GENERAL ASPECTS OF PROJECT DEVELOPMENT

At the time this paper was prepared the companies had been involved in implementation for nine months, developing benchmarking and waste identification and reduction activities. The research and implementation methodology is heavily based on formal training actions carried out by the research team with the firms’ personnel. The training requires immediate implementation of the concepts or tools learned in selected projects or office sites. Each

company had the opportunity to choose the project or office site where the implementation would be developed, as shown in Table 1 below. The choices of the companies for the waste identification and reduction activities were very diverse, including different types of projects and, in some cases, office sites.

Table 1: Number of Selected Project/Office Sites for Implementation

Type/Firm	#1	#2	#3	#4	#5	#6	#7	TOTAL
Mining	0	0	0	1	1	0	0	2
Building	2	3	0	0	0	1	0	6
Industrial	0	0	2	0	0	1	0	3
Headquarters	0	0	0	0	1	0	1	2
TOTAL	2	3	2	1	2	2	1	13

Different aspects of the implementation in each company site are described in a series of tables shown further below. The scores used in the tables were obtained using three different sources: field observations of the research team, evaluation meetings with each company committee and from the analysis of an implementation survey that was answered by each company.

In Table 2, the first aspect refers to the discipline on the implementation of the various actions inside the company; this considers the presence of activities such as planning, documentation, and monitoring of workshops, improvement plans, communications and other conditions of the project. A second aspect, essential in any improvement project, is related to upper management involvement. This refers to aspects such as commitment to the implementation and effective leadership. Upper management participation was also rated for each company analyzing whether this was active or passive and permanent or sporadic. Finally, the communication of upper management signals to the personnel involved in implementation was also considered in the analysis.

Each one of the companies developed an improvement implementation committee that would be in charge of the implementation of diagnosis and improvement actions within their organizations. This committee would include people from different levels of the company, and would include the active participation of a company high level manager and a group leader that would be responsible for the coordination of all the actions to be developed. This committee would essentially be in charge of promoting the implementation within the firm. Table 2 shows the observed behavior. The first aspect indicates the existence of the formal committee and the timing of the constitution of the committee in terms of whether it was done early or late. The last two columns describe the degree of consolidation/maturity of the committee and its authority within the company.

A preliminary observation shows that there is a positive correlation between the discipline in the implementation and the effectiveness of the results. Every company that has had a disciplined implementation has shown positive results; this is also positively related with the quality of the communications present in the implementation site. An orderly

methodology, based on periodic meetings for coordination, planning and well defined strategies seems to be a key ingredient for success. These activities should become part of the daily work. On the other hand, it is worth noticing that it is not actually necessary to be that rigorous throughout the training workshops in order to achieve a successful implementation.

It was also observed that every company where upper management showed clear and positive signals achieved good results. It is not enough to obtain upper management commitment (even though it is absolutely necessary and should be looked after constantly), it is also necessary to show that commitment through permanent signals to the personnel, in addition to a motivational effort.

An early constitution of an improvement committee where its consolidation/maturity is clearly visible, promotes a proper environment for the realization of the activities and their success. On the other hand, a late implementation can be eased, and the “time lost” recovered with a greater effort. The observations show that the committee consolidation is critical when the effort has been spread to more than one project. Finally, a committee with authority enables the development but does not ensure success.

Table 2: General Aspects of Behavior

Rating 1: Worst ? 5: Best		FIRM	#1	#2	#3	#4	#5	#6	#7
Effectiveness of Implementation (L: Low H: High)			L	L	H	H	L	H	H
Discipline in the Implementation	Workshops		2	2	3	3	4	4	5
	Improvement Plans		3	3	5	4	3	4	4
	Committee's performance		1	2	5	3	2	4	5
	Communications		2	3	4	4	2	4	4
Upper Management Behavior	Commitment		3	4	5	4	3	5	4
	Leadership		2	3	5	4	2	5	3
	Participation	Active	No	Yes	Yes	Yes	No	Yes	Yes
		Permanent	No	No	Yes	Yes	No	Yes	Yes
	Signals		No	No	Yes	Yes	No	Yes	Yes
Committee Behavior	Constituted	Exists	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		Timing	Late	Late	Early	Early	Early	Late	Early
	Consolidated/Mature		No	No	Yes	No	No	Yes	Yes
	Authority		Yes		Yes	Yes		Yes	No

THE ROLE OF SITE/OFFICE MANAGEMENT

Due to the hierarchical organization that characterizes the Chilean construction companies, the project/site managers and/or department managers, in case of central offices, is very important

in the implementation process. They exercise leadership and are important in the establishment and removal of barriers, and they are the link with middle management. Tables 3 and 4 summarize the most critical aspects observed in the implementation sites. Aspects such as commitment, participation and leadership are included in the analysis. Also, the knowledge of both the implementation program and the concepts of lean construction were considered in the analysis. This seems to be a critical factor because site/office managers are the ones who establish the direct link with the operative phase of implementation. Two additional elements were considered in the analysis of middle management behavior, the first one is related to the existing work relationships and the second points out the observed changes in mindsets and ways to face work.

Table 3 shows that the site/office manager plays an important role. In every case, when the commitment of the manager was obtained, a successful implementation has been achieved. Upper management commitment is not enough, because the site/office manager stands as a figure of power and influence at the implementation site. The signals at this level do not show the influence they had at upper levels, at this level, the big signal is full commitment.

Table 3: Office Managers` Behavior

FIRM	#1		#2			#3		#4	#5		#6		#7
Effectiveness of Implementation (L: Low H: High)													
Effectiveness	L		L			H		H	L		H		H
Site/Dept.	S1	S2	S1	S2	S3	S1	S2	S1	S1	S2	S1	S2	S1
Effectiveness	H	L	H	L	L	H	H	H	L	H	H	H	H
Rating 1: Worst ? 5: Best													
Commitment	5	2	4	3	3	5	5	4	2	5	4	4	5
Participation A: Permanent B: Regular C: Low													
Participation	A	C	A	A	R	A	A	A	C	A	A	A	A
Leadership	4	3	3	-	-	4	4	3	3	3	-	-	3
Signals A: Positives B: None C: Negatives													
Signals	A	B	B	C	C	A	A	B	B	B	C	B	A
Knowledge	5	3	4	-	2	5	5	4	3	5	4	4	5

Table 4 shows that commitment of middle management at the office/site is not absolutely necessary for the achievement of a successful implementation.

Table 4: Middle Management Behavior

FIRM	#1	#2	#3	#4	#5	#6	#7
Effectiveness of Implementation (L: Low H: High)							

Effectiveness	L		L			H		H		L		H		H
Site/Dept.	S1	S2	S1	S2	S3	S1	S2	S1	S1	S2	S1	S2	S1	
Site Effectiveness	H	L	H	L	L	H	H	H	L	H	H	H	H	H
Rating 1: Worst ? 5: Best														
Commitment	5	3	-	-	-	3	3	4	3	5	4	4	4	-
Participation A: Permanent and Positive B: Regular C: Low														
Participation	A	B	-	-	-	B	B	A	B	A	A	A	A	-
Internal Relations	A	C	-	-	-	B	B	B	A	A	A	A	A	-
Change to Lean Vision	Yes	No	-	-	-	-	-	-	No	Yes	Yes	Yes	Yes	-

Table 5 summarizes the average results obtained by companies with High (H) and Low (L) implementation effectiveness. It is clearly observed that there is a cause-effect relationship between the different aspects of the organization and the effectiveness of the implementation. High effectiveness is obtained as a result of combining the key ingredients of the organization and management of the process.

Table 5: Average Behavior of companies with High and Low Implementation Effectiveness

		General Effectiveness	
		H	L
Discipline in the Implementation			
Workshops		4	3
Improvement Plans		4	3
Committee's performance		4	2
Communications		4	2
Upper Management Behavior			
Commitment		5	3
Leadership		4	2
Participation	Active	Yes	No
	Permanent	Yes	No
Signals		Yes	No
Committee Behavior			
Constituted	Exists	Yes	Yes
	Timing	Early	Late
Consolidated		Yes	No

Authority	Yes	Yes
Site/Office Managers' Behavior		
Commitment	5	3
A: Permanent and Positive B: Regular C: Low		
Participation	A	B
Leadership	3	3
Signals A: Positives B: None C: Negatives		
Signals	B	B
Knowledge	5	4

One of the most favorable organizations for implementation and future introduction of the new practices to the company is one that has incorporated the different hierarchical levels existing in the company in the implementation effort. For instance, the whole spectrum from upper management to lower management participates in training and organizational activities. Committee members, field managers and foremen participate together in implementation workshops. This approach provides the necessary links between each one of the participants as well as all those attributes that may be needed, in order to be successful.

Until now, all those organizations which have had a clear and concrete commitment from upper management have already obtained benefits from implementation. The permanent involvement of people from company headquarters in some of the project implementations has had a positive impact generating motivating the global involvement of the company. However, the achievement of these benefits requires a leader that has the capacities, the abilities and the authority to lead the improvement process. It must be a person that integrates leadership, coordination and motivation capacities. However, the most important ingredient seems to be commitment to the improvement program.

The establishment of a clear and participative line of command has enabled several companies to integrate and complement all their existing personnel to be able to reach a successful implementation. This points out to the advantage that can be obtained for future developments in the company.

During the evolution of the project, the importance of the leader for the implementation became evident. Most companies had clearly established their leader, but the influence and relevance of the leader have been directly impacted by the definition of his functions and authority. Limitations in formal or informal authority can greatly affect the ability of the leader to influence a successful implementation. The leader also plays a role in the generation and transmission of information for the people involved in the implementation and also for the entire company.

CONCLUSIONS

The empirical observations of this collaborative implementation effort confirms most recommendations found in the technical literature regarding planning and organization for managing implementation of new practices (Juran, 1990 a, b) (Scholtes, 1991). Most of this

experience comes from the TQM literature. In fact, in a very early stage of the project, these recommendations were made available to company managers and to the original implementation committees of the firms. However, learning from the actual experience of these firms seems to be a much more powerful message to each of the participants.

The lessons learned so far have been very useful to help some of the companies to improve their implementation approaches, learning from each other. Some of them can be summarized as follows:

- Signals from upper management are very important for motivation and commitment of other levels of the organization.
- Commitment from site/office managers is a must for a successful implementation.
- Early constitution of an improvement committee, in charge of implementation, is very important.
- Leadership is relevant to ensure success of the process.

A general conclusion is that successful implementation of new practices in construction companies requires the rigor and discipline of a well established organization.

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