

VALUE GENERATION IN THE COLOMBIAN AEC SECTOR BY ADOPTING A PM STANDARD: A CASE STUDY

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ABSTRACT

The International Group of Lean Construction (IGLC) has been studying the concept of value for several years, in order to eliminate the obstacles for its creation, as value maximization is a core idea for Lean Construction (LC). Some Project Management Standards (PMS) address value generation processes according to the LC definition of value, which comprises a group of different conceptualizations. This study seeks to understand how value may be generated in the Architecture, Engineering and Construction (AEC) sector by means of exploring a PM model, based on a PMS, created in a real estate developer in Colombia; the model is called *AXIS*. Value generation in this case study is assessed through the qualitative review of the impact of implementing *AXIS* on projects. Results show that PMS and the adoption of a model based on a standard coincide with LC ideals in their considerations of value. The comparative analysis of value generation processes according to LC, PMS and *AXIS* leads to establish a starting practical approach for real estate developers interested in embracing value within their practices and improving project performance. Further investigations may include a wider sample of companies for better understanding the value generation process through model implementation.

KEYWORDS

Value, project management standard, real estate developers, managerial model.

INTRODUCTION

LC emerges from systems that focus on value delivery by the elimination of wastes. Therefore, the concept of value has been studied by the IGLC community throughout the conferences that have taken place for several years, as it plays a major role in the body of knowledge of LC. Important conceptualizations of value in the community are pointed out due to the positive influence that LC has in construction performance (Salvatierra-Garrido et al. 2012). Moreover, there is a growing evidence for value

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allocation in different stages of the project (Koskela et al. 2002, Reifi and Emmitt 2013); hence, the identification of value processes depends on understanding the value concept.

Project Management Standards (PMS) increase value as their implementation implies that the standard fits to the needs of the organization (Hurt and Thomas 2009). Consequently, Project Management (PM) practices and techniques provide value to the organizations that adopt them (Papke-Shields et al. 2010).

A real estate developer in Colombia was examined in order to understand how the adoption of a PMS may generate value. The case study company developed an in-house managerial model (based on a PMS) that suits its needs and priorities, includes project life cycle stages, and is the backbone of PM within the company. This study aims to analyze how value may be generated through the adoption and adaption process of the PM standard and identify whether LC principles are considered.

This study includes: methodological approach, the local context to the light of value generation concepts, a literature review, the case study, and as a conclusion a starting practical approach for real estate developers interested in embracing value within their practices and improving project performance.

RESEARCH METHODOLOGY

The collection and analysis of data for this study is framed in the qualitative research case study category (Naoum 2007). The qualitative research included exploratory and attitudinal approaches of research as we were seeking to determine whether value is generated while adopting PMS. Results are supported by surveying similar companies in terms of type and scale of projects.

The case study followed four stages. First, information concerning current company structure, process changes, adaption and adoption process of the PMS and its application on projects was gathered through interviews and written requests to the company. Second, a literature review of LC and PMS value conceptualizations helped to identify similarities and differences between these perspectives and the value processes that *AXIS* considers. Third, five similar companies were interviewed to assess their PM practices and standardization level, aiming to understand their own appraisal of PMS as possible sources of value. Survey was done between November and December 2013 and the questions were formulated to identify whether companies perceive PMS benefits throughout the project supply chain and their commitment towards implementing a standard or developing their own model. Some questions sought to define value according to the local context. Survey analysis was done to the light of LC and PM principles. Finally a comparison between value generation processes under three different perspectives: LC, PMS and *AXIS*, leads to establish a starting practical approach for real estate developers.

CONTEXT: THE AEC INDUSTRY IN COLOMBIA

AEC and real estate industries are relevant for the growth process of Colombia. For instance, housing and urban renewal is one of the five main development drivers defined by the National Development Plan 2010-2014. The share of the construction sector relative to the total national GDP is greater than 8% and the share of the building construction sector is 4% (DANE 2012). According to the Colombian Construction Chamber (CAMACOL), non-residential buildings correspond to 56% of

the total constructed area in 2010 with almost 4.4 million m². In particular, the construction of commercial, industrial and office buildings has grown by 370% in the last decade (CAMACOL 2011).

There is no evidence that value generation through management processes and practices has been studied in the AEC sector in Colombia. According to the interviews, quality standards such as ISO 9000 are more commonly implemented than PMS. However, three of the interviewed companies have developed PM plans, where monitoring and control, lessons learned and culture change are relevant practices that reduce time, costs and wastes, and support project development. These benefits may be related to value generation. One of the interviewed companies is considering LC implementation and one firm argues that PMS are useless paperwork that do not contribute to the company. This seems to be a consequence of the fact that PMS are used as mandatory instead of employing them on a day to day basis for improving processes continuously. Regardless of the PM practices in every company, interviewees acknowledge the importance of implementing them in their activities to improve business performance.

All interviewees had different or none definitions and perceptions of value. Therefore, the next section provides an analysis of value sources related to PM practices for the industry, made by the authors.

VALUE GENERATION IN THE AEC INDUSTRY

Understand which activities generate value is important to develop practices that translate into sources of value. Figure 1 shows the layers where value may be generated in construction and the internal and external levels that influence the value generation process.

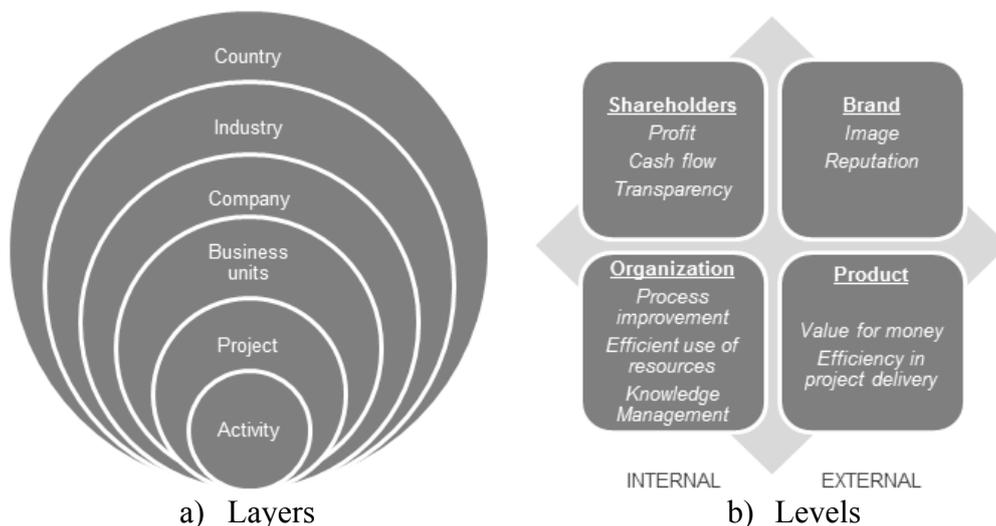


Figure 1: value generation in construction (Elaborated by the authors)

According to Figure 1, the first layer where value may be generated is *Activity*. When value is created at this layer an impact in project development can be acknowledged and business unit performance is enhanced, contributing directly on company's success. Moreover, as companies strengthen, industries leverage country's development.

Activities have impact at internal and external levels. Activities at design, planning and control phases, directly affect the organization and the product. Process improvements and an efficient use of resources support product development and delivery in order to reduce costs, influencing the company's profit and sustained business growth. On the other hand, corporate activities contribute to the organization in terms of employees' motivation, knowledge development and retention, and brand development.

LC and PMS implementation provide value for the AEC industry since they consider processes that support value generation in activities. Therefore, in order to understand which processes generate value, both conceptualizations of value are reviewed in the next sections to acknowledge similarities or differences between them.

LITERATURE REVIEW

LEAN CONSTRUCTION (LC) STUDY OF VALUE

Lean is a value seeking process (Howell and Ballard 1998) that leads to the constant search of the concept of value that the IGLC community considers. This concept has various understandings determined by the authors and their contribution to LC. For this reason, this article does not seek to present a unified concept of value. Conversely, it collects some of the value conceptualizations defined previously by LC authors in order to identify processes where value may be generated.

Salvatierra-Garrido et al. (2012) reviewed the proceedings of nineteen annual IGLC conferences in an effort to identify the main tendencies of understanding the value concept. Through this analysis, the authors realized that the concept of value remains subjective and is influenced by the TFV model view proposed by Koskela (2000). Therefore, value is conceived as dynamic and context dependent. Despite these findings, they acknowledged value generation processes. These include stakeholder needs fulfilment, efforts towards a final output and efficiency in processes, as well as transparency and control. Therefore, as long as value for users/owners/society is fulfilled, value is generated.

Emmitt et al. (2005) contributed to a comprehensive understanding of value and provided a four-stage value-based model. This means that from the beginning of the project, where major decisions take place, a solid process is developed to reduce changes, delays, cost overruns, and associated wastes. The model is divided in two phases: value design and value delivery. The first phase establishes and documents accurately client values through workshops that are considered value drivers, since uncertainty is reduced via reaching agreements between parties and providing the best design solutions. The second phase considers minimizing waste in the delivery process by accomplishing estimated time, cost, quality and other agreed requirements. Finally, learning development is also included in the value delivery phase (i.e. feedback for future projects).

The aforementioned reviews exhibit that the involvement of every project participant from its early stages leads towards a more holistic view of the project itself. Hence, a clear methodology for developing projects can be acknowledged as a value driver. Incorporating client requirements is one of the most significant sources of value, and takes place at the early stages of the project, where more value may be achieved. Authors also show that client satisfaction is an important source of value

(Tillmann et al. 2010, Salvatierra-Garrido et al. 2012). Although value concept is ambiguous and flexible, similarities in its conceptualization lead to understand what generates value and how to evaluate whether value is created.

PROJECT MANAGEMENT (PM) UNDERSTANDING OF VALUE

PM practices aim to meet project and stakeholder requirements by the accomplishment of goals (e.g. scope, costs, time, quality, environmental, performance, among others) (Zhai et al. 2009). Project uniqueness causes that PM is based on their particular needs. However, similarities between projects contribute to develop a common reference frame for managing them, in order to assure project performance (Aubry et al. 2007, Eskerod and Riis 2009). The latter can be achieved throughout the implementation of PM best practices captured by PMS (Papke-Shields et al. 2010). Besides, standardization of PM practices supports ambitious goals (Milosevic et al. 2001) and creates value for the organization, as currently, organizations handle simultaneous projects that require adequate management (Aubry et al. 2007, Eskerod and Riis 2009). Therefore, efforts of promotion and adoption of PMS are convenient (Papke-Shields et al. 2010) and a PM model can be introduced (Eskerod and Riis 2009).

Uniformity in processes, methodologies and behaviors contribute to generate value in PM models (Eskerod and Riis 2009). However, customization must take place in order to assure that the model is tailored to the context of the organization (Wells 2012). In fact, customization becomes an important value driver in the company. Furthermore, the adoption of models allows identifying value processes through the different customized practices.

Eskerod and Riis (2009) studied five companies that developed PM models based on recognized phase models. Value processes of these models included cost savings due to on time delivery; rework avoidance; projects on time, within budget and specifications; clear roles and responsibilities; reputation for the company; transparency and easier communication. Moreover, all companies recognized top management involvement in the customization of the model and increased efficiency in the project. Although models were design to suit different companies' interests, perceived values are similar.

PM practices generate value by means of the processes that support the accomplishment of goals. However, as projects and stakeholders have different requirements, there is a growing need for customizing recognized phase models instead of just using them, as they might not be suitable for every organization. Therefore, value of PM practices allocates in customization (i.e. the value of standardization depends on the degree of tailoring the model) and in the value perceived by stakeholders, as value processes reside within the models. Thus, value in standardization of PM practices is recognized (Milosevic et al. 2001).

Customization of models deals with project complexity and reduces wastes as products and processes are improved due to the structure of PMS, where tasks are developed step by step. Therefore, a common ground between LC and PM practices is recognized. However, PM practices may be improved by the TFV proposal that considers a smoother transition between project phases, aiming to generate value and enhancement through project life cycle.

COMPANY CASE STUDY

Terranum Group was born in 2009 as a platform of investment, development and delivery of corporate real estate services in Colombia. One of its principal units is Terranum Corporate Properties (TCP) that gathers a group of experts which frame, structure and develop high potential mixed-use projects with unique characteristics (e.g. corporate buildings, logistic parks and built to suit projects).

TCP organizational structure has been evolving as new projects and challenges appear. During 2009-2010, the company had a rigid projectized structure that presented mixture of functions, lack of role definitions, difficult decision making and a vast workload. Later, in 2011, The TCP Project Management Office (PMO) was formed and included a project manager officer who defined a strong matrix organizational structure for the PMO (i.e. the creation of functional areas). The PMO structure had better defined roles and responsibilities, and improved project control. Therefore, overall management of projects became more reliable and integrated.

In 2011, as the PMO was set up, the need to stabilize, integrate and document the operation of projects arose. Thus, after undertaking a market benchmark and an academic research, TCP senior managers decided to develop *AXIS*, an in-house managerial model that suits the company's needs and priorities based on Project Management Institute (PMI) good practices. *AXIS* embraces a set of policies, procedures, forms and instructions that are the backbone of PM within TCP.

***AXIS* IMPLEMENTATION ON PROJECTS**

AXIS implementation has brought significant benefits to the way projects are planned and executed. A review of some projects before and after *AXIS* implementation is shown below.

Before *AXIS*

Projects A and B

These projects were executed during TCP first year of operation; therefore no project management methodology was followed. They consisted on the major renovation of an existing building expected to be LEED certified. Since project initiation, requirements were unclear, selection of contract type was not properly analyzed versus project constraints and project budget was elaborated by a third party little monitored by project management team. Schedule delays were caused by disagreements between the parties regarding change order approvals and there was lack of coordination of work onsite. The certification process was not properly planned, thus, certification achievement was uncertain until project completion.

Project C

This project consisted in the major renovation of an existing building to host services for a Corporate Campus. From the beginning, requirements were unclear and feasibility budget was estimated with no preliminary technical studies. The procurement method for the project was not properly analyzed versus project constraints leading to longer execution time and increased costs. Project C was cancelled and restructured.

After *AXIS*

Project D

This project replaced project C and consisted in the construction of a new building to host services for the Corporate Campus. This time *AXIS* managerial model was followed step by step. First, a statement of work was created by collecting requirements of key stakeholders. Second, preliminary studies were executed and a careful analysis of the procurement method was performed. Third, feasibility budget was elaborated by the costs department. A formal project management plan was elaborated and a realistic time, cost and scope baseline was established to facilitate project tracking and change control. Budget was elaborated by a third party, closely monitored by the costs department. Moreover, the implementation of lessons learned process allowed the project team to avoid several errors committed in previous projects and improve overall project performance.

AXIS VALUE

AXIS managerial model can be considered as a source of value as a PMS was customized to satisfy TCP needs and contribute to enhance PM practices within the company. Project reviews show that the development and adoption of *AXIS* provides internal and external value throughout its processes. For instance, the most convenient procurement route for the project is chosen by analyzing single project constraints. On the other hand, *AXIS* considers LC principles particularly in the way it incorporates a permanent learning process and waste reduction. Thus, LC and PM conceptualizations of value can be recognized in *AXIS*.

Table 1 shows processes that have been acknowledged as value sources by the three different perspectives compared in this study: LC, PMS and *AXIS*, based on the processes identified in the literature review and *AXIS* description.

Table 1: value generation processes

LC	PMS	<i>AXIS</i>
Client/user satisfaction evaluation (owners, users and society)	Stakeholder satisfaction evaluation (owners, customers, organization, society)	Documentation of stakeholder requirements
value-Based Management	Compliance with project requirements	Compliance with the statement of work
Evaluation of constraints	Assessment with the iron triangle (cost, time and quality)	Development of initial schemes and preliminary normative and technical studies
Measuring efforts for delivering a final output	Efficient use of resources	Evaluation of the procurement route for the project by analyzing project constraints
Use of process models (management tools)	Use a project management model	Budget monitoring
		Development of a PM plan

Elimination of unnecessary costs and functions	On time delivery and clear roles definition	Project work organization and communication improvement
Collaboration	Collaboration	Collaborative work
Planning	Planning	Planning
Control	Report measurements	Integrated change control system
Use of technology	Use of Information Technology (IT)	Adoption of IT
Incorporating sustainability	Environmental assessment	LEED Certification integrated to the model
Promoting action learning	Knowledge Management	Documenting lessons learned

Table 1 shows that all perspectives strive for reducing time and costs and improve project development. They also attempt to document stakeholders requirements effectively, in order to deliver a final output that meets project specifications. Besides, the development of PM plans is also considered, as well as collaboration since they contribute to transparency, control and communication enhancement. Likewise, the adoption of information technology is useful for these means. The importance of learning can be also addressed in the three perspectives.

By means of this comparison, it can be said that *AXIS* managerial model considers LC conceptualizations and supports value generation through its adoption.

PROPOSAL: A STARTING PRACTICAL APPROACH FOR GENERATING VALUE

Adopting and adapting a standard in a development firm generates value for the organization as the customization of a model is a value driver itself. Its implementation leads to define value processes as cited in Table 1. According to the case study company, the implementation of *AXIS* had positive measurable results in terms of project performance. They also recognized that one of the key value sources of *AXIS* is the increased ownership, commitment to the methodology and that standardized procedures are followed effortlessly (Hurt and Thomas 2009).

Based on the case study and the value generating processes identified from LC and PMS, a starting practical approach for promoting value is presented below.

- PMS selection: choose a standard that adjusts to company's operation improvement.
- Best practices identification: an analysis of the presence or absence of best practices can be done through interviews and document review. Weak areas should be identified, in order to establish the starting point for organizational transformation (i.e. recognize the importance of key and mandatory processes (Hurt and Thomas 2009)).
- Route map design: define the plan for standardizing processes, measuring results, monitoring and assuring continuous improvement.

- Work plan design: establish the specific tasks to meet the route map requirements.
- Model customization: develop and adapt a model based on the selected PMS. It is critical to include internal members of the organization to this process and guarantee top management involvement. Customization may include the following.
 - Define a common language to support communication.
 - Identify key processes in each stage of the project.
 - Recognize which processes will be standardized.
 - Assign relationships between stages to guarantee integration and that a logical process is followed in planning and executing projects. Consider the TFV proposal in order to develop smoother and cleaner relationships and measure waste between stages.
 - Define reporting requirements and their frequency.
 - Change control system integration.
 - Adopt IT tools for enhance planning, controlling and resource management.
 - Document lessons learned and share knowledge to improve practices and performance.
- Implement an on-going review of results processes: another review of documents and interviews may take place to evaluate whether goals are being accomplished or improvements must be made.

It is important that the model is somehow flexible. Hurt and Thomas (2009) recognized that the concepts of flexibility and standardization get along as they allow that the model adapts to changes (e.g. organizational life cycles and leaders). However, PM core ideas must be preserved to assure value generation.

CONCLUSIONS

LC does not have a single definition of value, neither PMS. However, both have conceptualizations that lead us to identify processes where value generation may take place. There is no evidence that value generation through management processes and practices has been studied in the AEC sector in Colombia. Therefore, the objective of this study is to identify whether value is created through PMS. The research methodology was developed to analyze the case study of a company that adapted and adopted a PMS by the creation of an in-house managerial called *AXIS*. By comparing processes that may generate value according to LC and PM literature, it was found that *AXIS* is a clear example of a model formed by processes where value can be actually created in internal and external levels.

Value indicators such as stakeholder satisfaction; delivering projects on time, budget, specification and accurately planned and controlled; are some of the improvements accomplished with *AXIS*, according to observations made by the

company. Therefore, standardization of PM enhances project development and translates into better reputation for the company.

Based on this success case, a proposed framework for generating value through standardization is presented. It includes a preliminary and general sequence that may assist real estate developers in adopting a PMS while achieving value as it has been defined by some LC authors.

Further research may include a wider sample of companies that have developed models to manage their projects. It would be of interest to study firms where LC and PM practices have been integrated in order to understand how the value generation process takes place.

REFERENCES

- Aubry, M., Hobbs, B., and Thuillier, D. (2007). "A new framework for understanding organisational project management through the PMO." *International Journal of Project Management*, 25(4), 328-336.
- Cámara Colombiana de la Construcción (CAMACOL). (2011). *Revista Urbana*. (Available at http://camacol.co/sites/default/files/revista_urbana/u50.pdf)
- Departamento Administrativo Nacional de Estadística (DANE). (2012). "PIB del sector de la construcción." *Comunicado de prensa*. (Available at http://www.dane.gov.co/files/investigaciones/boletines/pib/cp_PIB_IVtrim12.pdf).
- Emmitt, S., Sander, D., and Christoffersen, A.K. (2005). "The value Universe: Defining a value Based Approach to Lean Construction." *Proceedings for the 13th Annual Conference of the International Group for Lean Construction*, Sydney, Australia.
- Eskerod, P. and Riis, E. (2009). "Project Management Models as value Creators." *Project Management Journal*, 40(1), 4-18.
- Howell, G. and Ballard, G. (1998). "Implementing Lean Construction: Understanding and Action." *Proceedings for the 6th Annual Conference of the International Group for Lean Construction*, Guarujá, Brazil.
- Hurt, M. and Thomas, J.L. (2009). "Building value Through Sustainable Project Management Offices." *Project Management Journal*, 40(1), 55-72
- Koskela, L. (2000) "An exploration towards a production theory and its application to construction", PhD Thesis, Technical Research Centre of Finland-VTT, Helsinki.
- Koskela, L., Howell, G., Ballard, G., and Tommelein, I. (2002). "The foundations of Lean construction." *Design and Construction: Building in value*, Butterworth Heinemann, Oxford, UK, 211-226.
- Milosevic, D., Inman, L., and Ozbay, A. (2001). "Impact of Project Management Standardization on Project Effectiveness." *Engineering Management Journal*, 13(4), 9-16.
- Naoum, S.G. (2007). "Approaches to Data Collection". *Dissertation Research and Writing for Construction Students*, Butterworth-Heinemann, Oxford, MA, 37-51.
- Papke-Shields, K.E., Beise, C., and Quan, J. (2010). "Do project managers practice what they preach, and does it matter to project success?" *International Journal of Project Management*, 28(7), 650-662.
- Reifi, M.H.El. and Emmitt, S. (2013). "Perceptions of Lean design management." *Architectural Engineering and Design Management*, 9(3), 195-208.
- Salvatierra-Garrido, J., Pasquire, C., and Miron, L. (2012). "Exploring value Concept Through the IGLC Community: Nineteen Years of Experience." *Proceedings for*

the 20th Annual Conference of the International Group for Lean Construction, San Diego, USA.

- Tillmann, P., Tzortzopoulos, P., and Formoso, C. (2010). "Analysing Benefits Realisation from a Theoretical Perspective and its Contribution to value Generation." *Proceedings for the 18th Annual Conference of the International Group for Lean Construction*, Haifa, Israel.
- Wells, H. (2012). "How Effective are Projects Management Methodologies? An Explorative Evaluation of their Benefits in Practice." *Project Management Journal*, 43(6), 43-58.
- Zhai, L., Xin, Y., and Cheng, C. (2009). "Understanding the value of Project Management from a Stakeholder's Perspective: Case Study of Mega-Project Management." *Project Management Journal*, 40(1), 99-109.