

# EXPLORING VALUE CONCEPT THROUGH THE IGLC COMMUNITY: NINETEEN YEARS OF EXPERIENCE

Jose Salvatierra-Garrido<sup>1</sup>, Christine Pasquire<sup>2</sup> and Luciana Miron<sup>3</sup>

## ABSTRACT

The concept of value has been widely cited within Lean Construction (LC), and important discussions have been taking place during the conferences of the International Group for Lean Construction (IGLC). This paper aims at exploring the concept through the nineteen years of proceedings of the IGLC community (1993 to 2011). In order to select the sample, the concept of value is firstly identified from titles, abstracts and key words of all papers presented in previous conferences. Then, information is summarised to mainly underline value conceptualisation from different authors and contribution to the LC experience. A review of the published work leads to conclude that (1) this concept has been broadly influenced by the production view of construction (value generation view from the TFV model of Koskela, 2000); (2) value is still regarded as an ambiguous concept because different interpretations contribute to its understanding, and more subjective aspects are deemed as an important part of this concept; (3) most efforts have been mainly endeavoured to deliver value at project level, where waste reduction and planning & control of construction site activities have been key activities linked to value; and (4) numerous efforts have been mainly endeavoured to fulfil particular customer's requirements.

## KEY WORDS

Lean Construction, Lean Thinking, Theory, Value Concept.

## INTRODUCTION

During previous conferences of the IGLC, an ongoing discussion about value has been observed with individual attempts to understand this concept identified. However, nineteen years after the first annual conference the lack of an overarching understanding still remains in the minds of current researchers and practitioners. This situation may be attributed to several reasons such as the complex nature of value, its multiple features, several fields of knowledge influencing different approaches, etc. Regarding the LC perspective, the manufacturing sector has encouraged a view of

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<sup>1</sup> PhD, Assistant Professor, Department of Civil Engineering Works, Universidad de Santiago de Chile, Chile, Phone +56 (2)7182838, jose.salvatierra@usach.cl

<sup>2</sup> PhD, Professor of Lean Project Management, School of Architecture, Design and the Built Environment, Nottingham Trent University, UK, Phone +44 (0)115 941 8418, Christine.Pasquire@ntu.ac.uk

<sup>3</sup> PhD, Professor, School of Architecture and Urbanism, Department of Architecture, Researcher at Building Innovation Research Unit (NORIE), Federal University of Rio Grande do Sul, Brazil, FAX:+ 55 51 3308 4054, Luciana.miron@ufrgs.br

construction practices from a different perspective, by observing and understanding the whole process across the Supply Chain (SC). Thus, opportunities to improve the performance of the construction sector, such as waste reduction, have been identified as a means to deliver value more efficiently to customers.

In 1992, Lean Thinking (LT) rose from obscurity into the construction sector by Koskela and the simultaneous work of Howell and Ballard. One year later, the first annual meeting of the IGLC community was held and continues as a forum for debating and disseminating ideas. Since 1993 the IGLC forum has largely discussed the concept of value through the consideration of complementary approaches. The literature reflects a deeper understanding of LC practice and has resulted in an evolution of the value perspective from an objective view to a more subjective one. As a consequence, marketing strategies have been highly influenced by the definition of customer requirement as an understanding of value. Additionally, attention has been centred on early stages of projects, where opportunities to achieve agreed value are increased.

Initial the consideration of value was mainly linked to the transformation view along the production process. Thus, value adding activities have been closely linked to waste reduction. Accordingly, Macomber and Howell (2004) argued that the proper understanding of waste is a basic prerequisite to understand value. In this vein LC efforts have been broadly focused on reducing waste within onsite activities, and a lack of a deeper understanding of value through early stages has been criticised (Thyssen et al. 2008:507-8; Leinonen and Huovila, 2000). This criticism can be linked to the strong influence of the “value generation view” from the TFV model (Koskela, 2000)<sup>4</sup>. According to this model, production in the construction sector was conceptualised as a “process where value for the customers is created by fulfilling their requirements” (pg. 89)<sup>5</sup>. Thus, the critical importance of satisfying customer requirements in the best possible way was underlined. These ideas were previously stressed in the IGLC forum by Ballard and Howell (1998), who argued that value, is created through a process of negotiation between the customer ends and means. Additionally, the latter authors held that the main role of a designer is to clarify the effects of their desires to the customers; lately, customers may change their ends. From this conception, subjective and dynamic aspects of value were underlined.

Although Lean philosophy has positively influenced the construction sector performance, a lack of theoretical foundation concerning current practices has been pointed out. In this context, the concept of value has commanded the attention through the theoretical debate of the last IGLC community. Aimed at clarifying the understanding of value, this concept is explored through the annual conference proceedings of the IGLC (1993 to 2011). Thus, important tendencies are underlined from of a sample selection based on the process detailed below.

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<sup>4</sup> This idea was previously presented by Koskela and Huovila (1997). These authors proposed three ways to consider design: conversion process, flow process, and the generation of value for customers.

<sup>5</sup> According to Koskela (2000) this view to understand value arose from Levitt (1960) and Drucker (1989). As said by these authors, value of a product was assumed to be created only from customer perspective, and the aim of production is basically to satisfy customer needs.

## **METHODOLOGY**

To identify main tendencies related to the concept of value, almost 800 papers from nineteen previous annual conferences of the IGLC were visually scanned. 191 papers were selected where the concept of value was identified from titles, abstracts or key words. The papers identified were fully explored identify the depth of their discussion of value. Consequently, a final sample of 52 papers was obtained and investigated to obtain the following information:

- Knowledge classification and contribution to the understanding of value (Table 1); and
- Main tendencies of current understanding of value.

## **DATA ANALYSIS**

The final sample allowed the main tendencies contributing to the understanding of value for IGLC community to be identified. Thus, information is categorised as:

Theory: Sixteen papers aid to better understand theoretical aspect of this concept and the following ideas are underlined:

- In Koskela's TFV, value is created to fulfil customer needs, requirements, and the like. Therefore, what the client wants allowed to define value;
- Value should be understood as the final output of a mutual efforts of all parties contributing to the design and construction stages;
- Value needs to be established from early stage of projects;
- Value delivery activities should differentiate at least three client groups: owners, users and society. Thus, different classifications have been identified, e.g. Use value, Exchange value, Internal value, External value, First value & Last value;
- Value definition changes according to project features and authors perspectives;
- Value should be comprehended as objective, subjective, relative, dynamic, context dependent and oscillating concept;
- The concept of value must be differentiated from values. In this way, it is proposed that those concepts should be differentiated as economic value and sociological values;
- Benefit realization has potential to contribute to the generation of value;
- Value  $\neq$  Quality  $\neq$  Waste reduction  $\neq$  Cost reduction;
- Value perception should consider individual assessment based on subjective aspects such as benefits and sacrifices;
- Value should be consider as the objective of any production activity;
- Value should be considered in a global context considering economic, social, political and environmental constrains; and
- Product value could be understood as the delivery of defined product specifications. On the other hand, the management of the delivery process in an effective manner could be understood as a process value.

1. Product Development and Design Management: Eighteen papers contribute to better understand the concept of value from early stage of projects. Thus, the following ideas are highlighted:

- From the value generation view (Koskela, TFV) design activities should be focused on deliver the best value from the customer perspective;
- Value arise from an iterative dialogue between ends and means;
- Initial customers' requirements should be verified to be fulfilled in the best possible manner;
- Process models are underlined as effective management tools to deliver value to customers;
- Value systems should be considered because they impact the way customer needs are construed and represented;
- Client requirement management could contribute to obtain better design solutions. Thus, value perceived by the client should be increased; and
- Satisfaction should be considered as an important dimension of value perceived by the customer/user.

Additionally, other areas such as control & planning, safety, environment, etc. have contributed to the understanding of value through the IGLC community. The following ideas are underlined:

- Production Planning and Control: performance measurement of transformation process increase value provided to the client. In addition, efficient process should contribute to add value to the customer.
- Contracts and Cost Management: Value for money could be achieved by elimination of unnecessary costs and functions while performance of construction projects is maintained and optimised.
- People Culture and Change: Increased controllability and transparency could contribute to maximise the value added from each individual.
- Safety, Quality and Safety and Environment: Lean could contribute to sustainability only if the customer values sustainability. Therefore, current practices should introduce the social and environmental issues as new values.
- Supply Chain Management: Utility value and Market value are closely linked to the concept of value from LC perspective.
- Enabling Lean with Information Technology: IT could contribute to deliver best value through a better representation of customer needs.

In the table below (\*) means proposed classification because this year any classification was included by editors of the IGLC

Table 1: Knowledge classification and conceptualisation of value from IGLC papers contributing to the understanding of this concept

N°	Authors & Year	Knowledge Classification	Contribution
1	Orrechia and Howell, 1999	Theory	Financial considerations are underlined as critical aspects of a project's value & help to interpret what the client wants.
2	Tzortzopoulos & Formoso, 1999	Lean Design	The development and implementation of models for managing the design process in practice is an important source of reflection and discussion for the consolidation of the lean construction theory.
3	Howell and Koskela, 2000	Project Management, Lean Production (*)	The lack of theoretical basis for project management (as practice and doctrine) is identified. Thus, it is argued that the view of production management could contribute to reformulate current practices given the opportunity to deliver value.
4	Leinonen and Huovila, 2000	Design Management, TFV Theory (*)	Presents problems in the value generation of the design phase and discusses their consequences to the project and to the end product. A tool providing assistance in the project definition phase is introduced. The tool is currently implemented in projects of different building types with the emphasis on eco-efficient facilities.
5	Bertelsen and Koskela, 2002	Theory and Knowledge	A method to operationalize the TFV considers 'process management' as responsible for delivering value to the client. (Process Management is understood as equal to flow management in the TFV model).
6	Kestle and London, 2002	Product Development	An Exploratory Design Management Conceptual Model for Remote Sites is proposed which considers both production and sociological approaches to design management.
7	Tzortzopoulos et al., 2002	Product Development	Explores the implementation of process models within construction and manufacturing companies. The main results describe the importance of the methods used to develop process models and pointed out the main barriers to implementation.
8	Miron and Formoso 2003	Product Development	Guidelines for client requirements management: (a) requirements capture; (b) requirements flow control; and (c) value assessment and information storage. Working in multi-disciplinary teams. Understanding the nature of product development in concurrent construction projects
9	Whelton and Ballard, 2003	Product Development	Advocates the use of an adaptive management framework to manage the dynamic complexity of the projects. Based on this framework, a set of linguistic constructs are developed to support the management of the project definition conversation.
10	Wandahl and Bejder, 2003	Supply Chain Management	The result of the theoretical approach lead to a well-founded hypothesis stating that the supplementary use of Value-Based-Management in a project organization with different legal parties can be a more proactive control tool, i.e. the management get an earlier warning if the process go off the rails compared with traditional control mechanisms.
11	Wandahl, 2004	Labour and Trades Management	Value-Based Management is one idea of how to work purposefully with the different values to improve effectiveness and efficiency in the construction industry.
12	Emmitt et al., 2004	Product Development	A three phase model (Value/Process/Operation) is proposed and 6 value parameters identified: Beauty, Functionality, Durability, Suitability (for the site and the community), sustainability (respect for the environment) and Buildability. Establish common values to improve cooperation and reduce conflict in construction projects. Value is recognised as subjective and dynamic. Workshops proposed for open communication and knowledge sharing.
13	Santos et al., 2004	Implementation	Corroborates the argument that briefing is essentially a communicative process that can be considered as a cultural representation from both sides of the design process: consumers and designers. This process delivers more comprehensive end results if wider typologies of value such as the one proposed by Holbrook are adopted.

14	Emmitt et al., 2005	Theory	Some definitions of value are provided aiming at developing a common language to discuss and implement value through LC practices - The concept of external and internal value are introduced: External value, which is the client/customer value, and the value that the project should end up with and the delivery team focusing on achieving & Internal value, by and between the participants of the delivery team. -To deliver value it is proposed a global stakeholders vision: owner, user and society.
15	Bertelsen and Emmitt, 2005	Theory	It is proposed that client in construction should be seen as a complex system. Thus, an irrational behaviour should be expected.
16	Tzortzopoulos et al., 2005	Product development	Identifies the influences of the procurement method used over lean design management, and the influences of design management and role definition over requirements capture and value generation. Finally, causal relationships between issues related to the transformation, flow and value views are discussed.
17	Leite et al., 2005	Product development	Improve the client requirements capture: training for collaborative work among the various sectors in the institutions involved and to view the process as a whole, establish communication interfaces, the participation of the final client in the development process.
18	Cuperus and Napolitano, 2005	Prefabrication Assembly and Open Building	Value perception is differentiated among different parties (e.g. Client, Manager, Contractor and Final user) - Open building and Lean Construction are investigated as complementary approaches in the construction sector.
19	Bolviken, 2006	Product Development Design Management	Industrialised production is seen as a production of 'commodities' which have both use value and price (exchange value). Thus, the consideration of use and monetary value dimensions could contribute to better understand the commercial dimensions of construction.
20	Björnfot and Sardén, 2006	Prefabrication, Assembly and Open Building	Three case studies are investigated to demonstrate that prefabrication based on well-defined and tested products could contribute to both control value stream and better meet customer requirement in order to deliver best value for all involved stakeholders.
21	Höök, 2006	Implementation and Performance Measurement	To comprehend perceived value it is underlined the need of understanding both technical and social contexts of construction – It is argued that a lean prefabrication strategy still has to meet the traditional needs of the process, as control and trust of the production process and the product, trust of the manufacturer together with information transfer, to obtain customer value.
22	Bae and Kim, 2006	Safety, Quality and Safety and Environment	Highlights the contribution of LC tools and methods to sustainable facilities - Link between value and sustainability.
23	Andersen et al., 2008	Theory	Underlines the importance of combining the logistical, economic and social perspectives in order to understand and improve the design, engineering and production processes of the construction sector.
24	Lawlor-Wright et al., 2008	Product Development Design Management	Performance Targets are having a major impact on how health services are delivered in the UK National Health Service (NHS). The TFV model has proved a useful way of understanding the transition of the NHS from one based on functional areas.
25	Forgues et al., 2008	Product Development Design Management	It is highlighted the positive effect on value creation that have the reconfiguration of the division of labour, rules and the introduction of new boundary objects (e.g. requirement management construct).
26	Lima et al., 2008	Product Development and Design Management	It is emphasizes the task of processing client requirements based on visual displays development and on the house of quality adaptation (QFD). Based on this discussion, the limitations and benefits of the proposed tools for requirement processing in the context of low-income housing are pointed out, considering the peculiarities of this product in terms of value generation.

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27	Frier et al., 2008	Prefabrication, Assembly and Open Building	Through the development of a particular interior architectural focus the paper suggests a method for reintroducing customer value; architectural quality, as the outset for making housing construction lean.
28	Lennartsoon et al., 2008	Prefabrication, Assembly and Open Building	It is argued that it is not the product decomposition into modules that is of importance, rather the process that strives to balance internal and external values.
29	Salvatierra-Garrido et al., 2009	Theory	It is underlined the difficulty of identifying a global definition of Value. Thus, it is underlined that a lack of ability to identify a common definition means that current theories and management tools define this concept according to their own interests. Therefore, value is delivered according to each author's perspectives and mainly focused on the delivery of value at project level.
30	Lima et al., 2009	Theory	The understanding of the relationship among satisfaction, human needs and perceived value according to the perception of the main clients involved in construction projects, especially the dwellers..
31	Slivon et al., 2010	Theory	It is argued that considering the human being as actor within a world of concerns gives an essential context and foundational clarification for all following discussions of process, flow, value, and commitment.
32	Rooke et al., 2010	Theory	Several value features are underlined such as subjectivity, dynamism, instrumentality, etc. - value is treated as an issue of lean knowledge management. - It is suggested that the concept of value should cover the whole life cycle of the built facility, value is best understood as an intersubjective phenomenon. Understandings of value can be evaluated using the Unique Adequacy requirement. the purpose of projects is to generate economic value, but the specification, production and delivery of value are governed by sociological values. The concept of internal value requires further investigation, particularly with regard to its impact on benefits flow.
33	Salvatierra-Garrido et al., 2010	Theory	A preliminary, conceptual model of value in a Global context (Society) is presented that demonstrates how a project can be positioned within the value parameters. Value is proposed to be an "oscillating" concept (Value becomes a phenomenon that moves constantly between a particular, local context (building/infrastructure projects) to a global context (Society)).
34	Erikshammar et al., 2010	Theory	It is underlined the need of perform at the beginning of the project, a quantitative evaluation of stakeholder's value preferences in terms of waste, variation, cost, uncertainty and design. - It is emphasised the need of LC' methods allowing quantitative assessment of qualitative aspects of value in the design process.
35	Tillmann et al., 2010	Theory	A theoretical discussion of the benefit realisation approach is presented, as well as its potential contribution to further developments of value generation concept. How the theory will be tested with experimental data is also indicated at the end of the paper.
36	Perera et al., 2010	Theory	Data collected allowed to visualise that all HC activities in process management could be categorised into task and/or flow perspective from the TFV approach and they all have a value aspect (quality and cost) inherent in each activity. Additionally, different value aspects are identified related to TFV and VBM views.
37	Christiansen, 2010	Product Development and Design Management	Through a case study, the hypothesis that qualities that potentially could be considered valuable by the client were continuously added throughout the brief and design phases was tested and proven false. Additionally, this study revealed that the client regarded only short periods of time as having been directly value adding.
38	Schlachter and Barros, 2010	Product Development Design Management	It is underlined the role of satisfaction evaluations in the creation of value to the final clients.

39	Miron and Formoso, 2010	Product Development Design Management	Hierarchy of values that establishes a connection between the perceived performance of project attributes by the final users and goals of the project from the point of view of different stakeholders
40	Rooke, et al., 2010	Safety Quality and Environment	A review of knowledge management, design, wayfinding and lean literature, together with ongoing participant action research at Salford Royal hospital, are reported. To ensure wayfinding information remains immortal throughout the life of the building, a Through Life Management (TLM) approach is suggested. Thus TLM is viewed as an important consideration in lean construction.
41	Polesie, 2010	People, Culture and Change	It is underlined the need of practical exploration of Lean principles. In this way, it is argued that important terms such as value are usually interpreted differently in different situations.
42	Salvatierra-Garrido and Pasquire, 2011	Theory	The First and Last Value model (F&LVM) is proposed to widely visualise value in the construction sector. It includes the delivery of value spans across two different contexts: First context refers to value delivery for the cure of environmental & social issues (First Value), and Last context deals with value delivery at production level, linked to transformation activities or what needs to be done – the work (Last Value). It is underlined the potential of LT for addressing environmental issues, where sustainable practices are proposed as a first level strategy of current LC practices.
43	Maia, et al., 2011	Theory	It is outlined potential consequences related to the current way of thinking about value in both the field of sustainability and ethical responsibility.
44	Bertelsen and Bonke, 2011	Theory	It is investigated the use of the TFV model as a strategic tool in the development of the project production firm. - It is underlined that value quite often is increased using little efforts in terms of cost of production.
45	Koskenvesa Koskela, 2011	Production Planning and Control	It is argued that all factors adding value to the construction process must be considered within performance assessment.
46	Rosas, et al., 2011	Production Planning and Control	It is underlined that efficiency could help to reduce the cost without necessarily add value to clients
47	Hanid, et al., 2011	Contracts and Cost Management	It is argued that continuous monitoring of loss of value is needed because cost management system is not aligned with the development in production process and value is not considered in it.
48	Ruiz, et al., 2011	Contracts and Cost Management	VE technique aids to consider end user value perspective and reduce cost considering value perspectives form users (Perceived benefits/price) and company (Functionality/cost)
49	Luoma and Junnila, 2011	People Culture and Change	It is argued that from end-customer or tenant perspective the focus in value generation could be visualised from a broader context than project management and delivery. Thus, for end-customer the workplace solutions could create value by finally influencing their central activities and performance.
50	Sfandyarifard Tzortzopoulos, 2011	Product Development Design Management	Participatory design approach is investigated as a solution for meeting user's needs.
51	Lima, et al, 2011	Enabling Lean with IT	Simplification of the theoretical model of design feedback proposed by Sampaio (2010) to benefit companies and customers, giving support to development of better products which increase user satisfaction and enhance the acceptance of new projects.
52	Mills, et al., 2011	Production System Design	It is emphasised the need form a whole system integrated approach which allows to deliver value over various healthcare care scales through lean asset management.

## **CONCLUSION**

As LC has been influenced by LP experience, there is a common tendency to view construction as a transformation process, where value delivery is associated with the fulfilment of customer requirements. In this way, the TFV model by Koskela (2000) has played an important role, and its impact has been observed through the conceptualisation of value from current researchers and practitioners of the IGLC community.

Through the analysis of articles related to the concept of value, it is possible to identify three central ideas:

- (1) value is still regarded as an ambiguous concept because different interpretations contribute to its understanding, and more subjective aspects are deemed as an important part of this concept;
- (2) most efforts have been mainly endeavoured to deliver value at project level, where waste reduction and planning & control of construction site activities have been key activities linked to value; and
- (3) several efforts have been mainly endeavoured to fulfil particular customer's requirements.

Moreover, other trends are identified:

- (a) there is a significant amount of research related to product development;
- (b) some research, especially those carried out in Brazil, uses the theoretical framework from marketing; and
- (c) some research is exploring newer and broader approaches, such as benefits realization, to understand the value creation in new projects.

Consequently, concepts and approaches in the areas of marketing, product development and benefits realization represent a considerable innovation potential for value generation in the development of construction projects.

Finally, the need to consider a wider view of value is emphasised, where the impact and legacy of the construction sector could be visualised as first level strategies for current practices of the IGLC community and LC as a whole.

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