

# DEVELOPING A 'TRUE NORTH' BEST PRACTICE LEAN COMPANY WITH NAVIGATIONAL COMPASS

Claus Nesensohn<sup>1</sup>, S. Tugra Demir<sup>2</sup>, and David J. Bryde<sup>3</sup>

## ABSTRACT

One challenge facing many organisations is how to become Lean. There are two aspects to this. First, what does a real Lean organisation look like? Second, how do you get there? This paper seeks to provide answers to these two questions. It presents an exemplar best practice Lean organisation for construction project management which has been developed through a benchmarking process involving 5 organisations. Using the Reading Model, a validated benchmarking process for construction, Lean methods, philosophy, strengths and weaknesses are analysed. Then a route map is outlined which can act as a compass to guide organisations wishing to undertake Lean as defined in the Reading Model. It is highlighted that the implementation of Lean in construction project management often requires both a change in organisational culture and structure. It is also stressed that the effective implementation of Lean requires a rigorous analysis of the organisation's capability in relation to becoming Leaner.

## KEYWORDS

Benchmarking, Collaboration, Continuous Improvement/Kaizen, Germany, Lean Construction, Project Management, True North.

## INTRODUCTION

This work forms part of a wider research-oriented project which has been undertaken in collaboration with a project management company from the South-West of Germany. The company wished to develop a new strategy in order to gain more competitive advantage, by increasing customer satisfaction, efficiency and effectiveness of its projects. To facilitate this, the company decided to implement Lean Construction, because previous research shows that the implementation of Lean Construction results in the improvement of the productivity, more stakeholder satisfaction and higher quality (Salem et al. 2005). However, the problem the company faced was that the main focus to date in terms of implementing Lean Construction is from contractors, rather than from project management offices which are acting on behalf of the Client. Therefore a new best practice model was needed to provide a more holistic implementation of Lean Construction in project management. Hence the research project aimed to develop a long-term Lean implementation

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<sup>1</sup> Researcher, Built Environment and Sustainable Technologies [BEST]-Research Institute, Liverpool John Moores University, Liverpool L3 2ET, UK, Phone +44 151 23 14 149, C.Nesensohn@2012.ljmu.ac.uk

<sup>2</sup> Researcher, Built Environment and Sustainable Technologies [BEST]-Research Institute, Liverpool John Moores University, Liverpool L3 2ET, United Kingdom

<sup>3</sup> Reader in Project Management, Built Environment and Sustainable Technologies [BEST]-Research Institute, Liverpool John Moores University, Liverpool L3 3AF, United Kingdom

strategy. To achieve this aim, the research first sought to identify the characteristics of a Lean organisation. Second, it focused on determining a holistic approach for implementing Lean Construction. The result is a Lean implementation strategy which is articulated as the 'true north' (after Rother 2010). To arrive at the True North, a route map was developed which acts as a compass for a stakeholder wishing to become Leaner – in this case the project management company.

## **LITERATURE REVIEW**

### **LEAN CONSTRUCTION**

The increasing complexity of construction projects results in a need for new management paradigms. In search for new ways of managing construction projects, the industry is adopting Lean Construction, because it aims to reduce the complexity of construction projects and hence increase efficiency (Ballard and Howell 1997). Two different broad interpretations of Lean Construction can be found in the literature on the subject. The first interpretation is to directly adapt Lean production principles and techniques to construction (Ballard and Howell 1998, Choo et al. 1999). The second interpretation, which is increasingly dominating Lean Construction theory, is to develop a new methodology for construction inspired by Lean production (Koskela et al. 2002; Vrijhoef and Koskela 2005). What both interpretations have in common is that projects are conceived as temporary production systems (Howell et al. 2004), which aim to eliminate waste activities, decrease none value-adding activities and maximise value-adding activities (Koskela 1992).

The outcome of Lean are processes which are highly efficient and effective, i.e. performance improvement (Alarcon et al. 2005), resulting in competitive advantage (Almeida and Salazar 2011). The claimed benefits of using Lean Construction techniques include: the reduction of waste, improvement of productivity, profitability, stakeholder satisfaction, shorter construction periods, labour reduction, higher system flexibility, higher quality and improved safety and health (Thomas et al. 2003; Jørgensen 2006; Mossman 2009). When adapting Lean a new form of project management is created, through the integration of Lean production theory, principles and methods (Dulaimi and Tanamas 2001); it “differs from traditional project management not only in the goals it pursues, but also in the structure of its phases, the relationship between phases and the participants in each phase” (Ballard and Howell 2003 p. 119).

If Lean Construction views construction projects as unique and temporary production systems (Ballard and Howell 1998) an abandonment of traditional thinking about construction is required (Hirota and Formoso 1998). This is because the implementation of Lean will lead to changes at the project as well as at the business management level (Ballard and Howell 1998). The implementation process needs the support of top management, in financial terms as well as human resources, although even with this support success is not guaranteed (Almeida and Salazar 2011). Therefore the implementation of Lean should first focus on activities which are important and visible (Womack and Jones 2003). This will motivate people and lead to high levels of engagement within the organisation's staff, which is a key requirement for the success of Lean (Coffey 2000). The effective implementation of

Lean Construction also depends on the characteristics of the company (Neto 2002), which makes a link to the importance of business management and especially having an appropriate business strategy (ibid.). By way of contrast Neto and Alves (2007) pointed out that problems happens when these short-term focus on visible and important tasks understood as lean implementation. Rather, the focus should be on the long-term and founded on a solid basis (ibid.), with the process looking beyond economic aspects (Alarcon and Seguel 2002). Hence, the implementation of Lean in construction requires the organisation to become a learning company in order to sustain competitive advantage (Henrich et al. 2006). The learning company in this context means "an organisation which facilitates the learning of all its members and continuously transforms itself in order to meet its strategic goals" (Pedler et al. 1989 p. 92). Benchmarking is a way to achieve innovation and "breakthrough" (Alves et al. 2009) and leading construction organisations use benchmarking to constantly improve their performance (Pickrell et al. 1997). Benchmarking is seen as an important continuous improvement tool, enabling companies to enhance their performance by identifying, adapting, and implementing best practice in a participating group of companies (Ramirez et al. 2004). It is a tool for business strategy development (McCabe 2001) where the aim is to change business process for the better (Pickrell et al. 1997). It involves change in relation to culture, process, improvement of performance and productivity (Alarcon et al. 1998).

Innovation is conceptualized as continuous improvement (CI) (Kaizen) and 'breakthrough' as radical innovation (Kaikaku) (Alves et al. 2009). The Kaizen and Kaikaku perspectives create a relationship between Lean and Benchmarking, in which Benchmarking can be used as tool for introducing and/or undertaking Lean Construction (Ramirez et al. 2004; Serpell and Alarcon 1996; Marosszeczy and Karim 1997). However, benchmarking is not a straightforward task for construction (Mohamed 1996). There are various barriers, such as: Construction being a project oriented industry; the product is usually unique in terms of design and site conditions, and a temporary organisation needs to be created for each project; a construction project tends to be relatively complex; there is a wide variety of materials and components involved; many different agents take part in the process; and the final product has a large number of performance attributes.

Therefore different methods are required for benchmarking in construction. Mohamed (1997) determined three types of benchmarking for construction: internal, project and external. Internal benchmarking compares internal business operations of an organisation in order to continuously improve them. Project benchmarking compares the projects of an organisation with each other to create a database for managing future projects. External benchmarking aims to adapt best practices from other industries. There are different types of external benchmarking, which McCabe (2001) sub-categorised as: competitive, functional or generic. Competitive benchmarking compares a company with another which is a direct competitor. This method causes difficulties in gathering data as direct competitors might be not interested in sharing their knowledge. Functional or generic benchmarking aligns with Mohamed's definition of external benchmarking.

The construction sector requires tools or methods which are simple and flexible (Garnett and Pickrell 2000). The current benchmarking tools/methods which are implemented in other industries do not always reflect this requirement as they are

often too detailed to be effectively applied to construction (Pickrell et al. 1997). The Reading Model is one simple and flexible tool for benchmarking which has been developed for the construction sector (ibid.) and has been further validated by Garnett and Pickrell (2000). It consists of the following steps: (1) recognising that you need to change, (2) deciding what to benchmark, (3) deciding who to benchmark against, (4) defining what data to collect, (5) collecting data and analysing it and (6) putting the results into practice.

### **‘TRUE NORTH’ APPROACH**

The application of a CI philosophy within the implementation of Lean Construction is essential. Though Rother (2010) argues that this might be not enough because an additional overall direction is required i.e. applying Lean thinking to construction needs long-term thinking (Mossman 2009). Long-term visions or directions will help to navigate through different actions to finally achieve the aim (Rother 2010). With its ‘True North’ focus Toyota has achieved a lead position over the past 50 years in eliminating waste, creating value and improving its own products and processes continuously (ibid). The goal is zero defects, 100% value with the lowest costs and continuous flow production. The True North works as a compass proving a guide to take an organisation from the current condition to where they want to be (ibid.). The assumption is that every process step on the path to the True North will create benefit for the organisation (Johnson 2007).

### **METHOD**

The conceptual framework for the research is the Reading Model (as introduced above), which is a benchmarking technique developed for construction (Pickrell et al. 1997). The first step in the model is a stakeholder recognizing the need to change and the second step is deciding what to benchmark. The stakeholder in this case was a project management company (subsequently referred to as Company X), which aimed to implement Lean Construction principles and techniques in their projects. This provided the rationale for change and for benchmarking. The research adhered to the view that there should be a long term strategy in order to implement Lean in a sustainable way (Neto and Alves 2007). This created the idea of the True North approach, which aimed to navigate Company X through the path to becoming the best Lean Construction project management company. All the targets set are part of a pathway to achieving this vision.

The next step is to determine the benchmarking partners. Here the research faced the problem that Lean Construction has not been implemented by project management companies acting on the client side in the same region of Germany as the stakeholder. Hence competitive benchmarking could not be undertaken. Therefore functional and generic benchmarking was proposed. Five Lean Organisations [LO] were selected, based in the same region as Company X. LO-A, LO-D and LO-E are very well known Lean Construction consultancy companies in Germany. LO-B produces paper machines as its core business and is one of the biggest in the world. LO-C is one of the biggest construction contractors in Europe.

Then benchmarking criteria is defined. This requires a deep understanding of the implementation of Lean, which was facilitated using a qualitative research strategy as it provides rich information on the use of Lean principles and techniques (Ramirez et

al. 2004). As a result semi-structured interviews were utilized, which have the capacity to provide insights into how research participants view the world (Bryman 2008). Each interview lasted on average one hour each. They were tape recorded and transcribed. Thematic analysis was then undertaken which resulted in four broad benchmarking criteria, namely: philosophy, strength, weaknesses and techniques. These broad criteria were then sub-categorised into 36 characteristics of Lean. The next step was to collect the data. This was done using a quantitative method, whereby the developed benchmarking were sent to the same five companies and they assessed themselves within the benchmarking matrix.

## FINDINGS

### LEAN PHILOSOPHY

All the LOs stated that the philosophy is the most significant issue if one wants to implement Lean. As stated by LO-D: *“the philosophy is so essential that it’s a basic prerequisite for the success”*. The LOs use different models to convey the Lean philosophy into their organisations. LO-D said: *“we use Workshops and they should be conducted with adequate business games/simulation to bring a wow-factor to the participants”*. LO-D argued further that the creation of a small success in a specific area serves as a kind of lighthouse for the people and motivates them to internalize the philosophy. However, especially at the beginning, the LOs faced difficulties in getting the Lean philosophy accepted. This difficulty was articulated by the LO-C: *“approximately 10% of the employees are fundamentally against the Lean philosophy and as many are direct convinced about it and take it on, but the mass (80%) have a neutral attitude and need good and continual training to be convinced”*.

Table 1: Benchmarking Lean philosophy

Lean Philosophy	LO				
	A	B	C	D	E
How important	High	High	Very high	Very high	Very high
Implementation by training courses/lessons	X	X	X	X	X
Mentor of the Philosophy		X	X	X	X
Acceptance	Good	Good	Average	Good	Good
In-house training	X	X	X	X	X
External training			X	X	

Table 1 shows that all LOs believe the Lean philosophy to be of high importance and in order to facilitate this philosophy within the organisation different types of training initiatives are required.

### ADVANTAGES AND BARRIERS

All LOs saw clear advantages from implementing Lean. LO-B said: *“in terms of time saving we could identify in the whole process an improvement of up to 30%”* within

the last 15 years. LO-E concurred, stating that “we identified cost savings in our projects from 10% to 30%”. However, the LOs also experienced problems. LO-D believed “the planning effort is higher for a construction project but thereafter there is less control effort needed”. LO-C argued that Lean Construction does not easily fit every corporate culture and that short-term thinking by top management is a barrier within the approach. The danger of falling back to the old daily routine way of working, without any Lean approach, was also identified by the LOs as a danger.

Table 2: Benchmarking Lean - advantages and barriers

<b>Lean Advantages</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
Time savings	10-20%	>30%	10-50%	>40%	10-30%
Cost reduction	10-20%	5-10%	10-50%	>15%	10-30%
Quality improvement	Yes	Yes	Yes	Yes	Yes
<b>Lean Barriers</b>					
Sustainability of the employees	X	X	X		X
Understanding of Lean thinking	X		X		X
Enduringness of the management			X		X
Willingness to change		X	X	X	X
Increase of the planning effort				X	
New partners = no continuity	X				X

Table 2 summarises advantages and barriers of Lean. Advantages are articulated in time, cost and quality terms. Barriers relate to the traditional thinking, culture and structure of the construction industry.

## LEAN METHODS

All of the LOs believed that there is a necessity for a basic organisational set-up before a company can start implementing Lean. LO-B stated: “you have to implement a professional project organisation before you start to go Lean”. Furthermore most of the LOs believed that: willingness to change, effective communication channels, the existence of a clear organisational vision and the commitment of the top management all must be present in the organisational set-up. LO-E expressed the view that: “All project participants have to be pre-qualified to find out whether they fit into a Lean project or not”. Within this basic set up the LOs determined barriers, such as internal boundaries in the hierarchy levels of an organisation, lack of holistic thinking or unwillingness to abandon old habits. The Lean methods have to be used by the employees, which results again in deeper understanding of the Lean philosophy being crucial at the operative level as well as the strategic level. Furthermore all LOs customised their Lean methods before they used them.

Table 3 shows how the LOs are using a high variety of techniques/methods which are typically associated with the different conceptions of Lean. The 5 Ss, 5 Whys, visual management and continuous improvement process being used by all.

Table 3: Benchmarking Lean techniques/methods

Lean Techniques	A	B	C	D	E
5 S	X	X	X	X	X
5 Whys	X	X	X	X	X
Visual Management	X	X	X	X	X
Continuous improvement process	X	X	X	X	X
Spaghetti Chart	X	X		X	X
PDCA - Plan-Do-Check-Act	X	X		X	X
Production Analysis Board	X			X	X
Setup Reduction	X			X	
Value-Stream Mapping (VSM)	X			X	X
Just in Time	X		X	X	X
One Piece Flow	X		X	X	X
Pull System	X		X	X	X
Mistake-proofing			X	X	X
Kanban			X	X	
TPM -Total Productive Maintenance		X	X	X	X
Heijunka			X	X	X
Last Planner System					X
Lean Project Delivery System					X
Basic set-up are required	Yes	Yes	Yes	Yes	Yes
Use in the planning phase	X		X	X	X

## DISCUSSION AND CONCLUSION

The interview and survey findings give an indication of what a Lean organisation looks like in practice. Even though the benchmarking strategy was generic and functional, the data collected provides findings which are general and applicable to any type of organisation. For instance the findings suggest a deep understanding of the Lean philosophy is essential for any type of organisation wishing to become Leaner. This can be related to the need in many cases for cultural change, where the company has to move from their traditional culture to the Lean culture, so that the new way of working becomes second nature. This cultural change includes seeing projects as temporary production systems, more process thinking, the elimination of waste and the pursuit of perfection in the project processes. To facilitate this, training, in various guises has to be carried out. However, once the organisation is aware of Lean thinking and its techniques then it comes to more specific issues which are related to the nature of construction project management and here the collected data became more limited in use. A logical way forward is the establishment of a strategic business unit, which will customise over time the organisation's own way of doing Lean Construction and develop acquisition strategies for projects under the umbrella of Lean. However, the success of project management from the Client's perspective

depends on the effective participation of all the parties involved in construction, i.e. the designers and the contractors. Project management deals with issues at the more strategic level, through defining the key milestones, the quality standards and other (mainly economic) resources to the parties involved in construction. Therefore, the project management company cannot achieve an appropriate Lean approach at the construction project level without the participation of others. All the parties involved have to be taken on board. This requires the involvement of those with a similar level of Lean knowledge and culture as the project management company and the Client. As a result the project management company has to set the framework for operation.

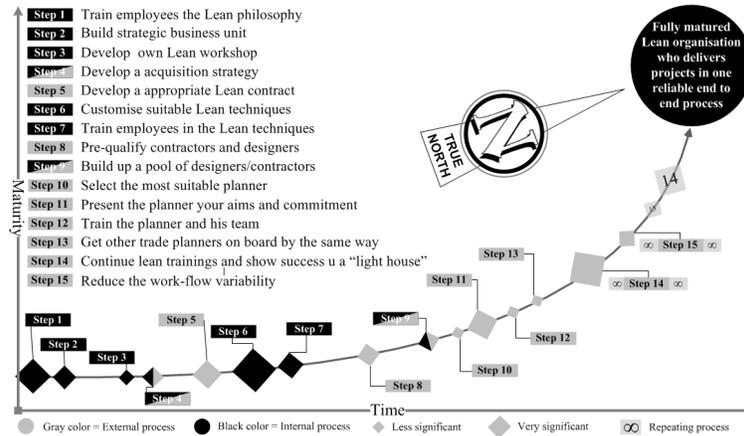


Figure 1: True North Route Map

Figure 1 shows the route map for Company X, with several identified steps to move towards their True North. The route map can therefore be seen as a navigating compass showing the way to the goal. It might be not necessary or practicable to implement each step on this way. But as long as each step taken is on the path towards the True North the organisation will continuously improve their Leanness. Furthermore, in addition to these steps it might be beneficial to change the structure of the project organisation and introduce the “Lean Project Manager”. Working at a strategic level and across all projects, in a manner akin to a six sigma black belt working on quality improvement projects, the Lean Project Manager can play a key role in educating the parties involved in construction on Lean thinking, principles and techniques and providing advice and guidance as to how to optimize the processes associated with Lean.

Further research is required in the field of maturity model developments, specifically in terms of how to measure the gap between where a construction project organisation is currently at and where they want to be in terms of Lean Construction.

So to conclude, we return to the original research questions: what does a real Lean organisation look like? And how do you get there? The findings of this research show that a Lean organisation develops a philosophy based on Lean second nature. Furthermore projects are seen as temporary production systems. A Lean organisation is aware of process thinking, the need to eliminate waste and uses customised Lean techniques and methods which are adapted to suit the organisational requirements. Finally they foster long-term and deep-rooted cultural change which is facilitated through the commitment of the top management, internal and external training

initiatives and a long-term vision providing a clear focus and direction of where they want to go in terms of becoming more Lean.

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