

Lean Construction in South Africa: Myth or Reality

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Abstract

After widespread use in manufacturing, lean is now embraced in the construction environment. The use of lean within the past decade has sought to address construction implementation problems for a range of reasons that focus on performance. To this end, the principles and tools of lean construction are desirable in South African construction that has always had to overcome performance problems. This paper thus reports on a study that qualitatively explored how to mainstream lean principles and methods in South Africa through implementation. The semi structured interview questions, which relied on the information obtained through a review of related literature, were used to arrive at insights, which show that contractors are open to the use of lean construction principles and techniques as it constitute a working manner that can assure efficiency and assist them to achieve stated business and project objectives. However, the proliferation of lean construction among contractors in South Africa would only appear when stakeholders shift their mind set in relation to the construction process. The exploratory study points to a need to identify and leverage drivers that would shift the perspectives of how construction implementation processes are conceptualized and realised in South Africa.

Keywords

Contractors, Lean Construction, Performance, South Africa

1. Background

Lean manufacturing target the elimination of waste in every area of production. Areas that are often addressed include: customer relations, product design, supplier networks, and factory management (Baghel and Bhuiyan, 2005). The benefits of lean thinking in the construction production environment are to minimize overproduction, delays, extra processing, over stocking, excessive motion and defects. Hence, waste in processes will be reduced or minimized by incorporating a lean thinking ethos (Bolvikén *et al.*, 2014). Emuze (2012) note that the literature suggests the core elements of lean construction to be waste reduction, process focus in production planning and control, end user focus, continuous improvements, cooperative relationships and systems perspective. As noted by Ballard and Howell (2004), there are problems with the management and planning aspects of construction processes and the implementation of lean could begin to address the problems. For instance, by implementing lean techniques and tools, construction managers will be able to transform sites into productive and efficient enterprises by assuring a complete focus on value adding processes.

The study came about because of the perception that contracting firms are not using lean thinking for the management of business and project outcomes in South Africa. This perception is at variance with the trend in international construction, which sees lean as a growing approach with many advantages (Bryde *et al.*, 2013). The statement by Bryde *et al.* (2013) raises a question of why South African construction managers lack a lean thinking attitude; hence the importance of this study is to clarify why their attitudes are lagging towards lean thinking as there are many advantages of lean for construction in emerging and developed countries.

2. Rationale for ‘Lean’ in the Construction Industry – An Overview

Due to production management neglect and poor control (low reliability in handoffs) and a tendency to promote adversarial relationships, performance issues have abounded in the construction process. Kemmer and Koskela (2014) argues that production management in its current form of understanding is a possible cause for the issues in construction. Björnfort (2006) suggests that the driving force in the development of applications for lean construction is production system design for increased control over construction events - stability (reliability) and better control (predictability) are sought by reducing the variety in working practices and supply chains. Consequently improving workflow is the primary goal of lean construction. Björnfort (2006) further explains that the way forward is improving workflow as he points out the importance of being able to learn workflow in construction. Making work flow smoothly and reliable is the first step in performance improvement at every level of the production system. Based on the benefits listed in Table 1, contractors have embraced the lean construction practices in an attempt to improve performance in construction projects (Alarcon and Calderon, 2003) in many countries. Such benefits include increased work flow reliability, improved supply chain integration, reduced project delivery time, improved communication among project participants, fewer day-to-day problems, and improved quality of work (Fernandez-Solis *et al.*, 2013). Among other benefits, implementing lean construction offers the construction industry an approach to improve sustainability by optimizing resource utilization and human safety during construction activities and minimizing waste through standard procedures.

Table 1: Experienced benefits of lean construction

Benefits	Countries
Improved project delivery methods	Japan, UK, USA
Supporting the development of team work and transfer the responsibility on the supply chain	Finland, Japan, Korea, USA
Managing uncertainties in supply	Brazil, Finland, Japan, UK
Continuous improvement within projects	Germany, Singapore, UK
Efficient use of resources	Brazil
Delivery of products and services that enable clients goals to be met	Korea
Delivery of products and services on time and within budget	Finland, Germany, Singapore
Delivery of custom products instantly without waste	Brazil, Finland, UK
Reduction on direct cost and time in transportation and communication	Brazil, UK
Well informed business case design at all project level	USA
Improved quality control and minimisation of risks	Korea
Minimisation of conflicts that can dramatically change budget and schedule	Germany, Singapore, UK
Improved reliability, accountability, certainty and honesty within the project environment	Germany, Singapore, UK
Reduced owners design related request eliminate wastes	Portugal
Mitigation and reduction of project risk factors	Egypt

Sources: Mossman (2009); Martins and Cachadinha (2013); Issa (2013)

The end result will reduce the amount of solid waste from residential construction deposited in landfills (environmental sustainability), improve productivity of construction operations (economic sustainability) and improve the safety and health of workers (social sustainability) (Nahmens and Ikuma, 2012). In particular, the implementation of lean strategies tends to improve the workplace thus ensuring the health and well-being of the workforce with better layouts and uncluttered workstations, reducing the opportunity for accidents (Nahmens and Ikuma, 2012). According to Forbes and Ahmed (2011), lean is a new way to manage construction because its principles and techniques have formed the basis for the new integrated project delivery (IPD) process. The flow attributes of lean processes facilitates waste reduction and value maximisation that should redefine the way people think about, and carry out construction activities (Novak, 2012). This argument is not to say the implementation of the concept has not witness a resistance in the sector. After all people will always resist change if they think it will cause them to lose something of value (Smit *et al.*, 2011).

3. Methodology

The phenomenological study attempts to understand contractors' perception of the status of lean construction in South Africa. According to Creswell (2012), participation in phenomenological research can vary from 5 to 25 individuals who have had direct experience with the phenomenon being studied. As such, interviews were conducted with seven contractors. The primary data were obtained by identifying qualifying firms and contacting them by e-mail and telephone. Interviews were requested and scheduled with applicable contractor representatives, experienced in construction improvement initiatives. In depth interviews were conducted over a period of four weeks. The interviewees were all part of the management team of their respective construction organisations. Interviews, generally, were between 30 and 40 minutes in duration and were all conducted in English. At the time of the study, all the interviewees were involved in building and civil engineering projects in a metropolitan area in South Africa. In terms of background information, the interviewees are professionals with various construction tertiary education qualifications and in terms of relevant experience of the interviewees; the minimum was 8 years while the maximum was 40 years.

The interviewees were given assurance that the interview was strictly confidential and the objective was to provide more insights relative to lean construction in South Africa. The interview protocol comprised of open ended questions. All interviews were recorded and transcribed by the interviewer. The results of the interviews are presented in the next section.

4. Findings of the Interviews

Theme 1: The effect of lean construction on your company's performance

Lean construction as a management concept in South Africa is rather new and most of the interviewees opine that theoretically it is a great concept, but in practice, it may encounter some obstacles, for example the labour law and labour requirements. An interviewee further state there are much more effective ways to ascertain elements of construction, but labour intensity takes priority in South Africa due to the large number of unemployment. This may cause a collapse in time, cost and quality planning. For example, some state owned clients also do not always play along regarding time management, a situation that has implications for planning.

Based on their industry experience, the interviewees were also asked to comment on whether contractors in South Africa will benefit from the implementation of lean construction. According to the interviewees, profit and overall image of the company can be improved by implementing lean as management theory. Interviewee 5 explains that time and quality will also improve because lean focuses on better planning. He further states that if planning is done beforehand and throughout the construction period, costs can be

minimised while quality can be enhanced as there will be more control during construction phases. In effect, the interviews were of the view that there would be improvement in performance relative to a range of parameters if lean construction is adopted by contractors in South Africa.

Theme 2: How can lean thinking be enacted in a construction firm?

When asked if lean construction would inspire continuous improvement within South African contracting firms, the interviewees responded in the affirmative. However, it was noted that construction workers / supervisors' inherent aversion to change is caused by the uncertainty created by the possibility of losing a job in South Africa. An interviewee even mentioned that certain section of the industry perceive that lean construction is a new buzzword, which promotes an approach to change the current construction industry, making it more cost effective and performance driven. Interviewee 2, a consultant turned contractor with an Honours Degree in Civil Engineering states that *"Yes once you taste improvement, you will want more and everyone in the industry would want a piece of the pie"*. He elaborates further that new challenges can be created, which may open new doors for a firm. In addition, the interviewees observe that set goals have to be in place to measure if a firm is growing in the industry after implementing the concepts and principles of lean construction. A big driver for implementing lean construction will be continual improvements in a firm; this is the opinion of interviewee 2. Interviewee 5 complements this by adding that a performance based goal will have to be in place which in turn will lead to personal growth and other incentives such as time management, less rework and various financial benefits. As an illustration, *"Educating the role players (suppliers, clients, engineers and contractors) in the South African construction industry will drive the implementation of lean construction,"* states a Site Agent with 10 years' experience and a bachelor's degree.

There are various role players in any construction project, and everybody has to work together to make the project successful. From a conceptual reasoning position, interviewee 7 suggests that lean construction is a joint effort. He further explains that *"Once you lose a team player and you fail to find a suitable replacement, the whole structure would collapse because of that one link that keeps everyone behind. In other words, everyone would have to play along and make an effort."* This argument is supported by 6 of the 7 interviewees. All the interviewee concur that the client, contractors, designers and construction workers have to back the lean construction concept to make it viable. However, an interviewee who is a director and project manager with more than 40 years' of relevant industry experience debates that only the contractor will be a driver for the implementation of lean construction seeing that only the contractor will benefit from lean as he is the only one that will be able to reduce cost and save money in the production environment.

With respect to value adding activities, the transcribed comments show that the interviewees confirm its importance in construction projects. Aspects such as time, cost and quality must be evaluated to ensure that production levels are at their optimum, comments interviewee 4. Similarly, interviewee 1 elucidate that in the South African context, in order to enhance project performance and add value to the industry, grants have to be taken away. He perceive that people should work for their money and by decreasing the grants / incentives, South Africans will be more innovative and work harder as they need to secure their jobs. The interviewee went further to say that performance bonuses and incentives such as promotions will motivate stakeholders to give more attention to value adding activities. Interviewee 6 goes as far to state *"As from today, lean construction will be his answer"*.

Theme 3: Drivers needed to enhance a lean thinking culture in the construction industry

In an industry, change gives way to new opportunities and this view is recognized by the interviewees. They opine that South African construction is open to change and is not as rigid as many might think. Interviewee 5 emphasize that contractors will definitely alter their attitude towards change when they understand the benefits it holds. Respondent 6, a professional engineer and contracts manager with 8 years' experience, claims some firms will change while other lag behind. The more established and successful companies will be hesitant if they are not familiar with a concept, he further states most of the

firms already understand the elements of lean thinking although they have not formally recognized it as lean construction.

All of the respondents agree that the South African construction industry is not operating at an optimum level. Inexperience, corruption, strikes and over exaggerated registration statuses are the main problem observe by interviewee 2. Interviewee 5 concur with this view when he says “employees are not qualified for specific projects, contracts should be awarded according to benchmarks set and not always be awarded to the lowest tenderer”.

In brief, the interviewees noted that the high unemployment rate in the country should act as a catalyst for improvement initiatives such as lean construction as everyone should want to do their best because of the existing competition in the industry. Although at present, the opposite is the case due to the promotion of labour intensive construction, the business case for improvement would drive contractors to overcome resistance to change in their firms.

Discussion

The findings suggest that the contractors are already implementing lean as a strategy. Although most of them confirmed that lean as a strategy has been adopted in their firms, further questions shows that benchmarking and total quality management were involved in their perceptions. Among the interviewees, only 4 of them observe that their firms have adopted elements of construction improvement initiatives that can be linked to lean thinking. According to Forbes and Ahmed (2011), lean thinking is a new way to manage construction. The principles and techniques of lean have formed the basis for a new project delivery process. Lean thinking is a translation process in a logical flow that will add value for clients and contractors. The flow facilitates waste reduction whilst adding value. A strategy would redefine perfection, and change the way people think about and implement construction processes. Such a strategy would benefit contractors in South Africa as they have historically contended with performance issues.

It is however notable that the high performance recorded by the contractors in their individual projects can be down to the use of an improvement strategy, which could be a sub set of lean construction, total quality management, and benchmarking. Two interviewees however complain that they are struggling to improve time and quality performance in their firms. Performance is significant for these firms so much so that they have device a mean of tracking several indicative factors (Forbes and Ahmed, 2011). Improvement can be achieved by a variety of initiatives that include lean construction. An organization will invest in specific human resources in order to meet its objectives. An employee requires continual reassessment, evaluation and capacity building within the work context. This is to sustain performance at the expected levels.

To be succinct, 5 interviewees observe resistance to change among their work force when an improvement initiative is introduced. They contend that the situation would not be different for the wholesome implementation of lean construction in their firms. It is important to recognize that leading change successfully requires several necessary actions. Construction project teams need to be guided in approving new attitudes and behaviours in order to utilize lean construction principles and practices. According to Forbes and Ahmed (2011), five specific actions have been identified as minimal requirements; while adopting all five does not guarantee success, excluding any of them will derail an effort for lean. Forbes and Ahmed (2011) suggest “*Educate the people involved. The organisation must provide proposed changes that will have benefits to all, as the status quo makes everyone vulnerable in a competitive environment. Present employees with reasonable performance standards, maintaining transparency with setting standards in order to project fairness. The organization must demonstrate clear new behaviour and engage people in emulating them. Use measurement, knowledge and rewards to monitor new behaviour against old behaviour. Make changes that are positive for the employees as they are an integrated part of the change*”.

5. Conclusions

The study reveals that lean enhances the implementation of construction projects in the industry. Lean attributes has contributed to its use in many countries, which has similar industry need like South Africa. For instance, the reduction of waste and enhancement of value adding activities is desirable in South African construction and the interviewed contractors have confirm same. Therefore, the decision to embrace lean by contractors can be linked to the management of the project and business aspects of construction in South Africa. The findings of this exploratory study make a case for a relevant strategy to aid contractors in different ways to incorporate lean in their processes. It should be noted that this study has only focused on contractors related lean thinking perceptions in South Africa and as such, the views of other industry stakeholders should assist in the formulation of a robust strategy. These views should thus form the basis for a larger empirical study in the future. Most especially, the view of labour stakeholders in terms of efficiency and labour intensive construction should be analysed. Studies should be directed towards better understanding of the labour laws that are at variance with lean thinking strategies and where contractors must start to incorporate lean thinking as a viable and sustainable option for managing their firms. As a start, the industry in South Africa should focus on the compilation of a strategy that will enhance the application of a proper management system such a lean by providing training in lean construction principles to avoid resistance to change. Beyond training, reward system, career path and skills development, a future study could address structural industry issues that potential inhibits the implementation of lean in South Africa. Future studies should also endeavour to seek responses to pertinent questions that include:

- Which performance measures are mostly influenced by lean construction?
- What are the possible challenges associated with the introduction of lean construction in practice?
- How are lean introduction barriers rated comparatively?
- Is lean construction cost (investment) effective in South Africa?
- How far is the construction practice in South Africa from being characterized as lean construction?

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