International Journal of Business Management and Commerce; Vol. 7 No. 1; January 2022
International Journal of Business Management and Commerce
Published by Center for Contemporary Research

Lean Construction Roadmap - Part II

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My first introduction to Lean Construction came in 2008 with a large national construction firm. The economy was in recession and construction had almost dried up in Phoenix. I was hired to help mitigate the financial losses as much as possible. As owners and projects became more and more difficult to find, our once thriving division resorted to Lean Construction to stay in business. Lean was new to the company and the division. It was the best thing that ever happened to me personally and to the division. Our team committed 100% to first, become lean ourselves, and second, help our trade partners do the same. I never imagined the results could be so positive. Our journey was not in any way gradual. We were fighting for our very existence and our results were downright amazing and occurred quite fast! I never thought it was possible to achieve the things we did through lean.

- 12.7% reduction in direct costs
- 40% reduction in schedule durations
- High improvements in quality (no statistics available)
- Visible improvements in morale (no statistics available)

This paper is a follow up to a previous publication entitled Lean Construction Roadmap (IJBMC Vol. 6, No. 2). Part one focused on how DPR, the Bolt Company, and Linbeck Construction advanced lean construction strategies throughout their organizations to be considered among the top lean construction firms in the United States. Their 25-year roadmap was outlined to assist other companies to become lean in less time and without making the same mistakes. The research followed a qualitative case-study research project to collect, analyze, and report the findings.

The study sought answers around eight major themes:

- Lean Discovery – How and why was the discovery of lean useful?
- People – How did people help or hinder lean?
- Tools – What lean tools were utilized on the journey? (LPS, VSM, 5S, A3, etc.)
- Implementation – What strategies were effective during implementation?
- Training – Who needed training and who did the training?
- Culture –How did culture change with lean adoption?
- Barriers – What barriers needed to be overcome?
- Future of Lean – How does lean move forward at each company?

Lean Construction Roadmap Phases

The purpose of the study was to identify the various paths to becoming a successful lean construction company. A primary motivation of the research was to help newcomers navigate their own journey by providing guidance and insight from those who have successfully traveled the lean road.

Although there is no single correct method to follow to become lean, the three companies studied showed evidence of connected patterns and relationships in their journeys. The similarities and the occasional differences identified offer great insight into the lean process and provide increased awareness and perhaps an accelerated adoption path for those new to lean. The researcher's recommendations are included hereafter to assist other organizations on their own lean journeys. Conclusions are based on participant interviews and supported by lean research and other experts.

Based on the findings of the study, below are the five essential phases to becoming a successful lean organization in the construction industry.

- Phase 1: Lean discovery and learning period
- Phase 2: Critical turning point and commitment
- Phase 3: Lean strategy development
- Phase 4: Lean culture saturation
- Phase 5: Partner Training

The researcher recommends that organizations that are new to lean construction proceed through each phase linearly. However, they can also expect overlap from one phase to another, especially during the last three phases. Each phase is both essential and equally important to the transformation. Below is a written description of each phase, with greater attention allocated to phases 3 and 4 because much of the information in the other phases was covered in part I.

As noted multiple times, executives are the key to lean saturation. Lean implementation begins with their leadership and only continues forward zealously with their commitment and drive. Executives must be prepared to question their own traditional strategies as well as the outdated tactics of the industry. If they are willing to critically assess their own company's past performance, executives will likely acknowledge the gap between current and desired results. This gap typically inspires forward-thinking executives to drive changes and make improvements. Executives may also acknowledge that a new system is needed to overcome the inadequacies of the industry. The strong desire to change the future direction of the organization is vital to the success of lean.

Phase 1: Lean Discovery and Learning Period

Conclusions from this study show that executives and employees with a progressive outlook will be naturally drawn to lean because of the excitement for it within the industry as well as its many stories of success. As executives and employees search for answers to the challenges of today's construction industry, lean will emerge as a likely solution. As a result, forward-thinking executives will seek to understand and apply lean. To that end, they must be willing to invest in learning and training, and to test lean sufficiently to determine its value. Consultants, associations, trainings, and other learning methods should be utilized frequently. As this investment is made, employees should be challenged and empowered to learn and experiment with lean without fear of failure.

The first phase of lean recommends that lean be personalized to as many employees as possible. The recommendation to personalize lean is based on the statements from multiple participants who claimed that personalized lean was the most effective way of introducing lean and training all employees on it. Employees should be taught to utilize lean problem-solving tools to improve the way they work each day. Personalized lean is the natural starting point to help companies create and maintain a new energy within the entire organization. With personalized lean, everyone in the organization should feel empowered to improve the way they work. When this occurs, top performers will emerge and lean successes will follow.

During this phase, employee attitudes will range from negative and resistant to positive and exuberant. This should be expected. However, these attitudes do not diminish the value of personalized lean and its positive message of change. In fact, executives can utilize this feedback to identify future lean leaders. Lean leaders are typically employees who demonstrate a positive attitude towards change, are successful and committed, and show high levels of innovation. Lean leaders may emerge from construction personnel as well as administrative employees. It should be noted that this research indicates that top performers with traditional command-and-control styles do not always perform well in a lean setting. Nevertheless, by introducing lean to all employees rather than to only a limited group, executives have a larger pool from which to identify possible leaders.

Phase 2: Critical Turning Point and Commitment to Lean

Depending on the level of early success with lean, executives will reach the critical turning point at which they will decide whether or not to wholeheartedly commit to lean construction as the future operating system of the company. Of course, success is largely dependent upon the seriousness of the executive team in leading the initiative. Although this phase in the sequence may not be long in duration, it is absolutely critical to the success of the initiative. Without a true commitment, lean has little chance of success. When executives do commit, however, the real work begins.

Phase 3: Lean Strategy Development

The conclusions from this study as well as those from other experts (Alarcón & Diethelm, 2001; Liker & Meier, 2006; Nesensohn et al., 2012; Rubrich, 2012) indicated that lean success is highly dependent on how deliberate a company pursues lean. Lean must become a driving impetus of the organization to achieve maximum results. Haphazard implementation will produce haphazard success at best.

Once lean is targeted as the future operating system of the company, executives must create and oversee a lean team. The team's mission is to design and carry out the company's lean saturation plan. The focus of the team should be on developing people by making the journey enjoyable and simple so all can succeed. The plan should be sufficiently detailed with a mission statement, goals, milestones, achievements, and individual recognition indicators. It should not be overly technical or systematic, as this will discourage participants and hinder results.
The lean saturation plan is really a blueprint to change the culture of the entire company. Liker and Meier (2006) stated:

"Changing a culture is a challenge. Before you run out and start creating a culture, understand that cultures just don't happen. Cultures are created over time. They arise out of need, in response to the system that exists to support them; or if there is no support structure, the culture that develops is one of self-sufficiency, 'Every man for himself'." (p. 173)

This statement confirmed the findings of this study that a lean culture must be deliberately established and will not emerge haphazardly. It also shows that when a culture is positive and enjoyable, employees will respond accordingly. When it is stressful and complex, employees will resist.

The saturation plan should be developed by a team of champions, top-performing practitioners, and executives (Rubrich, 2012). This includes construction personnel as well as office personnel, with leadership from at least one forward-thinking executive. Following Liker and Meier's (2006) advice, planning to change a culture requires the right people focused on the right things.

"A committed leader must provide the resources to keep things moving. This includes top-notch people to work on lean as well as financial support and accountability for delivering results. It must be clear that this is important to the company, and that participation is not optional." (p. 432)

Executive support, as stated previously, is necessary during every phase. Other employees simply do not have the ability to approve resources, provide financial support, or require accountability.

To stay consistent with experienced, successful lean companies, the focus of the culture change should not change from people to profits or even to productivity. Profits and productivity are byproducts of a lean culture, but they are not the focus. If they are the focus, the team's lean efforts will fail (Akers, 2013; Fearne & Fowler, 2006; Picchi & Granja, 2004). The focus must be much larger. The focus should continue to be on developing people, as stated by several participants.

"Lean is supremely about people. We're in the business of changing and improving humanity. At its core, lean is about nothing other than teaching, training, refining, learning, and improving the condition of people. Lean is not a mechanical system for eliminating waste. It's a methodology to change people's minds about the way they see work." (Akers, 2013, p. 114)

The three companies in this study were initially interested in results, such as profits, shortened schedule durations, and productivity. After 10 years of focusing on processes, they only recently began to realize that people were the real answer.

Personalizing lean to each individual is what created the culture that offered solutions to achieving those early anticipated results. This realization is what allowed all three companies to create a culture of developing people. Also during the strategy phase, trainers should be selected from successful practitioners. Trainers must possess a strong ability to lead and teach others to discovery, rather than "talking at" or lecturing other employees. Training should maintain an inquisitive, positive atmosphere for all employees while empowering and assisting top performers to innovate and excel beyond minimum standards. Practices should eventually be standardized across projects and departments to illustrate the commitment of the organization.

Because Akers was cited by at least half of the participants as providing the "next generation of lean commitment" at their organizations, a quote relating to people would be appropriate. After visiting Toyota in Japan, he said:

"I had just spent the last 5 years focusing on waste and continuous improvement. [I found that] Toyota, on the other hand, was obsessed with building a culture through teaching and training its people. In contrast, I was trying to convince my people to embrace lean thinking by initiating "lean events." My mistake had to do with my incorrect focus on processes. I needed to focus on building a culture of people who understand and embrace continuous improvement." (Akers, 2013, p. 40)

Building and developing people by helping them grow and achieve great results fits very well with the literature on motivation by Frederick Herzberg (1966). Lean motivates by producing a greater capacity to problem solve, utilize collaboration tools, and enhance planning abilities.

With a focus on people, the lean strategy team can begin writing the playbook for the rest of the organization. There are several excellent resources to help with this task. Larry Rubrich (2012) has offered his 10-step policy deployment process while Nesensohn and colleagues (2012) has offered their 15-step "True North" guiding principles. These and other resources offer great insight, which can and should be considered. However, they are somewhat contrary to the findings learned from this study in one simple regard. They offer tips on changing culture through policy deployment. However, creating a lean culture will not occur from policy alone. The lean team has to reach people's hearts. The evidence from this study shows that a positive and simple plan is critical to changing a culture that has existed for years. The plan must reach each individual on a personal level to change their perspective regarding the way they work. Thus, in construction terms, the lean culture change should include the following conditions, which were modified from Akers (2013).

- Set fun, simple goals and expectations for all employees.
- Reinforce those expectations through regular lean activities and reports.
- Celebrating successes regularly and often.

Phase 4: Lean Culture Saturation

The conclusions from this study and other literature (Akers, 2013; Alarcon et al., 2001; Liker & Meier, 2006; Nesensohn et al., 2012; Rubrich, 2012) illustrated the importance of setting expectations for lean with each employee. Personalizing that message creates an understanding of each employee's contribution to the lean initiative and to the company as a whole.

For newcomers to lean, the researcher recommends following the three bulleted conditions in the above section as the focus of the implementation phase during the saturation period. First, the team should set fun and simple expectations from all employees at every level, in every department. It is important that everyone understands their personal contribution to the new culture. Workplace motivation stems from recognition, achievement, advancement, the work itself, and growth (Herzberg, 1966). For example, the lean strategy team might task project managers with holding daily field huddles in which they track Percent Planned Complete (PPC) and plan with their trade contractors. They could be further responsible for training others on their projects to eliminate waste and share the results. Office employees might be tasked with improving their work each day. The executive team is responsible for removing barriers, empowering others, and leading by example. Each of these tasks contributes to Herzberg's motivational factors. All employees might be rewarded or recognized for creating and publishing lean videos for the entire organization to see.

Second, expectations can be reinforced by standardizing lean activities on every project through policy deployment. The lean strategy team might require reports from both the office and the field on a regular basis.

Time should be built into each role so that all employees can easily meet or exceed the expectations. When time is not built in and such tasks are perceived as extra work, employees will resist. This can be accomplished as executives, project leaders, and office leaders reinforce these expectations. Standardized activities and reports, when coupled with positive zeal, will produce an atmosphere of enabling accountability or "enabling bureaucracy" as cited previously by Adler (1999).

The most logical way to allocate time for lean learning, activities, and reports comes in the form of daily huddles or daily meetings. Whether on the job site or in the office, short daily meetings offer great potential. Daily huddles are considered a best practice in the industry already. They offer an opportunity to organize the work to be performed daily and provide a review of the previous day's successes and failures. Taken to the next level, a few additional features could be suggested. First, a different employee (or subcontractor foreman) could lead the meeting every day, giving the opportunity for leadership growth. Second, participants should share highlights from company/project book readings on lean or on other important topics. Third, they should share personal stories of continuous improvement in an A3 storytelling format. Fourth, they should review company values and relate them to current business conditions.

None of the companies in this study had taken lean to this level. The idea provides built-in learning and growth to all employees and subcontractors. As trade contractors attend the daily huddle meetings on site, they are made active participants in the process. From an office perspective, daily meetings could follow this general format to improve communication, motivation, company processes, and morale in general. Additional best practices such as Lean Boards, Lean videos, and standardized reports provide a path for any company to transform the organization into a fun, successful, world-class lean construction company. Despite the successful paths reported throughout this study by The Boldt Company, DPR and Linbeck Costruction, there is still opportunity for future lean growth within these companies.

As a recommendation for saturation, project teams should produce standardized lean reports to account for project successes and failures. They might also be required to provide a recovery plan when the project is not performing well. Project teams should report or present on their successes so that others can learn from them. Successes should be presented by the very individuals who excelled, offering gratification and validity to their work, and offering best practices to other employees. Executives, on the other hand, should plan to visit each project team regularly to inspect the team's Lean Boards and attend their meetings. At the corporate office, upper management can and should walk the halls regularly, quizzing and probing the employees on the eight lean wastes or other company values in a positive, enthusiastic manner.

Third, the lean strategy team and the executive team should emphasize the new lean program by recognizing employees for their successes and contributions on a regular basis. This might include treating an entire project team or a specific department to lunch after consistently tracking PPC for three months or an achievement award at a company function for completing an entire project in a lean fashion. Reinforcement also comes as executives "walk the walk" by attending trainings, posting their own videos, having deep conversations with others regarding lean philosophy, and reporting their own lean solutions when appropriate. Additional support might come through quarterly performance reviews where personal and company-specific goals are established and reported quarterly. These are just a few ideas for the lean strategy team to build upon. The team should seek to customize to the needs of their organization.

Linbeck utilized this very pattern with success on several levels. They first set the expectation of mandatory lean practices on all projects. They did so by standardizing all projects so each team utilized Lean Boards as a visual management technique. Lean Boards showcase a weekly work plan in poster size displayed in a prominent location on the job for all to see. Second, the system was reinforced regularly as each team met together for the daily huddle and the weekly planning meeting. During this daily meeting, they tracked PPC among other lean metrics. These standardized reports were then sent to the main office so executives could keep a pulse on each project. Finally, the system and the behaviors were reinforced as executives visited the job regularly and asked the team to explain the results on their Lean Boards. They publicly recognized the successes of the team or offered guidance in private as needed. They provided opportunities for the team to share their best practices at company events, with further opportunities to praise each team member for their contributions to lean.

As the lean team follows these suggestions, they should be better prepared to establish goals and expectations for saturating the culture with lean.

The planning phase is designed to help them begin to visualize the future state of the organization and design a path to get there. Planning will help the team choose the right people to carry out the strategy as well as set guidelines for each position. It will help them understand how to bring out the best in others.

Phase 5: Partner Training

Conclusions form the study show that lean companies are always lean trainers. Existing literature supports that finding (Akers, 2013 ; Liker & Meier, 2006; Nesensohn et al., 2012). Most employees should be actively involved in training employees from other construction-related firms (e.g., trade contractor employees, designer employees, owner's representatives, etc.). Office personnel, such as estimators, schedulers, and other pre-construction roles, should help their counterparts at subcontractor firms just as project managers and superintendents train the trade contractors on site. Owners, engineers, designers, and trade partners alike need to understand the new system so that they can expand their relationship and work better together. Organizations will continuously improve and grow together, thus improving the industry as a whole.

While great challenges exist when training trade contractors and other partners (e.g. trade contractor turnover after each project), it is a necessary step for them and for a company's own employees. Real growth occurs when employees share with and train others. They take greater pride in their work and seek to become better at what they do when they know they are lean trainers and others are watching (Akers, 2013). Trainings on the jobsite include daily huddles, offering opportunities for attending foremen to lead, learn, plan, and participate in greater levels than they are accustomed. Office personnel can invite their counterparts to the main office to show them how and why the changes are occurring. It provides an opportunity to spread bits of lean knowledge and best practices to company partners.

Summary

Of the three companies in this study, Linbeck was the most deliberate with their lean journey. This is because their goal was not simply to be successful with lean. Instead, they focused on building people and building the industry as a whole. The Linbeck division vice president stated, "Most of us agree that this isn't just about Linbeck. It's about building our industry." As they focused on the talents of their people, they were also able to improve the industry.

Each of the successful companies in this study passed through the five phases outlined above at some point. Some of their actions, however, created failures or delayed success (overemphasis on lean tools, egos, selective lean, etc.). The findings and phases outlined above have been organized in such a manner as to produce greater success for newcomers early on in the process through early participation from all employees. Maintaining a focus on developing people by developing a positive, yet simplistic saturation plan will have the greatest effect on the new lean culture.

Despite the success of each company, there remains further room for improvement. As evidenced by the three companies in this study, lean is a never-ending journey of continuous improvement. As newcomers progress along their own paths to lean, they will see opportunities for continued growth that will position them for increased success as highly effective lean organizations.

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