

A TRADE UNION'S VIEW OF THE BUILDING PROCESS

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ABSTRACT

The Danish Building and Construction Workers Unions primary concern is to improve the overall working conditions for the construction workers. We are also determined to increase the quality, productivity and efficiency in the construction industry. We consider the theory of Lean Construction as a viable means to achieve these goals. Lean Construction puts the construction worker into focus, as he is the only participant in the building process *directly* generating value to the customer.

Since the building process is a co-operation vertically and horizontally between many different participants it can best be understood as a form of teamwork. The teamwork inherent in this building process requires every participant to be dependent on each other. The process must be based on mutual respect and recognition of all the participants' competencies. If the trade unions are to achieve our goals this recognition is an absolute prerequisite.

The unions view Lean Construction as a means to increase the construction workers' responsibility and influence by recognizing their qualifications regarding planning, coordination, cooperation and decision-making. The International Federation of Building and Woodworkers, IFBWW⁴ supports these views, although pointing out that the concept of Lean Construction is mostly applicable to the construction sectors of industrial rather than developing countries.

This paper reviews research in cooperation, teamwork and life-long learning, and reports interviews with 28 construction workers who have participated in Lean Construction or Lean Construction related projects.

KEYWORDS

trade union, working conditions, construction workers

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⁴ IFBWW, with head office in Geneva, represent 286 unions and approximately 11 million members from all over the world.

INTRODUCTION: WHO ARE WE?

BAT⁵ was formed in October 1990, but long before that there was a formalized cooperation between the trade unions in the building, construction and woodworking industries. The first such cooperation dates back to 1938. This co-operation has since then continuously been developing. BAT's objective is to support and co-ordinate the work of the trade unions regarding the solution of trade issues, including among others:

- To create a united and strong appearance towards employers in order to improve the wage and working conditions of the members.
- To improve the educational possibilities for BAT's members. These educational possibilities are aimed at securing a qualified vocational education for all young people, giving adults the opportunity for continual and on-going vocational and in-service training.
- To exert maximum influence on the political decisions locally, regionally and nationally.
- To assist the affiliated trade unions in their professional, political and international work.

The seven trade unions affiliated with BAT represent a total of 138,000 members. They are distributed as follows:

- The National Union of Plumbers 7,500
- The National Union of Electricians 11,000
- The National Union of Commercial and Clerical Employees 7,000
- The National Union of Painters 8,000
- The National Union of Metalworkers 2,500
- The National Union of General Workers 48,000
- The Timber, Industry and Construction Worker's Union 54,000

BAT represents more than 80 percent of the construction workers in Denmark. A further description of the industrial relations context in Denmark can be found in "The survival of the Danish Model", 1994 and "Changing Industrial Relations in Europe", 1998.

BAT BELIEVES IN THE LEAN-THINKING

At BAT we have a general objective of improving working life for the construction workers. We are in this respect also very active to contribute to an increase in quality, productivity and

⁵ Bygge-, Anlægs- og Trækartellet, a cartel of 7 unions in the building, construction and wood working industries.

efficiency in the entire building and construction industry. The building and construction workers are willing to take on a responsibility of our own to achieve these objectives. It is in this context we regard the theory of Lean Construction as a very positive renewal of the way we all perceive the building process, and Lean Construction therefore becomes a useful means of reaching some of the objectives that the construction workers have in common.

Furthermore we hope that the concept of Lean Construction can contribute to improving management in many construction companies. A survey from 1999⁶ shows that management skills in the construction sector leaves a lot to be desired compared to other sectors.

Since the building process is a co-operation vertically and horizontally between many different participants it can best be understood as a form of teamwork. The teamwork required in this process requires every participant to be dependent on each other. The process must be based on mutual respect and recognition of all participants' competencies. If we as trade unions are to achieve our goals this is an absolute prerequisite. In our interpretation, Lean Construction views the building process as follows:

- The building project is viewed as a whole with a focus on value-generating activities.
- It is considered impossible to reduce the total construction costs and total construction time by reducing just the costs associated to individual activities.
- An optimum process is reached by securing a steady work rhythm where the different participants are in step, co-operate and coordinate their work.
- Much emphasis is put on the construction worker to meet these ends.

Lean Construction puts new challenges on the construction worker and improves his⁷ learning and involvement in the building process. He is regarded as the only participant in the construction process *directly* generating value to the customer. In BAT this is precisely our aim, we wish to create as challenging, exciting and fulfilling working conditions for our members as possible – leading to higher levels of overall work satisfaction.

We view Lean Construction as a means to pass more competencies, responsibility and influence to the construction worker, whose qualifications regarding planning, coordination, cooperation and decision-making are recognized and improved. The lean construction based tool "Last Planner" structures and systematizes planning on the construction site, an activity aimed directly at the construction worker. Planning has always been a part of the construction worker's job and with Last Planner we have a standardized tool that takes the randomness out of work process planning on the construction site.

A further argument supporting Lean Construction is that it creates a safer construction process. From the experiences of MT-Hoejgaard, the leading Danish general contractor working with Lean Construction, utilization of the LC-philosophies has led to a substantial reduction in work-related accidents on the construction site. This indicates that the use of Last Planner and Lean Construction theory implicitly leads to a safer working environment.

⁶ Danish Business Excellence Index, an index of different sector's way of handling management, employees, systems and creating results. The construction sector turns out last in all parameters.

⁷ We can say "he" because in Denmark the construction worker is by 95% a man.

This is not only of value to the workers but also to the company and society at large⁸. As a consequence of our commitment to Lean Construction BAT joined the Danish network of Lean Construction, Lean Construction – DK, in the autumn of 2002.

A VISION FOR THE CONSTRUCTION WORKERS' ROLE REGARDING LEAN CONSTRUCTION IN THE FUTURE

In BAT's understanding of the theory behind Lean Construction it covers the entire construction process from the bottom to the top and constitutes a concept that must include every participant in the process. Lean Construction as a concept for a building project can only be used if agreed on by management. In practice it is the planning elements of the Last Planner System and the principles of early involvement that have the highest importance to the construction workers.

LAST PLANNER AS A CONCRETE TOOL FOR THE CONSTRUCTION WORKERS

Via Last Planner the final planning is delegated to the lead man⁹, who plan the concrete activities within a short time horizon – usually within 5 days – in close collaboration with his fellow lead men. The construction process is so unpredictable that the final, detailed planning must be updated constantly as the building process proceeds. Utilizing Last Planner construction workers can introduce changes on their own, as long as the techniques are known and the initiative is taken. In that way part of Lean Construction can be introduced from the bottom-up and hopefully spread to other participants and levels in the construction process. Thus, the construction workers - based on their joint efforts - can attain a greater influence on the organization of the construction site.

In Last Planner the valuable experiences and competencies of the construction worker is incorporated into the planning process. In this way planning is optimized since the construction worker knows more than management does about solving the practical challenges on the construction site. This also gives the construction workers the responsibility for the practical work and puts them in charge of carrying it out. The construction workers must therefore have the adequate skills and the necessary competencies and responsibility to make their own decisions.

HANDLING OF CHANGES IN THE CONSTRUCTION PROCESS

Building projects are highly unpredictable. The products are specially designed for the customer, one of a kind, produced in constellations of cooperation that vary from project to project. During a construction process many changes often emerge, these changes are often identified as the cause of waste, failure, postponed delivery dates and many extra costs.

By enabling these changes to be handled in the most efficient manner this is exactly the point where Last Planner provides the highest benefit. At the weekly planning meetings

⁸ As documented by BAT-kartellet in the report "A good working climate is a good investment", January 2003.

⁹ Lead man/team leader/gang leader: The concept of the lead man is that he is first among equals. He is not part of management but he act as the contact person between the gang and the company and manages, plan and negotiate the "work" for his gang. In Danish he is called "sjakbajs".

unforeseen incidents and changes can be taken care of. This moves the decision as far out in the process as possible and as close to the actual work activity as possible. Changes in or incomplete drawings can be discussed as a part of the weekly planning and not be a cause for major delays.

A NUMBER OF CONSTRUCTION WORKERS' EXPERIENCE WITH LAST PLANNER OR WHY COMMON SENSE IS NOT ALWAYS COMMON PRACTICE

In order to assess how construction workers perceive Lean Construction and Last Planner we have undertaken a field study interviewing lead men who have worked with this concept or are in other ways acquainted with Lean Construction. Eight of the respondents work at two different construction sites and the remaining twenty have participated in a seminar for lead men regarding management and cooperation, where they have also had a thorough introduction to Lean Construction especially in respect to Last Planner. The interviews were made on the basis of two inquiry guides that are appended at the annex.

General impression of working on a site with logistical control and Last Planner

With the exception of one individual it is the respondents first exposure to Last Planner. The lead man with experience utilizes Last Planner on a daily basis. The essential difference in working on site with Last Planner is the weekly meetings (20-30 minutes in duration). At the meetings the process leader, the lead men and the project leader go through the work carried out during the week. Based on this background work for the following week is planned and organized.

The general opinion is that Last Planner represents an incredibly efficient method of controlling both the overall and the detailed planning of the work. It is effective to have a weekly plan as well as a 5-week plan that can be adjusted constantly and at the same time quickly call attention to problems and change requirements. The respondents indicate that with Last Planner there is now a way to describe a practice that has been used for a long time. Last Planner creates concrete methods to carry out planning in a homogeneous and continuous manner.

Some of the respondents suggest that coordinating and planning meetings are held more than once a week. The large construction sites required to build bridges, shopping malls, museums, sports facilities and power plants, for example, are very unpredictable. In order to undertake the final coordination of the day's work it would be helpful to have a short meeting (15 minutes) every day. Accordingly, lead men must be given the unconditional time and scope in determining their own work in relation to others. This means that middle management shouldn't second-guess lead men's decisions related to the planning process.

There is some evidence that even if Lean Construction is not a concept used in the building process, the use of Last Planner by a team of construction workers will influence other teams to follow this team's planning, or at least plan their tasks in relation to the team using Last Planner. We found that this is the case even when management does not think in terms of Last Planner. The planning meetings and utilization of Last Planner enable workers to avoid hindering the activities of others. The work is organized in such a way that a new

activity does not suddenly take precedent when previous activities are unfinished. A steady work rhythm is obtained, waste is reduced and downtime minimized.

However, the interviews indicate that it is not always the planning that is the most important aspect of the weekly meetings rather that the participants get to know one another. This very important side benefit increases the participants' responsibility toward each other and encourages them to keep their individual commitments. There is a higher degree of confidence and a positive attitude on Last Planner-sites. There are no or very few conflicts, employees help each other and sort things out through discussions. Everybody is just a little more flexible!

All things considered, better planning results in a better working climate increasing work satisfaction. This is the main motivational reason for respondents to utilize Last Planner. Generally they prefer to work on sites that have control of the planning and maintain positive work relationships.

The safety at sites with Last Planner

Respondents indicate there is a large focus on safety on most construction sites in Denmark, both traditional and Last Planner-sites. As one said: "Safety is not something to be laughed about, everybody is taking it seriously".

Compared to other construction sites the Last Planner-sites are far tidier. Several of the respondents emphasize that as a consequence of the weekly planning meetings there is more emphasis put on getting the work place ready for the next activity. Encouraging construction workers to clean up after themselves and remove excess materials.

At the two construction sites accidents have been kept to a minimum. At the one site that has been going for more than 3 years, the respondents knew of only two accidents - both only minor incidents. One accident concerned someone slipping off a ladder and scraping his shin, and the other was a driver who had an unfortunate jump from a platform, where he broke his foot. According to the respondents the site cannot be blamed for the accidents. The parties involved were just unlucky.

On the other construction site the respondents had no knowledge of any accidents. This indicates that since the job site is in order on the Last Planner-sites the accident level is not as high as comparable sites – order on the job site leads to a safer working environment. Furthermore there is no doubt that better working climate and fewer conflicts among construction workers contribute to a safer working environment.

Experience with the process leader

The respondents had only praise for the process leader who, by the way, in both construction sites was a woman. Her tasks were to run the planning meetings and take charge of safety and coordination. Several of the respondents were relieved to have a person to turn to. One who follows up on matters agreed upon and ensures that the collaboration between the trade groups is working. Furthermore, the construction workers on one site recognized how effect the process leader was at the planning meetings, maintaining focus on the planning and stopping the project leader when he started to discuss details regarding the construction.

The planning meetings are not the right forums for discussing details because not all the lead men have the same interests. So details regarding the construction should be discussed closely to where the issues apply. Several of the respondents conclude that the process leader-function is vital in order for the concept of Lean Construction to work.

The need for education

On the one construction site all lead men participate in a start-up meeting, where an introduction to Lean Construction and Last Planner is given. Subsequently there are informational meetings for everybody on the site at regular intervals. The respondents point out a huge need for education, especially methods to simplify the planning process. Lead men need to learn how they can contribute most effectively to the planning process before and during construction.

In order to reduce the paper work connected to Last Planner almost every respondent suggested integrating IT-tools into the process as a method to streamline the administration. Despite the possibilities in IT it was recognized that many construction workers are still relatively unfamiliar with the daily use of IT. There is no doubt that there is a need for education in the utilization of a personal computer. This will help lead men tremendously in their planning tasks and give the construction workers direct access to exchange information regarding the steps in the planning process. Architects and engineers could also use it as an on site interactive tool when drawings, calculations etc. need to be checked or changed.

The respondents point to a need to speak the same language on the construction site. This goes for both the building management and construction workers. This indicates a need for courses in communication and negotiating techniques. Summing up, the construction workers don't need further technical training, but there is a widespread need for education in soft skills such as:

- Planning
- IT- tools
- Communication and negotiation
- Co-operation

Better wages?

The general impression from the interviews is that wages are not lower on the Last Planner-sites compared to the traditional sites. One of the respondents was paid by the hour, and in such cases use of Last Planner does not have a direct influence on the pay. Advantages regarding pay only have influence if there is an economical incentive in the wage system.

The economical advantages from using Lean Construction must benefit all participants in the construction process, and it must be evident and tangible that this is the case. The planning meetings were for some of the construction workers held as part of the piecework collective agreement. They estimate that the time spent on meetings was easily recovered through increased efficiencies and reduced downtimes. To hold the planning meetings is seen as a good investment.

Conditions for success

From the interviews it appears that a prerequisite for the success of Last Planner is that lead men from all trades represented on the construction site participate in the planning meeting. If everybody does not participate coordination must occur afterwards reducing the effectiveness of the meetings.

Moreover, it is very important for the building management to follow up on problems and matters agreed upon. Problems should be resolved immediately and plans must be carried out, this is the responsibility of the management. Some lead men mention that the level of middle management is so strong the concept never reaches and settles at the construction worker level. The implicit process in Lean Construction of delegating competencies and responsibility to the workers goes against the interests of middle management. Top management has a decisive role to play in ensuring that delegation of competencies, decision-making and responsibility to the construction workers is accepted throughout the entire organization. In the experience of the Danish trade unions this is not yet the case, creating a strong barrier to achieving the benefits of Lean Construction.

All in all the conditions for carrying out the activities on the construction site should be optimized, and the seven flows for a healthy activity should be complied with. Two things in particular are identified as barriers to implementation.

1. The drawings have to be 100% in order during the entire process. The drawings act as communication between advisors and construction workers, and they are often defective and incomplete before the start of construction.
2. There has to be enough time. Experience shows that pressed timetables result in the good intentions concerning planning and worker involvement fall to the wayside. In this case management creates the guidelines, which are then forced on the construction workers. This is very de-motivating and does not enhance collaboration.

With the correct utilization of Last Planner these factors should not be a problem because the strength of Last Planner lies in its ability to handle changes in an efficient manner.

General opinion: everybody prefers to work with Last Planner

The most obvious advantages of working at Last Planner-sites have to do with pay, safety and working climate. With regards to pay it is difficult to draw up conclusions because of the limited amount of interviews. It would demand a larger sample to conclude firmly regarding this issue.

Respondents estimate that it is economically viable to invest the time for weekly planning meeting as part of the piecework collective agreement. This indicates, that all other things being equal, it is desirable to have an even work rhythm, less controversies, less waste and reduced waiting times. Moreover we find it a prerequisite that there is an economical incentive for all.

Regarding safety, there have not been any serious accidents at the two construction sites and at the same time safety has had a high priority. The focus on maintaining order and clear access roads reduces the risk for accidents considerably, and the weekly planning meetings,

where also the delivery of materials is coordinated, obviously influence this greatly. The planning meetings encourage the participating trades to tidy up, move excess materials, get the work place ready for the next trade and all in all show consideration for each other. This increases safety on the construction site.

The interviews indicate that the weekly planning meeting not only enhances control of work coordination, but also allows participants to get to know each other gaining a larger sense of responsibility toward each other. The confidence between the trades is high, there are few or no conflicts, and the participants sort things out through communication and appreciate each other's problems.

There is also a better working climate at the Last Planner-sites, which creates a more efficient and well-run construction site. The participants in the construction process therefore have higher work satisfaction than at traditional construction sites. These are overwhelming reasons for the respondents to prefer working at sites utilizing Last Planner rather than at traditional sites. Social norms and conventions have a great influence on peoples' well-being and work satisfaction. These results indicate that this is also the case in the building and construction industry.

So, Lean Construction and Last Planner can be seen as means of achieving better overall working conditions for the members of BAT. This leads to the development of BAT's vision for the future role of the construction workers in Lean Construction.

VISION

We view Lean Construction and the Last Planner System as means of achieving better overall working conditions for the construction workers through their influence on the construction process and daily working conditions. A well-organized construction site creates a better working climate, and with LPS, allows the construction worker to play an active role in setting the agenda for the future development of the construction site.

Thus:

BAT's vision is: that construction workers become prepared to meet and accept the challenges of Lean Construction and Last Planner

Specifically during a 2-year period we aim to disseminate the knowledge of Last Planner to the affiliated unions of BAT and their divisions throughout the country.

A STRATEGY FOR REALIZING THE VISION: LIFELONG LEARNING

Lifelong learning¹⁰ is about how to adapt people to meet the challenges of the present and the future, and how to provide individuals with the learning opportunities that bring greater fulfillment to both their personal and their working lives. It is no longer realistic to think in

¹⁰ "Lifelong learning and sustainable managed forests", a paper from BAT regarding lifelong learning presented at the conference "Forest Operations of Tomorrow" September 20-24, 1999 in Bourdoux, France. The paper was in October 2001 announced in "Resources in Education" (RIE) and included in the ERIC system of the Ohio State University.

terms of education, working life and retirement as successive phases. Knowledge acquired in the early years becomes obsolete at an accelerating rate. Today no one can be content the rest of their life with the education and vocational training they received in their youth.

The concept of lifelong learning by promoting education and training throughout the life cycle opens up new prospects for the shaping of peoples lives, and thus for the way they manage both their work and leisure time. Therefore, we need to change the way we have traditionally viewed education and training, and face the new challenges and possibilities.

In working life people must be able to adjust to technological, economic and social changes. In our view, Lean Construction as a new concept of managing a construction site is an example of one of these changes. As knowledge of Lean Construction is disseminated and the concrete tools are put into practice there will be an increasing need for all the participants in the building process, including the construction workers, to build upon their existing skills and training. Management must regard construction workers as a fixed and not a variable capital cost. This also means that companies must invest much more in the development of skills and competencies of the workforce in order to meet the ends of Lean Construction.

DISSEMINATING KNOWLEDGE OF LC AND LPS TO THE CONSTRUCTION WORKERS

In BAT's view an effective way to disseminate knowledge of LC and LPS is through education. We are convinced that, in time, education will create the change in attitude and culture that the implementation of Lean Construction and Last Planner demands.

A solid educational effort will without a doubt lead to an increase in construction workers' desire to utilize Last Planner. The advantages of Last Planner are so clear with regards to a well-organized and structured construction site that the changes will come from the bottom-up instead of, as is typical, from the top-down. In this way the construction workers will play a more active role in setting the agenda for the future development of the construction site.

Both the employers and the workers have an interest in increasing the productivity, quality, efficiency and value in the construction sector. Therefore an educational effort should be made in cooperation with the two parties. As a part of attaining our vision we will work to achieve this cooperation. We have three concrete projects planned or in progress aimed at realizing our vision:

Pilot seminar regarding Lean Construction and Last Planner

In order to disseminate knowledge of LC and LPS to the construction workers a pilot seminar for approximately 20 lead men was held in the spring of 2003. The experiences from this course are very positive. Almost all participants support the ideas of Last Planner and wish to use it in their work if agreed on by their employers.

Building on the experiences from this seminar the intention is to create a nation-wide seminar offered within the framework of the public vocational system for further training. The seminar is planned to start in January 2004. It is intended that other participants in the construction process, such as engineers and employers, will attend the courses. Under the public vocational system for further training construction workers, who are paid according to

piecework or by the hour, receive public financed wage loss compensation, while others can attend the course for free.

Development of a textbook on collaboration in the construction process

We have initiated the development of a textbook, dealing with issues of collaboration in the construction process, which includes Lean Construction and Last Planner. The idea is to give apprentices, architect- and engineer students an introduction to modern organizational methods, logistical tools, and knowledge of the skills inherent in the different specialty areas and an understanding of construction as a process oriented collaboration. The textbook is focused both towards the basic vocational education level and the educations of engineers and architects. It is planned that the set of textbooks will be ready for use in August 2004.

A huge need for further education

The interviews indicate a huge need for further education among construction workers - especially for lead men - in further planning, co-operation, communication, negotiation techniques and handling of IT-tools. The construction workers must be better at planning, coordinating, co-operating, communicating, negotiating and handling the planning by the use of IT-tools made for the purpose. A supplement could be courses in team-building, consciousness of quality and personal development.

When the nation-wide seminar on Lean Construction and Last Planner has been developed and offered BAT will begin developing the superstructure for these courses within the continuing education system. Our objective is to offer these courses as formalized courses within the framework of the public vocational system for further training by January 2005.

STRATEGY

BAT's strategy for realizing the vision of dissemination of knowledge regarding LC and LPS is to make Lean Construction, Last Planner and other relevant educational offers a permanent component of the public vocational system for further training and the basic vocational education level for construction workers.

- Milestone 1:** to develop the pilot seminar into a formalized nationwide and permanent seminar for lead men with thoroughly prepared material within the framework of the public vocational system for further training (January 2004).
- Milestone 2:** to disseminate the knowledge of Lean Construction and Last Planner to the apprentice level by introducing a textbook aimed at the basic vocational education level (August 2004).
- Milestone 3:** to develop additional formalized training courses in further planning, communication, negotiation techniques and handling of IT-tools for lead men as superstructure on the first seminar within the framework of the public vocational system for further training (January 2005).

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