ANNALS OF "DUNAREA DE JOS" UNIVERSITY OF GALATI
FASCICLE XI – SHIPBUILDING. ISSN 1221-4620
2015

APPLICATIONS OF THE LAST PLANNER SYSTEM

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ABSTRACT

Lean is one of the industrial tools that allow companies to change their thinking by involvement of all partners and by waste reduction. Well known in the manufacturing sector, this approach tends to spread to shipbuilding. In addition to the basic tools of Lean Manufacturing, a new tool, namely the LPS, was developed. This is a system of planning and production control in which the last scheduler is the one that does the job at a given stage because this person is better placed to communicate the work and execute it. This tool is based on several planning levels with different backgrounds. This article aims to explain what the LPS is and to compare this tool to those traditionally used in project management.

Keywords: Lean, Last Planner System, Production Management.

1. INTRODUCTION

Nowadays, flow optimization is a key challenge for companies. Lean is one approach that allows this change within societies by encouraging the involvement of all partners and by reducing waste. Strongly developed in the manufacturing sector, with relatively well known methods and mastered by most companies, this approach tends to spread to shipbuilding because of the possibilities of prefabrication and the high demand for industrialization. In addition to the basic tools of Lean Manufacturing (5S, Kanban, VSM, Takt time, etc), Lean brings an innovative tool that is the LPS. The LPS (Last Planner System) is a system for planning and production control in which the last scheduler (Last Planner) is the person who performs the work at a given stage. This person is best placed to communicate about the work and to execute it. This is a tool particularly suitable for the construction field and is based on several different levels in planning horizons.

2. FROM LEAN TO LEAN CONSTRUCTION

In the United States in the 1990s, L. Koskela tries to show possible parallels between manufacturing, where Lean is already well-established, and the construction sector. His study led him to conclude that the most effective method for the constructive domain must be based on the philosophy of JIT (Just In Time).

In 1992, G. Ballard develops a new tool, LPS (the Last Planner System) which has the effect of transferring part of the planning authority to the heads of shipyard shops for their management of the resources available by weekly forecasts.

Lean is recognized worldwide as a means of increasing projects productivity in the areas of architecture, engineering and construction. Lean Consulting, that is to say the art of implementing the Lean systems through consulting firms, leads when adapted to the field of construction, by 5 great ideas

that turn out to be relatively effective for large-scale projects:

- Collaboration is essential: we must make the best of each other, knowledge allows for close collaboration, faster decision-making, compromise. A high level of collaboration maximizes the shipyard's chances of success.
- Increase the relationships between all project participants: people working on a project should know each other. Openness, human development and respectful professional relationships contribute to build trust, foundation necessary to the effectiveness of a project.
- Projects are networks of commitments: the most important concept is that each person can and should express its creativity and reliability through innovation and should respect its commitments.
- Optimize the project in its entirety, without breaking up: in a lean scheme from the start, a project must be considered in its entirety. The personal interests must be put aside and the medium term gains must be watched over.
- Couple action with learning: when the systems are in place, the continuity of improvement should be possible by taking systematic and regular measurements.

Lauri Koskela describes Lean Construction as: "One way to design the production system to minimize waste materials, time and effort, in order to generate the maximum possible value".

3. THE LPS (LAST PLANNER SYSTEM)

The Last Planner System is the tool that makes the connection between the philosophy of Lean management and the construction industry.

2.1. Theoretical principle: Transformation Flow-Value (TFV)

To overcome the various problems encountered in construction, L. Koskela has developed a new production method covering all the important functions that were missing in the traditional system. The method he developed was called Transformation Flow-Value (TFV).

The method of TFVaims at managing the three elements that are the transformation, the value and the flow simultaneously. Koskela offers in a summary table the vision of each element in relation to the others.

Table 1: Integration of TFV, production viewpoint

	Transformation point of view	Flow point of view	Generation of value point of view
Visualization of the production :	Like a transformation of incoming products into outgoing products	As a flow of materials composed of processing, inspection, movement and wait	As a process in which value for the customer is created by fulfilling its requirements
Goal :	Make that production is organized to be effective	Eliminating waste (non-added value activities)	Eliminate the loss of value (obtained value relative to the best possible value)
Methods and applications:	Work Breakdown Structure, MRP, organizational chart	Continuous flow, continuous improvement, driven	Quality Function Deployment (QFD), the house of quality
Practical contribution:	Become aware of what needs to be done	Minimize unnecessary actions (waste)	Take care of customer requirements and ensure to fulfill them in the best way
Applications suggested name of each point of view:	Task Management	Flow Management	Value Management

Ballard and Howell, after a lot of research studies and experimental work, presented to Koskela in 1992 a new production control approach based on the theoretical proposals of the latter. This new tool called Last Planner System (LPS) proves to be the missing tool allowing control according to the theory of TFV.

Fig.1. Traditional planning system (driven flow)

The traditional schedule system used (Fig.1) in the construction sites has a scarecrow effect: at the beginning, all stakeholders will commit to respect the deadlines imposed. But soon almost nobody pays attention, deadlines are not respected

(despite penalties) and / or operations are carried out hastily to limit the costs incurred and possible fines on ships receptions.

As explained above, the flow may be interrupted or slowed down. As stated in the principles of Koskela regarding the TFV, the fact of focusing only on the transformation (the tasks) means neglecting the management of flows and thus generates the loss of control of the project.

2.2. Application of LPS

How can the planning and control be carried out properly when we find ourselves in a dynamic environment with different production process variables. This is the question that Ballard and Howell tried to answer. They proposed the Last Planner System (LPS), which is both a planning and a control tool for correcting the shortcomings of traditional planning in the middle of construction. The LPS is applied in 4 distinct phases:

Phase 1 : Master Schedule

The first step of the LPS resides in the creation of a general schedule (Master Schedule). Close to the traditional schedule developed in Gantt, in the Master Schedule only the generic lots are planned, the input data voluntarily remaining rough. The goal is to visualize large ensembles, key players and to place the construction site over time (a beginning and an end should be given) for booting the system.

The Master Schedule can take the appearance of a Gantt chart, it is directed by the supervising team of the project, each can intervene and bring his knowledge on the planned activities to make the document as relevant as possible.

Phase 2: Phase Scheduling

This part can be made from the first work which is accomplished, usually keel laying. The goal is to achieve a schedule collaboratively. Ideally, when developing the schedule, all stakeholders should be represented (companies, developer, design office, etc.). It is better for companies to be represented by the person or people closest to the site (managers, foreman ...) If those directly involved during construction may be present, this will allow a better vision for the business and a better final accuracy of forecasts.

Phase 3 : Look-Ahead Planning

At this stage, participants will be asked to attend at least once a week a progress meeting, to raise the constraints and prerequisites. The look-ahead schedule, by Ballard, is the main tool for construction. This is undoubtedly the most important phase becauseit is at the basis of the control method.

During this stage, each company must announce the progress of its work to ensure the continuity of the following tasks. To be sure that tasks start without any problem, companies complete a Schedule Advancement of tasks.

Phase 4 : Production Planning

These are different work synchronization meetings from the Look Ahead Planning; they are provided on a fixed-day weekly basis.

These meetings are intended to streamline the work on the site. Once a week, each "Last Planner" is invited to announce the work it can perform and the work that they undertake to achieve in the coming week. The constructors make tables with sliding windows for two weeks, allowing a broader vision and greater involvement of "Last Planner".

The schedule is therefore conducted in the manner showed in Fig.2

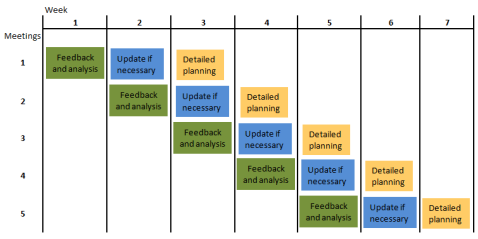


Fig.2. Production Planning in sliding windows

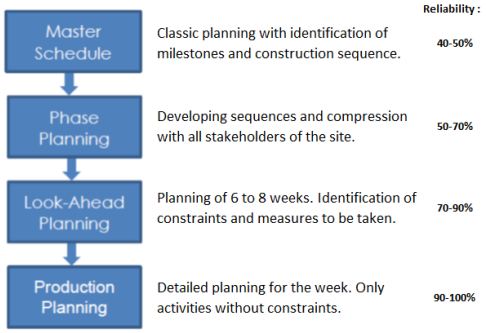
The meeting takes place in 3 stages:

1. Minutes of the last week, and analysis of facts and progress compared to forecasts of the previous week.

2. Each participant will outline the work that it expects to achieve the following week. The golden rule of this game comes down to: "Nothing is agreed upon until everything is acceptable to all."

3. The last step aims to project staff over a longer period and thus to plunge them into an optical foresight and personal involvement. The interest of the manoeuvre is to identify interface synchronizing problems one week in advance in order to react on time.

Studies have shown that with rigor, investment and especially basic Lean training, the gradual use of tools provides good reliability of the method. Note that it may be relatively easy to reach a level of reliability greater than 70%. It is through the look-ahead schedules that it is possible to exceed 70% and expect a much higher reliability of the method. As we go deeper into details, reliability tools are proportionally proven. However, you cannot hope to achieve such a level of reliability without the use of these tools and their perfect knowledge.



4. CONCLUDING REMARKS

In recent years, many research studies have been conducted in the area of management control, to directly confront the control and the organization. The establishment of a "compatible" control / management system is relatively new, the first writings dating back to the 2000s and concerning mainly the field of financial management. These systems have the advantage of controlling the resources, but also of measuring the reliability of the system itself: it is called Management Control System (MCS).

The LPS is a method combining many tools already known and used in the industry, as it allows the MRP II to implement the Lean philosophy for shipbuilding. Nevertheless, a major element differentiates the MRP and LPS: LPS is perfectly adapted to a dynamic environment. "Classic" tools remain the basis of the methods developed for Lean Construction: the real innovation comes from the adaptation of these tools to a perpetually changing construction environment.

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Paper received on December 15th, 2015