LEAN ORGANIZATION: EXPLORING EXTENDED POTENTIALS OF THE LAST PLANNER SYSTEM

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ABSTRACT

The subject of the paper originated from practical project work in a large organization designing, planning, and supervising public infrastructure projects. This organization can be described as traditional with a lot of regulations but conscious of the fact that project work could be improved. Cooperative phase planning along the lines of the Last Planner System was applied in several pilot projects (design/planning phases only). It became obvious rather quickly that lean approaches on a project level would be limited in developing their potential if the overlying organizational structures and cultures would not offer a commitment to Lean and preparedness to changes. The objective of the paper is to show how these changes can gradually be initiated to overcome the main obstacles as fear, resistance to change, and existing procedures.

The main questions are: What are the desirable features of an organization that will support lean project work? Can the Last Planner System play a double role by both improving the project and facilitating gradual changes within the organization?

The method adopted in the organization referred to in this paper was to make the project teams acquainted with some selected eye openers of organizational concepts. To discuss the full set of such concepts with the teams would have done no good. This paper gives a report on this selective approach. In this process the Last Planner System is now being used to transfer improvements of motivation, cooperation, transparency, reliability and promises from the project level into the organization.

KEY WORDS

lean organisation, organisational changes, lean management, last planner system,

INTRODUCTION

The author and his team have always encountered one major field of constraints during the practical work of discussing Lean Principles and of trying to make Lean Tools work on project level in various public organizations operating in infrastructure development. Besides human resistance and inertia towards change, the existing organizational structures formed the major obstacles towards spreading the idea of Lean and towards actually trying something new. Organizations in infrastructure construction are mostly "designed" along the observations made by Galbraith (1995) and they are not understood as a communication system as proposed by Taylor and Van Every (2000).

Admitting communication as the governing organizational principle is

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not easily possible within traditional public infrastructure companies that are financed or owned by the state. An organization of that type is being referred to in this paper. These organizations are usually conscious of the fact that project improvement and organizational streamlining are possible if not necessary. But the organizational rigidity usually prevents its own reorganization. Business re-engineering is tried here and there, rationalization studies are used to reduce costs. All this is done with suboptimal success. Applying Lean Tools on a project level cannot produce full results if the organization is an obstacle and remains to be, even when the management is looking for change. But how can changes be made without shattering the whole structure? Can the organization be brought to move towards Lean Ideals, can the culture gradually be changed towards a more trustful one where learning and leaning from failures would be possible?

The relevant literature shows that creating a Lean culture is a process that starts and is maintained on the shop floor of production (e.g. Mann, 2005). However, in this paper the "shop floor" is in the design and planning offices and divisions, both in the own organization and with contracted A/E firms. This is a rather difficult "shop" with a lot of individualism, a few metrics of measuring output and value, a lot of boundaries, sub-optimal solutions in organizational silos, slow moving processes with obscured visibility, and construction execution with contractors still far away. For this particular phase in the particular construction world special approaches to Lean have to be considered.

ORGANIZATIONAL NEEDS

Modern organizations face two new challenges (according to Spath, 2003): *uncertainty* and *innovation*. These two terms have always been important in the past but they did not have to develop the eminent influence that is necessary today to develop specific mechanisms for shaping innovation and for mastering uncertainty. If organizations and their structures have to be able to master complexity, uncertainty and innovation, then a good portion of Lean Principles have to be incorporated, made available and brought to life in all staff levels. In this context a considerable number of papers have been published within the Lean Construction Community. For example Howell et al (2004) outlined new features of management and managers. Numerous publications come from the field of economics and behavioural sciences, e.g. Renesch (1999) and Worley et al (2003), dealing with Conscious Organization and Organizational Development, respectively. The term *Lean organization* is rarely mentioned. This paper concentrates on two main questions: What are the desirable features of an organization that would support Lean project work? Can the Last Planner System play a double role by both improving the project design work and facilitating gradual changes within the organization?

The method of pursuing answers to these questions was to first make the project design and planning teams acquainted with one selected author who has published considerable work in the field of organization theory and practice from a point of view of sociology (Baecker, 2003). This reference has been selected since it offers organizational proposals that, in

the opinion of the author of this paper, come closest to a vision of a Lean organization, although Baecker does not name it that way. Some of his organizational theories and proposals are reviewed for the purpose of getting hints as to what a Lean organization could look like (later we shall try to learn from Hatamura's "Learning from Failure").

This selective approach was considered sufficient to open the minds of the project teams. To present the full organizational theories could have scared them off. Therefore this paper does not discuss organizational theories or concepts of other relevant publications (e.g. Giddens, 2006) or Chia, 1998). Foucauldian power relations (Foucault, 1977) definitely come into play in the bottom up approach proposed in this paper. Again, in the practical work it is considered sufficient to open the minds for organizational matters and to the use the Last Planner System (Ballard (2000)) as a tool to develop own ways of dealing with necessary changes and of overcoming organizational resistance.

BAECKER'S MANAGEMENT OF ORGANIZATION

Some of Baecker's relevant proposals are selected, combined and interpreted using experiences gathered by the author of this paper while introducing Lean Principles in traditional organizations.

More than ever the organization of and for the future is based on communication. Consequently, the work within the organization must also be evaluated in the context of how the ability to talk communicates purposes and means. This organization then is not only a system for design, planning, and production, or for the generation of further results, but it is a social system of communication. This organization organizes itself anew everyday (it optimizes itself and adapts to new situations) – through communication. It is rather a "becoming" than a thing (Koskela and Kagioglou, 2006). This organization is self-learning. That means to learn from former mistakes of others and to react on own mistakes and failures very quickly.

A major failure of organizations is that they themselves create the limiting factors as prerequisites from which they think they have to start from. They create these because they need a rock-solid base on which all other things can be constructed. Means and ends deducted from these prerequisites become the dominating factor, the organization accepts those constraints and then tries to do and achieve what remains to be possible in a most efficient way.

Everyone willing to deal with uncertainty (most likely this has to be done in organizations) has to rely on communication. In this case "The one who works produces" cannot be said any more without saying "The one who works communicates", at the same time. This communication is about what he wants to produce for whom, when and how. The organization of the future is characterised by communication, openness, transparency, it is even "fragile" and from that fragility it develops its robustness. In this environment obstacles and mistakes will be discovered jointly at an early stage, all participants learn, consensus is found, reliability is increased. That could go as far as one division already

dealing with the problem of another division that has not yet realized the existence of that problem. Failures and mistakes will also be discovered and dealt with across company boundaries.

Knowledge and learning are crucial factors. But how can a knowledge creating and learning environment be organized? Perhaps organizations have always known what they do but they don´t explicitly know what they must know in order to do what they do; and that has to be changed. In most cases there is more knowledge in the organizations than they are able to utilise (and discover and make transparent). Communication and autonomy help to initiate this change. This future organization is not only means for an end but it develops its own ends and is a system looking for ends. This is the only possibility to shape the environment of projects and their results. In this organization the main motivators are not mechanisms of discipline or expectations of promotion any more but the content of the work and, importantly, the intensity of interactions with others, such as collaborators, clients and other stakeholders. Communication is not merely a canal to transmit orders (top-down) and information (bottom-up) but it is increasingly becoming the most important production factor for success.

Lean Production does not get its sense and purpose by using the old patterns of design and construction even more effectively, but by developing new patterns of communication about the work to be done. The organization has to be able to deal with uncertainties (including its own), for example, by learning. However, learning is a destabilising activity (old stuff has to be thrown

overboard). In our modern organization we must therefore be able to develop a routine for discarding routines. A competent organization organizes its own ability to learn. An organization is able to observe situations, describe them and reshape them. It cannot merely be a receptor of orders. It must be simple, have a strong value of autonomy, create definition and consciousness of values and develop a self-understanding.

Humans are the simplest structure that is in the position to deal with complexity. In traditional organizations this fact is not considered sufficiently. These organizations describe the functions of the organization as logically as possible and free of contradictions, and then they try to fit the humans into that structure afterwards with the help of job descriptions. In this case, it is no wonder that these humans then restrict their abilities to calculate their own destiny in the respective organization and to predominantly work for securing and improving their chance to survive and to be promoted. A structure in a company is autonomous if everyone knows which client he works for. The cross-relation with the customer creates the independence of business units without leading to a state of uncontrollability. Keeping the customer in mind and in focus, these units control themselves and they do this with more secure means and more ideas than would be created by control from the top. The main thing is that in an organization nothing happens that is not for a client or for an order of a client.

With these principles and tools we can master high complexities. High complexity cannot be mastered by increasing the complexity of the

organization itself. Our modern organization is an intelligent network, its intelligence consisting of the fact that every individual can (and shall) compensate own missing knowledge through knowledge of others. This particular intelligence can only be developed and become fruitful in a climate of trust. In this context management consists of permanently caring for an environment of trust.

LAST PLANNER 1

If we now look back to our typical public organization we see that the world there is rather different from an ideal Lean organization. We see silos, boundaries, spheres of interest, mistrust, little understanding between internal clients and design/planning divisions, bad understanding between design/planning divisions and external designers, planners, and contractors. In a number of pilot projects the Last Planner System was tested mostly in design/planning teams. There were positive results, however, the teams anticipated and discovered many hindering factors and constraints that would lie in the own organization. Breaking boundaries within the organization and towards third parties was also considered close to impossible. Most teams were fed up with previous reorganization models that only brought more regulations for dealing with more complexity. Trust from higher levels into project levels was limited and control systems and reporting systems were predominant. The question, therefore, was: How could a Lean organization or something similar to it be created that would enable the LPS to take full effect on project level? Project teams that are developing certain gusto for LPS do not believe that identifying typical hindrances created by the

organization itself and reporting them to the organization could change something. Still, there is a solution: Use the LPS for what it is designed for, project improvement and, at the same time, use it as a means to induce effects into the overlying organization. This can be done in a two-fold way.

On the one hand the project teams are encouraged from the top to report organizational obstacles and constraints of their projects back into the organization. That means they feel more important and they develop a sense that they have power to initiate gradual change. On the other hand, this rather gentle approach is not considered as a threat by the middle and top management, the positions of which are still relying on the existing organizational structures. Any other way would be perceived as an earthquake with all its fears and potentials to damage the whole structure.

The Last Planner System is now being used to slowly turn our organization in reference towards the right direction of development. It helps people understand that "the one who works communicates" is not only helpful on project level but also for organizational changes. Through Last Planner it is discovered and understood that constraints and failures can only be detected earlier through the cooperation of all stakeholders and that win-win situations can be created through enhanced reliability and communication. Through Last Planner it is revealed that communication across boundaries is the predominant factor for successful design and production. Again, that is communicated from the project level into managerial levels through Last Planner. The most striking effect of

LPS can be seen in overcoming fear. Changing necessarily creates fear because the present situation is destabilised. The Last Planner System offers a method for a moderate and adequate entry into these processes of change towards a better future.

Another remarkable result of these approaches is the modification of the communication and cooperation between silos and projects. The traditional objectives of a manager of a silo (e.g. costs) partly contradicted with the project objectives. As a result of the improved communication through Last Planner it was decided to modify the numerical target values of the heads of silos in order to better serve the objectives of the projects. All these changes and developments are in their initial stages and a lot has still to be done. This includes the involvement of external contracted firms into that open process.

HATAMURA'S LEARNING FROM FAILURE

There is no doubt that learning from failure forms the major part of any continuous improvement process (CIP, Kaizen). Learning means avoiding a repetition of a certain failure but it - even more importantly- also means to learn from one failure how to anticipate a different failure. It is also clear that learning only can take place if an atmosphere of openness and trust is created in the teams and organization. Unfortunately, the human nature (or our education?) hinders the openness because we tend to hide and cover our mistakes. In our organization in reference these hindering factors also exist. Before we return to this, the term *learning from failure* is discussed from a more general point of view.

As in the previous main chapter, where a sociologist was discussed and interpreted in terms of Lean organization, one author on *learning from failure* will be studied and interpreted in terms of lean. The author is Yotaro Hatamura (Hatamura, 2003). He describes the mechanisms of how failures happen and how they are spread and worsened by covering them up. He stresses the point that, against normal human behaviour, it is important to disclose and make transparent everything in connection with failures. He does this from an engineering point of view and so we are able to look at our Lean organization topic from a second position. Although Hatamura does not refer to anything like *Lean organization* (after all Lean is a western word for what the Japanese do and feel), but his proposals and views can be interpreted for contributing to something like a *Lean organization*. This interpretation is done in the following.

From phrases like "failure is the source of success" Hatamura quickly leads to "many failures are indispensable for creative design". He complains that in the educational systems pupils and students are taught to find the quickest route to solving well-defined questions and not to fail. It would be much better and more important to teach learning how to define the problems themselves. And already we remember our design or planning team trying to apply Last Planner and to develop openness and trust in the reference organization. Trying to follow Hatamura's idea, this team would face a lot of further obstacles on its way to be able to learn from failure. There is the tendency of covering up a small failure so that no

one finds out. However, there is Heinrich's Law showing that any catastrophic failure or failure of great damage has about 30 preceding incidents that have already shown effects and about 300 very small indicators. If these are not detected or are covered up, then the larger magnitude failure is inevitable. If they are disclosed, the larger failures are prevented and learning can take place. So, teaching to disclose the small ones can help to create learning and avoid larger failures. This learning can only take place when each mistake and failure is reported, immediately reported, by an open exchange within the team and not only reported for a report. This is the case especially in a project environment where a certain amount of new territory is always being entered. Mistakes and failures are normal in that context and they will be turned into positive drivers when immediately disclosed and discussed. In the attempt of detecting failure it is more important to learn to see the real problem than to adopt a fast solution to a superficial problem. The development of a culture that does not hide failure is of utmost importance.

A particular source of failure often lies in hierarchical structures. Every level has its own views of the things, top management imposes regulations that lead to the covering up of failures and lower levels have their hands on but are often afraid to report. Changes half way into the project are another major root of problems. These changes often appear so late because of a lack of communication between different design and planning divisions. In a typical tree structure there is lack of horizontal exchange of information (and experience) and often invisible links and dependencies between

products components are not discovered leading to further failures and late changes.

It is important that the responsible person freely describes the failure because in all failures there are emotions involved. Reporting the pure fact is not sufficient to create a learning effect. In a usable failure report, besides the facts and emotions, matters should also be mentioned that would otherwise not be known, e.g. problems with the organization. Experience and learning come with doing the things hands-on in the areas where failures normally occur. But the employees of that level are often in organizational structures that do not support openness and courage.

Even the most elaborate design drawing can still lead to mistakes if it is not made sure that the "hidden factors" (that have led to that solution) are well understood. Many organizations operate without recognizing small failures. In order to change this, Hatamura proposes to introduce an economic mechanism that returns positive numbers for catching signs of failure. It is also important that each individual in an organization should have the "big picture" and understand his role within it and not only following his tight total quality control rules of his own section with the result of suboptimal solutions and of failures at the interfaces. If the people do not have an overview over the whole the result can be "a local optimum and the worst for the whole".

LAST PLANNER 2

The above quotations and interpretations definitely belong to the sphere of Lean Management especially to its Kaizen components. Hatamura proposes a lot of further concepts and solutions for the problems. But these

are not the topic of this paper. Here we would like to return to our reference organization. As seen earlier, during the piloting of Last Planner, it became obvious that its application should be accompanied by organizational changes. And it became apparent that Last Planner could help in these changes. A similar observation was made when the first Last Planner participants stumbled into the problem of being open, of communicating freely and of even revealing own mistakes or indicating coming failures that they would see. Numerous are the reasons for behaving timidly and for hiding things. The reasons have their roots in the human psyche but also in organizational weaknesses. However, Last Planner requires openness for learning from failure and from each other and the organization has to account for that. As an additional feature the LPS offers means to open minds for organizational adaptations necessary to start in small steps towards creating a culture of openness, trust and discussing failures. The teams definitely learn to understand and see that the team approach can help to detect the small incidents according to Heinrich's Law.

The team also very rapidly learns to see what a failure is: Any organizational structure or human act that did not accomplish the original purpose. Following the organizational rule of strictly saving costs in a suboptimal way is a failure and has to be reported within the (moderate) initial new powers invested in the team as part of the expanded Last Planner approach of having the team not only improve its project but also to report organizational or behavioural constraints.

LPS AS A TOOL FOR EVOLUTIONARY REVOLUTION

Changing an organization and its culture is difficult since humans are involved and the change can only be managed gradually, like an evolution, whereas the results must be radical, like a revolution. Nothing but evolution will be accepted by the top management that lives in and for the organizational structures that have been created by them.

It is also impossible to design something like a Lean organization. It can only grow through self-learning processes. Figure 1 shows an arrow representing the path from a present situation, bottom left, to a Lean Enterprise, top right. It is sure that this arrow has to be supported by tools, a selection of which is shown in the lower right triangle. At the same time the path to become a Lean Enterprise depends on a number of decisive factors such as top management unconditional commitment, organizational changes etc., shown in the upper triangle. In the lower triangle the *Last Planner System* has been marked and in the upper triangle the *Organizational Changes* and *Culture of Learning*. This has been done for good reasons since, as shown above the Last Planner System is, besides its potentials on the project level, the door and gateway to the organizational and cultural changes on which the path to a Lean Enterprise is so decisively depending. The top management commitment will not be declared for a revolutionary change that would shake the organizational structure. On the other hand, radical results at the end of the transformation process are welcomed.

The upper left triangle, the managerial context, implies another

term not yet mentioned in figure 1. This is the natural and rational desire and task of the management to keep the things under control. Control (in the sense of both checking and steering) is one of the focuses of managerial thinking and organizational structures. Who wants to lose control? In order to become a Lean Enterprise and to develop the full potentials of Last Planner and of other tools on project level parts of the control have to be delegated. In this process, the overall control will not be weakened but shifted. In a traditional organization the tendency to be expected will be that the control intentions from top left would push the arrow or the path leading to the Lean Enterprise down as it is shown in figure 2. In the worst cases it would even flatten out the arrow that means no grade, no ascent towards Lean is possible. Again, the Last Planner System is the method of "getting the control under control". It is relatively easy to get a management's consent to

pilot projects with Last Planner System and to give to the project teams the right to openly report and even complain if certain organizational structures and behaviours are impeding or negatively influencing the project work and result. In this phase, structural aspects of organization and regulations would not yet be changed but made visible. In other words, the arrow takes off at a small angle, this means with low profile but with the aim of gradual change. This pilot phase is there to create trust and confidence on both (top down and bottom up) sides of the path to Lean Enterprise.

If progress on project level can be shown or anticipated then a next phase can be initiated that is a roll out of pilots in general and at least one full-scale project to give the whole process more power and weight and possibilities to indicate areas where changes are possible and necessary. (Our organization in reference is in that phase.)
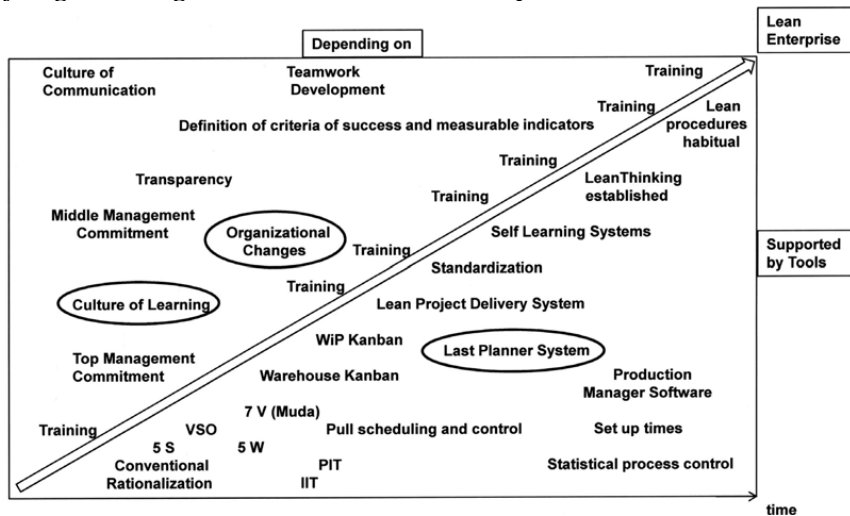

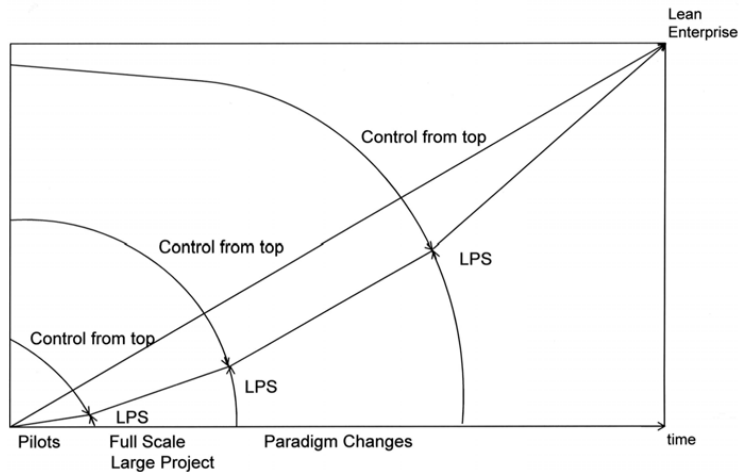Figure 1: The road map to a Lean Enterprise

Figure 2: LPS versus top-down control on the path to a Lean Enterprise

By doing this and by applying additional Lean Tools, our arrow can work itself further up. Eventually there should be a phase of changes of paradigms. Here, both successful project work and consequent indication of weaknesses of the organization show results turning our arrow more and more towards the direction of the focal point Lean Enterprise. Ultimately, Lean Thinking will be established and Lean Procedures become habitual. Figure 1, of course, is a simplification. For one, the Lean Enterprise is not the final point but a continuous road. Secondly, LPS is not the only method to find a balance between control and delegation, between hindering factors and progress, between mistrust and lack of confidence. Many other tools of the Lean world and also from classical management must help as shown in figure 1. But LPS has the potentials and powers of a scout, of an opener of minds - properties that are necessary to initiate and sustain an *evolutionary revolution* with adequate speed and

measure but with radical positive changes in the future.

CONCLUSION AND SUMMARY

LPS can contribute to better project results. This contribution is limited when cultural and organizational changes fail to materialize. This failure is often programmed by existing rigid structures and a management fearful of rearranging the structures or of delegating some of the control into the Lean project team. On the other hand, traditional project teams are not trained to disclose own failures for learning on project level and, even lesser so, to consequently report hindrances generated by the own organization. There is not enough confidence on project level to really see the possibilities of contributing to changes on the organizational level. A prudent application of Last Planner can and will bring the two sides together on the way to a better project management and on the road to a Lean Enterprise. The LPS takes fear of losing control away from the top down people. And it

induces confidence into the own capabilities of the project team to communicate not only for a better project but also for taking influence on organizational and cultural changes:

- Top-down: Change! Yes, we can (admit it in small doses)

- Bottom-up: Change! Yes, we can (really do something).

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