Abstract - Lean Thinking can help improve customer satisfaction through increase of value to end-customers. Knowledge assets within organizations such as project lessons learned can also provide such value. The question is how lessons learned processes can benefit from lean thinking principles. There seems to be a lack of scientific literature providing insight into this issue and this work aims at narrowing this knowledge gap. It is found that in the initial phases of a project, the ‘wish for learning’ can trigger pulling lessons learned. However, during project lifetime this trigger appears to lose its momentum as keeping lessons learned on the agenda becomes difficult. This difficulty can be overcome through organizing facilitated intervision sessions, where peers exchange knowledge and experience.

Keywords: Lean thinking; Knowledge management; Lean knowledge management; Project lessons learned; Knowledge pull; Just-in-Time knowledge

1. Introduction

Enterprises today find themselves in a competitive and international market where product customization is growing (Bendell, 2006). In order to stay competitive and maintain optimal functioning under such circumstances, firms need to be critical towards their production methods and the quality of their products and services. Cost reduction and customer satisfaction or lack thereof can in some cases be the maker or breaker of businesses (Wu & Liker, 2000). One way of achieving customer satisfaction is through Lean Thinking process optimization methodology (Hicks, 2007).

Lean thinking offers an increase of value to end-customers by identifying and eliminating waste and its root-causes (Bhamu & Sangwan, 2014). This method was initially applied in the automotive manufacturing sector (Green, 1999), however, since then many other sectors have implemented its principles as they also wished to profit from its benefits (Bhasin, 2012).

Value to end-customers can also be created and derived from knowledge assets within organizations. These assets and their effective application can be critical for organizational success and act as a differentiating competitive factor (Wiig, 1997). Management of these knowledge assets is known as knowledge management. Alavi et al. (2005) identified benefits of effective knowledge management to be: improved customer service, cost reduction,
improved decision making, innovation, quick and efficient problem resolution, and efficient transfer of best practices.

Optimal utilization of knowledge assets is of importance to project-based organizations. The main working processes of these organizations are structured around projects and they have established distinct work processes for successful project execution (Thiry, 2008). One way of capturing knowledge and experiences gained in projects is through lessons learned. These are lessons from a project that can help safeguard best practices and prevent repeating past mistakes (Bhamu & Sangwan, 2014). They can hence improve future decision making in projects (Pitagorsky, 2000). Lack of learning from projects has been identified in the literature (Williams, 2004) and many organizations struggle with LL processes (Bendell, 2006). These processes are in need of improvement.

**Added value** - as lean thinking can contribute to process improvement leading to an increase in customer satisfaction, the question arises whether the principles of lean thinking can help improve knowledge management efforts and in particular knowledge exchange by means of project lessons learned. The number of scientific literature regarding this issue is found to be rather slim. This paper aims at narrowing this knowledge gap by examining applicability of lean knowledge management to project lessons learned. We consider opportunities and limitation of such application.

In order to achieve this goal, in section two research methods is given. Section three takes a closer look at lean knowledge management and in particular the principle of knowledge pull. Section four provides opportunities and limitations of achieving knowledge pull in project lessons learned. Section five concludes this paper’s findings, describes its limitations, and offers suggestions for future research.

2. **Research Method**

This paper uses literature review and a case study as its research methods. A systematic literature search is initially started by looking at lean thinking, knowledge management, lessons learned, lean knowledge management, and knowledge pull/Just-in-Time knowledge. Using a wide search engine, a global understanding of the type of publications that can be found on these subjects is obtained. We notice that lean thinking is also referred to as Lean and Lean philosophy and that knowledge management is also referred to as Information Management.

Using these keywords, we initially look for literature reviews to get a better understanding of these topics. The reference list of these publication and the list of publications they have been cited in, are then used to find more specific literature. For this part, both wide and specific search engines are used. The main part of publications selected are those that look at applicability of lean thinking to non-manufacturing activities, characteristics of knowledge, and challenges in exchanging lessons learned. Where possible information on lean knowledge management and in particular knowledge pull is collected.
Next to these theoretical aspects we also consider a case study to test our literature-based findings in practice. For this case study a project-based organization that wishes to improve its lessons learned process is chosen. In order to get a better understanding of how this company operates and how its lessons learned process is organized, we collect data through interviews and workshops. Our findings are finally tested in a pilot.

**Case study** - in order to get a better understanding of the steps a project goes through and the connection of lessons learned process to these steps, we gather data. Initially data is collected through interviews. Knowledge-customers are divided into 4 categories and in total 21 interviews are conducted. They are semi-structured face-to-face individual interviews. Their results are raw data in need of interpretation. We analyse data by becoming familiar with it and its context, through which cause and effect links become apparent. Results of interviews are anonymous and confidential. These results reveal the root-causes behind lack of success of the current lessons learned process according to the knowledge-customer.

The most important root-causes are identified and countermeasures in dealing with them are formulated in a workshop. A diverse selection of those interviewed plus experts on documentation, project management training, and the system administrator take part in this workshop. The first hour of the workshop is used to validate data collected during interviews. The second hour is a brainstorm session where countermeasures are formulated in dealing with the most important root-causes.

The findings of the literature study described earlier, plus the results of the interviews and the workshop are used to formulated improvement proposals for the current lessons learned process. These proposals are constrained by time, budget, and resources available during our study. A selection of the proposed improvements are directly implemented and others are left for future steps. We do not want to overwhelm our knowledge-customers with too many alterations which can cause resistance to change. Furthermore, making too many changes at once can also make their evaluation more difficult.

In order to examine the workability of our proposals in practice, a pilot with a duration of 6 weeks is organized. All those who participated in the interviews are invited to take part in this pilot. Data collection takes place via email correspondence, personal conversations, and participation in meetings. Through this pilot potential problems are detected and effective and workable solutions in dealing with them are formulated. Moreover, we create acceptance for changes needed to the current lessons learned process. For more on our study, please refer to: “Improving Knowledge Management by means of Lean Thinking; A case study of project Lessons Learned exchange at the Engineering department of Janssen Biologics”, November 2015. A selection of our findings is given in this paper.
3. **What is Lean knowledge management?**

Lean thinking as a philosophy has the potential to be applied to various activities and offer them significant improvements (Hicks, 2007). It is, however, believed that in such application attention should be given to characteristics of these activities (Green, 1999). Lean thinking consists of five steps, namely: 1) Define value, 2) Identify value stream, 3) Create flow, 4) Establish pull, and 5) Strive for perfection. In this paper we concentrate on step four, establish pull. This step concentrates on providing the customers with what they need, when they need it (Petersen, 2009). For the pull concept to be successful, good communication and collaboration with downstream customer is needed in order to fully understand their needs and wishes (Thangarajoo & Smith, 2015).

**Knowledge Pull** - the concept of knowledge pull concentrates on providing knowledge if and when it is demanded by the customer (Hicks, 2007), hence Just-in-Time knowledge. According to Kerschberg and Jeong (2005, pp. 1) “the concept of Just-in-Time knowledge management is appealing in that, the goal is to provide the right information, to the right people, at the right time so they can take action based on that information”. To Malhorta (2005, pp. 17) Just-in-Time knowledge management is delivering knowledge “without latency or delay”.

The task of a pull system for knowledge management according to Mahe and Rieu (1998, pp. 18-4) “consists in bringing people together for them to directly exchange knowledge or to orient them to archives of past projects”. In traditional push approaches, the chosen knowledge for future reuse is selected based on a forecast. Making this forecast is found to be difficult. The pull approach has the benefit of providing swift results in contrast to the traditional push approach which requires long investment periods after which results can be experienced (Mahe & Rieu, 1998).

4. **Opportunities and limitations of applying lean knowledge management to project lessons learned**

Individuals are usually gravitated towards those who are perceived to be an expert (Malik & Malik, 2008) as they can offer valuable knowledge. In cases where demand for knowledge in the form of ‘wish for learning’ is present, knowledge pull can take place. This wish for learning can trigger pulling knowledge from the knowledge source (database or individual). Hence, creation of a knowledge pull process can use this wish for learning as a trigger. When it comes to the lessons learned process, the aim would be to use such trigger throughout the project lifetime to optimize lessons learned retrieval.

**Opportunities** - using learning as a trigger for pulling lessons learned can be successful in the initial phases of a project. Here, there is a great need for knowledge and lessons learned can be an important source. As project members are eager to learn, they are expected to pull knowledge from various sources. Moreover, through this wish for learning individuals become aware of knowledge present within their organization and how to access it.
**Limitations** - next to collecting lessons learned in the initial stages of a project, the aim would be to utilize lessons learned throughout the project lifetime. Keeping lessons learned on project agenda, can be challenging due to lack of time. This lack of ability to keep lessons learned on the agenda causes the importance of retrieving lessons learned to fade with time. In order to overcome this challenge, facilitated intervision sessions can be organized. In such sessions peers get the opportunity to exchange knowledge on a regular basis. This manner of knowledge exchange allows interaction and feedback to take place through active personal contact, which is the most effective manner of sharing knowledge (Wang & Noe, 2010).

5. **Conclusion, Future Research and Study Limitations**

Lean thinking can contribute to process improvement, leading to an increase in customer satisfaction. The question is whether its principles can help improve knowledge management efforts and in particular knowledge exchange by means of project lessons learned. There appears to be a knowledge gap with regard to this application and this paper aimed at narrowing this gap.

It is found that using learning as a trigger for pulling lessons learned can be successful. In the initial phases of a project, there is a great need for knowledge and lessons learned can be an important source. As project members are eager to learn, they are expected to pull knowledge from various lessons learned sources (databases and individuals). However, keeping lessons learned on the project agenda can be challenging due to lack of time. This lack of ability to keep lessons learned on the agenda causes the importance of retrieving lessons learned to fade with time. In order to overcome this challenge, facilitated intervision sessions can be organized where peers get the opportunity to exchange knowledge on a regular basis.

The lessons learned process is in essence a traditional push process as at present knowledge is collected and stored for projects that are in some cases unknown and where the customers for lessons learned at times cannot be identified. Hence, effective identification of the needs and wishes of customers in such situations cannot take place through direct dialogue and feedback (which is essential to lean thinking). Having said that, this does not necessarily mean that some aspects of project lessons learned process cannot become more Lean through for example using the wish for learning of customers as a trigger for pulling knowledge.

There is a great need for future research when it comes to applicability of lean knowledge management to project lessons learned, both on theoretical and practical level. Below a few suggestions are given:

1. The role of Management and the project sponsor are left out of the study scope. They, however, play an vital role in enforcement of changes and long term success of the lessons learned process. The importance of this role needs future consideration.
2. Company culture as well as norms and habits regarding knowledge sharing, can also impact success of the lessons learned process. These factors are not considered in our study and need future examination.

3. In our case study a lessons learned process is in place and project activities are defined at a high level. Applicability of lean knowledge management in setting up a lessons learned process needs to be investigated.

4. In this work we looked at everyday projects of a project-based organization. One-of-a-kind projects have different processes and organizations. It should be examined to what degree these aspects influence the findings of our study.

Given time and scope constraints, this work has its limitations and in applying the above given results these limitations need to be considered. Our findings are based on the results of one case study and we did not look at their wider applicability within other organization. This can lead to organizational bias.

References:


