

Experienced Barriers to Lean in Swedish Manufacturing and Health Care

Bengt Halling

Centre for Musculoskeletal Research and Center for Innovative Production and Logistics, University of Gävle, Sweden, and Royal Institute of Technology, Sweden.
E-mail: bengt.halling@hig.se

Katarina Wijk

Department of Public Health Medicine, County Council of Gävleborg, Sweden; Faculty of Educational Science, Uppsala University, Sweden; and Centre for Musculoskeletal Research, University of Gävle, Sweden.

ABSTRACT

Purpose: The purpose is to compare similarities and divergences in how the concepts of Lean and barriers to Lean are described by key informants at a production unit in a large manufacturing company and two emergency health care units in Sweden.

Design/methodology/approach: Data was collected via semi-structured interviews and analyzed with the constant comparative method (CCM) and Porrás and Robertson's (1992) change model.

Findings: In both organizations, the view of Lean changed from a toolbox to a human behavior view. Eight barriers were experienced in both organizations. Three barriers were unique to manufacturing or to health care, respectively. Nine barriers were elements of social factors; five were elements of organizing arrangements.

Research limitations/implications: Only people practically involved and responsible for the implementation at the two organizations participated in the study.

Practical implications: Persons responsible for implementing Lean should consider organizational arrangements and social factors in order to limit barriers to successful implementation.

Originality/value: Most research on Lean has been about successful Lean implementations. This study focuses on how Lean is viewed and what barriers personnel in manufacturing and health care have experienced. In comparing the barriers to Lean experienced in the two groups, common, archetypical, and unique barriers for manufacturing and health care can be identified, thus contributing to knowledge about barriers to Lean implementation.

KEYWORDS

Lean, implementation, barriers, comparison, development, health care, manufacturing

ARTICLE INFO

Received October 2013

Accepted December 2013

Available online December 2013

INTRODUCTION

Lean, with its origin at the Toyota Motor Company, is a concept that can increase effectiveness in manufacturing (Sugimori et al., 1977; Krafsik, 1988; Womack et al., 1990; Cusumano, 1994; Womack and Jones, 2003; Kim et al., 2006; Emiliani et al., 2006). Cusumano (1994) argues that at Toyota in the late 1980s, the output per worker was two to three times higher than at U.S. or European plants. The Lean concept has been proposed and argued to be relevant for improving production performance in health care delivery as well, through waste elimination, adding value for the customer and flow focus (Kim et al., 2006; Kollberg and Dahlgaard, 2007; de Souza, 2009; Joosten et al. 2009). Since the phrase Lean was coined in 1988 (Krafsik, 1988), Lean as a concept has evolved over time. The result is confusion about what Lean is (Hines et al., 2004). This in turn may lead to a variety of ways to understand and implement Lean in organizations.

The Toyota Way and Lean

Lean is described as having begun as a translation of the Toyota Production System. One might logically expect a management concept as popular as Lean to have a clear and concise definition, but there is none. Over time the Lean concept itself has become translated to different versions (Pettersen, 2009). The Lean concept has shifted its focus from the technical production system to an all-encompassing organizational philosophy. These two views of Lean are called Toolbox Lean and Lean Philosophy, respectively (Langstrand 2012). From this one can assume that Lean implementation may differ in different organizations.

Toyota's success has inspired a lot of organizations around the world to start a "Lean journey". The reported results of Lean implementation efforts are, however, divided. Some scholars report that most of the Lean implementation efforts are not reaching the goal (Sohal and Eggleston, 1994; Spear and Bowen, 1999; Bhasin and Burcher, 2006; Emiliani, 2006). This study surveys some of the barriers to successful Lean journeys.

A basic and important assumption at Toyota is that people are the source for the development of production (Liker, 2004; Osono et al. 2008; Rother, 2010) and people development has been seen as a key success factor by Toyota leaders since the company's founding (Liker and Hoseus, 2008). The assumption of the importance of people and their development has shaped the Toyota Way, leading to a system characterized by dualism. Liker and Hoseus (2008, p. 39) depict the Toyota DNA as two intertwined value streams, the product value stream and the people one. The dualism of the Toyota Way is also clearly seen in the two main principles: continuous improvement (CI) and respect for people (RfP) (Toyota, 2003).

The dualism, CI and RfP, that is seen as so important at Toyota is equally important in Lean. Emiliani (2006) argues that simple logical arguments would reveal that authentic continuous improvement is not possible without respect for people (p. 177). However, it seems common to misunderstand or neglect the "respect for people" principle, calling it an obstacle to Lean (Sohal and Eggleston, 1994; Bhasin and Burcher, 2006; Teresko, 2006; Liker and Hoseus, 2008; Osono et al., 2008; Pay, 2008; Ivarsson et al., 2013). Seddon (2005) argues that "toolheads" will not succeed with Lean in manufacturing or service organizations. In contrast, just as Toyota focuses on the "respect for people" principle, in the future managers that go for Lean must understand the meaning of respect for people to succeed. The manager's role in Lean is

to be supportive and challenge the people they manage to develop (Liker and Meier, 2007). That means that manager's capacity to lead is central in both the Toyota Way and in Lean.

Lean in health care

It is now recognized that Lean, with its improvement focus, is relevant in more sectors than manufacturing, such as in service (Radnor et al., 2006; 2012) and in health care (de Souza, 2009; de Souza and Pidd, 2011; Mazzocato et al., 2012, Radnor et al., 2012). The relevance of Lean in health care delivery is argued to be the Lean concept's improvement approach through waste elimination, adding value for the customer and flow focus (Kim et al., 2006; Kollberg and Dahlgaard, 2007; de Souza, 2009; Joosten et al., 2009). Many countries face an increased demand for efficiency and avoiding waste in providing health care (Radnor and Walley, 2008; Mazzocato et al., 2012; Radnor et al., 2012). Health care in Sweden is facing that kind of challenge; Lean is proposed as one approach to achieve the more effective use of resources in health care (Kollberg and Dahlgaard, 2007; Mazzocato et al., 2012).

Kollberg and Dahlgaard (2007) argue that it is important to see Lean as a part of a larger management shift, in order to plan for changes in mindsets and workplaces. They also advocate taking into account that local departments have different requisites to plan and predict their demands when adapting the Lean principles to health care. Radnor et al. (2012) and de Souza (2009) find that so far most Lean initiatives in health care have been performed as discrete projects that create 'pockets of best practice' rather than adopting an organizational or system-wide approach.

Joosten et al. (2009) argue that application of Lean to health care has often been limited by a tool focus. Seddon (2005) also see Lean tool focus as a threat to successful Lean application, concluding that "toolheads" risk losing the opportunity to improve service organizations. Joosten et al. (2009) assert that the application of Lean in health care needs a more integrated approach as a framework for Lean thinking, with both socio-technical and operational aspects. Lean in health care is at an early stage of development and often focuses on the use of particular tools (Mazzocato et al., 2012, Radnor et al., 2012). Radnor et al. (2012) suggest that health-care organizations are at a stage equivalent to automotive manufacturing in the late 1980s and early 1990s; they argue that managers must move from a tool focus to embrace Lean thinking more broadly across the wider health-care system. However, there are some initial positive effects reported from the application of Lean in health care, including: reduction of patients' waiting times (Mazzocato et al. 2012; Radnor et al. 2012), positive impact on quality (Kim et al., 2006; Radnor and Walley, 2008; Radnor et al., 2012), reduction in cost (Radnor et al., 2012), increased satisfaction among staff and patients (Radnor et al., 2012), increased efficiency in patient flow (Kim et al., 2006; Radnor and Walley, 2008) and increased productivity (Radnor and Walley, 2008)

Among challenges to adopting Lean in health care Waring and Bishop (2010) argue that though Lean has the potential to improve health care delivery, that potential is not easily realized and requires good leadership. Kollberg and Dahlgaard (2007) conclude that it is important to design a system that measures the initiatives taken, requiring new thinking about management in health care.

Mazzocato et al. (2012) point out that Lean in health care is still at an early stage and argue that research on Lean is limited and that studies reporting successful Lean interventions predominate, while not enough studies report about failed Lean attempts or barriers to its

application in health care. They further argue that research on Lean often lacks an explicitly stated and appropriate research design.

Barriers and resistance to change

Change efforts occasionally fail; so do most Lean efforts (Spear and Bowen, 1999; Sohal and Eggleston, 1994; Bhasin and Burcher, 2006; Emiliani, 2006). In a 1979 Harvard Business Review article, reprinted in 2008 with the title "Choosing Strategies for Change", Kotter and Schlesinger (2008) argue that there is nothing more difficult and doubtful of success than to initiate a new order of things. They further argue that change initiatives often encounter resistance from humans and that managers, although generally aware of that, surprisingly rarely search systematically for sources of resistance before they initiate change initiatives. In the article they identify four common reasons to human resistance to change: a desire not to lose something of value, a misunderstanding of the change and its implications, a belief that the change does not make sense for the organization and a low tolerance for change.

And they claim that it is important for managers to be aware of the four common reasons for resistance to change, because that gives them a chance of predictability (Kotter and Schlesinger, 2008).

Kotter (1995) identified eight errors that often are made in change efforts. Error 1 is not establishing enough of a sense of urgency. Error 2 is not creating a powerful enough guiding coalition. Error 3 is not developing a clear vision that is easy to communicate. Error 4 is failing to communicate the vision. Error 5 is not removing obstacles to the new vision. Error 6 is the lack of planning and creating short-term wins. Error 7 is to declare victory too soon. Error 8 is neglecting to anchor the changes in the organization's culture.

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Barriers to Lean

Research on Lean is still limited and often lacks an explicitly stated and appropriate research design and measurement of outcomes. Also, there is a lack of knowledge about failed Lean attempts and barriers to application of Lean (Mazzocato et al., 2012). However, some reports on barriers have been published.

Sim and Rogers (2008) concluded that among Fortune 500 plants located in eastern USA, an aging and high-seniority hourly workforce and lack of committed leadership were the primary barriers to Lean. They further argue that communication is essential for continuous improvement initiatives, maintenance and effectiveness.

In a study of 68 UK manufacturing firms, it was found that barriers to Lean are strongly connected to the size of an organization and that as every organization is unique, cultural issues are of importance. For a successful Lean journey both financial and human commitment is essential (Bhasin, 2012).

Research on Lean implementation in aerospace (Crute et al., 2003) showed that when implementing Lean it is important to consider the plant's specifics rather than firm specifics, since circumstances can differ among plants belonging to the same firm. The research indicated that operation managers need to have both a strategic as well a tactical role. Crute et al. also found that top managers are important, since they are the ones who must present a coherent vision that clearly communicates how Lean fits and is related to their business strategy, if the Lean implementation is to be successful. It was proposed that a culture that supports autonomous working and learning through experimentation could speed up the implementation process.

Research on Lean manufacturing implementation in Malaysian automotive components manufacturing (Muslimen et al., 2011) showed the importance of skilled people with their own experience with Lean as Lean teachers and coaches. They further concluded that support and clear directions from top managers are important.

Radnor et al. (2006) identified eight slightly different barriers compared to Kotter (1995), for lean implementation in public services: (1) people, in terms of skepticism about change programs in general; (2) lack of ownership, in terms of current activities or of proposed processes; (3) poor selection of improvement team members; (4) leadership failure; (5) compartmentalization or silo culture; (6) weak links between the improvement program and the organization's strategy; (7) lack of resources; and (8) poor communication (pp. 70-71).

Based on the literature and their own experiences, de Souza and Pidd (2011) identify eight barriers to Lean, five common to both manufacturing and health care (M&H) and three that are unique to health care (H). The explored barriers were: (1) perception of Lean (H), (2) terminology (M&H), (3) personal and professional skill (H), (4) organizational momentum (M&H), (5) professional and functional silos (M&H), (6) hierarchy and management roles (H), (7) data collection and performance measurement (M&H), and (8) resistance to change/scepticism (M&H).

Change for increased organization performance

The lessons that can be drawn from change initiatives will probably be of increasing interest and importance with increasing competition. According to Kotter (1995), the most important lessons are that a change process goes through different phases that usually require time to handle and that critical mistakes in any of the phases can create a devastating impact on the change process. He argues that there are eight important steps that help a change effort to

succeed: 1 establishing a sense of urgency, 2 forming a powerful guiding coalition, 3 creating a vision, 4 communicating the vision, 5 empowering others to act on the vision, 6 planning for and creating short-term wins, 7 consolidating improvements and producing still more change and 8 institutionalizing new approaches (Kotter, 1995).

The eight steps above aim to influence how humans think and behave. Human work behavior is central for organizational performance, and change aiming for increased performance requires change in human behavior at work (Robertson et al., 1993). Dul and Neumann (2009) argue that ergonomics (or human factors) knowledge can support a company's business strategy to stay competitive, as ergonomics is concerned with the understanding of interactions between the human and other elements in a working system. The two goals of human factors and ergonomics (HFE) are to optimize human well-being and optimize the performance of the overall system (Dul and Neumann, 2009; Dul et al., 2012). By designing a work environment to fit humans, two related system outcomes are possible to achieve: performance and well-being. Performance outcomes can be achieved in terms of productivity, efficiency, effectiveness, quality, innovativeness, flexibility, system safety and security, reliability and sustainability. Well-being is achieved in terms of health and safety, satisfaction, pleasure, learning and personal development (Dul et al., 2012, p. 5). Unfortunately HFE is still too unknown (Dul et al., 2012) and therefore HFE knowledge often is overlooked in organizational change efforts aiming to increase organizational performance.

Confusion about the Lean concept

Since Krafsik (1988) coined the term Lean, Lean as a concept has evolved. The result is confusion about what Lean is (Hines et al., 2004). Pettersen (2009) supports this notion, stating that Lean is a translated version of the Toyota Production System and that Lean itself has been translated into many different versions. The emphasis has shifted from a technical production system focus to an all-encompassing organizational philosophy; these two views of Lean can be called Toolbox Lean and Lean Philosophy, respectively (Langstrand, 2012). If Lean is viewed solely as a technical tool kit, Lean attempts will end in failure (Liker and Hoseus, 2010).

PURPOSE

The purpose of this paper is to compare similarities and divergences in how the concepts of Lean and barriers to Lean are described by key informants at a production unit in a large Swedish manufacturing company and at two emergency health care units in Sweden.

RESEARCH QUESTIONS

RQ 1: How is the concept of Lean described by key informants at two different large organizations?

RQ 2: What are described as the main barriers to succeed when implementing Lean, according to key informants at two large organizations?

METHOD

The data was collected through semi-structured interviews that were recorded with a digital voice recorder; the recordings were then transcribed to text. Analysis was done with the constant comparative method (CCM), and Porras and Robertson's (1992) change model.

Data collection

We conducted semi-structured interviews at three workplaces. The key informants are the personnel leading and responsible for Lean implementation at the workplaces. They were invited to participate and all agreed. At the manufacturing company there were 14 interviews; and at two emergency units there were nine interviews. All selected respondents agreed to participate. The interviews lasted one-and-a-half to two hours and took place in the respondent's office or in a nearby conference room.

The Interview guide consisted of ten questions:

1. Have you had any Lean training?
2. How would you describe Lean?
3. Do you think all the people in your organization view Lean in the same way?
4. How is Lean implemented?
5. How is the implementation process going?
6. Do you see any barriers/challenges to succeeding with the Lean implementation?
7. Have you or your organization any vision of what it will look like when Lean is implemented?
8. Is there any health-related work connected to the Lean implementation?
9. What are you doing to promote wellness among the personnel?
10. Is Lean affecting the leadership?

Description of workplaces and sample

The studied manufacturer is part of a globally established Swedish manufacturing company that started their Lean journey eight years ago. The company is divided into several independent strategic product areas, which in turn contain several production units. The interviews were at one of the production units. Interviewed were the 14 managers at the unit that are responsible for the Lean implementation process: the production unit manager, two production managers, eight production leaders, two maintenance unit managers and the manager of the technical support unit, in all 14 interviews.

The two emergency units belong to the same county in mid-Sweden and will from here on be called Health Care. Interviewed at Health Care were the division manager, the operations manager, the HR strategist at the division, two business developers, the nursing manager at respective emergency units and two Lean coordinators, in all nine interviews. The Lean journey for the emergency departments started in 2009, three-and-a-half years before the interviews were conducted.

Both the manufacturer and the emergency departments had been using big global established consultant firms (not the same one) to obtain basic Lean knowledge. In Health Care the teaching was directed to nurses and some managers; in the manufacturer the consulting firms directed the training to the managers in production. In both cases the training was about 5S and daily steering using visualization boards, with the aim of building continuous improvement through group kaizen activities. That meant that all the respondents received basic Lean knowledge from consultants.

Method and analysis procedure

The analysis consisted of two major steps. The first was to find obstacles from both industry and health care informants and compare them; this was done with the constant comparative method (Boeije, 2002). The second major step was to analyze the barriers with a proposed model for change (Robertson et al., 1993).

In qualitative research, comparison is an ordinary principle. One analysis method used for this kind of research is the constant comparative method (CCM). CCM analysis consists of two equal important activities to reconstruct the perspectives of researched groups: fragmenting and connecting. Fragmenting emphasizes the separate themes that emerge from the interview and focuses on an individual ordering process. While the fragmenting separates the coded pieces from the context of the interview, the connecting activity accentuates the context and richness of the data as the interview parts are interpreted as a whole and the pieces of one case are connected into a coherent picture. CCM analysis is a step-by-step process, but the number of steps as such is not important, as it depends on the kind of material involved (Boeije, 2002).

The CCM analysis in this paper is based on two groups, the Manufacturer and the Health Care group, and consisted of three steps: 1 comparison within a single interview, 2 comparison between interviews within the same group and 3 comparison of interviews from different groups.

Step 1 began with listening and transcription of the voice recordings to text. The transcriptions of the individual interviews were then read to search for factors related to RQ1 and RQ 2. When factors were found they were marked with a highlighter. The process started with the interviews with people from manufacturing and then from health care.

In step 2 the factors that had emerged in step 1 were copied to paper and cut out with scissors. This made it possible to arrange and rearrange the factors in clusters, a process that went through several iterations, forming a development spiral from factors to clusters. The comparison between interviews within the same group was first done with interviews from the manufacturing informants and when finished done with the interviews from the health care group.

In step 3 we compared the interviews and the emerged factors and clusters from the two group's clusters; that process ended with seven shared barriers to Lean and two sets of three barriers unique to each group.

Change model analysis of the barriers

Production is based on human activities; quality for the end user therefore depends on the quality of the processes and activities that create and deliver the product or service (Eklund, 2000). Organizational change, i.e. improvements in organizational function, requires behavioral change among the people working in the organization, and work behavior is influenced by the work setting (Robertson et al., 1993). Eklund (2000) argues that it is important to discuss and develop a framework for analyses of the quality of interactions between humans, technology and organization. A framework has been proposed by Robertson et al. (1993). According to Robertson et al. (1993) an organizational work setting consists of four major interrelated subsystems: organizing arrangements, social factors, technology and physical setting. Each of the four subsystems consists of specific elements that strongly influence the work behavior of individual organization members. Porrás and Robertson (1992) define the specific elements related to the four subsystems as in Table 1 below.

Org. arrangements	Social factors	Physical setting	Technology
1 Goals	1 Culture	1 Space configuration	1 Tools, equipment and machinery
2 Strategies	2 Management style	2 Physical ambiance	2 Information technology
3 Structure	3 Interaction processes	3 Interior design	3 Job design
4 Administrative policies and procedures	4 Informal patterns and networks	4 Architectural design	4 Work flow design
5 Administrative systems	5 Individual attributes		5 Technical expertise
6 Reward systems			6 Technical procedures
7 Ownership			7 Technical systems

Table 1. The four subsystems with related elements, after Porras and Robertson (1992, p. 729)

RESULTS

How is the concept of Lean described by key informants at two different large organizations?

In both groups the initiative to implement Lean had come from the top in the organization, with the stated aim of getting economic paybacks through reduced costs. The informants argued that this was a reflection of lack of knowledge among top managers about what Lean is. However, according to the informants from both organizations it created suspicion and some resistance to Lean among some personnel who believed that Lean was a way for the top managers to lay off employees to get the paybacks. That situation has now changed, according to key informants, and slowly more and more people have started to see benefits from working according to Lean principles.

In both groups the informants described a beginning stage in which the consultants held a view of Lean as a toolbox. That view was said to have been changed through implementation experiences. A representative declaration by an industry manager highlights this when he tells about his Lean training:

"The people are a missed object in the courses I went through. Of course you can learn about that from other sources, but it is only now I realize the importance of people. Until now we mainly talked about machines and such things".(Manager in the Manufacturer)

Another informant expressed it this way:

"I think we started in a wrong way and as a consequence Lean got a negative connotation. It started before the significance was understood. Some tools for sorting out and creating order were introduced, but became a prerequisite as time for the personnel to pursue improvement work in groups was not allocated". (Manager in Health Care)

To sum up, the answer to the first research question is that the view of Lean is now a Lean Philosophy view. All the informants from the Manufacturer and Health Care were clear that they had learned that Lean is not primarily about tools or technical issues. Instead it is, according to them, about people and creating a supporting environment, to help people do their best in their daily work. The informants from the two groups questioned the Lean competence among the consultants that had been used at the workplaces and stated that the

consultants' tool-obsessed approach had created problems for them in terms of negative impact on engagement among personnel and therefore had slowed down and made the implementation process more difficult than necessary.

What is described as the main barriers to succeed when implementing Lean, according to key informants at two large organizations?

In the two organizations there were descriptions of 14 barriers, of which eight were described in both the manufacturing company and the two emergency departments and three were unique to each respective organization. The barriers are listed in Table 2 below.

Main barriers in manufacturing	Main barriers at the emergency depts.
1 Consultants with limited Lean knowledge	1 Consultants with limited Lean knowledge
2 Leadership	2 Leadership
3 Time	3 Time
4 No vision	4 No vision
5 No common view of Lean	5 No common view of Lean
6 Organizational silos	6 Organizational silos
7 Insufficient communication	7 Insufficient communication
8 Reactive culture	8 Reactive culture
9 Lack of support functions	9 Insufficient cooperation with external organizations
10 Operators lack Lean knowledge	10 No follow-up and evaluation
11 Lack of work standards and the black book	11 Rules not followed

Table 2. The main barriers described in the manufacturing and health care groups

Consultants with limited Lean knowledge

The informants from the Manufacturer and Health Care stated that the consultants they had used had a toolbox view of Lean. This was perceived as negative, because it focused only on some tools and infrastructure, such as information boards, but did not incorporate the "human" side of Lean, people, and how leaders could and should support the people and the new way of thinking and behaving. With increased teaching about Lean and the Toyota way from books, seminars and conferences and their own experiences, the consultants had been concentrating on only one pillar in Lean, the continuous improvement pillar, but not the respect for people pillar, according to the informants. In both organizations the consultants was described as tool-obsessed who had neglected the soft side of Lean. The importance of the soft side or respect for people pillar in Lean is illustrated by one of the informants from Health Care, who described what Lean is about:

“On one hand it is about the soft parts, people and culture, that is the most important part and then it is the practical part, so we know where tools are located and how we are to act following routines and standardized work procedures for patient security. It is two legs and both are needed”.

Leadership

It was clearly stated by all informants that for Lean to function, there must be a different leadership than they have had before. The picture the informants give is that the manager style has so far been marked by planning, budgeting and setting rules, but with Lean that kind of management was seen as insufficient. Operative managers, according to the informants, must provide leadership in terms of creating visions to align people, taking a coaching approach, and participating much more in the daily work than has been the case so far. Top managers are said to need much more contact with and understanding of the daily work in the future to be able to be supportive and make the best decisions. The need for changed leadership is seen by the informants in both manufacturing and health care as a crucial aspect of making the Lean implementation successful and sustainable. It was clearly stated that managers that cannot provide leadership and support must be replaced with people with leadership ability, and that was seen to be the case no matter what level in the organization. A statement that is representative for the both groups of interviewees was given by one of the health care informants:

“We have to get a leadership that clearly supports the operations through knowledge about the activities and the employees’ needs”.

Time

Both groups of respondents said that the implementation process was much slower than they expected. The implementation process was at first seen as a project led by consultants who introduced basic knowledge and Lean tools such as 5S and visualizing boards. The experience in both organizations was that Lean is more about people’s thoughts and behavior than about Lean tools. To change how people think and behave was found to be a much more time-consuming task than the time they had expected they needed to implement Lean.

No vision

All informants expressed the belief that there was no common shared vision of a future that the Lean implementation was aiming to create. This meant that all members of the organizations could create their own individual visions of the future and react to them. To create a common shared vision to align the whole organization was seen as an urgent issue in both the manufacturing and health care groups to be able to succeed with Lean implementation.

No common view of Lean

At both the Manufacturer and Health Care a common uniting vision of Lean was said to be lacking. Even if the informants said that locally in some parts of the organization a common

vision of what Lean is about was beginning to form, they expressed that in the organization as a whole there were many different views, ranging from Lean seen as a set of tools to Lean Philosophy. This situation was seen as a fragmentation of the organization, and they clearly expressed that it was essential to create a common view of Lean and make all people in the organization understand its implications for daily work regardless of the individual's hierarchical level. A statement that reflects a common opinion among the respondents regardless of which organization they belong to was from one of the industry managers: "We need to sit down and talk this out".

Organizational silos

In both interviewed groups a description of a defragmented organization was given that was seen as a barrier to Lean and flow in the organization as a whole. The picture was that the organizations consisted of different unit silos with different subcultures and too little cooperation, knowledge sharing and joint problem-solving activities. This was said to result in different ways of working, which in turn made cooperation problematic; this defragmentation often led to suboptimal or partial improvements that were negative for the customer/patient and/or the organization as a whole. This was said to be very important to change if the client is to be put at the center and if they want to avoid waste. Several informants described the need for movement from an old departmental focus on results in numbers to a focus on flow through the whole system with the client needs at the forefront, and asserted that all different parts of the organizations had to understand that they must work according to Lean principles.

Insufficient communication

As a consequence of the organizational silos, the communication between different parts and hierarchical levels was said to be insufficient in both organizations. One of the health care informants indicated that they work in units with no one having an overall perspective over the unit boundaries, leading to work being done that have already been done in other parts of the organization:

"I think that 30 percent of the work in the hospital is doubled work and not necessary".

Reactive culture

In both the manufacturing and health care groups, the informants opined that they work in a culture of reactivity. They work more with fire-fighting and quick fixes for the moment than on eliminating the sources of the problems. One interesting topic in relation to reactivity approach is the view on health. At both the Manufacturer and Health Care respondents said that they worked a lot with health, following all health regulations and laws. But they said that this was reactive work, often reactive efforts after some injuries or health-threatening incidents have already happened; a lot of the health work was said to be about rehabilitation. It was regarded as necessary to change to a health-promotion approach, as Lean was seen to depend on people, and healthy people were said to be best suited to working according to

Lean principles. Not having people that are as healthy as possible at work was described as waste and contradictory to Lean principles. Despite the argued importance of health, the informants believed they didn't know how they should carry out this health promotion work in connection with Lean, but they want and need such knowledge for the future.

Unique barriers

The description above of barriers to Lean was described by informants from both groups. The barriers described next were unique either to the manufacturing industry or to health care.

Lack of support functions (manufacturing)

The informants from the Manufacturer said the decision to give priority to productive parts of the organization and leave support functions, particularly human resources (HR), out of the Lean implementation process was a mistake. A consequence was that now when the managers were in need of help to develop more of a coaching leadership style they said HR didn't understand the needs they had and often acted in a way that the production managers felt was contradictory to what they needed and tried to achieve. HR, by lacking Lean knowledge, was seen as an obstacle and a threat to Lean implementation.

Operators lack Lean knowledge (manufacturing)

The production managers stated that now when they themselves, as they said, had understood what Lean was about (after seven years) they believed the next step was to ensure that all operators also got Lean knowledge. At the time of the interviews most operators lacked that knowledge, and the managers said that if the operators never got that knowledge Lean would never work. This was seen as something that would cost a lot of money and be time consuming but absolutely necessary if they were to succeed in becoming a Lean company.

Lack of work standards and the black book (manufacturing)

The lack of work standards was seen at the Manufacturer as a barrier that had to be corrected by implementing work standards. But the informants felt that this was a big challenge as it was opposite to the black book culture that had a long history in the company. The black book is really a black notebook, in which the operators write down experiences and tricks they learn individually to reach productivity and quality goals and beyond. This has resulted in operators seeing the black book as an individual "secret" and not something to share with others, since then others would become as good at the job as they are. This was said to be a problem, as Lean is about all working according to the best-known way, the standard, developing openly in cooperation, and sharing knowledge about improvements in processes so the new best-known way becomes the new standard for work procedures.

Insufficient cooperation with external organizations (health care)

A problem that was mentioned by health care informants was that when patients were ready to leave after a finished treatment they were sometimes moved to other care providers, as when the patient is going to have some sort of support in the home, and this was often a slow process with negative effects on the patient flow.

No follow-up and evaluation (health care)

The informants said a lot of things were changing in health care, but the norm was that change initiatives were never followed up and evaluated, resulting in no one knowing what the change resulted in or if the goals were reached. They informants said this was something they are lousy at in health care and something they had to change to enable control, improvement and avoiding waste, which was said to be the nucleus in Lean.

Rules not followed (health care)

Organizational rules and procedures were said not to be followed, and the informants expressed the opinion that there should be some sort of “punishment” when managers ignored organizational rules or procedures, because it was a source of organizational tension and made it more difficult for different parts of the organization to cooperate. One example given was the rules that are intended to regulate salary levels when hiring people. The aim with the regulation is to reach homogeneity in the organization about salary. However, the rules were often not followed and this was something that was said to sometimes leading to different units in the organization competing with levels of salary to get a nurse or doctor. This was said to lead to a problem keeping experienced and capable personnel. It was even predicted that this was a problem that was going to increase with the growing number of nurses working for staffing companies.

The barriers to successful Lean implementation in relation to the change model were found to be five elements that originated in organizational arrangements and nine social factors. None of the barriers were related to physical setting or technology, as shown in Table 3 below.

Org. arrangements	Social factors	Physical setting	Technology
1 Time	1 Consultants with limited Lean knowledge		
2 No vision	2 Leadership		
3 Organisational silos	3 No common view of Lean		
4 Insufficient cooperation with external organizations (H)	4 Insufficient communication		
	5 Reactive culture		
	6 Lack of support functions (M)		
	7 Operators lack Lean knowledge (M)		
5 No follow-up and evaluation (H)	8 Lack of work standards and the black book (M)		
	9 Rules not followed(H)		

Table 3. Barriers found in relation to the change mode proposed by Porras and Robertson (1992, p. 729).
H = Health Care; M = Manufacturer.

ANALYSIS AND DISCUSSION

Both the manufacturing and health care organizations used consultants at the beginning of the Lean implementation process. The informants from both organizations stated that the consultants had been working with a Lean tool view and that they themselves had learned by experience that a toolbox view of Lean is not enough. That a Lean tool view is not enough to succeed with Lean is well known (Sohal and Eggleston, 1994; Seddon, 2005; Bhasin and Burcher, 2006; Teresko, 2006; Liker and Hoseus, 2008; Osono et al., 2008; Pay, 2008; Ivarsson et al., 2013). This indicates that any consultants chosen must be familiar with the dualism of the “continuous improvement” and “respect for people” principles of Lean.

To succeed with Lean the informants in both organizations argue from their experiences that supporting and aligning people is important. Lean is now seen as a concept with a strong focus on people. That is in agreement with what Liker (2004), Osono et al. (2008) and Rother (2010) state is the basic and important assumption at Toyota: people are the source for the development of production. It is also in line with Crute et al. (2003), who assert that managers need to have both a strategic and a tactical role.

Kotter (1995) identified eight errors that often are made in change efforts (see the introduction). All of these errors, with the exception of error 7, declaring victory too soon, have played a role in the Lean implementations as the informants in the present study describe it. So our conclusion is that error 7 does not occur in Lean implementation at those workplaces, but it could be when implementing change in general.

Informants in our study reveal that they have experienced barriers to Lean that according to Porrás and Robertson’s change model are classified as social factors and organizing arrangements. When our findings of barriers to Lean are compared with findings by others, there are both differences and similarities in barriers, as illustrated in Table 4.

Barriers	Our findings	Crute et al. 2003	Radnor et al. 2006	Sim & Rogers 2008	de Souza & Pidd 2011	Muslimen et al. 2011	Bhasin 2012
1 Consultants with limited Lean knowledge	X						
2 Leadership	X		X	X	X	X	
3 Time	X						
4 No vision	X	X					
5 No common view of Lean	X	X			X		
6 Organizational silos	X		X		X		
7 Insufficient communication	X	X	X	X			
8 Reactive culture	X						
9 Lack of support functions	X						
10 Operators lack Lean knowledge	X						
11 Lack of work standards and the black book	X						
12 Insufficient cooperation with external organizations	X						
13 No follow-up and evaluation	X				X		
14 Rules not followed	X						
15 Terminology					X		
16 Personal and professional skill					X		
17 Organizational momentum					X		
18 Lack of people with their own experience from Lean as Lean teachers and coaches						X	
19 Aging and high seniority workforce				X			
20 Size of the organization							X

21 Culture		X					X
22 Resistance /skepticism to change			X		X		
23 Lack of ownership			X				
24 Poor selection of improvement team members			X				
25 Weak link between improvement program and the organization's strategy			X				
26 Lack of resources		X					
27 Managers need to have both a strategic as well as a tactical role		X					
28 Plant specifics important rather than firm specifics		X					
29 Both financial and human commitment is essential							X

Table 4. Barriers to Lean reported in different papers

However, when the 29 barriers in Table 4 are classified according to the change model proposed by Porrás & Robertson, Table 5, it becomes explicit that the barriers reported in all papers relate to organizing arrangements and social factors, with social factors as the most common. There are no barriers reported as due to physical setting or technology. John P.T.Mo. The role of lean in the application of information technology to manufacturing. Computers in Industry. 60.2009. 266-276.

Org. arrangements	Social factors	Physical setting	Technology
3, 4, 6, 12, 13, 17, 20, 23, 24, 25, 26	1, 2, 5, 7, 8, 9, 10, 11, 14, 15, 16, 18, 19, 21, 22, 27, 28, 29		

Table 5. The 29 barriers classified according to the change model proposed by Porrás and Robertson (1992, p. 729)

Kotter and Schlesinger (2008) argue that change initiatives often encounter resistance from humans and that managers, although generally aware of that fact, seldom systematically search for sources to resistance before they initiate change initiatives. Our findings of barriers, like the findings from other researchers, indicate that a systematic search for sources for barriers and resistance is still seldom done before initiating Lean implementation. We argue that, since it is known that barriers to Lean are social and organizing arrangement factors, it is possible for organizations to use these research results and do a systematic search for barriers and resistance before they initiate change initiatives such as implementing Lean. Lean consultants should also “learn” about the identified barriers so they can help their clients avoid them, thus helping to improve their business through the people in the organization. Since the informants in our study revealed their experience that barriers to Lean are related to social factors and organizational arrangements, and since other researchers have confirmed these results, it would be interesting to study if avoiding those barriers leads to the successful implementation of Lean.

CONCLUSION

In both organizations the view of Lean changed from a toolbox to a human behavior view. Eight barriers were experienced in both organizations. Three barriers were unique to the manufacturing industry and to health care, respectively. Nine barriers were elements of social factors and five elements of organizing arrangements. No declared barriers were related to physical setting or technology. From that we conclude that basically Lean is about people.

Research limitations: Only people practically involved and responsible for the implementation at the two organizations participated in the study.

Practical implications: People responsible for implementing Lean should consider organizational arrangements and social factors in order to limit barriers to successful implementation, and they should see people as the source for improvements and Lean as an all-encompassing organizational philosophy.

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