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UNDERSTANDING AND ADDRESSING USER RESISTANCE TO IS IMPLEMENTATION IN A LEAN CONTEXT

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Abstract

One of the key success factors for the implementation of 'Lean' concepts is the successful introduction of Information Systems (IS). However, a number of negative outcomes resulting from the implementation of Lean (and its corresponding IS) can lead to strong user resistance to Lean implementation. Using a case study approach supported by interviews with different user groups, this study investigates typical types of user resistance together with strategies for overcoming these resistances. Drawing from prior research on IS and Lean resistance the preliminary findings suggest that Lean IS implementation is not very different from other IS implementations, confirming prior research in this area. However, it also contributes new findings. First, the results showed that information transparency may play an important role in two ways, both as a trigger for user resistance and as a strategy to overcome user resistance. It therefore balances negative and positive effects of user resistance. Second, we found that the order of implementation may have a more significant impact on implementation success than suggested in prior literature.

Keywords: Lean production, IS implementation, user resistance, organisational changes.

1 Introduction

Lean has become one of the most dominant strategies for production organisations (Karlsson and Ahlström, 1996). It attempts to reduce impediments to the smooth flow of production by continuously improving productivity and quality (through TQM), “Just-In-Time” (JIT) inventory systems, and the elimination of “waste” time and motion (Landsbergis, et al., 1999). Nowadays, Lean is not only used in manufacturing but is also adopted by other industries, such as services (Swank, 2003), construction (Paez, et al., 2005) and IT (Middleton, 2001). However, despite the many benefits of implementing Lean, companies’ experiences are not always positive. Instead, a number of negative outcomes such as stress, fatigue, job anxiety, job depression, and even cardiovascular diseases (Delbridge, 2007; Landsbergis, et al., 1999; Lewchuk and Robertson, 1996; Niepce and Molleman, 1998) have been identified as outcomes which can lead to resistance to Lean implementation.

Often the implementation of Lean requires firms to implement large-scale Information Systems (IS) (Niepce and Molleman, 1998). As such, one of the key success factors for Lean implementation is the successful introduction of IS. On the negative side, the implementation of IS might be associated with some of the negative effects mentioned above, contributing to a large extent to user resistance. There are also some specifics of Lean that might reinforce existing resistance or bring about new types of resistance. For example, Lean requires a high degree of information transparency. To implement the feedback processes required, Lean systems require information on discrepancies between production targets (benchmarks) and the actual performance of a worker (Niepce and Molleman, 1998). This aspect of Lean can lead to many forms of user resistance. Resolving such resistance is essential to the success of IS and Lean implementations. Understanding how organizations can respond to user resistance to IS implementation in a Lean context is therefore important to many organisations.

So far, the literature in IS has widely covered the area of user resistance (Kim and Kankanhalli, 2009) but is largely silent on the context of Lean implementations and the strategies that may be needed to address resistance in this environment. This paper therefore addresses the following question: How do project teams respond to user resistance when implementing an IS into a Lean organisation, and which of these strategies are most effective for dealing with user resistance? Hence, the aims of this study are twofold: first, to identify unique types of user resistances that may occur when implementing an IS supporting Lean and second, to identify strategies used by project teams to address these resistances.

2 User resistance to IS implementation

This section reviews the literature on user resistance to IS implementation, which is also relevant to the Lean context. User resistance has consistently been the prevalent issue that causes many IS implementation failures (Kim and Kankanhalli, 2009). A survey from 375 organisations world-wide indicated that user resistance is the number one challenge for implementing large scale IS, such as an enterprise resource planning system (ERP). User resistance to IS implementation has been defined as an adverse reaction (Hirschheim and Newman, 1988), or as an opposing action to the perceived change related to the implementation of the new IS (Markus, 1983).

Previous literature suggests several theories for understanding the cause of user resistance to IS implementations. For example, system-oriented theory argues that resistance is derived from external factors related to the design of the system or the technology itself, such as inappropriate design or poor user friendliness. People-oriented theory on the other hand suggests that people resist the new system because of factors internal to a person or group (Jiang, et al., 2000; Markus, 1983). Markus (1983) also explains user resistance from the interaction perspective and argues that the resistance exists because of the interaction between system-related characteristics and people-related characteristics. In other words, people are inclined to use a system if they think the system increases their power. Conversely, they are inclined to resist using a new system, if their power is threatened.

Equity-Implementation theory offers another explanation of the causes of user resistance. Based on equity theory, Joshi (1991) proposed a model that illustrates how people evaluate IS implementation-related changes based on the classification of changes; if users determine that the change leads to inequity or an unfavourable outcome, they are likely to resist the implementation. Marakas and Hornik (1996) suggested a model of passive resistance misuse (PRM) to explain resistance behaviours to IS implementation. This theory points out that resistance behaviours are passive-aggressive responses of an individual to perceived threats or stress that are introduced by an implementation of a new IS. The theory suggests that the implementation team should “move beyond the rational model of implementation that assumes overt resistance and explore methods of resolving the conflicts that encourage PRM behaviour” (Marakas and Hornik, 1996, p. 218).

Martinko (1996) suggested the attributional model. This model includes the new technologies and the individual’s experience with similar technologies as factors that can affect an individual’s expectation of the new system in relation to performance outcome. In turn, this affects his/her reaction to the technology and its use. Finally, Samuelson and Zeckhauser (1988) put forward the status quo bias theory to explain user resistance. This theory explains people’s preference for the current situation based on three categories: rational decision making, cognitive misperception and psychological commitment. The framework covers various reasons for resistance and maps them into the above categories. Table 1 summarises the types of resistance, reasons for resistances, and resistance behaviours identified by these theoretical views.

Type of resistance (Based on the theories)	Reasons for the resistance	Resistance behaviour
Resistance to Power loss (Markus, 1983)	The implementation of new IS introduces loss of power of the individual or group, and gain of power of another individual or group. Examples: job insecurity (Jiang, et al., 2000), change to the decision making approach (Markus, 1983).	Keep speaking resentfully about the system, and following the former procedure (Lapointe and Rivard, 2005).
Resistance to equity changes (Joshi, 1991)	The implementation of the new IS introduces inequity to an individual. Examples: a decrease in net gain, or increase in inequity of an individual.	Individuals are more likely to minimize their input and others’ outcomes, and maximize others’ input.
Resistance to the new routine of performing work (Marakas and Hornik, 1996)	The implementation of new IS changes the way of performing day-to-day work. Examples: changes to job content, uncertainty, unfamiliarity, mis-information (Jiang, et al., 2000).	Passive resistance misuse (Marakas and Hornik, 1996).
Resistance to Attributional changes (Martinko, 1996)	The implementation of the new IS lowers the efficacy and the outcome (Martinko, 1996).	Users covertly use the system, or use it harmfully.
Resistance related to status quo bias (Samuelson and Zeckhauser, 1988)	People could be innate conservatives (Hirschheim and Newman, 1988). People may not like rigidity in their work (Marakas and Hornik, 1996).	This type of people can show many of resistance behaviours listed above.

Table 1. Types of user resistances.

2.1 Resistance to Lean Production Systems

The Lean concept originated in Japan after the Second World War, driven by the Toyota Motor Company. The philosophy of Lean is to lower the cost of production by eliminating waste or anything that does not add value to the final product (Karlsson and Ahlström, 1996). By eliminating eight typical wastes (Womack and Jones, 1996), Lean helps organisations improve product quality and reduce production time, thereby reducing production costs (Levy, 1997).

The successful implementation of Lean principles is very dependent on successfully implementing the supporting IS (Niepce and Molleman, 1998). Often the Lean implementation requires certain manufacturing-related components of an ERP system as the backbone which is then enhanced by Lean control systems (e.g. visual communication tools) that drive operations and processes in real time (Parry and Turner, 2006). IS that support Lean principles therefore have features that are unique to the Lean context and may require adjustments in the IS implementation process. Another distinct feature is the process of continuous improvement that requires the IS to be highly flexible and adaptive. Most of the problems and suggestions are raised by front-line workers. As a result, users can often drive the evolution of the system from the bottom-up by suggesting add-ons (Niepce and Molleman, 1998).

Prior research has identified a number of unsatisfactory outcomes after the implementation of Lean. For example, research has shown that Lean implementations are characterised by negative outcomes such as work related musculoskeletal disorder symptoms, stress and fatigue (Lewchuk and Robertson, 1996), job anxiety, job depression, reduction in the role of breadth-self efficacy (Parker, 2003) and health-related issues such as cardiovascular disease (Landsbergis, et al., 1999). Each of these negative outcomes can become reasons for resistance and can be explored using one or more of the theoretical lenses identified in the literature (see Table 1).

Lean also requires a high degree of information transparency to support its requirement for visual control, but this can cause resistance at all levels. For example, Delbridge (2007) observed resistance from managerial staff when a Lean system requires open book accounting. The feedback process in Lean relies heavily on pervasive visual controls to display benchmarking information and absentee records (Niepce and Molleman, 1998). This feedback process is predominantly used for the surveillance and monitoring of a worker's activities, which in turn can lead to strong resistance.

2.2 Management Strategies for User Resistance

Since IS implementation and Lean can lead to various user resistances, the project team must address these issues (Klaus, Wingreen, and Blanton, 2010). Prior research has identified various ways of dealing with user resistance to IS implementation. For example, Jiang, et al. (2000) investigated the link between resistance reasons and system types, and the importance of different strategies to promote user acceptance. They outlined 20 strategies for promoting user acceptance of new systems such as, open communication and involving employees in the development of the new IS (Jiang, et al., 2000). Klaus et al (2010) also examined strategies for dealing with user resistance from the user's perspective. In this study, users were classified into eight groups based on their characterised resistant behaviour and reasons for resistance and the three most desirable management strategies for addressing user resistance identified: having a clear plan, management expertise, and top-down communication (Klaus, et al., 2010). Bringing together key findings from Jiang, et al. (2000) and Klaus et al. (2010), four strategies can be identified as most useful for addressing resistance. (Note that these strategies are not mutually exclusive and can be implemented together):

Participative strategy: This strategy includes actions such as involving employees in the development of new systems (Mumford, 1979), conducting pilot studies to examine the impact of change (Anderson, 1985), and documenting standards for the new system (Nord and Tucker, 1987).

Clear plan: A clear plan refers to a consistent project implementation plan, which includes a clear direction and consistent management strategies. The project team should always follow this plan.

Management expertise: Decision makers and senior managers should understand the system and the business processes in detail, and have the ability to address the questions and concerns of users.

Top-down communication: This strategy refers to an approach in which senior managers and/or the project team shares information with employees, notifying them of changes as completely as possible (Klaus, et al., 2010). However since Lean is a bottom-up process (Womack and Jones, 1996), top-down communication may not be a very effective structure for a Lean implementation.

3 Case Study Method

To address the aims of this study, a qualitative exploratory study was designed and conducted. It was guided by the process recommended in Eisenhardt (1989) to reveal pre-existing phenomena, which is consistent with a positivist point of view. This approach can also be used to identify and explore other types of resistances and strategies in the manner of an interpretivist view (Kirsch, 2004).

The selected organisation is a leading provider of construction, maintenance and management services across New Zealand's infrastructure and amenity assets. It has an annual turnover of approximately \$141 million and about 1000 employees across 15 branches throughout New Zealand. The Lean project was initiated by the Business Improvement Department, which is implementing the system to better manage its business processes. The IS implementation is an essential part of the Lean project. The IS is used mainly to support monitoring functions and benchmarks. Data are collected from field staff using PDAs and displayed on LCD screens in the office. By implementing a 'traffic light system' management can call staff to find out what the problems are and try to help them resolve any issues. This system not only directly monitors field staff but it indirectly monitors the managers' performance also. Weekly system-generated reports summarize the team members' performances and trigger management action if the performance rate of a department is far below the benchmarks.

Using Flanagan's (1954) critical incidents technique, data was collected by interviewing the project manager of the Continuous Improvement Project, and four senior user-managers in different roles: the Parks and Waterways Divisional Manager, the Water and Wastewater Divisional Manager, the Turf Manager and the Water Contracts Manager. The interviews were recorded and transcribed. Open and relational coding was used to code the data which was then assessed for similarities and differences and grouped into categories (Corbin and Strauss, 1990). All the resistance events identified in the interviews were evaluated and similar events grouped and labelled. A second round of coding will be used to evaluate the project team's responses. Altogether, the coding process is expected to uncover various types of resistance, mapped to their response strategies. This will facilitate analysis of different perceptions of user resistance and response strategies across groups (i.e. managers vs. field staff).

4 Preliminary Findings and Discussion

What are the important findings so far? First, we identified the following resistance types: resistance to power loss, new routines, equity change and status quo bias. As such, it seems that Lean IS implementation is not very different from any other IS implementation, so confirms prior research (Joshi, 1991; Markus, 1983; Marakas and Hornik, 1996; Samuelson and Zeckhauser, 1988). Second, we did not find evidence for resistance types, such as maximising one's outcomes or minimising the inputs, or of covert resistant behaviours (Martinko, 1996). This may be attributed to the limited number of interviews to date, in particular field staff are yet to be interviewed. This outcome could also be explained by the strong focus on information transparency, which may act as a *trigger* for user resistance and, at the same time be used as a *strategy* to overcome user resistance, balancing the negative and positive effects of user resistance. Finally, we found that the *order of implementation* may have a more significant role than expected. We will briefly expand on the latter two findings.

Information transparency: On the positive side Lean's monitoring and performance measuring system helps to eliminate certain resistance behaviors. Not only managers, but also all employees within the same division can see each other's activities and performances through the reports which are presented at weekly meetings. As a result, covert behaviors may be particularly difficult to conduct in organisations with very high degrees of information transparency.

Information transparency is also recognised as a unique Lean associated source of user resistance (Delbridge, 2007; Niepce and Molleman, 1998). Information transparency finds expression in the visual control process, which reflects the close monitoring and performance measuring capabilities of

the new system. In this study, staff showed strong resistance to these capabilities as it introduces close control of all the field staff and erodes their decision-making capability.

“The instant response from a lot of the guys is that, you are turning them into robots.”
(one Divisional Manager).

Similarly, middle-level managers also felt they were being tightly monitored and controlled by the project manager and other high level managers, with many losing some of their decision capabilities:

“Some managers ... [believe] they are running a real good organisation. ... we come along and say well, yes, you might be running it efficiently, but we actually see this, this, and this, and that will make it even more efficient. For some ..., they resent that.” (Project Manager).

This requirement for information transparency has therefore resulted in a loss of power for field staff and managers (Markus, 1983) leading to resistance at both levels.

Order of implementation: Another interesting finding is that both divisional managers considered the order of implementation a very important strategy for resolving user resistance to the implementation of both the IS and Lean system. As the Lean system relies heavily on its IS, the managers believe that the project team should roll out the IS first, before implementing any of the Lean principles. They realized that staff needed to first familiarize themselves with the technologies. Otherwise, when both systems are implemented together, staff may feel overwhelmed by the many changes.

“I think getting them trained in the use of PDA first... is quite crucial. So they are happy and familiar with the use [of] the PDA, because that is how we capture our information. That is the biggest hurdle, having that knowledge first. If you try to do the PDA and also Lean at the same time, staff get a bit overwhelmed. So ... implementing ... the technology first, and then rolling [out] the principles of Lean, after the guys are happy with the PDA” (one Divisional Manager).

This is an important finding as usually the Lean project with its extensive scope and complexity will drive the requirements for implementing technology (Niepce and Molleman, 1998). IS is then often seen as the dependent variable in the organisational imperative caused by the (Lean) organization's information processing needs (Markus and Robey, 1988). However, our results suggest the order of implementation in Lean organisations may need to be carefully evaluated. It appeared that users were far less resistant to the technology (e.g. PDAs) if it was not first perceived as part of the Lean project. Being aware that managers will use the PDAs to closely manage staff appears to create stronger resistance compared to just learning how to use the new technology. Once users get used to the new technology and it becomes a part of their work routine, the introduction of Lean appears to be met with less resistance. However extra care should be taken as staff may feel they have been deceived by being ‘hooked’ first into using a tool, which is then used to monitor and control their work.

What are the next steps in this research? First, there will be further interviews with stakeholders (e.g. field staff) and analyses of the case data. Second the current study reports findings from only one organisation. Further research involving other cases is needed to address this limitation and shed more light on the role of information transparency and its impact on user resistance. The preliminary findings also call for more research into the newly identified strategy - the order of implementation.

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