Negative Side Effects of Lean Management Implementations – A Causal Analysis

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Abstract. The side negative effects of Lean Management implementations are well known among practitioners. Recently they became a subject of systematic research. This paper presents conclusions from a causal analysis of the unlikely results, which were identified along case studies. The research was conducted in the machine building industries in EU. The insights from interviews and expert-panels were systemized by cause-and-effect models, thus suggesting the root causes of the negative effects. The synthetized results are considered herein as an input for constructing a method for multi-perspective assessment, to enable better planning and control of the Lean Management implementations.

Keywords: Lean Management • Side negative effects • Management control

1 Introduction

The Lean Management was attracting a lot of interest among researchers, companies and consultancies in recent decades. Although the scientific and professional literature is principally positive about its use and effects, it is well known among practitioners that Lean Management often brings side negative effects. Recently this issue became a subject of systematic research [1]. It was confirmed by a sound empirical evidence that in many cases the losses from Lean Management implementation, which usually come with a delay, may exceed the gains. This exhibits an important practice gap and raises a question about causes of such a phenomena. It seems impossible that simple reasons, like mistakes or incompetence, can explain its frequency and scale.

This paper investigates the root causes of side negative effects that often follow Lean Management implementations. The researched phenomena is surprising and no explanations are given by practice or by literature. Hence it was assumed to respect the rules of empirical phenomenology to protect robust outcomes from the investigation. The research was conducted in machine building industries along a series of case studies. The paper presents conclusions from analysis of insights from interviews and expert-panels, which were systemized by cause-and-effect models. This way the major root cause of negative side effects could be identified, which is argued to be the reductionist assessment of planned effects and risks. The conclusions are later considered as inputs for guidelines for multi-perspective and holistic assessment, to enable improved planning and control of the Lean Management implementations.

2 Literature review

A bold volume of Lean Management literature exposes advantages of this approach [2,3] and links improved plant performance to its implementation [4,5,6,7,8,9]. Some papers even suggest that "… the research question of primary interest in the literature is no longer whether lean can benefit performance …" [10]. The recently provided empirical evidence neglects this unilaterally positive outlook [1]. The published results suggest that almost half of the researched Lean Management implementations finally outcome in a negative balance of effects [1]. The typically reported negative side effects are as follows: (i) Fall-outs, i.e. late or cancelled deliveries, mainly due to internal problems in supply chains; (ii) Quality problems / issues; (iii) Increased stock / buffers; (iv) Customer dissatisfaction, or even damaged reputation; (v) Reduced sales; (vi) Misuse and loss of competence, e.g. by misusing experts outside of their professional qualifications, fluctuation of core employees; (v) Increased costs: due to the above effects, or even exceeded budgets of Lean projects/initiatives, hence no return from investment into them. As yet there are no accessible papers that directly investigate the causes of negative side effects of Lean Management implementations. The dichotomy of reported results from Lean Management implementation cannot be resolved on the basis of literature knowledge. This exhibits evident practice and methodological gap. Potentially publications on managerial control and accounting, particularly those focusing on measurement of improvements (in terms of performance), could provide some valuable inspirations. These are reviewed later on.

A number of papers examine how the management control activities foster or impede implementations of Lean Management [5,6], [10,11,12,13,14,15,16]. A major attention is given to the following practices: the extent of dedicated teamwork, focused performance reporting, implementation or regular audits, allocation of responsibilities, use of financial and non-financial incentives. It is argued within this stream of literature, that some management control practices have a limited fostering impact, if any at all like the financial awards or top-driven management audits. Many authors suggest to use few non-financial performance indicators, rooted in the company strategy, clear and understandable to easy motivate people, linked to processes but not to humans. Visualizations and periodic comparisons of actual effects against targets are proposed to follow up and facilitate improvements. Guiding and motivating people, who are involved in Lean Management implementations, to add more value and to avoid waste, is typically focused on. Some authors suggest creation of accounting or controlling system for value streams, addressing costs of product development, sales, production and supplies [15]. Evidently such high level methodological recommendations are not helpful when tackling the discussed problem. The published findings and proposals do not explain, nor protect against the reported side effects. Notably, the literature bypasses the issue of potential side effects of Lean Management implementations, that can come out after some time or manifest themselves in other areas of company activities. This leads to a conclusion that holistic assessment of the effects is possibly missing. It must be also pointed out, that although the link of expected Lean Management effects to company strategic objectives and overall performance is often mentioned, it is never a subject of systematic and detailed considerations.

Very few papers attempt to investigate how Lean Management implementations may be affected by some contextual factors. The following have been researched: company age [5], plant size [5] and unionization [5], [9,10]. The presented evidence suggests that large plants are more likely to implement the Lean practices, while the two last factors have minor importance. Other contextual factors are not addressed.

The management control literature has long focused how to coordinate company activities and motivate employees to implement the strategic objectives [17]. Possibly the overall methodologies of management control and accounting could provide some value with regard to the issue. Among them strategic control methods (e.g. Balanced Scorecard [18]) or managerial accounting methods (e.g. Activity Based Costing [19], Process Costing [20], Flexible Margin Costing [21], Resource Consumption Accounting [22], Throughput Accounting [23]) seem to be potentially useful. However, none of them can be straightly applied to explain the causes of discussed effects.

The above review exposes that existing literature knowledge does not explain the discussed phenomena nor directly applies for its diagnosing. It even does not provide indications of its hypothetical reasons. Hence a prior causal analysis is indispensable.

3 Research methodology

As it was argued in the preceding section, the existing literature does not provide useful insights for explaining in a robust way why the phenomenon of side effects of Lean Management implementations is so frequent and has significant negative impacts. This comment applies in particular with regard to development of hypothetical causes. The picture of problem domain is not clear, as no direct explanations to the issue are given by practice or by literature. Therefore it would be rational, to assure valid outcomes of the research, to respect the rules of empirical phenomenology, i.e. to directly investigate the reality of phenomenon by a kind of field investigation.

The research presumed a number of case studies. These were conducted in the machine building industries. Companies from the EU, sizing from 200 to 1000 employees, were approached. Altogether sixteen case studies were performed. The staff of various departments, with regard to the scope of particular implementations (i.e. also considering the side effects), participated in the case studies, namely from departments of: production, purchasing, sales and product development. Senior and executive management associates were usually involved as the experts into the research.

At the beginning, to get an initial understanding of the phenomenon, a series of Lean Management implementations was investigated. By interviewing managers and collecting relevant data. Considering the main objectives of the investigation, the conclusions from empirical data were systemized by cause-and-effect models, which addressed the twofold manifestation of the phenomenon. The first layer of causes and effects reflects the straight matter of the projects. The conditioning factors, like those contextual or related to the management control and organization, i.e. including the hypothetic root causes, compose the second layer. The items from both layers are also linked by causal relations. To validate and extend the initial results second iteration of the field research was performed, by expert-panels. All experts were fully equipped

Table 1. Plan of research

Phase	Scope	Methods / Tools
Initial	Problem conceptualization	Analysis of literature
Empirical phenomenology	Case studies – initial phase	Semi-structured interviewing
Causal analysis	Case studies – root-cause analysis of side effects	Cause-Effects modelling Expert panels (2nd iteration) Root-Cause Modelling
Conceptual development of countermeasures	Guidelines for Multi-Perspective Assessment	Theoretical synthesis of root-causes

with compiled results of first iteration research, very detailed. They were expected to validate the identified roots causes and to assess them. Their weight and correlation could be eventually expressed in terms of frequency, importance of the side negative effects, and amplification power for causal relation. For the beginning subjective assessments of experts were considered as a sound mean for explanation and weighting the impact of previously identified root causes. The conclusions about root causes could be later used as inputs for developing guidelines for practice oriented countermeasures, which eventually protect against the unlikely effects of Lean Management implementations. The drafted overall plan of research is presented above in Table 1.

4 Research findings and conclusions

All performed case studies were luckily supported by a full access to the available data related to Lean Management implementations, however due to the non-disclosure agreements all the quantitative data had to be transformed into synthetic information.

It has appeared that without any exception, projects were used as the vehicle for driving Lean Management implementations, which were expected to be planned and controllable, using the measures of financial outcomes. The approach was considered itself like a kind of technology leading to some specific types of outcomes, namely:

- Slimmed waste in different departments, along exact processes or within functions
- Reengineered products to minimize costs of goods sold
- Reduced fixed costs or minimized other expenditures by outsourcing
- Improved performance/competitiveness by investment in technology or automation
- Ensured cash flows due to increased sales by high or steady order entries

The above is in opposition to the Japanese approach to Lean Management, which is considered as an open philosophy, focusing on elimination of waste in value streams and emphasizing non-financial measures to facilitate and control improvements.

The primary findings from semi-structured interviewing were mapped to the form of cause-and-effect diagrams. Separate diagrams were prepared for all investigated implementations and the two mentioned layers. This way a precise and sound picture of all researched cases could be obtained. An example diagram is presented in Fig.1.

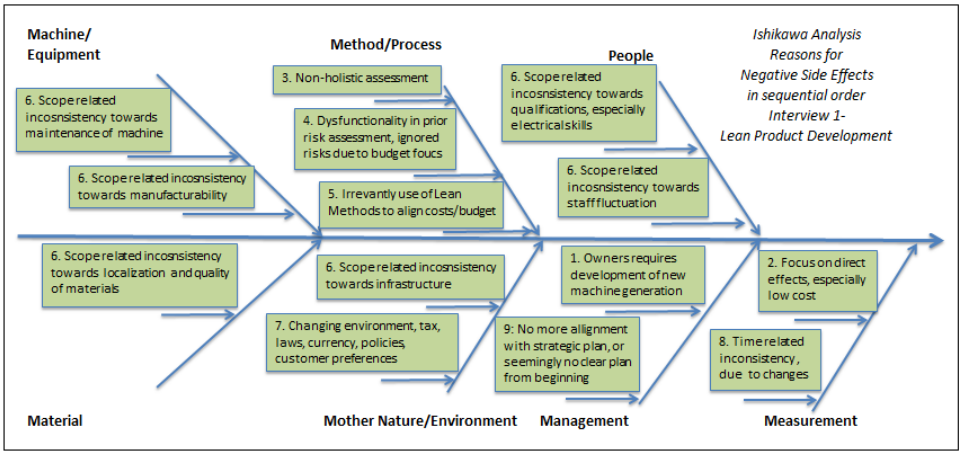

Fig. 1. An example cause-and-effect diagram (root causes layer)

Later on the causes and effects have been systematized, reflected and compiled, to enable identification of root causes of the observed side negative effects. The faults or dysfunctionalities of Lean Management were not considered as a potential source of root causes, as it was presumed that the management control system should not allow using any inappropriate method. The following root causes have been identified:

1. Irrelevant use of the Lean Management, i.e. applying it for purposes (capacities, processes etc.), that should not be targeted by this approach or its method.
2. Incompetent use of the Lean Management, i.e. from the methodical point of view.
   (a) Misapplication of methods;
   (b) Misapplication or no use of cross-X teamwork (X: functions, departments etc.);
3. Dysfunctionalities of management control, like:
   (a) Dysfunctionalities of assessment of effects:
      (i) Time-related inconsistency of planned effects, i.e. omitting later effects;
      (ii) Scope-related inconsistency of planned effects, i.e. bypassing effects in other areas (departments, etc.) or those experienced by other stakeholders;
      (iii) Focus on direct, i.e. first momentum effects;
      (iv) Non-holistic assessment, i.e. ignoring significant interdependencies, trade-offs or discrepancies of effects, which can be only identified when a whole (company, supply chain etc.) is assessed considering its complexities;
      (v) Difficulties to account or relate performance and financial measures;
      (vi) Changing conditioning factors (e.g. environmental factors, baselines etc.);
   (b) Dysfunctionalities of prior assessment of risks;
   (c) Missing link to company strategic objectives.
4. Contextual factors, like:
   (a) HRM practices (e.g.: assessment, incentives, responsibilities, promotion);
   (b) Corporate governance, in relation to the ownership type, by push from the top management towards short-term effects, due to the requirements of company value management.

Along the second iteration of field research the experts verified and validated the identified roots causes. This was documented in a number of ways. One of them is by representing the precedence relations between the root causes. This view is presented below in Table 2. The numbers in columns reflect the sequential order of occurrences.

Table 2. Sequence of occurrence of the root causes

Root cause	Case															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Irrelevant use of Lean Management	3					5				2				4		
Misapplication of Lean Management methods	4	6		4	3							3		3		
Misapplication or no use of cross-X teamwork			3		4				3							
Time-related inconsistency of assessment	8	8	6	8	8	7	4	3	6		4		5			5
Scope-related inconsistency of assessment	6	7	5	6	5	6			5					4	5	6
Focus on direct (first momentum) effects	2	2	2	1	1	2	1	1	1		2		2	2	3	2
Non-holistic assessment	5	5	4	2	6	3	3			1		1	3	5		3
Difficult relating perform. & fin. measures																
Changing conditioning factors	7		7										4			4
Dysfunctionalities of prior risk assessment		4		3	7	4	2	2	4	3	3	2				
Missing link to company strategic objectives	9		1	9	9	8					1	4	6	1	1	1
HRM practices		3							2							
Corporate governance context	1	1		5	2	1				4			1		2	1

Another view could be obtained by assessment of relative importance of the root causes, i.e. taking into account their impact on level and occurrence of the negative side effects. This aspect was analyzed in several ways. Table 2 presents a simple but transparent picture, i.e. by subjective weights assigned by the experts, who have used the Likert scale (1-5). It was understood by all of them that correlations between root causes may take place, as well as some kind of overlapping.

Table 3. Average impacts of the root causes

Root cause	Case																Av.all	Av.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
Irrelevant use of Lean Management	1					3				2					3		0.6	2.3
Misapplication of Lean Management methods	4	2		4	3							2		3			1.1	3.0
Misapplication/no use of cross-X teamwork			3		3				3								0.6	3.0
Time-related inconsistency of assessment	1	1	1	1	1	3	2	2	3		2		2			3	1.4	1.8
Scope-related inconsistency of assessment	5	1	4	1	2	3			4					3	5	2	1.9	3.5
Focus on direct (first momentum) effects	4	4	1	4	2	4	4	4	2		4		3	3	4	4	2.9	3.4
Non-holistic assessment	4	4	3	3	3	4	2			5		4	3	2		3	2.5	3.3
Difficult relating perform.&financial measures																	0.0	0.0
Changing conditioning factors	2			3			5						4			4	1.1	3.6
Dysfunctionalities of prior risk assessment		4		3	2	4	3	4	3	3	3	3					2.0	3.2
Missing link to company strategic objectives	2		2	2	2	4					2	2	3	2	2		1.4	2.3
HRM practices		3							4								0.4	3.5
Corporate governance context	2	2		3	2	2				2			5		5	4	1.7	3.0

According to the precedence view of the root causes it is evident that "all begins with the wrong setting of objectives". Sometimes it is due to the stress from the top management, sometimes by ignoring company strategic goals, sometimes due to narrow focus on direct goals, finally it may be due to non-holistic assessment of possible effects. An extended perspective can be derived by considering the impact factor of root causes. It is also evident, that from the overall point of view, the different aspects of dysfunctional effects assessment compose altogether the major determinant of side negative effects of Lean Management implementations. It can be also concluded from the findings, that when appropriate assessment of effects would be accompanied by linking them to company strategic objectives, in most cases the side negatives effects could be effectively avoided. Furthermore, in such cases mistaken initiatives, like due to stress from top-management on short term effects, would be most likely rejected.

It can be argued by concluding from the obtained research findings, that the following guidelines provide a comprehensive and sound framework for effective management control of Lean Management implementations:

1. The objectives of any Lean Management initiative should be derived from or confronted with the company strategic objectives.
2. The expected effects of Lean Management implementation should be assessed in a holistic way, i.e. by applying multiple perspectives of company or supply chains, and by considering all possible significant interdependencies, trade-offs and discrepancies of causes and effects. This should be primarily protected by:
   (a) Multi-perspective assessment of the effects by the Cross-X teams, i.e. through involvement of different stakeholders;
   (b) Qualitative controlling of effects, which should be supported by the means of qualitative modelling, in most cases probably by the cause-and-effect models.
3. Specific complexities of effects should be analyzed by dedicated modelling means, to relate some factors and to estimate trade-offs, and to elicit the possible second momentum effects. The holistic method of assessment should be equipped with a range of such means, making it ready for the most common circumstances, like e.g.: using standard Lean methods, targeting typical effects, and so on.

5 Summary

This paper elicits root causes of frequent side negative effects of Lean Management implementations. The empirically gathered evidence suggests that this unwelcome phenomenon is usually driven by particular dysfunctionalities of management control. Among them reductionist assessment of effects, plays the dominant role. It primarily manifests itself by: (i) bypassing those effects that are not directly linked to the area of given initiative; (ii) strict focus on first momentum effects; (iii) omitting complex causal relations of the effects. Additionally, the missing link between Lean Management effects and company strategic objectives brings further deterioration of effects.

In response to the identified dysfunctionalities of management control, guidelines for the holistic assessment are proposed, which meet the practice gap, and not like the literature, address the discussed question in a concrete, specific and focused way.

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