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# The learning way to EBITDA improvement.

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**Abstract.** Multi-national firms pursue enhanced market positioning by production performance, profit realization and cost reduction. As such, a key strategy is to apply standardized management concepts such as lean and Toyota Production System, or more recently, to develop a Company-Specific production System (XPS). However, a fundamental challenge is how to document the financial impact of such programs. The promise of cost reduction is frequently discussed, often hidden behind other organizational initiatives, such as downsizing and restructuring. This study investigates a Norwegian multi-national in Process industry, producing silicon to the global market. The company has developed, implemented, and institutionalized its own XPS since 1991 and claims that this has directly contributed to extensive cost reduction and significantly strengthened competitive position. The company claims a cost-reduction of 5-7% of total production cost, year-on-year since 2013. This is supposedly the result of planned change activities related to the XPS implementation. We challenge this claim, assuming that such a significant and sustained cost reduction must be explained by other variables. Our findings, however, indicate that the XPS first created institutionalized learning and secondly that this ‘learning capability’ managed to link continuous improvement work directly to improving the cost level of the organization. Our data were controlled against downsizing, market change, exchange rates, new investments, new technology and other contingency factors. The findings have implications for how firms might pursue business improvement. By using an XPS as catalyst for organizational learning, continuous improvement work might be linked more directly to financial performance for the company.

**Keywords:** Lean, company specific production system (XPS), financial results, organizational learning.

## 1 Introduction

Multi-national corporations (MNCs) are constantly seeking enhanced efficiency and business performance through technological and organizational development. This “race for efficiency” has been a driving force for MNCs since the birth of industrial capitalism, with different best-practice organizational concepts [1, 2] becoming roadmaps for organizational implementation. Since then, lean has been presented as a

"superior" global management concept [3] and is one of the most popular organizational paradigms of our time - that builds on the knowledge of the Toyota Production System (TPS). Since the late 1980s, several companies from different industries and organizations have made significant attempts to implement TPS and lean as models for best practice, aiming for production performance and enhanced financial outcome. However, it turned out that copying TPS and lean was more challenging than initially expected [4]. Facing different contextual environments, many MNCs argue that the lean statement of "universal applicability anywhere by anyone" [3] did not fulfill its promise. A significant number of studies in the last 30 years have documented the gap between the promised universality and practical reality [5-8].

Popular organizational concepts such as lean have two key characteristics: room for interpretation, and the promise of performance improvement [9, 10]. An organizational concept is usually presented with a set of principles, methods, and tools. These principles are easy to understand, but also ambiguous and imprecise, which allows for different interpretations. Such "interpretive viability" [11] makes it possible for different consumers (e.g., managers, consultants) to adapt the concept to different local conditions in their own organizations [11]. This in turn gives the concept more applicability and increases the field of distribution, because consumers use the elements that are most beneficial to their own interests. A prerequisite for popularity is thus the concept of "ambiguity", and it is this possibility of providing one's "own interpretation" that defines the "interpretative space" [11, 12].

Arguably, lean is a good example of a concept with high ambiguity. As suggested by Womack and Jones (1996), lean can be defined according to five main principles:

1. Define customer value
2. Identify the value stream(s) for each customer
3. Create flow
4. Secure pull
5. Pursue perfection through continuous improvement (*kaizen*).

With such a level of abstraction, lean has significant scope for interpretation, which, in turn, allows consumers, whether intentionally or not, to choose components that they find appropriate for their own context. This explains the long and ongoing discussion about lean and the content of the concept [13]. lean might be viewed through different 'lenses' [14] i.e., as a system [15], as a philosophy [16], as a set of tools and practices [17], as a 'soft lean' version [18], as a start-up program for new businesses [19], as a management concept [20], as an organizational learning system [21], or as a concept for cost cutting termed "hard lean" [22]. Hence, without a common understanding of the content, any attempt to measure the success of implementation and expected financial outcome relies on how the concept is interpreted. Consequently, the discussion of successful implementation is based on how the concept is defined. This explains how and why lean often is used to camouflage extensive downsizing in an organization, directly affecting the financial outcome regardless of enhanced production performance [23].

In response to the challenge of implementing 'best practice' concepts, MNCs began to develop new strategies to secure business performance in their network, with a focus

on adjusting and tailoring lean (and other concepts) to fit the company's uniqueness [24]. This "own-best-way" approach to the "one-best-way" phenomenon suggests that companies should adjust and tailor the principles and concept of lean to their contextual environment. Such adjustment is supposed to be made at the corporate level, with the new concept being implemented in the corporate network to ensure standardization and homogeneity among its subsidiaries. This company-specific production system (XPS) carries the company name, where the "X" represents the name of the company [25].

An XPS is also portrayed as a "multi-plant improvement program" [26] and a "corporate lean program" [27, 28]. The main resemblance is to the "own-best-way" approach, according to which the corporate level uses different concepts to create their own improvement program. This distinguishes it from other (global) lean programs by referring to a coordinated initiative at the corporate level whereby a tailored program is created and implemented among the company's subsidiaries.

The XPS phenomenon seems to be a growing trend among MNCs [24]. Hence, adjusting organizational concepts at a corporate level with the aim of network standardization implies a significant strategic initiative followed by a vital change process for an MNC [25]. Consequently, the phenomenon has academic and practical relevance. Despite the growing interest and strategic impact, research on XPS is very limited. In particular, the XPS phenomenon lacks empirical documentation on causal relations between XPS implementation and financial effects. Except for the work of Netland [24-26] and Ostermann [15, 29], and studies on corporate lean programs [21, 28], we have discovered no other empirical material describing either the creation and implementation process of an XPS or direct financial outcome of such implementation. This claim is based on an extensive search of the scientific literature. Thus, there is a need for more empirical data to examine the effect on production performance and financial outcomes when implementing an XPS in an MNC.

## 2 Research Design

This article built on the empirical material taken from the first author's recently completed doctoral project at School of Business and Law, University of Agder and post doctor data collection spring 2021. The first author examined the creation, implementation, and institutionalization of an XPC in a Norwegian MNC within process industry (from now called *Norwegian Chemical Company NCC*) [30, 31]. Data were obtained in the period 2017 to 2020. (See table 1 for an overview of data material). In this previous work, it was discovered that one division of NCC claimed to have developed the XPS to secure direct financial impact in its plants. Based on the knowledge of lean implementation and scarce XPS documentation, we set out to challenge this claim, hypothesizing that direct cost reduction must be explained by other variables than simply the implementation of an XPS. We collected data from one of the plants in the NCC division (from now called NCC Plant). This enabled a precise examination of possible financial outcomes and contextual variables regardless of variation within the NCC division's other plants (See table 1). Data was collected based on interviews and archival data from the plant. The plant was also visited during the data collection. Data was then sorted and analyzed using the reflexive methodology, emphasizing careful interpretation, challenging the reflection of data [32].

**Table 1. Data material Norwegian Chemical Company (NCC)**

Plant visits	Observations	Interviews	Archival data
Four NCC plants, Norway	One week observation shop floor level	Top managers 11 interviews	XPS written material
NCC plant, Brazil	One week observation shop floor level	Managers 32 interviews	Assessment written material
NCC plant, China	One week observation shop floor level	Shopfloor interviews 30 interviews	NCC performance data
	One week assessment program observation	Other 12 interviews with former CEO/managers	
NCC plant, Norway	One-week NCC university observation	8 interviews with managers NCC plant, Norway	

### 3 Findings

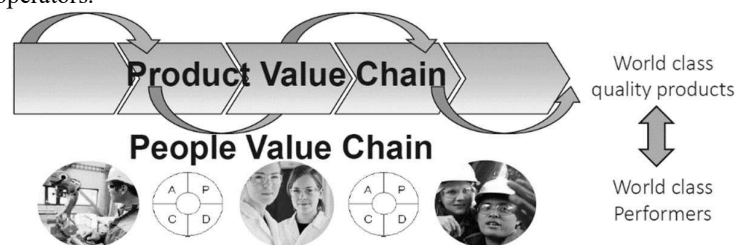
Our findings indicate that NCC Plant had implemented the XPS to an extent that continuous improvement had been institutionalized [33] with extensive operator involvement [34, 35]. In the plant, 80 out of 105 of the operators had voluntarily participated in ‘critical process groups’, working systematically to reduce the furnaces’ instability [34]. We also found that the operators reported a strong motivation for this job, stating that the continuous improvement work was one of the most important activities for improving performance at the plant.

*"Because... you know, if the furnace is good, my job is good. The group work has been very important for my daily work". (Furnace operator NCC Plant)*

We found the XPS was initiated and created from corporate level in 1994 to 2006 [36] and that the content of the XPS implied two important organizational choices: first, to show ‘respect for people’ and involve everyone in continuous problem-solving, and, second, to decentralize decision-making in autonomous work teams and remove the position of the team supervisor. Extensive empowerment should then lead to better problem-solving and higher employee motivation. In the words of the CEO of the NCC:

*"I had to understand the [people] dimension and how strong it is. The enormous energy you can release through the organization when people are properly trained and are made responsible... and your decisions are decentralized".*

Since the beginning of the XPS creation process, the NCC started to implement and institutionalize the XPS in its global network [36]. Different ‘best practice’ concepts from different organizational traditions (i.e., lean, TPS, Socio-technical System theory) influenced the creation and later development of the XPS but the core has remained from its initial consolidation in 1999. A dual emphasis was placed on improving both technology and human resources, as illustrated in the ‘the double integrated value chain’ (see Fig. 1). Technological and human development should be equally emphasized, as specified in the statement: to create world-class production, we need world-class operators.



**Fig. 1.** The double integrated value chain (from NCC company presentation)

In developing the XPS, we found that one important concept was implemented early in the process: Critical Process Management (CPM). Metallurgical upstream processes

have an extensive number of variables that influence the output. To ensure stable production, these variables must first be defined, then constantly measured, and monitored. Central to this is the organization's ability to ensure that the variables are identical every time (to stabilize them) and then to develop and improve the process (to make it capable). In 2001, the NCC started to implement CPM more extensively. At that time, the NCC Plant was struggling to get the furnaces under control. Division managers then started hiring specialists to further develop the knowledge within the division and in the NCC Plant. Finally, in 2006, CPM were blended into the NCC's XPS.

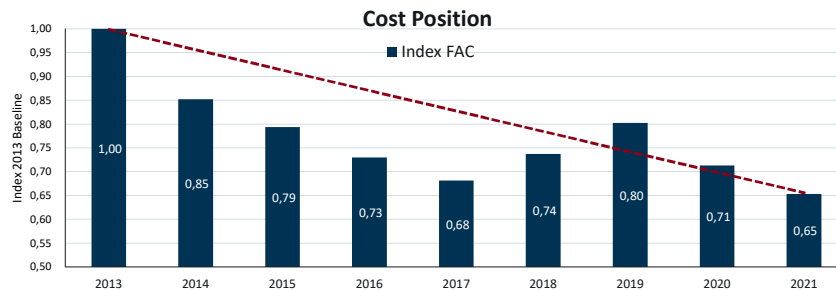
We found that CPM knowledge was to have a decisive impact on the NCC's production [36] and major consequences both for the furnaces and for production performance [34]. The quality of the production increased considerably, and fewer resources were required, but, perhaps most importantly, the operators and engineers experienced the furnaces becoming more stable and less unpredictable. This directly affected working conditions on the shifts, which gradually became calmer and more controlled. We found that this 'learning from direct experience' [37] contributed to the institutionalization of continuous improvement, later to be important for further improvements of plant performance.

We found that a new concept was in 2013 rolled out under the XPS umbrella. Cost Road Map (CRM) was launched as a strategic program in the overall XPS, aimed to secure not only production performance, but also the best possible cost position among its competitors. The CRM was directly designed with purpose of connecting the organisation and the improvement work to the financials. Defined KPI's had to document causality between the action taken and its result and lead to a direct improvement of 'Fully Absorbed Cost' (FAC) which is the company's total production unit cost, including all costing such as raw material, labor, capital cost and credits, FAC was measured against the production of tonnage produced product. All improvement had to be demonstrated in FAC reduction, and the priority of projects was crucial. As an example, time efficiency not related to direct cost reduction (i.e., 1 min saved per employee per day) was not defined as CRM initiatives, whereas increased load, yield improvements, reduced power or raw material consumption represented examples of defined CRM projects. The CRM improvement was measured against a predefined plant specific baseline established in cooperation with the plants finance team. Such a predefined baseline was anchored in the actual cost position from last year's fourth quarter, aiming to secure a precise measure of actual cost reduction for the plant. Target was to reduce actual cost every year by 7 % measured against baseline from previous year.

Anchored in the overall XPS philosophy and the 'double integrated value chain' (see fig 1), we found that operators, employees, engineers and managers in the different departments were regularly involved in 'brainstorm'-sessions, initiating possible CRM projects for the existing and next year's project portfolio. Incoming suggestions were reviewed by top management and prioritized. Then 'defined projects' was distributed back to the operators and departments for execution. An important and extensive CRM standard for the NCC division was established. The responsibility for the CRM development was not outsourced to the financial department. It was a direct responsibility for the top manager and his chain of command, only to be supported from the financial department and the plants' help chains.

In the NCC Plant, we observed several projects related directly to the CRM program. Operators, managers, technical staff were participating, using typical lean production tools for improvement (i.e., A3, visual mapping, CPM, 5S, VSA etc). To secure that the projects initiated for the CRM target had sustainability, the financial team did not report project successful until 3-month sustainability of improvement on financial report had been established. The projects initiated for CRM was spread over all parts of the plant's value stream and involved the whole organization from raw material to final product deliverance.

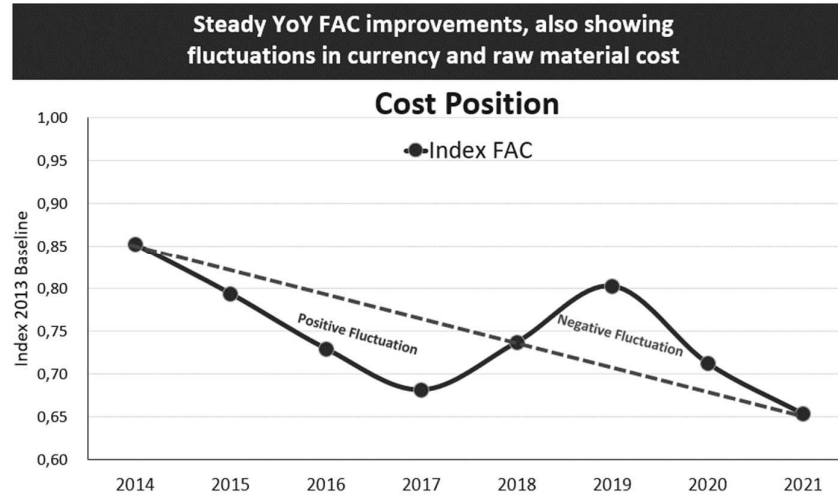
We found that the XPS combined with the new integrated CRM program have had significant effect on financial outcome in the NCC Plant. Since 2013 the plant has managed to reduce its cost position every year, measured in Euro cost pr tonnage produced silicon pr year. FAC has been reduced real term with approximately 7 % every year, according to target (see Fig. 2).



**Fig. 2.** Cost reduction NCC Plant 2013 - 2021

Some fluctuations occur in the period, also described as ‘bad news and good news’ among plant management (see Fig. 3). This relates to external factors like raw material price, currency etc. I. e. in the period 2014 to 2018 ‘good news’ resulted in nominal cost development beyond target of 7 %, whereas in 2019 and 2020 ‘bad news’ due to e.g. increased price on raw materials resulted in nominal cost development below target. Importantly, we found that this fluctuation was not related to the actual improvement work in the NCC Plant. Fluctuation was founded in external factors influencing the cost position regardless of actual underlying improvement.





**Fig. 3.** Fluctuations in cost reduction NCC Plant 2013 - 2021

We also tried to find other explanations for the financial performance in the plant, not related to the XPS. We found that the numbers of employees were stable in the period, indicating no downsizing or change in numbers of operators. Management were also stable in the period, indicating no major change in leadership or management of the plant.

We found no significant investments in new technology that alone had resulted in increases in production volume, process knowledge or the like, and thus significantly reduced the cost position. For example, we found no major investments in technology for expansions and increased capacity on plant furnaces. We only found that the NCC Plant had invested in equipment aimed for enhanced flexibility and increased process knowledge (i.e., constantly new measuring points), related to daily operation and continuous improvement efforts.

## 4 Discussion

Two main topics emerge from our findings. (1) The topic of sustainability and how the institutionalization of learning might generate financial results in an organization [33] and (2) the use of ‘best practice’ concepts (i.e., lean) as catalyst for organizational learning [28].

Within conceptual organizational theory, institutionalization involves the long-term persistence of change, indicating the sustainability of new practices in an organization [33]. In this stage of the change process, new practices and concepts become shared norms, values, and knowledge, and a normative consensus has been reached [38]. There is a distinct notion that continuous improvement brings evidence of lean being

institutionalized in an organization [8, 18, 28, 39-42]. Continuous improvement has its roots in the evolution of TPS and the formalization of improvement work during the 1950s and 1960s. Institutionalized practice became one of the main experiences when Toyota and General Motors (GM) established their joint venture, New United Motor Manufacturing Inc. (NUMMI) starting to distribute TPS to the Western world [43, 44]. In the NUMMI project, continuous improvement was claimed to be institutionalized among the operators in GE's Fremont plant, constantly developing performance in the production line [44]. This was later re-established and documented by Fujimoto (1999) who explained the logic behind Toyota's "manufacturing learning capability" and how this institutionalized learning explained the success of the company. Womack and Jones (1996) further emphasized this in the fifth principle of lean: conducting "continuous kaizen" by improving the standards in the flow [45]. Many companies deciding to implement lean have, therefore, considered lean means to establish continuous improvement and create a learning organization.

A significant number of studies have reported problems with institutionalizing continuous improvement in an organization [7, 46]. Studies have shown that organizations tend to establish short-term projects with external or internal consultants responsible for the implementation process [6, 18]. Such 'outsourcing' of the implementation process often results in short-term effects, leaving the organization with no shared assumptions or consensus about the deeper principles of the concept [7, 46, 47]. In the case of the NCC, institutionalization of continuous improvement began as early as 1999 when the XPS was consolidated [36]. Significant resources were allocated to secure the long-term sustainability of the XPS. By creating a global university, the corporate XPS department aimed to coordinate all improvement activities, assessment programs, cross country learning initiatives, leadership training, XPS coordination, global reporting system etc. As such, the NCC's global culture was systematically developed into a learning organization, made possible by constant re-examination of basic assumptions [48] in the global network [34, 35]. The NCC 'long time initiative' from 1999 explains the institutionalized learning capability in the organization, representing the core of the XPS [35].

Secondly, the NCC did not use 'best practice' concepts as standard for the creation and implementation of their XPS. The NCC used lean and other management concepts (i.e., Socio-Technical System Theory) [49] as catalysts for organizational learning [36]. Resembling the original concept of TPS, the NCC experimented with different concepts, and extracted the learning into its own XPS. This process lasted for 15 years [36]. Then the XPS was distributed and institutionalized, constantly being developed by experimenting with new concepts. In 2006, CPM was formally consolidated into the XPS [35]. And, as we have seen, the NCC started also to deploy CRM as the direct cost improvement initiative in 2013. The constant development and integration of new concepts demonstrates the NCC's learning capability and might explain the success of connecting organizational learning directly to its financial outcomes. Financial results have traditionally been hard to demonstrate due to lean implementation. For example, [5] refers to the Wall Street analyst Cliff Ransom estimating that only 1-2% of firms that implement lean do so effectively enough to see the results financially [5]. In the case of the NCC, financial results have been linked directly to its organizational learning

initiative, securing sustainable cost reduction and EBITDA improvement steadily since 2013.

## 5 Conclusion and implications

We found that NCC managed to link organizational learning directly to the improvement of financial results in their organization. The XPS created institutionalized learning in the organization and this ‘learning capability’ managed to link continuous improvement work directly to improving the cost level of the value chain. The XPS was developed resembling the creation of TPS, where different concepts and ideas were used for experimentation, constantly extracting new knowledge to the overall XPS. The evolving XPS concept, with its associated departments, values, and practices, served as a repository for the organization’s accumulated experience. By codifying the lessons learned, the XPS practices functioned analogously to how standard operational procedures (SOP) should function in a learning shop-floor environment [42, 50].

What are the implications of this study for managers wanting to link improvement directly to financial results? First, they should appreciate that institutionalized learning requires significant time, attention, support, and dedication. The duration of the XPS development in the NCC implies that there must be consistency in top-management support. This may be easily endangered when there are changes in top-management positions. Second, top managers should stimulate the organization to pick up new ideas and actively build a network for external learning. Third, top managers should allow the organization to experiment with different concepts before the final content of the XPS is consolidated. Finally, top managers need to realize the importance of allocating resources for institutionalization of the XPS. The creation process is an opportunity for building shared norms in the organization, later to be used directly for cost reduction and financial improvement.

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