

Navigating implementation strategies: insights from XPS programmes

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Abstract

Purpose – This study explores how industrial production companies adjust implementation strategies to deliver value with their company-specific production system (XPS) in a multi-site setting. Implementing an XPS is part of operations management and is supposed to mobilise employees resource-efficiently to increase operational performance.

Design/methodology/approach – Based on a multiple-case study, this study qualitatively explores the patterns of implementation decisions within and between five multi-site production companies. Conclusions were drawn on a mix of timely and retrospective data gathered through individual interviews with senior managers and joint workshops where they interacted and shared experiences.

Findings – This study identifies the fact that companies respond differently to non-unique implementation challenges, constituting various decision patterns when implementing their XPS. This paper identifies four implementation strategies (Education, Tool, Pragmatic and Culture Strategy) that explain various implementation setups. More experienced companies frequently shifted between strategies to return to previously de-prioritised implementation aspects.

Originality/value – This paper offers a dynamic model for XPS implementation in contrast to a simplified tool–system–culture sequence in literature today. Companies that deliberately shift implementation strategy by understanding the benefits and challenges of their decisions are more likely to keep momentum in the XPS implementation.

Keywords Corporate lean management, Implementation, XPS, Production, Improvement programme

Paper type Research paper

Quick value overview

Interesting because – Current models for lean implementation fall short of capturing the complexity of implementing company-specific production systems (XPS) across multiple production sites by managing corporate-level programmes. Although such programmes often span several decades, there is limited understanding of *how* companies adjust their implementation strategies to address emerging challenges. Corporate-level decisions significantly impact many employees within the company, yet the adjustments in strategy to keep momentum in XPS implementation have not been sufficiently explored.

Theoretical value – This study presents four distinct types of implementation strategies, outlining a method for how companies develop their responses to emerging challenges. The findings suggest that companies unintentionally shift their implementation strategies, prioritising certain implementation aspects while neglecting others. By making the decision patterns at the corporate level explicit, the study highlights the ability to intentionally manage and adjust shifting strategies as a critical corporate capability.

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Practical value – Companies implementing an XPS should evaluate their past and current implementation strategies, leveraging the types of strategies outlined in this paper. By examining previous initiatives alongside the associated benefits and challenges, companies can gain valuable insights into their current patterns for decisions about how the XPS is implemented. Failure to break these patterns may result in a resource-intensive implementation process with limited impact on operational performance and organisational waste.

1. Introduction

Building on the experience of lean production and Toyota's achievement of better operational performance (Liker, 2004; Womack *et al.*, 1990), many production companies have executed their lean strategy by developing company-specific production systems (XPS) (Hekneby *et al.*, 2021; Netland, 2013). Part of developing an XPS is to manage a systemised implementation process of the XPS to become an integral part of a corporation's existing management system (Bellgran, 2014; Miyake, 2008; Netland and Aspelund, 2014). Implementing an XPS is, therefore, a long-term iterative process and is often managed in lasting corporate programmes (Hekneby *et al.*, 2021; Netland and Aspelund, 2014), hereafter XPS.

In this paper, an XPS is defined as the main strategic programme within the organisation that manages overall corporate-wide change, aiming to gain operational excellence. The typical objective is to gain operational excellence by improving overall performance, harmonising values and mindset among the employees (Hekneby and Powell, 2023; Netland and Ferdows, 2014) and sharing and diffusing best practices within the corporation (Ansari *et al.*, 2014; Secchi and Camuffo, 2016). An XPS evolves organically toward diffuse objectives based on programme managers' experiences (Netland, 2012; Pellegrinelli, 1997).

XPSs are frequently grounded in lean principles and tools, reflecting lean as a dominant methodology for achieving operational excellence (Netland and Powell, 2016). The primary objective of an XPS is to enhance business profitability, often by improving operational efficiency and productivity in operations (Peng *et al.*, 2011). However, there has been a growing emphasis on people-oriented implementation aspects, recognising the critical role of corporate culture in achieving sustainable outcomes. Hopp and Spearman (2021, p. 619) explain the organisational perspective of implementation, which is aimed for with an XPS, as "*an organisational culture that encourages continual reduction of the cost of waste*". Companies seem to invest heavily in improving behavioural performance, for example leadership (Bortolotti *et al.*, 2015; Camuffo and Gerli, 2018; Netland *et al.*, 2020) and organisational learning (Hekneby and Powell, 2023; Saabye *et al.*, 2021; Secchi and Camuffo, 2016). This multifaceted perspective on operational performance can lead to varying priorities when companies formulate their implementation strategy. Given that a company's resources are finite and operating environments are continually changing, sustaining a competitive edge necessitates the development of dynamic capabilities (Teece *et al.*, 1997). However, a significant gap remains in understanding how companies cultivate the capabilities required to implement their XPS and how these strategies are adjusted to optimise value delivery.

One common strategy is implementing tools to diffuse best practices within the organisation (Bellgran, 2014; Netland and Ferdows, 2016). Likewise, many academic publications on lean implementation have focussed on applying tools or finding the "perfect sequence" for implementation (Stone, 2013). However, it has been established that solely implementing tools is insufficient to accomplish the system-level and cultural improvements needed to achieve the overall improvements aimed for with the XPS (Hekneby and Powell, 2023; Hines *et al.*, 2020). Therefore, implementation challenges, such as developing an improvement culture, remain a major concern for companies (Bortolotti *et al.*, 2015; Hines *et al.*, 2020). Even though challenges are identified, it is still poorly understood how such challenges relate to the implementation decisions made in the XPS and how companies respond to overcome them. Instead of assuming that companies must solely experiment with their way forward, this study aims to contribute with a

dynamic model to explain how implementation strategies could be evaluated and designed to close the gap in the literature.

We investigate implementation strategies in a production context due to the widespread application of XPS. By aiming to gain further insight into how companies keep the momentum in XPS implementation, the following questions have guided the research:

RQ1. What challenges do production companies face subsequent to the implementation decisions made in their XPS?

RQ2. How do production companies adjust their implementation strategy based on challenges identified in the XPS?

2. Literature review

2.1 Implementation decisions in the XPS

Achieving corporate-wide change differs from implementing best practices in single processes or implementation at the factory level. For example, the implementation of lean has shown to be a process of applying lean philosophy (Scherrer-Rathje *et al.*, 2009; Womack and Jones, 2003), principles (Liker, 2004) and methodologies (Bicheno and Holweg, 2009). The implementation must reach the organisation widely to improve overall performance (Womack *et al.*, 1990). There is a vast amount of lean research investigating implementation in single processes or factories compared to the processes involving the entire organisation (Hopp and Spearman, 2021; Stone, 2013). Table 1 displays examples of publications that have applied the lens of corporate-wide change. Roughly three categories of implementation aspects capture managers' decisions when implementing an XPS (Table 1). Decisions may relate to the concepts and scope of the programme, improvement methods in the toolbox and management control practices.

Defining the core concepts of the XPS aims to describe the features of the change and clarify ways of operating conceptually. Companies visualise core concepts and principles with

Table 1. Implementation aspects in an XPS

Implementation aspect	Examples of references	Descriptives
Concepts and scope	Hekneby <i>et al.</i> (2021), Netland (2013) Bellgran (2014), Miyake (2008)	Adapting TPS Conceptual/functional frameworks (e.g. pillar system)
Toolbox	Grothkopp <i>et al.</i> (2022), Hermundsdottir and Aspelund (2022), Plekhanov <i>et al.</i> (2022) Netland and Powell (2016), Shah and Ward (2003) Bellgran (2014)	Integration with operation strategy Bundles Lean tools
Management control	Demeter and Losonci (2019), Netland (2014), Secchi and Camuffo (2019) Boscari <i>et al.</i> (2016), Demeter and Losonci (2019), Hekneby <i>et al.</i> (2020), Miyake and Nakano (2007), Secchi and Camuffo (2016) Bellgran (2014), Netland (2014) Hekneby <i>et al.</i> (2020), Netland and Powell (2016) Bellgran (2014), Camuffo and Gerli (2018), Holmemo and Ingvaldsen (2016), Netland <i>et al.</i> (2020) Ansari <i>et al.</i> (2014), Linderson <i>et al.</i> (2024), Netland and Aspelund (2014)	Organisation Training Roadmap Assessment Leadership role and responsibility Level of standardisation /degree of autonomy

Source(s): Table created by authors

models adapted to the company's essence and terminology, sometimes called TPS- or lean houses (Hekneby *et al.*, 2021; Netland, 2013). Today, we know that companies' models for XPS highly resemble each other (Hekneby *et al.*, 2021; Netland, 2013). However, XPSs are not static. An XPS might expand its scope to immature functions and divisions (Bortolotti *et al.*, 2016). An XPS could also change content-wise as a response to a new operations strategy, for example, when integrating digital and circular concepts to gain operational excellence (Hermundsdottir and Aspelund, 2022; Kurdve and Bellgran, 2021; Plekhanov *et al.*, 2022). However, the visualisation to define the core concepts of the XPS on its own is non-representative of how the XPS is implemented.

As a way to collect and store the best-known improvement methods and tools (Bellgran, 2014), companies develop their own "toolboxes" (Demeter and Losonci, 2019; Linderson *et al.*, 2024). Since the companies develop tailored toolboxes, they have the opportunity to include tools from various management concepts (Netland, 2013), which is different from the implementation of distinct bundles of tools in isolation, for example lean (e.g. 5S, Kanban, kaizen), Six Sigma (e.g. DMAIC) or Agile (e.g. Scrum).

However, managing the content of the XPS is not enough. To achieve corporate-wide change, companies apply multiple management control practices to coordinate and motivate employees in the implementation. Management control relates to practices with both social and technical aspects (e.g. Harzing and Sorge, 2003). In XPS implementation, examples of social control are collaboration in cross-site networks (Netland *et al.*, 2015), best practice diffusion (Ansari *et al.*, 2014; Intra and Zahn, 2014) and various mechanisms for knowledge transfer (Boscari *et al.*, 2016; Danese *et al.*, 2017; Secchi and Camuffo, 2016). Often, companies develop dedicated organisations with XPS offices and improvement agents at different organisational levels to manage the XPS (Demeter and Losonci, 2019; Netland *et al.*, 2015). Technical control aims for more tangible practices, such as the development of implementation roadmaps (Bellgran, 2014), corporate-wide monitoring and assessment of performance (e.g. cost, quality) and maturity (e.g. implementation of tools) (Andersson and Bellgran, 2015; Narayanamurthy and Gurumurthy, 2015; Netland *et al.*, 2015).

2.2 Implementation strategy – the pattern of implementation decisions

A strategy is often understood to be formed in more explicit, intended and proactive ways than in reality. Mintzberg (1979, p. 69) suggests a distinction between intended and realised strategy, where the latter is "*a pattern of stream of decisions*". Once the patterns are revealed, they could form the basis for a deliberate strategy (Mintzberg, 1979, p. 69). We adopt a similar view to define the implementation strategy of the XPS, which is the pattern of implementation decisions. Existing literature recognises an organic and evolving pathway of how companies implement their XPS (Hines *et al.*, 2020; Netland and Ferdows, 2016). For instance, Netland and Ferdows (2016) identify initial exploration and later exploitation phases, resulting in non-linear performance patterns. Hines *et al.* (2020) portray lean implementation as an evolving sequence of tool-system-culture improvements.

Managing an XPS assumes a looping implementation pattern, where each loop includes decisions about the initiative, realisation and feedback about the initiative's impact (Netland, 2012; Pellegrielli, 1997). Hence, managers could make a stream of decisions to accomplish changes over time and keep momentum. To avoid the risk of stagnating or dissolving the programme, companies are expected to adjust their methods to implement the programme (Hekneby *et al.*, 2021; Lycett *et al.*, 2004). However, previous work does not explain *how* companies adjust their strategy to overcome various implementation challenges.

Depending on the management control practices (as explained in 2.1), programme managers create a feedback loop useful when evaluating the initiative's impact on operational performance. The initiative might not have the impact as anticipated, or the priorities for operational performance may shift. Ideally, programme managers would adjust and make implementation decisions based on the experience they have gained. By recognising emerging

patterns of implementation decisions, different strategies could be identified and become helpful in understanding how companies adjust their implementation strategy.

3. Methodology

In order to identify and understand how production companies adjust their strategies to manage the implementation of an XPS, a qualitative research approach using a multiple case study design was adopted (Yin, 2009). The multiple cases supported theory building as the aim was to identify various implementation decisions made within the cases as well as make comparisons between the cases (Eisenhardt, 1989). This paper reports on the data part of a larger joint project between industry and academia to develop implementation guidelines. The project applied an interactive research approach based on an industrial and academic co-creation of new knowledge, solving parallel problems in both theory and practice (Ellström *et al.*, 2020).

3.1 Multiple case study design

Five industrial production companies (cases C1-5) comprising 1–2 participants from each case company were selected based on their interest in learning more about the development and implementation of their XPS. Although the case companies operated in different industry sectors and had various levels of experience in their XPS, they all shared the corporate strategy of having a formal XPS in a multi-site production context (see Table 2 for details about the

Table 2. Overview of companies and participants in the study and data collection

Case company	C1	C2	C3	C4	C5
Industry sector	Pharma	Automotive	Metal processing and recycling	Mining and construction equipment	Batteries and accumulators
Programme experience among participants	>25 years	>25 years	>25 years	>25 years	>25 years
Employees in operations and logistics	>10.000	>10.000	<10.000	>10.000	<10.000
Initiation of the XPS	In 2002, at a large site, initially global level in 2010, but formally in 2015	In 1995, based on existing improvement programmes and support from Toyota Sensei	In 2012, at a large site, but formally in 2015	In 2019, after a consulting firm assessed great potential to improve its operations in 2016/2017	In 2022, after a top-down global decision and customer requests in the supply chain
Interview (before)	81 min	75 min	80 min	70 min	71 min
Company documents (e.g. Ppt and pdf documents describing the programmes)	116 pages	168 pages	97 pages	21 pages	39 pages
Workshop	180 min				
Interview (after)	52 min	52 min	56 min	53 min	45 min
Validation meetings	60 min, 13 ind. Practitioners	60 min, 11 ind. Practitioners	N/A	N/A	N/A

Source(s): Table created by authors

cases). The representatives were all senior experts with extensive and long experience within production and a clear mandate in decision-making processes regarding their XPS.

Initially, each case company's representative(s) was interviewed separately after providing written consent. A joint workshop was arranged with all the case companies' representatives in the next step. The workshop design aimed to stimulate a creative conversation where one participant could inspire and trigger the next participant and so forth (Brinkmann and Kvale, 2015). The workshop intended to increase the richness of the retrospective data to somewhat compensate for the lack of longitudinal data gathering. A second round of interviews was performed with all the case companies separately for validation. Additional validation meetings were held in two case companies (C1 and C2) to present and discuss the findings in groups comprising improvement agents from the extended XPS organisation on global and regional levels.

3.2 Data collection and analysis

The data was collected from March 2022 to March 2023 (see Table 2 for data sources). The first round of semi-structured audiovisual interviews was conducted with the support of an interview protocol, following (Säfsen *et al.*, 2020, pp. 152–158). One researcher led the interview, and the other took notes as a basis for discussions between the researchers after each occasion. Emerging themes were followed up on in the second interview for validation and triangulation. Examples of open-ended questions were “How would you describe the current approach for implementing the programme?”, “How do you evaluate the impact of the programme?” and “What changes have you made to have better impact of the programme?”. The joint workshop consisted of iterations between presenting early research findings and group discussions in which all representatives actively participated.

Thematic coding was applied for the transcribed data in Nvivo™ (see an overview of the data in Table 2). The analysis aimed to identify the implementation decisions, challenges emerging from implementing the initiatives and the adjustments made as a response to solve those challenges. The implementation decisions were analysed in relation to the three categories of implementation aspects: concepts and scope of the programme, toolbox and management control practices (described in 2.1). In addition, a fourth aspect, the priorities for operational performance, was included in the analytical model to explore the views on operational performance in implementation.

A within-case analysis was performed (case descriptions in Chapter 4) to identify challenges subsequent to the decisions (see 5.1). After that, the adjustments made within the cases to respond to the emerging challenges were compared in a cross-case analysis (see 5.2). The analysis approach was reflexive, aligned with Braun and Clarke (2006), to iteratively explore the decisions given our analytical model. By comparing the multiple cases, similarities and differences eventually constituted the various types of implementation strategies (displayed in Figure 1 and elaborated on in 5.3).

4. Findings

4.1 Company 1 (C1)

Initially, C1 focused on defining an XPS by collaborating with companies within their network and engaging consultants to initiate the implementation process and run pilots. To facilitate the use of fundamental lean tools, they developed visualisations of key tools in a system accessible corporate-wide. The primary responsibility for implementing these tools was assigned to a network of improvement agents.

To ensure comprehensive training, C1 developed an integrated training and assessment framework combined with maturity targets for their factories. However, after several years of conducting assessments, C1 encountered significant challenges arising from the high level of

standardisation imposed by mandatory method standards and various assessment frameworks. As the programme manager described,

... [global XPS office] drove standardisation too far, which we have now realised, and heard from managers at several levels that there is too much focus on methods and tools.

While this strategy did result in increased maturity levels, according to C1's assessment results, it also led to undesirable behaviours within the organisation. Improvement agents observed an excessive focus on tools and templates, which fostered a "tick-the-box" mentality. This was concerning, as many employees still had a limited understanding of the overall programme. The programme manager explained the challenge of,

Leaders ask us [improvement agents] to coach and help them to do more correctly, not to control and assess them only to pass the requirements.

This prompted C1 to adjust the strategy to shift away from decisions focused on achieving specific maturity targets and enforcing tools. Instead, the emphasis turned to developing "true" capabilities based on the principles and values of the XPS. To support this, C1 created a new assessment framework based on a certification system that explicitly defined the required capabilities for various roles across the entire organisation. Hence, the programme's scope expanded to new functions and middle managers, going beyond the shop floor. As a result, C1 discovered that the improvement agents needed additional training to enhance their coaching capabilities. The assessment procedures became less rigid, with no standardised maturity targets, although improvement agents remained mainly responsible for guiding teams toward higher maturity levels. Additionally, in response to the previous tool-focused assessment, the framework was adjusted to offer a broader view of the production system, incorporating digital and environmental principles and tools into the maturity assessment.

4.2 Company 2 (C2)

Initially, significant attention was given to promoting principles of the XPS with major inspiration from Toyota's operations. Including senior management when assessing the fit of principles and tools to C2's context was considered important. Over the years, C2 made several attempts to standardise measurements and evaluate maturity levels within the network to scale up the implementation. However, these efforts yielded only short-term results. As the programme manager explained:

We have measured in all possible ways you can imagine. The general trend was that we started with a scoring system to measure implemented methods. After a while, people learned the system and received the scores without doing the work. Then we changed to a more understanding-based approach where templates were the foundation for discussion ... before the organisation learned that as well.

Eventually, C2 moved away from its pattern of repeatedly revising assessment frameworks and developed a leadership system that integrated assessments, principles and tools to guide leaders. The adjustments aimed to make a triad of responsibilities explicit: developing employees, processes and strategies. While improvement agents provided training and coaching, managers were held accountable for progress. The strategy for systemising training followed a "train-the-trainer" approach, where improvement agents primarily trained managers to a level where they could, in turn, train their teams. A key challenge identified at C2 was the underestimation of the resources needed to sustain high performance, particularly in terms of transferring experiences, sharing success stories, and building a common language across functions.

C2 faced significant challenges due to varying maturity levels across the organisation and high turnover among managers. These maturity gaps made corporate-wide changes more complex, while the frequent turnover resulted in the loss of essential leadership capabilities, undermining the train-the-trainer model. To address these challenges, C2 introduced a 3-day training course to raise the overall capability level of all managers and change agents to ensure

consistent organisational capabilities. Recently, C2 piloted new tools before adding them to their toolbox to support digital and environmental strategies. However, the programme manager expressed concerns that some digital tools, with limited performance track records, mainly added complexity to the production process. C2 made comprehensive initiatives to address these concerns by conceptualising how the XPS supports the new digital and sustainability strategies to guide the implementation process.

4.3 Company 3 (C3)

C3 launched its efficiency programme at the corporate level to support all divisions, grounding it in the strong principles and values of the family-owned business group. In the early stages, C3 focused on educating widely, establishing a cross-site network, rolling out tools in implementation waves and developing assessment frameworks to evaluate maturity levels. The programme manager shared the challenges with the implementation strategy:

We had a wave-like implementation structure, one wave per year and site . . . this was put in the targets and pushed for, but then we began to get difficulties in motivating the organisation, and it turned out that they [line managers] did not really understand [the programme].

Recognising this challenge within the cross-site network, C3 sought to shift the responsibility for implementation from improvement agents to managers by introducing a new coaching model. This adjustment also aimed to address the imbalance in capabilities between line managers and improvement agents in support functions. The focus shifted from merely auditing maturity levels to aligning efforts with the business's specific needs. To further support this adjustment, C3 developed a digital version of the assessment framework, enabling self-assessment and placing greater emphasis on actual performance. However, the improvement agents remained the primary drivers of change. C3 also revamped its toolbox and "XPS house" by incorporating and piloting digital tools to align the XPS with the new operations strategy.

4.4 Company 4 (C4)

External consultants identified significant potential for developing an XPS at C4. In the early stages, the focus was on executing strategic plans to improve operational performance and achieve quick wins rather than uniformly rolling out tools across all sites. Given C4's highly decentralised structure, the programme manager deliberately avoided a one-size-fits-all approach where the central organisation would impose the same template on everyone. Instead, they aimed to balance attention between structure and tools on one side and leadership and culture on the other. The programme manager noted that focusing solely on principles and values could increase tool variation, making identifying and establishing best practices challenging.

C4's primary implementation strategy involved conducting pilot projects and developing and training the cross-site network. They also experimented with focused implementation periods to achieve quick wins. Although the organisation had targets for expected savings, there was no specific sequence of tools for implementing the XPS. However, line managers eventually requested more guidance in the implementation process as they faced challenges in determining where to start. To address this issue, C4 revisited the content of the XPS and developed an assessment framework that is optional to use. This adjustment aimed to prevent stagnation of the programme despite the existence of islands of excellence. The framework was designed to assist in creating tailored implementation roadmaps at the local level.

C4 initially focused on validating the programme's impact by collecting success stories and demonstrating improvements in operational performance through pilot projects before proceeding with broader implementation. The strategy prioritised coordinating existing programme resources, including training and tools developed over the past three years, rather than creating new content. However, C4 faced challenges in resource allocation due to competing initiatives and projects, such as IT system updates and sustainability initiatives.

4.5 Company 5 (C5)

C5 adopted multiple improvement concepts but encountered difficulties allocating sufficient resources for implementation and coordinating training. As a greenfield manufacturer with limited experience, C5 faced challenges related to rapid growth, frequent reorganisations and the absence of established corporate values and a training approach for its expanding multinational workforce. These challenges are exemplified as follows:

Everyone has been so focused on starting the production, building production lines, commissioning, and everything else that this [C5 Production System] has somewhat gone into idle mode.

The XPS office was integrated with the organisation designing the physical production systems. Yet, the programme manager reported challenges stemming from the lack of a strategic direction to guide the company's growth, particularly in determining the content and scope of the XPS. As one manager noted:

I see that it [C5 Production System] would have helped us to make everyone strive, or something to have in our hands to pull everyone in the same direction.

C5 relied on consultants to develop operating principles and a training model for their XPS programme. However, the coordination of training was poor, with different functions offering different types of training, creating misfits with the XPS. The lack of coordination led to the adoption of multiple improvement concepts and tools, complicating resource allocation for implementing the XPS. To address this challenge, the programme manager had to revisit the content and scope of the XPS to define its principles and values more clearly by including further input from senior managers.

5. Analysis and discussion

5.1 Challenges subsequent to implementation decisions

The challenges the case companies identified emerged after certain implementation decisions (see Table 3, two columns to the left). For example, the decision to conduct pilots was a critical way to collect the experience needed to customise the XPS. However, only a few employees became involved, and they had significant support from improvement agents, making the implementation difficult to scale. On the contrary, the decision to educate widely underestimated the resources needed to train the organisation in practice. Some companies tried to balance the more theoretical implementation of the XPS to focus on operational performance, where the teams' local strategy and issues would "pull" for how the XPS could be implemented. However, neglecting training in cross-site networks or maturity levels developed isolated islands of excellence or stagnation. In turn, this contradicted the XPS's aim for *overall* improvements within the company. Nevertheless, the challenges did not differ much between the companies.

5.2 Different adjustments to similar implementation challenges

The analysis revealed that the companies adjusted the following initiatives in their XPS in various ways (Table 3) to cope with similar implementation challenges. For example, C1-4 experienced difficulties scaling up the implementation after conducting pilots. However, C1-3 responded by educating widely through waves of tool implementation, and C4 focussed on operational performance at an early stage of their XPS.

The companies that wanted to move from a tool-focused strategy to focus more on actual performance improvements (C1-3) had several iterations between pushing tools and educating widely. The iteration between applying tools and educate widely resulted in a poor focus on local operational targets or having managers to train their teams. For instance, C1-C3 chose to refine criteria in the assessment frameworks (i.e. the same pattern) rather than revise the priorities in the implementation (i.e. changing the pattern) except for C2, which eventually adjusted the roles and responsibilities in the implementation. C2 decided that the managers had

Table 3. A cross-case analysis of emerging challenges as the result of implementation decisions and examples of adjustments to the following decisions

Implementation decision	Emerging challenge	Challenge identified at						Adjustments	Examples of following implementation decisions
		C1	C2	C3	C4	C5			
Conduct pilots to test new tools	Difficult to scale up implementation	x	x	x	x			→	Educate widely Train-the-trainer Implement tools Train the cross-site network Expand the toolbox
Promote principles and values	Unclear guidance in the implementation processes and what best practice is due to increasing variation of tools	x	x	x	x			→	Implement tools Focus on operational targets Assess maturity
Educate widely with coordinated training	Underestimation of the resources it takes to train the organisation	x	x	x				→	Train-the-trainer Train the cross-site network Correlation between maturity and performance Focus on operational targets
Train the cross-site network	An imbalance between capabilities within operations vs support functions	x	x	x				→	Focus on operational targets Train-the-trainer
Implement waves of tools	Shallow understanding of the system and extensive work with method standards	x	x	x		x		→	Assess maturity Focus on operational targets
Assessment given specified maturity targets	Undesired behavioural performance (e.g. Tick-in-the-box) and difficulties to find an appropriate level where the business benefits exceed the demand for resources	x	x	x				→	Educate widely Focus on operational targets Expand the toolbox
Focus on operational targets in local strategy (e.g. quick wins)	Islands of excellence or stagnation of the programme		x		x			→	Educate widely Expand the scope of the programme Assess maturity

(continued)

(continued)

Table 3. Continued

Implementation decision	Emerging challenge	Challenge identified at					Adjustments	Examples of following implementation decisions
		C1	C2	C3	C4	C5		
Train-the-trainer	Difficult to uphold sufficient quality of training (e.g. due to management turnover or increased scope)		x				→	Educate widely Implement tools Promote principles and values Train the cross-site network
Expand the toolbox (e.g. digital and green tools)	Increased complexity and no impact on operational performance	x	x	x			→	Focus on operational targets Educate widely Train the cross-site network Conduct Pilots Implement tools Promote principles and values
Expand the scope of the programme, for example by involving additional functions or divisions	Difficult to develop a common language cross-functionally	x	x				→	Educate widely Train the cross-site network Promote principles and values Expand the toolbox

Source(s): Table created by authors

to train their teams to overcome the challenge of scaling up training of the XPS with sufficient quality and depth (i.e. train the trainer). The decisions for adjustments to the challenges formed different decision patterns constituting types of implementation strategies, further elaborated in the next section.

5.3 Understanding decision patterns by four types of implementation strategies

The challenges associated with implementation decisions within the XPS appear consistent across the companies studied (see [Table 3](#)). However, the companies respond differently to the challenges by leaving previous implementation decisions behind ([Table 3](#)), forming a pattern in the stream of decisions, which constitutes various implementation strategies (strategy, according to [Mintzberg \(1979\)](#)). The following paragraphs elaborate on four identified strategies: Education, Tool, Pragmatic and Culture Strategies.

Education Strategy consists of a decision pattern that prioritises defining and implementing the content of the XPS. For example, creating a vision by conceptual models (missing in C5), as described by [Netland \(2013\)](#), deciding on implementation sequences (C1, C3), and educating widely by waves of training offerings regardless of local needs (C1, C3). The education strategy focuses less on “actual” business outcomes and bypasses the local strategies. It makes it an indirect approach, favouring building theoretical knowledge within the organisation over proof of impact or quick wins. Examples of decisions are alignment between training and toolbox (C1, C3, C4) or assigning education modules applicable for all, for example by e-learning or

classroom training. The main objective appears to be to develop foundational capability at scale and position the XPS within the organisation compared to other programmes.

Tool Strategy consists of a decision pattern that prioritises the implementation of tools to diffuse practices aiming to develop capabilities by widely applicable practical applications in the organisation. Examples of decisions are managing implementation waves of pre-decided tools or deploying maturity targets (C1, C3). The tool strategy focuses less on the conceptual ideas of the XPS, such as explaining the connection to the operating principles of a system. The main objective appears to be providing implementation guidance (missing in C4), streamlining practices with mandatory method standards (C1) and allocating resources to support the implementation process (C1, C3).

Pragmatic strategy consists of a decision pattern that prioritises implementation driven by business needs and local priorities for improving operational performance. The improvement initiatives emanate from problems concerning the local strategy when choosing suitable tools or conducting pilots to gather experience in practice. The pragmatic strategy focuses less on top-down coordination of training (C1, C3), best practice sharing in networks (C3) and promoting standardised ways to assess maturity and progress (C1). The main objective appears to be connecting different abstraction levels of values, principles and tools to verify that the implementation generates an impact.

Culture Strategy consists of a decision pattern focused on overcoming cultural challenges such as divergent terminology and mindset due to islands of excellence (C4) or an expanding programme scope (C2). For example, when aligning the XPS with the environmental strategy, as seen at C2. The culture strategy focuses less on specific tools and prioritises streamlining behavioural performance. The main objective appears to be to deepen the understanding of the purpose of implementing the XPS, an issue frequently recognised by others, for example [Bortolotti et al. \(2015\)](#) or [Secchi and Camuffo \(2016\)](#).

5.4 Managing shifting implementation strategies

[Figure 1](#) illustrates how the companies shift implementation strategy and predominantly iterate multiple times between a few. The constraints of resources hindered the companies from addressing all aspects simultaneously. The shifting focus demonstrates the complexity and demand for resources in the implementation processes of the XPS.

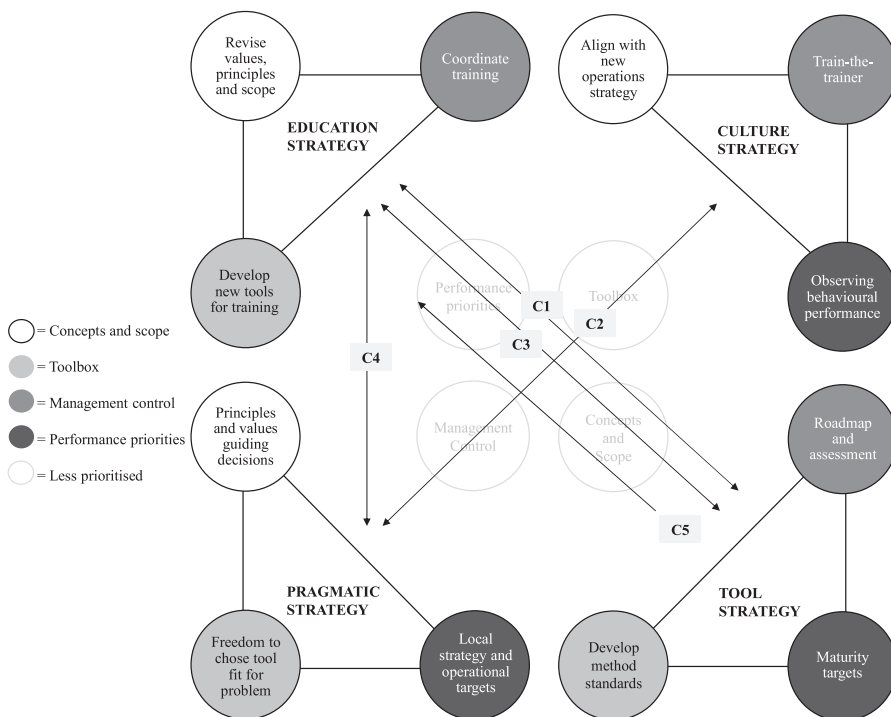
At an early stage, most companies applied the Tool strategy with iterations between the Education strategy. The Tool strategy prioritises assessment and targets for maturity levels of practices to create local experience and tangible action. [Boscari et al. \(2016\)](#) identify an initial push as necessary to build absorptive capacity. However, finding a realistic level of assessing maturity was challenging. The companies needed extensive resources to design frameworks and perform the assessment activities. Yet, the impact on operational performance remained relatively unclear, speaking for keeping assessment frameworks simple, aligning with arguments by [Netland and Powell \(2016\)](#). Hence, staying too long in the Tool strategy might fail to develop a deep understanding of achieving improvements at a system level (C1-3), also identified by [Hines et al. \(2020\)](#).

Similarly, staying too long with the Education strategy fails to build a deep understanding of the performance gaps and causes undesirable behavioural performance (e.g. tick-in-the-box) (C1-C3). However, “skipping” the Tool strategy appears to confuse the organisation since the guidance becomes too abstract, as demonstrated in C4. The findings demonstrate reasons to return to the Education strategy, as identified at C2, with leadership training when aiming to streamline foundational capabilities.

Nevertheless, iteration between the Tool- and Education strategy will still neglect operational performance related to the bottom line. Companies risk expanding the programme’s content without verifying its applicability and impact. Staying with the Education strategy risks developing a “paper product programme” and staying with the Tool strategy risks equating the XPS to a set of

tools. Both risks may lead to costly coordination and administration of the programme, and the XPS could eventually become outcompeted by other programmes or dissolve.

C2 demonstrated shifts between different strategies by mainly iterating between the Pragmatic and Culture strategies (Figure 1). The Pragmatic strategy prioritises applying relevant tools for the local strategy rather than applying pre-decided pathways and harmonising capability levels in the organisation. The Pragmatic Strategy differs from practice diffusion explained by Ansari *et al.* (2014), such as deciding on adaptation parameters in method standards. Instead, the relationship between conceptual content, toolbox and business needs is in focus. However, neglecting the management control aspect (e.g. training in the cross-site network) assumes that the organisation's capabilities are sustained. However, in C2, the high turnover of managers became a challenge, demonstrating that staying with the Pragmatic strategy risks creating islands of excellence. Companies may, therefore, need to return to the Tool strategy when expanding the programme content, for example new digital or green tools in the toolbox, or to the Culture strategy when aligning the XPS with the latest operations strategy. The Culture strategy prioritises harmonisation of mindset, which assumes the freedom to develop local tools. However, staying with a Culture strategy risks becoming too abstract and failing to guide the organisation to action, decreasing implementation momentum. In addition, uncontrolled development of tools could create new cultural challenges over time, such as a lack of best practice sharing and collaboration between sites due to inconsistent terminology. In summary, strategies aiming for one-size-fits-all might still be applicable. However, being stuck in the same strategy explains why the momentum of the XPS implementation could be impeded with any strategy.



Source(s): Figure created by authors

Figure 1. Display of the identified decision patterns constituting four types of implementation strategies

5.5 Navigating implementation strategies

The identified shifts between different implementation strategies demonstrate the complexity of decision-making in the XPS. Hence, it is important to understand the effect of developing capabilities in designing an implementation strategy. Companies eventually need to return to the de-prioritised implementation aspect, which requires a strategy shift, suggesting that staying too long in the same type of implementation strategy seems to be a greater issue rather than adhering to a specific sequence of strategies.

We found that mature companies have shifted more frequently between different types of implementation strategies based on the company's priorities. As the company shifts between implementation strategies, they gather experience about the consequences of their prior decisions. The experience simplifies the decision-making process since certain implementation aspects are prioritised over others. However, solely gathering experience is not sufficient. The programme managers need to translate the outcomes from implementation into insights and preserve them within the organisation, similar to a learn-to-learn capability suggested by [Hekneby and Powell \(2023\)](#). Hence, the structure for learning at a programme level will determine whether the XPS becomes a source of the company's competitiveness.

However, the companies in the current study did not appear to shift between strategies deliberately. This is probably because companies today have a poor understanding of the benefits and challenges of the chosen strategy. Therefore, companies must develop the capability to shift implementation strategies to keep momentum in XPS implementation. This paper suggests a dynamic model to support companies to move toward making deliberate shifts between implementation strategies. By identifying how implementation challenges emerge subsequent to the decisions and understanding the differences in how companies respond to such challenges, this paper provides valuable insight to companies that seldom identify such causal relationships. Companies could otherwise be stuck in realising unintended strategies, as [Mintzberg \(1979\)](#) argued, by overlooking the opportunities for building dynamic capabilities to adapt and realise their strategy. Deliberately changing implementation strategy means being aware of previous decisions, intentions, and patterns to keep momentum in the XPS implementation, such as returning to down-prioritised implementation aspects. The ability to know when the strategy should change, what strategy is more suitable and how to control the expected challenges with the chosen strategy appears as a hidden core strategic capability.

6. Conclusion

6.1 Contributions

This research aims to understand how companies keep momentum in XPS implementation to improve operational performance. The findings in this study contribute to the theory-practice gap described by [Hopp and Spearman \(2021\)](#) by identifying implementation capabilities when adopting an organisational lens to lean implementation. Many companies might follow a tool-system-culture sequence in their journey, as [Hines et al. \(2020\)](#) discovered in one case. However, the current paper builds on existing theory and presents a systemised view of implementation. Suggesting a dynamic implementation model contributes to how companies may deliberately choose a strategy that best fits what is aimed for, even though the XPS might change over time.

First, the findings contribute new knowledge about various challenges subsequent to implementation decisions. Although several enablers and challenges have been identified in other publications ([Hekneby and Powell, 2023](#); [Netland and Ferdows, 2016](#); [Secchi and Camuffo, 2016](#)), the current study demonstrate how the challenges relate to the implementation decisions made by programme managers. This contribution is important since the emerging challenges were found to be non-unique. Hence, companies may respond differently to emerging challenges once they better understand how the challenges relate to the decision previously made in the XPS.

Second, this study contributes by identifying different decision patterns by describing four types of strategies ([Figure 1](#)) based on insights from experienced senior managers ([Table 2](#)).

Previous publications base their conclusions on single cases, for example [Hekneby and Powell \(2023\)](#) and [Hines et al. \(2020\)](#). However, the current paper analyses decision patterns within and between multiple case companies. The types of strategies aim to simplify the complexity of implementing corporate-wide change. The abstraction of implementation strategies becomes helpful in understanding how companies shift strategy to increase the maturity of the XPS over time without referring to a sequence of actions. Hence, the strategies become helpful in defining company-specific pathways for corporate-level implementation.

Third, the study contributes to views on difficulties in imitating the ability to shift between implementation strategies deliberately. The findings explain why a changing implementation strategy is needed to avoid losing momentum in the XPS implementation. The novel view of shifting between implementation strategies corresponds well to the iterative nature of transformation processes. However, only a few publications explain how companies need to return to previous implementation decisions and “old” implementation strategies to meet the continuously changing environment within the company.

6.2 Implications for practice

This study has several implications for practice. First, making the challenges subsequent to the implementation decisions explicit may support programme managers when developing new strategies. Second, the identified types of implementation strategies support practitioners to gain insights into situations when it is appropriate to shift strategy and the consequences of staying too long with the same strategy. Third, this study elaborates on the importance of developing the ability to iterate more deliberately, and perhaps proactively, between various options for decision patterns to avoid iterating between only a few and, by that, losing momentum in the XPS implementation.

Notably, the studied companies put major effort into solving implementation challenges to manage their XPS. Yet, the managers lacked the tools to systematise their implementation strategy’s design and evaluation processes. [Table 3](#) and [Figure 1](#) could support executives, programme managers and improvement agents in such processes to make benefits and challenges with the strategies more explicit. Companies that pay attention to the learning process regarding implementation at a programme level, as a natural part of managing the XPS, develop the ability to shift between strategies deliberately. Possibly, the implementation capability has spillover effects on other transformation programmes within the company and may become a source to gain competitive advantages.

6.3 Limitations and further research

This study has several limitations. For example, longitudinal studies with more frequent data points could have provided greater granularity in analysing decision patterns. The study identifies four predominant types of implementation strategies derived from relatively high-level patterns, as the research included both within-case and cross-case analyses. Consequently, the existence of additional strategy types cannot be ruled out. Configurational theory may offer a valuable lens for exploring the deliberate transitions between implementation strategies, building on the typology presented in this paper. While companies may apply multiple strategies concurrently at the site level, evidence suggests that doing so at the corporate level is unlikely to be practical, primarily due to resource constraints.

This study has prioritised decision patterns established by programme managers. Future research could evaluate the applicability of the identified implementation strategy types ([Figure 1](#)) by focusing solely on mature XPS or extending the investigation to other strategic programmes for corporate-wide change. An additional avenue for exploration is whether the ability to shift implementation strategies generates spillover effects for different types of organisational transformations. This study identifies companies seeking to integrate digital and circular concepts into their XPS. Future research could examine to what extent the implementation strategies are deliberately formulated across a broader sample of companies.

Future research could further explore challenges associated with managing an XPS, with a particular emphasis on developmental patterns. One promising avenue of investigation could involve examining the process by which new concepts are integrated into an established XPS. Additionally, identifying the maturity stages of an XPS and analysing the specific expectations and actions appropriate for each stage could provide valuable insights. Considering XPS's significant impact on all employees, affected not only by the changes introduced but also the strategies employed during implementation, this represents a crucial area for ongoing research.

References

- Andersson, C. and Bellgran, M. (2015), "On the complexity of using performance measures: enhancing sustained production improvement capability by combining OEE and productivity", *Journal of Manufacturing Systems*, Vol. 35, pp. 144-154, doi: [10.1016/j.jmsy.2014.12.003](https://doi.org/10.1016/j.jmsy.2014.12.003).
- Ansari, S., Reinecke, J. and Spaan, A. (2014), "How are practices made to vary? Managing practice adaptation in a multinational corporation", *Organization Studies*, Vol. 35 No. 9, pp. 1313-1341, doi: [10.1177/0170840614539310](https://doi.org/10.1177/0170840614539310).
- Bellgran, M. (2014), "A corporate perspective on global management and development of lean production systems: a case study", in *Handbook of Research on Design and Management of Lean Production Systems*, IGI Global, pp. 270-289, doi: [10.4018/978-1-4666-5039-8.ch013](https://doi.org/10.4018/978-1-4666-5039-8.ch013).
- Bicheno, J. and Holweg, M. (2009), *The Lean Toolbox: the Essential Guide to Lean Transformation*, 4th ed., PICSIE Books, Buckingham.
- Bortolotti, T., Boscari, S. and Danese, P. (2015), "Successful lean implementation: organizational culture and soft lean practices", *International Journal of Production Economics*, Vol. 160, pp. 182-201, doi: [10.1016/j.ijpe.2014.10.013](https://doi.org/10.1016/j.ijpe.2014.10.013).
- Bortolotti, T., Romano, P., Martínez-Jurado, P.J. and Moyano-Fuentes, J. (2016), "Towards a theory for lean implementation in supply networks", *International Journal of Production Economics*, Vol. 175, pp. 182-196, doi: [10.1016/j.ijpe.2016.02.020](https://doi.org/10.1016/j.ijpe.2016.02.020).
- Boscari, S., Danese, P. and Romano, P. (2016), "Implementation of lean production in multinational corporations: a case study of the transfer process from headquarters to subsidiaries", *International Journal of Production Economics*, Vol. 176, pp. 53-68, doi: [10.1016/j.ijpe.2016.03.013](https://doi.org/10.1016/j.ijpe.2016.03.013).
- Braun, V. and Clarke, V. (2006), "Using thematic analysis in psychology", *Qualitative Research in Psychology*, Vol. 3 No. 2, pp. 77-101, doi: [10.1191/1478088706qp0630a](https://doi.org/10.1191/1478088706qp0630a).
- Brinkmann, S. and Kvale, S. (2015), *InterViews: Learning the Craft of Qualitative Research Interviewing*, 3rd ed., SAGE Publications, Thousand Oaks, CA.
- Camuffo, A. and Gerli, F. (2018), "Modeling management behaviors in lean production environments", *International Journal of Operations & Production Management*, Vol. 38 No. 2, pp. 403-423, doi: [10.1108/IJOPM-12-2015-0760](https://doi.org/10.1108/IJOPM-12-2015-0760).
- Danese, P., Romano, P. and Boscari, S. (2017), "The transfer process of lean practices in multi-plant companies", *International Journal of Operations & Production Management*, Vol. 37 No. 4, pp. 468-488, doi: [10.1108/IJOPM-12-2014-0571](https://doi.org/10.1108/IJOPM-12-2014-0571).
- Demeter, K. and Losonci, D. (2019), "Transferring lean knowledge within multinational networks", *Production Planning & Control*, Vol. 30 Nos 2-3, pp. 211-224, doi: [10.1080/09537287.2018.1534272](https://doi.org/10.1080/09537287.2018.1534272).
- Eisenhardt, K.M. (1989), "Building theories from case study research", *The Academy of Management Review*, Vol. 14 No. 4, pp. 532-550.
- Ellström, P.E., Elg, M., Wallo, A., Berglund, M. and Kock, H. (2020), "Interactive research: concepts, contributions and challenges", *Journal of Manufacturing Technology Management*, Vol. 31 No. 8, pp. 1517-1537, doi: [10.1108/JMTM-09-2018-0304](https://doi.org/10.1108/JMTM-09-2018-0304).
- Grothkopp, M., Bernasconi, M. and Friedli, T. (2022), "A holistic view on production systems management", *Proceedings of the Conference on Production Systems and Logistics*, pp. 672-681, doi: [10.15488/12161](https://doi.org/10.15488/12161).

- Harzing, A.W. and Sorge, A. (2003), "The relative impact of country of origin and universal contingencies on internationalization strategies and corporate control in multinational enterprises: worldwide and European perspectives", *Organization Studies*, Vol. 24 No. 2, pp. 187-214, doi: [10.1177/0170840603024002343](https://doi.org/10.1177/0170840603024002343).
- Hekneby, T. and Powell, D.J. (2023), "The financial implications of XPS: an organizational learning perspective", *International Journal of Lean Six Sigma*, Vol. 14 No. 6, pp. 1248-1263, doi: [10.1108/IJLSS-05-2022-0099](https://doi.org/10.1108/IJLSS-05-2022-0099).
- Hekneby, T., Ingvaldsen, J.A. and Benders, J. (2020), "Managing adoption by cultural development : exploring the plant-level effect of a company-specific production system in a Norwegian multinational", *Journal of Industrial Engineering and Management*, Vol. 13 No. 2, pp. 402-416, doi: [10.3926/jiem.3119](https://doi.org/10.3926/jiem.3119).
- Hekneby, T., Ingvaldsen, J.A. and Benders, J. (2021), "Orchestrated learning: creating a company-specific production system (XPS)", *International Journal of Lean Six Sigma*, Vol. 13 No. 2, pp. 361-381, doi: [10.1108/IJLSS-09-2020-0139](https://doi.org/10.1108/IJLSS-09-2020-0139).
- Hermundsdottir, F. and Aspelund, A. (2022), "Competitive sustainable manufacturing - sustainability strategies, environmental and social innovations, and their effects on firm performance", *Journal of Cleaner Production*, Vol. 370, 133474, doi: [10.1016/j.jclepro.2022.133474](https://doi.org/10.1016/j.jclepro.2022.133474).
- Hines, P., Taylor, D. and Walsh, A. (2020), "The Lean journey : have we got it wrong?", *Total Quality Management and Business Excellence*, Vol. 31 Nos 3-4, pp. 389-406, doi: [10.1080/14783363.2018.1429258](https://doi.org/10.1080/14783363.2018.1429258).
- Holmemo, M.D.Q. and Ingvaldsen, J.A. (2016), "Bypassing the dinosaurs? – How middle managers become the missing link in lean implementation", *Total Quality Management and Business Excellence*, Vol. 27 Nos 11-12, pp. 1332-1345, doi: [10.1080/14783363.2015.1075876](https://doi.org/10.1080/14783363.2015.1075876).
- Hopp, W.J. and Spearman, M.S. (2021), "The lenses of lean: visioning the science and practice of efficiency", *Journal of Operations Management*, Vol. 67 No. 5, pp. 610-626, doi: [10.1002/joom.1115](https://doi.org/10.1002/joom.1115).
- Intra, C. and Zahn, T. (2014), "Transformation-waves - a brick for a powerful and holistic continuous improvement process of a lean production system", in ElMaraghy, H. (Ed.), *Procedia CIRP*, Elsevier B.V., Vol. 17, pp. 582-587, doi: [10.1016/j.procir.2014.01.097](https://doi.org/10.1016/j.procir.2014.01.097).
- Kurdve, M. and Bellgran, M. (2021), "Green lean operationalisation of the circular economy concept on production shop floor level", *Journal of Cleaner Production*, Vol. 278, 123223, doi: [10.1016/j.jclepro.2020.123223](https://doi.org/10.1016/j.jclepro.2020.123223).
- Liker, J.K. (2004), *The Toyota Way 14 Management Principles from the World's Greatest Manufacturer*, McGraw-Hill, McGraw-Hill Education, New York.
- Linderson, S., Eshetu-Birkie, S. and Bellgran, M. (2024), "The issue of corporate mandatory standards in production improvement programmes", *Journal of Industrial Engineering and Management*, Vol. 17 No. 2, pp. 385-402, doi: [10.3926/jiem.7182](https://doi.org/10.3926/jiem.7182).
- Lycett, M., Rassau, A. and Danson, J. (2004), "Programme management: a critical review", *International Journal of Project Management*, Vol. 22 No. 4, pp. 289-299, doi: [10.1016/j.ijproman.2003.06.001](https://doi.org/10.1016/j.ijproman.2003.06.001).
- Mintzberg, H. (1979), "Patterns in strategy formation", *International Studies of Management & Organization*, Vol. 9 No. 3, pp. 67-86, doi: [10.1080/00208825.1979.11656272](https://doi.org/10.1080/00208825.1979.11656272).
- Miyake, D.I. (2008), "The deployment of corporate production systems in auto industry companies: an approach to drive process improvements towards operational excellence", *International Journal of Automotive Technology and Management*, Vol. 8 No. 4, pp. 431-448, doi: [10.1504/ijatm.2008.020312](https://doi.org/10.1504/ijatm.2008.020312).
- Miyake, D.I. and Nakano, D. (2007), "Implementation of corporate production systems in the Brazilian auto industry: managing knowledge through practice", *International Journal of Automotive Technology and Management*, Vol. 7 Nos 2/3, pp. 153-167, doi: [10.1504/ijatm.2007.014972](https://doi.org/10.1504/ijatm.2007.014972).
- Narayanamurthy, G. and Gurumurthy, A. (2015), "Leanness assessment: a literature review", *International Journal of Operations & Production Management*, Vol. 36 No. 10, pp. 1115-1160, doi: [10.1108/MRR-09-2015-0216](https://doi.org/10.1108/MRR-09-2015-0216).

- Netland, T.H. (2012), "Managing strategic improvement programs: the XPS program management framework", *Journal of Project, Program & Portfolio Management*, Vol. 3 No. 1, pp. 31-44, doi: [10.5130/pppm.v3i1.2556](https://doi.org/10.5130/pppm.v3i1.2556).
- Netland, T. (2013), "Exploring the phenomenon of company-specific production systems: one-best-way or own-best-way?", *International Journal of Production Research*, Vol. 51 No. 4, pp. 1084-1097, doi: [10.1080/00207543.2012.676686](https://doi.org/10.1080/00207543.2012.676686).
- Netland, T. (2014), "Coordinating production improvement in international production networks: what's new?", in Johansen, J., Farooq, S. and Cheng, Y. (Eds), *International Operations Networks*, Springer, London, pp. 119-132.
- Netland, T.H. and Aspelund, A. (2014), "Multi-plant improvement programmes: a literature review and research agenda", *International Journal of Operations & Production Management*, Vol. 34 No. 3, pp. 390-418, doi: [10.1108/IJOPM-02-2012-0087](https://doi.org/10.1108/IJOPM-02-2012-0087).
- Netland, T. and Ferdows, K. (2014), "What to expect from a corporate lean program", *MIT Sloan Management Review*, Vol. 55 No. 4, pp. 83-89.
- Netland, T. and Ferdows, K. (2016), "The S-curve effect of lean implementation", *Production and Operations Management*, Vol. 25 No. 6, pp. 1106-1120, doi: [10.1111/poms.12539](https://doi.org/10.1111/poms.12539).
- Netland, T.H. and Powell, D.J. (2016), *Chapter 22 Lean Global Corporations*, The Routledge Companion to Lean Management, New York.
- Netland, T., Powell, D.J. and Hines, P. (2020), "Demystifying lean leadership", *International Journal of Lean Six Sigma*, Vol. 11 No. 3, pp. 543-554, doi: [10.1108/IJLSS-07-2019-0076](https://doi.org/10.1108/IJLSS-07-2019-0076).
- Netland, T., Schloetzer, J.D. and Ferdows, K. (2015), "Implementing corporate lean programs: the effect of management control practices", *Journal of Operations Management*, Vol. 36 No. 1, pp. 90-102, doi: [10.1016/j.jom.2015.03.005](https://doi.org/10.1016/j.jom.2015.03.005).
- Pellegrinelli, S. (1997), "Programme management: organising project-based change", *International Journal of Project Management*, Vol. 15 No. 3, pp. 141-149, doi: [10.1016/s0263-7863\(96\)00063-4](https://doi.org/10.1016/s0263-7863(96)00063-4).
- Peng, D.X., Schroeder, R.G. and Shah, R. (2011), "Competitive priorities, plant improvement and innovation capabilities, and operational performance: a test of two forms of fit", *International Journal of Operations & Production Management*, Vol. 31 No. 5, pp. 484-510, doi: [10.1108/01443571111126292](https://doi.org/10.1108/01443571111126292).
- Plekhanov, D., Franke, H. and Netland (2022), "Digital transformation: a review and research agenda", *European Management Journal*, Vol. 41 September, pp. 821-844, doi: [10.1016/j.emj.2022.09.007](https://doi.org/10.1016/j.emj.2022.09.007).
- Saabye, H., Kristensen, T.B. and Wæhrens, B.V. (2021), "Developing a learning-to-learn capability: insights on conditions for Industry 4.0 adoption", *International Journal of Operations & Production Management*, Vol. 42 No. 13, pp. 25-53, doi: [10.1108/IJOPM-07-2021-0428](https://doi.org/10.1108/IJOPM-07-2021-0428).
- Säfsen, K., Gustavsson, M. and Ehnsjö, R. (2020), *Research Methodology: for Engineers and Other Problem-Solvers*, Studentlitteratur AB, Lund.
- Scherrer-Rathje, M., Boyle, T.A. and Deflorin, P. (2009), "Lean, take two! Reflections from the second attempt at lean implementation", *Business Horizons*, Vol. 52 No. 1, pp. 79-88, doi: [10.1016/j.bushor.2008.08.004](https://doi.org/10.1016/j.bushor.2008.08.004).
- Secchi, R. and Camuffo, A. (2016), "Rolling out lean production systems: a knowledge-based perspective", *International Journal of Operations & Production Management*, Vol. 36 No. 1, pp. 61-85, doi: [10.1108/ijopm-04-2014-0194](https://doi.org/10.1108/ijopm-04-2014-0194).
- Secchi, R. and Camuffo, A. (2019), "Lean implementation failures: the role of organizational ambidexterity", *International Journal of Production Economics*, Vol. 210 No. May 2017, pp. 145-154, doi: [10.1016/j.ijpe.2019.01.007](https://doi.org/10.1016/j.ijpe.2019.01.007).
- Shah, R. and Ward, P.T. (2003), "Lean manufacturing: context, practice bundles, and performance", *Journal of Operations Management*, Vol. 21 No. 2, pp. 129-149, doi: [10.1016/S0272-6963\(02\)00108-0](https://doi.org/10.1016/S0272-6963(02)00108-0).
- Stone, K.B. (2013), "Four decades of lean: a systematic literature review", *International Journal of Lean Six Sigma*, Vol. 3 No. 2, pp. 112-132, doi: [10.1108/20401461211243702](https://doi.org/10.1108/20401461211243702).

- Teece, D.J., Pisano, G. and Shuen, A. (1997), "Dynamic capabilities and strategic Management", *Strategic Journal*, Vol. 18 No. 7, pp. 509-533, doi: [10.1002/\(sici\)1097-0266\(199708\)18:7<509::aid-smj882>3.0.co;2-z](https://doi.org/10.1002/(sici)1097-0266(199708)18:7<509::aid-smj882>3.0.co;2-z).
- Womack, J.P. and Jones, D.T. (2003), *Lean Thinking*, Simon & Schuster, New York.
- Womack, J.P., Jones, D.T. and Roos, D. (1990), *The Machine that Changed the World*, 1st ed., Rawson Associates, New York.
- Yin, R.K. (2009), *Case Study Research: Design and Methods*, SAGE, Thousands Oaks.

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