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Lean and action learning: towards an integrated theory?

Henrik Saabye
Department of Materials and Production, Aalborg University, Aalborg, Denmark and VELUX, Østbirk, Denmark
Daryl John Powell
SINTEF Manufacturing, Raufoss, Norway and Department of Business, Strategy and Political Sciences, USN School of Business, Kongsberg, Norway, and
Paul Coughlan
Trinity Business School, Trinity College Dublin, Dublin, Ireland

Abstract

Purpose – Being acquainted with both lean and action learning in theory and in practice, this study finds that the theoretical complementarity of these two research streams has traditionally been underexploited. In this conceptual paper, this study aims to advance the theoretical understanding of lean by exploring the complementarity of lean thinking and action learning leading to a proposed integrated theory of these two research streams. Target audience is the operations management research community.

Design/methodology/approach – By deliberately adopting a process of theorising, this paper explores, reflects upon and combines individual experiences of researching, teaching and engaging in lean and action learning as operations management scholars.

Findings – Having taken a gemba walk through the literature and practices of lean and action learning, this study views and notices a systematic and complementary relationship between the two domains. The overlapping theoretical and practical complementarities of lean and action learning suggest that these two research streams are ripe for synthesis into an integrated theory. This finding provides an opportunity to (1) progress towards an integrative design of interventions leading to more sustainable lean system adoptions and (2) add new depth to our theoretical explanation of the success and failures of lean system adoptions.

Originality/value – This paper contributes an original integrated theory perspective on lean and action learning.

Keywords Lean, Action learning, Theorising

Paper type Conceptual paper

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1. Introduction

From our combined experiences of studying, teaching and practising lean and action learning as operations management scholars, we recognise likenesses and similar nuances in both approaches. Further, we have discovered and explored how lean practitioners for years have exhibited the use of action learning without being conscious of it. Therefore, by deliberately adopting a process of theorising (Brown and Eisenhardt, 1995; Hansen and Madsen, 2019; Pagell and Wu, 2009), we seek with this conceptual paper to engage in a discussion and reflection, enabling us and the operations management research community to advance our theoretical understanding of lean by exploring the complementarity of lean and action learning. We suggest that a conscious theoretical integration of lean and action learning provides the operations management research community with an additional theoretical lens for understanding the process of lean system adoption. This theoretical integration will provide practitioners with an integrative intervention design invoking the complementarity of lean and action learning towards realising the true promise of lean.

In a recent viewpoint article in this journal (Åhlström *et al.*, 2021), leading lean scholars discussed and reflected upon both lean as a theory and the theoretical underpinnings of lean. We visualise these perspectives in Figure 1 using a View-Master stereoscopic disc as a metaphor. As one rotates the various lenses on the disc, one is immersed in the alternative views of lean and the respective theoretical perspectives. The scholars agreed that, although lean may not be a theory in itself, it does present itself as an umbrella concept for several underlying theories and lenses, including lean as a socio-technical system (Danese); lean as a business phenomenon (Netland); and lean as a meta-theory concerned with a culture of learning and leadership (Powell and van Dun). However, while several of these perspectives touch on the importance of learning in a lean transformation, none touch specifically on action learning as a theoretical (or practical) perspective for realising the promise of lean.

Reading through the most cited articles in the leading operations management journals, as well as the most popular business books on lean, we find that Revans' theory of action learning is rarely included as a basis for understanding the core of lean thinking, its principles and its practices (e.g. Revans, 1971, 2011; Marquardt *et al.*, 2017). Reflecting upon these different lenses of what constitutes lean from a theoretical point of view, we raise the following research question: *What are the theoretical and practical complementarities of lean and action learning and how can these two research streams be synthesised into an integrated theory?* This question originates from both practice- and research-based insights that lean and action learning share several similarities, including a focus on finding, facing, framing

Source(s): Extrapolated from Åhlström *et al.*, 2021

Figure 1.
The view-master reel: a metaphor for the different lenses of lean

and forming solutions to problems (by applying a scientific method) – a perspective that presents problem-solving in groups as a superior form of learning and leading, all founded on systems thinking (Ballé *et al.*, 2019; Liker, 2021; Revans, 2011).

Being acquainted with both lean and action learning in theory and practice, we also find that an integrated theory of these two streams of thought and practice provides an opportunity towards (1) an integrative design of interventions during lean system adoptions and (2) explaining the success and failures of lean system adoption theoretically. According to Kristensen *et al.* (2022), Powell and Coughlan (2020a) and Saabye *et al.* (2022), applying action learning is a useful and sustainable approach to developing problem-solving capabilities and eventually becoming a lean organisation. Moreover, both lean and action learning are deeply rooted in a respect for people and society perspective (Liker, 2021; Ballé *et al.*, 2017; Boshyk and Dil worth, 2010). These insights suggest similarities between lean and action learning practice but suffer from an absence of clarity about the complementarity between the two related research streams. Rooted in this comparison and in conjunction with our own research and practice, we go beyond the ongoing debate about lean as a theory and reflect on lean and action learning as an integrated theory. We propose a novel perspective where lean thinking contributes a theoretical component of what constitutes a lean system (in various contexts), and action learning contributes a complementary theoretical component of what constitutes the adoption and sustaining of a learning system as a (meta) cognitive foundation.

As we develop our thinking, we are guided by Brown and Eisenhardt (1995), Pagell and Wu (2009) and Hansen and Madsen (2019). We present our development as a process of theorising towards an integrated theory linking lean and action learning. In their paper, "Product development": Past research, present findings and future directions, Brown and Eisenhardt (1995) identified, examined and compared identifiable research streams within the literature as a starting point for proposing an integrated model. For us, lean and action learning are such streams. Supplementing Brown and Eisenhardt (1995), Pagell and Wu (2009) specifically guided our coding and analysis process, in which the paper's integrative intervention design invoking the complementarity of lean and action learning emerged. To develop and defend our proposal in response to our observation that action learning theory is rarely considered in the ongoing debate about lean theory, we adopt Weick's argument that the process of theorising is as important as focusing on theory as an outcome (Hansen and Madsen, 2019).

As a conceptual paper, we begin by outlining our method of theorising, followed by reviewing the literature on lean and action learning to locate our academic families. Then, once our academic families are located and connected, we present the theoretical foundation for proposing an integrated theory of lean and action learning by outlining the similarities and complementarity between the two streams of research derived from the literature. Finally, we reflect on and discuss the contribution to practice and theory and propose potential paths for future research.

2. Method: theorising

We see the challenge of inquiring into the complementarity of lean and action learning as requiring our engagement in *theorising*, the process of constructing a theory (Lee *et al.*, 2011). In addressing this challenge, we are guided by Hansen and Madsen (2019), who see theorising as "*the process through which a theory is created, from the first feeble hunch to the final theory, presented in print to the reader*" (p. vii). For them, theorising involves talking, listening, reading and writing in a community of scholars. It is this very process that guides our methodological choices in constructing an integrated theory of lean and action learning.

In the practice of theorising, Hansen and Madsen (2019) emphasise the fundamental role of conversation and engagement in a community of scholars. In this regard, we wish to express our gratitude to the lean research community, especially the reviewers, editor and colleagues

mentioned in the acknowledgement section. As members of that community or family, we introduce ourselves in terms of our respective experiences and how we came to collaborate. The first author is employed as a Lean Manager at VELUX and an Industrial PhD fellow at Aalborg University. He has more than 15 years of experience as a consultant, partner, coach and leader within leadership and organisational development based on lean thinking from LEGO, Orsted and the Danish Ministry of Transportation. The second author is Chief Scientist at SINTEF Manufacturing and adjunct professor at both the Norwegian University of Science and Technology and the University of South-Eastern Norway. He is also an award-winning lean author and practitioner, having won the prestigious Shingo Research Award for The Routledge Companion to Lean Management in 2017 and the Shingo Publication Award for the Lean Sensei in 2020. Moreover, he guided Kongsberg Maritime's Subsea Division to receive the Norwegian Lean Enterprise of the Year Award in 2017. The third author is a recognised academic in the field of Operations Management. A EurOMA fellow, he has been active in European research networks for more than 20 years, exploring and publishing in relation to systemic and systematic improvements in operations and their roots in action learning and collaborative innovation.

Essentially, our theorising process began at the EurOMA conference in Trondheim, Norway, in 2016. The second and third authors met to discuss the second author's, then-current practitioner endeavours in developing and deploying a lean program at Kongsberg Maritime. Here, the ideas of action learning (more precisely network action learning) were shared. From then on, the second author adopted the action learning formula $L = P + Q$ to guide his further development of the lean program deployment, particularly when it concerned collaboration within and across the company's supplier network. This work was later written-up and published in IJOPM (see Powell and Coughlan, 2020a). Action learning was also used to frame the company's internal *corporate lean program,* providing practical insights and implications for learning and continuous improvement (see Powell and Coughlan, 2020b). Shortly after these articles were published, the first author reached out to the second author as a "sparring partner" for his current work as an industrial PhD fellow at Velux in Denmark. Inspired by the IJOPM publication "Rethinking lean supplier development as a learning system" (and the special session "Lean Research: 30th Anniversary and mid-life crisis" at EurOMA, 2020 in Warwick, UK), he was ready to explore some ideas about lean thinking and action learning, while being open to the possibility of a fundamental theory combining both approaches. From then on, our collaboration in co-authoring and teaching, as well as our discussions with academic and practitioner colleagues, has given us the opportunity to engage in our theorising on lean and action learning.

2.1 Coding process and analysis process

In our process of identifying the six similar and complementary elements of lean and action learning (see Section 4.3) as the foundation for proposing our integrated theory, as illustrated in Figure 2 (see Section 5), we were guided by Pagell and Wu (2009). The coding process was as follows. Firstly, while co-authoring an earlier paper on lean and action learning (Saabye and Powell, 2022), the first and second authors reflected on and discussed over several meetings what lean can learn from action learning and what action learning can learn from lean. Building on our combined insights into lean and action learning, a list of nine similarities emerged from these conversations. Then the two authors invited the third author into the conversation to review the proposed list of similarities between lean and action learning and to advance the conceptualisation of this current paper. Second, once we refined the initial list of similarities with the third author, we applied it as a coding scheme to review the existing lean and action learning literature and locate the relevant references supporting our identified similarities. During this iterative literature review, the coding scheme emerged as six themes of similar and complementing lean and action learning elements. The themes reflect the

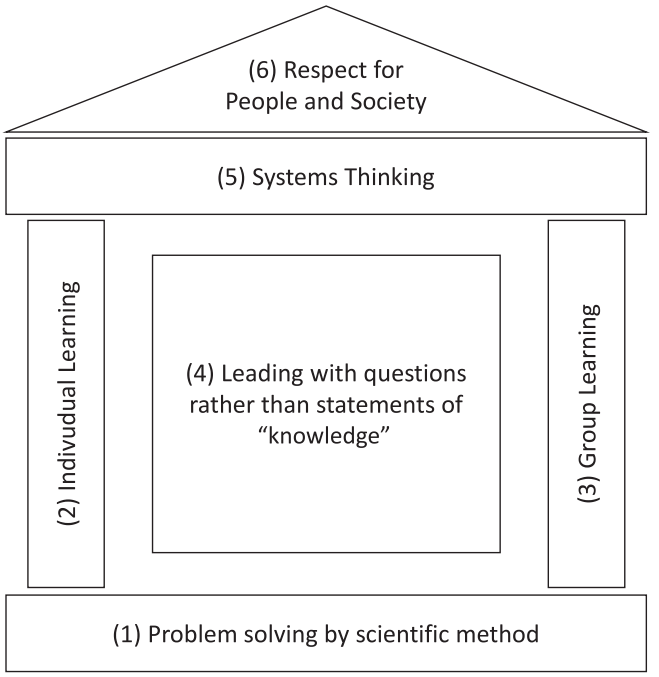

Figure 2.
The lean-action learning theoretical lens

underlying and logical (learning) process which characterises both domains. Third, with the six similar and complementary elements located, we applied them as a theoretical lens to analyse three cases (see Sections 4.2 and 5.2) and a classroom training scenario (see Section 3.2). Finally, we applied the insights obtained from this analysis to conceive Figure 2 (see Section 5) as a proposed integrated theory (1) towards proposing an integrative design of intervention during lean system adoptions and (2) explaining the success and failures of lean system adoptions sustainment theoretically.

3. Literature review: locating our academic families

A foundational part of our theorising process towards proposing an integrated lean and action learning theory is a literature review to locate our academic family of fellow scholars who have shaped thinking in the area (Hansen and Madsen, 2019). To locate our family, we first provide an interpretive synthesis of the lean literature, reflecting the challenge we have identified and exploring the potential complementarity with action learning. Second, through empirically identified inadequacies of expert-driven lean transformations, we outline the core components of action learning theory and how action learning can complement lean regarding adaptation and sustainment.

3.1 Lean

The concept of lean emerged out of the codification of the Toyota production system (Ohno, 1988) and was firstly labelled by Krafcik (1988) and later popularised by Womackros and Jones (1990), who codified the five lean principles of (1) Specify the values, (2) Identify the value stream, (3) Flow, (4) Pull and (5) Strive for perfection. Initially, the lean research stream

focused on understanding and theorising the lean principles-based manufacturing systems of Just-in-time and Jidoka to eliminate waste and improve quality for the benefit of the customers (Jasti and Kodali, 2015). The research stream resulted in a vast amount of scientific papers that provided detailed descriptions of the application of lean philosophy, principles, practices and tools (Jasti and Kodali, 2015; Stentoft and Freytag, 2013). E.g. Jasti and Kodali (2015) identified 848 publications between 1988 and 2011. Among these papers, 53% were descriptive, 21% were empirical, 22% were exploratory and only 1% were conceptual. Lean research has transcended into other sectors. However, since the many lean tools and methods were primarily codified on the manufacturing shop floor, 76% of these papers can be characterised as Lean Manufacturing, despite Karlsson and Åhlström's (1996) notation that a lean system must be understood as a Lean Enterprise which covers everything within an organisation. Besides Lean Manufacturing, Lean Enterprise systems must also include Lean Product development and Lean Supply Chain. An overall conclusion from reviewing the first two decades of lean research did not result in a clear definition since only a few of the published papers discussed the basis and meaning of lean and actually documented the preconditions and effect of the phenomenon (Stentoft and Freytag, 2013).

During the last decade of lean research, the "efficiency" lean research stream has continued searching for a definition and theory behind the lean system. For example, recent papers published in the Journal of Operations Management (JOM) also reflect on lean as a theory (Hopp and Spearman, 2021) but choose to retain the efficiency stream of lean research framed three decades ago. This perspective, concerned essentially with the implementation of methods and systems for reducing waste, was subsequently scrutinised by Cusumano *et al.* (2021), who considered that lean is more than efficiency and not confined to operations management.

Originating from this critique is a distinction between "hard" and "soft" lean practices, where "hard" practices refer to applying technical and analytical tools through an industrial engineering lens (Bortolotti *et al.*, 2015; Hines, 2022). Researching lean through a "hard" practices approach has been criticised for not fully explaining the underlying "success" or "failures" of lean systems adoption. Therefore, other studies have considered the "soft" lean practices as unquestionably one of the most important factors in an organisation's successful implementation of lean (Bortolotti *et al.*, 2015; Magnani *et al.*, 2019). "Soft" practices, in contrast to "hard" practices, concern people and relations, such as involving and empowering front-line workers in small-group problem-solving and continuous improvement, supplier partnerships, customer involvement and leadership (Bortolotti *et al.*, 2015; Holmemo *et al.*, 2018). According to Bortolotti *et al.* (2015), "soft" lean practices are used more frequently by successful lean plants. Also, other "soft" lean aspects have become part of the contemporary lean research stream, such as "respect for people" (Emiliani and Stec, 2005; Ljungblom and Lennerfors, 2021), lean leadership (Liker and Convis, 2011; Netland *et al.*, 2019); culture (Dorval *et al.*, 2019; Hines, 2010) and "hoshin kanri" (Jolayemi, 2008; Tennant and Roberts, 2001).

3.1.1 Lean and learning. From a "hard" lean practice perspective, the purpose of lean tools and methods is to improve efficiency. In contrast, the "soft" lean practice perspective considers the purpose of lean tools and methods is to identify learning opportunities and problems to be solved, which then as an outcome can lead to improved performance (Ballé *et al.*, 2019). Therefore, in another stream of lean research – the lean learning research stream – Hines *et al.* (2004) define the foundation of lean as the ability to learn to evolve. Moreover, according to Holweg's (2007) seminal paper on how to become successful with lean, or TPS in the case of Toyota, lean can be attributed to the presence of a "dynamic learning capability" within and across the organisation, developing and innovating practices over several decades. Coming out of the last decade, lean has evolved within other sectors outside manufacturing, e.g. within service (Hadid *et al.*, 2016), project management (Swink *et al.*, 2006), construction (Salem *et al.*, 2006) and health care (Johnson *et al.*, 2020). A central finding

emerging from this research stream is that a lean enterprise can be described as a learning organisation with the ability to improve through learning (Rother, 2010; Tortorella *et al.*, 2020; Liker, 2021; Rother, 2010; Saabye *et al.*, 2020). Correspondingly, it is the ability to find, face, frame and solve problems following the scientific method that is foundational for a lean learning organisation (e.g. Ballé *et al.*, 2017; Camuffo and Gerli, 2018; Kristensen *et al.*, 2022; Liker, 2021; Ståhl *et al.*, 2015; Tortorella *et al.*, 2015).

Applying the lean *learning* lens, the "efficiency" lean research stream suffers from "several" shortcomings, like lack of learning and cognitive realism. Firstly, the "efficiency" stream of lean research has not been occupied by how leaders and employees become cognitively aware and effective in finding, framing and solving problems (Shook, 2008; Ballé *et al.*, 2017). There seems to exist a naive understanding and focus on what constitutes learning. Teaching the codified problem-solving principles, tools and methods to leaders and employees in a traditional sense based on a fundamental assumption that best practices can simply be transferred from one context to another has proven inadequate. This reflection raises some new questions: *how do leaders and employees become meta-cognitively aware of how they think about and learn to become better at solving problems, and how do they develop others to solve them?* As such, they are considered to have a learning-to-learn capability that enables them to constantly find, frame, face and solve problems (Saabye *et al.*, 2022; Powell and Coughlan, 2020a; Ballé *et al.*, 2017). Similarly, Liker (2021) perceives Toyota as a lean organisation as one of history's best examples of a learning organisation, as defined by Senge (2006). Building on the disciplines of personal mastery, mental models, shared vision, team learning and systems thinking, such a learning organisation focuses on addressing expansive thinking patterns through the lens of systems thinking to foster a second-order learning capability to lean.

As a learning capability, lean is about learning in and from action. The objective is to understand and improve the processes and work through experimentation, reflection, teaching and empowering workers and managers to innovate for the benefit of the customers (Cusumano *et al.*, 2021; Saabye *et al.*, 2022). This *learning* stream of research regards lean practices and tools as methods of generating knowledge and surfacing problems rather than just increasing efficiency and eliminating waste. In that sense, it is, therefore, lean tools are understood as learning tools with the inherent purpose of creating learning opportunities. Hence, "A3 thinking" (Shook, 2008), "Toyota Kata" (Rother, 2010), "hoshin kanri" (Jolayemi, 2008; Tennant and Roberts, 2001) and "lean leadership" (Liker and Convis, 2011; Netland *et al.*, 2019) have become fundamental contributors to a systematic multi-purpose learning process of simultaneously solving concrete problems and developing problem-solvers and leaders as learning facilitators.

3.1.2 Lean as a learning system. Emerging from the lean *learning* lens is a notion that lean is to be considered a learning system that seeks to maximise learning opportunities for internal and external actors and pinpoint the strategic tools necessary to deliver value to customers (Hines *et al.*, 2004). The lean *learning* lens challenges the thinking that lean knowledge is synonymous with the ability to transfer standard solutions from an expert to a lean-learner during lean adoption. Instead, the lean *learning* lens adopts a Socratic approach of fostering a dialectic process based on equal power between the learners and a (lean) learning facilitator, enabling a helping relationship of learning and reflection among the learners (Saabye *et al.*, 2022). Organisations need to encompass superior adaptable and flexible capabilities (i.e. learning and innovation) to cope with the increasing velocity of changes stemming for disruptions and changes in the external environment, like COVID-19. Correspondingly, systematic and continuous learning by a lean-practising organisation allows it to adapt quickly to its changing environment (Gutierrez *et al.*, 2022). According to Gutierrez *et al.* (2022), this requires a lean culture that is oriented towards learning. Consequently, lean is viewed as a learning or education system rather than a production

system that applies across sectors (Ballé *et al.*, 2019; Hines *et al.*, 2020; Fenner *et al.*, 2023; Powell and Reke, 2019). Therefore, the organisation leaders must reorient themselves towards facilitating learning and fostering a psychologically safe environment, which becomes a foundational element for adopting a lean system (Fenner *et al.*, 2023; Saabye, 2022). Adopting the above perspective, Ballé *et al.* (2019, p. 3) present lean as a learning system in the following way:

> Lean is a system to continuously develop people and create a culture of problem-solving; a strategy to face challenges by engaging and involving all problem solvers into exploring issues and forming unknown solutions by learning experientially from practical countermeasures. Lean tools are techniques to create the conditions for such experiential learning, and the lean approach turns management upside down by turning the chain of command into a chain of help: challenge and support, rather than command and control,

Adopting the above definition of lean raises the question of how organisations might institutionalise lean as a learning system. To address this question, we turn our attention to our other academic family – those engaged in action learning – which may offer actionable insights into solving this *problem*.

3.2 Action learning

There is a broad consensus that a core element of implementing a lean system is problem-solving capabilities among the leaders and employees (Bateman, 2005; Camuffo and Gerli, 2018; Liker, 2021). However, what is a problem, what constitutes problem-solving capabilities and how do organisations develop these? Many organisations often focus on developing employees' ability to apply tools and templates to a (perceived) problem without an underlying appreciation of the challenge or appropriate learning and action orientation. Consider, for example, the following scenario:

> The practice at manufacturing organisations where the first author worked was the classroom approach to developing lean capabilities. Typically, selected employees participated in two-day classroom training sessions focused on 'practical problem-solving. The instructors presented the theory and steps behind the practical problem-solving process and the associated analysis tools, including fishbone, 5xwhy, Pareto and process analysis. The participants were exposed to small exercises and cases to understand the tools and templates better. After the two days of classroom training, the participants were instructed to identify a problem to start working on once back in their departments. For help, they were advised to reach out to the instructors for sparring and coaching. The instructors would then follow up on how the participants solved their problems and used the tools and templates. However, at the follow-up sessions and despite giving the two-day training course a high rating, most participants had not worked on their identified problems or applied the tools and templates.

So, why did the participants not apply the practical problem-solving tools and templates in practice? Was it because the tools or templates were poorly constructed? Or was it because they did not have any problems to solve? Or was it that they could not recognise a problem outside of the classroom context? Moreover, on reflection, could there have been a better way to develop the ability to apply structured problem-solving in practice and eventually adopt a lean system? Or, more fundamentally, was the training informed by any underlying theory of lean that had validity but limited relevance? These practice-based prompts inform and motivate the following review of the action learning literature in the context of lean transformations.

3.2.1 Action learning components. Action Learning, as devised by Revans, proposed that "*there can be no learning without action and no (sober and deliberate) action without learning*" (Revans, 2011, p. 85). He resisted efforts to define action learning but outlined the assumptions underpinning it, including learning being cradled in the task and formal instruction is not

sufficient; learning involving doing and solving problems requires insightful questions. Moreover, Revans (2011) draws upon a critical distinction in action learning between puzzles and problems. Puzzles are regarded as issues with a single solution. Often organisations request a specialist or expert to solve these puzzles. On the other hand, problems are situations with no single answer and are not amenable to specialist intervention alone (Revans, 2011). Often during lean transformations, lean learners are unwittingly being trained to act as specialists and puzzle solvers. Yet, most of the lean learners' opportunities for change and improvement in practice may arise in the context of a mix of machine malfunctions and situations where people were not acting as expected. Therefore, the training may not prepare participants to face problems with no single solution.

In addition, Revans (2011) specifies action learning with a learning formula, $L = P + Q$ (Revans, 2011). Here, (L) stands for learning through insightful questioning (Q) in relation to programmed knowledge (P). Revans stated that learning always starts with Q in an endeavour to face, find and frame a problem which needs to be resolved. In contrast, lean training and transformations often begin with experts or instructors focused on teaching the lean learners the programmed knowledge (P) of lean tools and practices (Holmemo *et al.*, 2018; Scherrer-Rathje *et al.*, 2009) in the hope of building understanding and comprehending lean in the expense of developing the lean learners' ability to ask insightful questions (Q).

Another theoretical and foundational element of action learning is Revans' (1971) praxeology of cyclical systems – alpha, beta and gamma. System alpha is about framing a problem by considering the specific context. System beta concerns solving problems structurally by applying a scientific method. Finally, system gamma discusses the participants' learning from critical reflections upon their beliefs, underlying assumptions and behaviours throughout the problem-solving process. During lean transformations, those responsible often attend training courses that, at best, only convey programmed knowledge (P) of the scientific method (system beta) but miss out on finding, facing and framing problems (system alpha) and critical reflection and scrutinising underlying assumptions (system gamma).

In summary, the lean and action learning streams point to two well-grounded and potentially complementary perspectives on lean. However, together, do they address our research question? For now, we contend, not yet. Despite the emergence of the lean learning research stream, we suggest that a specific connection to an action learning dimension is missing.

4. Analysis: connecting our academic families

As proposed, lean is about establishing a lean learning system – not deploying tools and techniques, which requires action learning. In that sense, lean is actually an *action* learning system. To further develop our proposed link and complementarity between lean and action learning towards an integrated theory, we adopt Turner's (2022, p. 3) definition of complementarity:

> Complementarity is the interaction of business strategies and management practices to produce coherent, aligned and mutually reinforcing systems and processes that give superior outcomes (such as shareholder value, profit, customer satisfaction, market share or cost reduction) over those that would occur if such strategies or practices had taken place independently of one another. It is where the complementary agency of those strategies produces superior results, where the relations of independent units or their evolution creates higher value than their individual operation.

To illustrate the complementarity between lean and action learning, we first present a description of what an application of action learning in a lean initiative might look like in practice. Then, we outline three cases from the literature to explore lean and action learning

complementarity. In the first case, action learning is omitted during a lean transformation despite the best (rhetorically) intentions (Holmemo *et al.*, 2018). In contrast, we then present two further cases where the respective authors have applied action learning as both a theory and practice for adopting lean. In essence, these latter cases connect the two families.

4.1 Applying action learning

The learning design would be quite different by applying action learning instead of traditional expert-driven lean implementations. The learning design would encompass action learning groups where learning facilitators will firstly focus on (Q) challenging the lean learners to frame a problem, take action and reflect on the action – by enacting systems alpha, beta and gamma. There would be less prominence given to programmed knowledge (P) and more on asking insightful questions (Q) and reflecting on practice. In particular, an action learning design will, for example, encompass Marquardt *et al.*'s (2017, p. 28) six interactive components:

(1) *A problem or opportunity:* The core element of a lean transformation would be for the participants to work on a concrete and relevant problem – not a puzzle, throughout the course. Therefore, the training courses would not be organised around the full day-class room training but split into small action learning workshops for several weeks until the participants have solved their identified problems.

(2) *A group:* The lean learners would move from being passive students to engaged members of an action learning group and act as critical friends, challenging and supporting each other's learning to define and solve their problems.

(3) *Commitment to taking action:* The purpose of action learning groups would be to determine and conduct actions until a problem is solved rather than to devise recommendations based on programmed knowledge as in a traditional classroom. The learning focus would move from understanding and comprehending the problem-solving tools and templates to framing and solving the specific problem. Hence, the problem-solving tools and templates would become a means to an end – not the end itself.

(4) *Commitment to learning:* Action learning is more than just learning about how to solve a specific problem (system beta). The participants would also need to learn how to frame and solve problems by applying the scientific method (systems alpha and beta) and learn that you need to change yourself to become better at solving problems (system gamma). Achieving this level of cognitive awareness requires a fundamental commitment to learning.

(5) *Questioning and reflection:* Rather than relying on experts to solve problems, learning occurs via questioning, investigating, experimenting and reflecting. Hence a core skill for the participants to master is asking challenging questions – not coming up with general answers. By learning this skill, the participants will experience that challenging questions stimulate systems thinking, consensus building and impactful actions.

(6) *Action learning facilitator/coach:* The traditional lean experts must also transform their role – from a classroom teacher standing in front of the PowerPoint projector to a coach and learning facilitator. Being a coach and action learning facilitator entails fostering and improving the environment for learning and reflection among the participants (system gamma) as they solve their problems and come to understand and comprehend the usefulness and usability of the problem-solving tools and templates in practice.

4.2 Lean and action learning complementarity: cases from the literature

We present three cases from the literature to explore how lean and action learning might have been or was associated with a learning-to-learn capability. The first case examines the paradox of contemporary soft lean and consultant-driven lean implementation (Holmemo *et al.*, 2018). The second case reflects how a learning-to-learn capability is a critical success factor for sustainable lean transformation within a supplier network (Powell and Coughlan, 2020a). Finally, the third case reflects how action learning enables the development of a lean learning-to-learn capability that industry 4.0 technologies (Saabye *et al.*, 2022).

4.2.1 Case 1: lean thinking: outside-in, bottom-up? The paradox of contemporary soft lean and consultant-driven lean implementation (Holmemo et al.*, 2018).* The first case study is a longitudinal, qualitative case study of how external lean consultants were hired to help a governmental service organisation to implement lean. The main goal of this design was to introduce the coaching and learning ideal of lean thinking in order to assist the client organisation in helping themselves implement lean. According to Holmemo *et al.* (2018), although the external lean consultants' rhetoric reflected the modern ideal of "soft" lean, their actual methods had not changed: implementation remained tool-focused, and outside consultants assumed the responsibilities of subject matter experts and not lean learning facilitators. For example, the consultants paradoxically used a "hard consulting" approach to direct groups in their problem-solving efforts and instructed the appointed "lean navigators" how to coach and develop others, as opposed to asking insightful questions to discuss until a suitable solution has been devised. Moreover, the senior leaders were not engaged in fulfilling a role as learning facilitators. Instead, the employees were trained as "lean navigators". Consequently, the engagement with the consultancy was prolonged since the self-sufficiency objective of the governmental service organisation was not yet realised. Holmemo *et al.* (2018) conclude that the rational, objective and decontextualised idea that lean is something that can be brought in and established by an outside expert does not easily match with a "soft", participation-oriented lean. We regard this case as an example of lean transformation where action learning is omitted, despite the best intention of (rhetorically) adapting to a "soft" lean approach.

4.2.2 Case 2: rethinking lean supplier development as a learning system (Powell and Coughlan, 2020). The second case addressed the research question: *how can suppliers learn to learn as part of a buyer-led collaborative lean transformation?* The research site chosen was at the Subsea Division of Kongsberg Maritime in Norway and six of its strategic suppliers. Together, the network accounted for more than 60% of value-added in Kongsberg Maritime's core products. Together with its six strategic suppliers, the Subsea Division launched a Network-action-learning (NAL) initiative to improve supply chain collaboration by developing a shared understanding and practices of lean. The NAL initiative consisted of six interventions: (1) Co-learning at a Lean lab, (2) Best practice study visits to exemplary lean enterprises, (3) Individual company lean self-assessments, (4) Lean coaching and individual company consultations, (5) Extended value stream mapping and (6) Rapid Lean Assessments. These interventions were designed as NAL cycles of facilitating, monitoring and reflecting on the interventions from individuals, groups, organisations and inter-organisational perspectives. Powell and Coughlan (2020a, p. 936) applied an extension of Revans' learning formula, $L = P + Q$, proposed by Coughlan and Coghlan (2010), which included organising insight (O) and inter-organisational insight (IO), hence arriving at $L = P + Q + O + IO$. They came to understand why developing a learning-to-learn capability was a core construct and critical success factor for lean transformation and concluded that NAL had a significant enabling role in buyer-led collaborative lean transformations.

4.2.3 Case 3: developing a learning-to-learning capability – insights on conditions for industry 4.0 adoption (Saabye et al.*, 2022).* The final case addresses how action learning enables lean and industry 4.0 complementarity. In this case, the research site is one of the

Danish rooftop window and lean-intensive manufacturer VELUX's Danish-based factories. Despite practising lean for almost two decades, VELUX initially failed in adopting I4.0 technologies and improving operational performance during a digital transformation. Acknowledging that a lean (learning system) built on a people and learning-based approach had not been instituted as a prerequisite for adopting and utilising industry 4.0 technologies required, VELUX Danish-based factory decided to initiate an action learning intervention to develop a lean learning-to-learn capability. This 12-week action learning programme was based on Revans' system alpha, beta and gamma principles and Marquardt *et al.* (2017) six distinct interactive components of action learning. The purpose was to develop the participants, starting with the general manager and senior leaders, into lean learning facilitators capable of empowering and enabling others to adopt Revans' scientific method when solving problems by fostering a supportive learning environment. Saabye *et al.*, (2022) proposed five underlying conditions for developing a lean learning-to-learn capability that, for example, is capable of adopting industry 4.0 technologies: (1) Organisation-wide systematic problem-solving abilities, (2) Leaders serving as (lean) learning facilitators, (3) A supportive learning environment, (4) An organisational learning scaffold and (5) Knowledge about I4.0 technologies and adoption.

5. Towards an integrated theory of lean and action learning

Having identified the two streams of lean research and action learning and have argued for a link emerging from both practice and the extant literature, we are ready for the next step in our theorising, where we connect our emergent academic families (Hansen and Madsen, 2019). We propose action learning as an additional theoretical lens to be integrated with lean for understanding the process of lean system adoption and realising the promise of lean.

5.1 Reflecting on the overlap

To understand and comprehend this proposition, we reflect on the literature's overlap between action learning and lean. In Figure 2, we illustrate the six similar and complementing elements of the two domains as inspired by the Toyota Production System (TPS) house (Liker, 2021). The orientation of the six identified similarities (building blocks) is purposefully arranged to resemble the underlying and logical (learning) process which characterises both domains: The lean-action learning process begins (and rather repeats) with identifying and solving problems through the application of the scientific method (1). Two pillars govern this action learning process: individual learning (2) and group learning (3), which promotes insightful questions over statements of knowledge (4) as a means to improve the whole system (5), with a goal of both serving and improving society by demonstrating respect to employees, customers, people and partners (6). We explore each element in turn.

5.1.1 Problem-solving by scientific method. According to Ballé *et al.* (2017), lean is fundamentally about finding, facing and framing the right problems and developing the organisation's members to solve these. Likewise, Liker (2021) defines scientific thinking as the core of the TPS, connecting the four integrated and foundational categories of Philosophy, Process, People and Problem-Solving.

In a complementary way, action learning revolves around empowering people to solve unfamiliar, real, urgent and significant problems (Boshyk and Dilworth, 2010). Hence, if there are no problems to solve, there is no basis for action learning (Marsick and O'Neil, 1999; Marquardt *et al.*, 2017; Pedler and Abbot, 2013). Both domains define a problem as a gap between a current state and a future or goal state; hence framing problems is about identifying or defining this gap, and problem-solving is about closing it (MacDuffie, 1997; Mohaghegh and Furlan, 2020; Marquardt and Yeo, 2012). Problem-solving can be a reactive

activity if it concerns returning a process to an expected state; or proactive if the focus is on elevating it to the expected state (Sobek and Smalley, 2008; Marquardt and Yeo, 2012; Smalley, 2018). Therefore, problems can be understood as repairing a malfunctioning system, implementing a corporate strategy, overcoming a lack of organisational integration, reducing incongruity within the organisation's value system or inability to define a goal (Marquardt and Yeo, 2012; Smalley, 2018).

The two domains embody nominally different methodologies for solving problems. However, substantively both are similar in their systematic nature and progression towards an emergent solution. Within the lean domain, the building blocks of the scientific method are often referred to as the plan-do-check-act (PDCA) learning cycle, which was conceived by Dr Edwards Deming: (1) **Plan:** Plan a change or test aimed at improvement, (2) **Do:** Carry it out, preferably on a small scale, (3) **Check:** Study the results. What did we learn? and (4) **Act:** Either adopt the change, abandon it, or run through the cycle again, possibly under different environmental conditions. It was widely adopted after the Second World War, initially in Japan, including by Toyota (Ballé *et al.*, 2017; Liker, 2021; Mohaghegh and Furlan, 2020). In action learning, Revans (2011, p. 14) describes his five-step scientific method as a paradigm for system beta: (1) survey/observation, (2) theory/hypothesis, (3) test/experiment, (4) audit/evaluation and (5) review/control.

Another similarity between the two domains is a wish to preserve flexibility to respond to the characteristics of the problem in its operating context. The process of solving problems is perceived as a (meta) cognitive learning process following the scientific method through experimentation and (critical) reflection and is not about following a pre-defined script of a tool and template, as seen in the classroom training example in Section 3.2. Essentially solving problems requires deep-thinking and not just filling out a piece of paper with pre-defined steps and tools. For example, Taiichi Ohno opposed recording anything about the Toyota system, as he believed that improvements were never-ending. By writing it down, the process would become crystallised (Ohno, 1988, p. ix). This belief is exemplified in opposition to codifying each methodology's tools and methods. Similarly, Revans refused to define action learning since he preferred to describe it in terms of what it was not. Revans believed action learning would become constrained artificially by trying to define it. He, therefore, purposely avoided giving simplistic techniques or recipe examples (Boshyk and Dilworth, 2010, p. 6). Revans was convinced that action learning could not be associated with puzzles, textbooks, lectures, case studies, fabricated issues or simulations.

5.1.2 Individual learning. Both lean and action learning operate on a multi-purpose foundation of simultaneously solving relevant problems, fostering insights and learning and improving the organisation's ability to solve future problems in a better way to achieve strategic success (Ballé *et al.*, 2017; Liker, 2021; Marquardt *et al.*, 2017). Therefore, the learning generated from problem-solving efforts is perceived as of equal value to the solution. According to Ohno (2013), employees at Toyota were not recognised for a successful result if they could not account for their learning and steps leading up to the result. Likewise, Revans conveyed that action and learning cannot be separated by stating that there is no learning without action and no (sober and deliberate) action without learning (Rigg, 2015). This statement from Revans also expresses the inference that solving problems takes place in practice, and practitioners must distinguish between getting things done and *talking* about getting things done (Revans, 2011, p. 5). Likewise, within the lean domain, the terms *gemba* and *genchi genbutsu* are widely used to describe the practices of going to observe and collecting the facts at the source of where a problem takes place in practice, that is, at the shop-floor or the customers (Ballé *et al.*, 2017; Liker, 2021; Ohno, 2013). Moreover, it is at the *gemba* where the employees learn and practice solving problems (Camuffo and Gerli, 2018; Liker, 2021).

5.1.3 Group learning. Within the lean literature, problem-solving is often referred to as an activity taking place within a group or team (Franken *et al.*, 2021; Liker, 2021; Rother, 2010). In some accounts, group problem-solving is described as a *kaizen* or *kaizen event*, where a group of relevant and dedicated people have an accelerated timeframe to solve a specific problem (Glover *et al.*, 2013; Franken *et al.*, 2021). In other (often older) accounts, *quality circles* describe the manufacturing improvement activity of bringing a team together to work dedicatedly on problems, e.g. quality, productivity or safety-related (Schonberger, 1983; Liker, 2021). Revans often referred to *quality circles* as an example of action learning in Japan and sometimes renamed them *questioning circles* (Boshyk and Dilworth, 2010). Thus, within action learning, the group or set is the core entity where the members are responsible for reframing the problem, assessing alternative actions, determining the goals, defining actions and implementing these (Boak, 2016; Marquardt *et al.*, 2017, p. 53).

Both the lean and action learning domains draw on theories from organisational learning (Liker, 2021; Marquardt, 2011). E.g. West and Burnes (2000) investigated the link between lean and organisational learning within the automotive industry. Saabye *et al.* (2020) explored the association between lean and organisational learning within the context of technology adoption, and Tortorella *et al.* (2015) studied lean adoption in Brazil through an organisational learning lens. The action learning domain, e.g. Doyle *et al.* (2016) investigated the link between action learning and public health care, and Pedler (2002) studied local democracy through action learning and original learning theories. Finally, Coughlan and Coghlan (2010) argued that sustainable strategic improvement in the extended manufacturing enterprise is based on action and learning within and between firms and that developing learning capabilities through appropriate learning mechanisms is central.

5.1.4 Leading with questions rather than statements of "knowledge". Another similarity between the lean and the action learning domain is the emphasis on leading change through questioning and self-reflection (Marquardt, 2014; Liker and Convis, 2011; Pedanik, 2019). Within the lean domain, the most crucial role of the leaders is to develop themselves and others in problem-solving and kaizen through routines of coaching and asking questions (Liker and Convis, 2011; Rother, 2010). According to Ballé *et al.* (2017, p. 57), leaders enable their employees, through questions, to define the goals and draw conclusions as opposed to imposing readymade answers on them. Similarly, Maalouf and Gammelgaard (2016, p. 705) conclude that leaders must assume the role of learning facilitators during change by boosting employees' involvement and participation. Likewise, Adler and Borys (1996) suggest that leaders must ensure enabling procedures instead of coercive ones, allowing and empowering the employees to resolve problems themselves.

In Action Learning, asking fresh and insightful questions are foundational for enabling groups to understand, clarify and explore problems and actions (Marquardt *et al.*, 2017). Moreover, questioning builds teamwork, improves listening skills and fosters individual, team and organisational learning (Marquardt *et al.*, 2017, p. 82). According to Pedanik (2019, p. 120), asking questions can help people think critically and reflectively and shift their behavioural patterns to resolve problems on their own in the future.

Critical reflection is also a dominant element of both domains and can be defined as upstream and downstream learning (Coghlan and Coughlan, 2010, p. 198). The process of questioning core assumptions, aspirations, objectives and life philosophy is called upstream learning. Inquiring into behaviour, ways of relating and action in the world is referred to as downstream learning, and it expresses the result of upstream learning in social and leadership behaviour. In the lean literature, critical reflection or deep reflection is referred to as *hansei*. It is the practice of self-development and entails the conscious process of looking back at yourself, reflecting on what went well and what did not and adapting these insights for future actions (Liker and Convis, 2011, p. 70). Within lean, the ability to perform *hansei* is a prerequisite for developing others (Liker and Convis, 2011). Similarly, Revans (2011, p. 76)

introduced the principle of the insufficient mandate: "Those unable to change themselves cannot change what goes on around them." Moreover, becoming aware of and avoiding misconceptions or assumptions when framing and solving problems is also fundamental in lean and action learning (Marquardt and Yeo, 2012; May, 2016; Ohno, 2013).

5.1.5 Systems thinking. Systems thinking is also ingrained into both domains. However, unlike linear thinking, systems thinking is about recognising patterns and being aware that what affects one part of an organisation also affects other parts in planned and unplanned ways (Seddon and Caulkin, 2007; Senge, 2006). However, a small, well-designed and timely action based on systems thinking can generate a significant outcome (Gharajedaghi, 2011).

Systems thinking can be traced back to the early leaders at Toyota (Liker, 2021, p. 53). Within the extant literature originating from TPS, lean is described as a (learning) system with people solving problems as a foundational and core element (Liker, 2021; Ballé *et al.*, 2017). Since the world is not simple, linear or predictable lean thinkers recognise that we cannot expect the organisation to follow formulated plans, as a mechanistic world view suggest (Ballé *et al.*, 2017). Instead, lean thinkers perceive organisations as dynamic and unpredictable living systems and therefore invest without expecting simple cause-and-effect relationships between actions and the bottom line but prepare to make continuous adjustments (Liker, 2021). Hence, when solving problems, lean thinkers apply a systems viewpoint since solving a problem in one part of an organisation otherwise will likely impose a new problem in another part of the organisation (Sobek and Smalley, 2008).

Action learning is fundamentally developed on the proposition that achieving long-lasting and effective problem-solving requires systems thinking (Marquardt *et al.*, 2017). Back in 1938, we find accounts in the literature that Revans was conscious of applying a systems approach to health care (Boshyk and Dilworth, 2010).

5.1.6 Respect for people and society. A final and fundamental element of both lean and action learning is respecting people and society over profit. Both build on a belief that, besides it being the right thing to do, respect is a requirement to be profitable in the long term (Liker, 2021; Ballé *et al.*, 2017; Boshyk and Dilworth, 2010).

Within lean, respect for people is described as caring deeply about the success of every employee and partner, the satisfaction of every customer and the well-being of the surrounding communities (Liker, 2021; Ballé *et al.*, 2017). For example, concerning implementing lean, Hasle *et al.* (2012) find that the effects on the working conditions are derived not from the concept of tools and methods but from how lean is practised and the context where it is established. Moreover, in this regard, Hasle *et al.* (2012) conclude that a meaningful way to prevent harmful effects on the working environment and employee health and well-being is to involve employees in lean implementation and lean production in practice.

Within action learning, Revans' often highlighted ethical values and principles such as honesty and social responsibility while at the same time promoting behaviour based on humility and respect for others (Boshyk and Dilworth, 2010, p. 53). In practice, he applied these values and principles to his action learning programmes. For example, in his action learning studies with teams of underground miners, he found that production improved when workers were allowed to design their work methods and determine priorities instead of being dictated to by management (Boshyk and Dilworth, 2010, p. 17). Similarly, in his study of the 10 largest hospitals in London, Revans focused on reducing a high turnover rate for nurses, high mortality rates, prolonged hospital stays, and demoralised staff (Revans, 1971, pp. 245–79).

5.2 Applying the lean-action learning theoretical lens: reflecting again on the three cases

The integrated lean-action learning theoretical lens (Figure 2) can be applied by reflecting on lean implementation Case 1 in comparison with Cases 2 and 3, as outlined in Table 1.

	Case 1: Holmemo *et al.* (2018)	Case 2: Powell and Coughlan (2020)	Case 3: Saabye *et al.* (2022)
1. Problem-solving by scientific method	The objective was to implement lean tools	The objective was to improve supply chain performance and collaboration	The objective was to improve performance and the capability to adopt industry 4.0
	Adopting lean is viewed as the goal	Adopting lean is viewed as means of fostering learning-to-learn capabilities	Adopting lean is viewed as means of fostering learning-to-learn capabilities
	Focus on solving *puzzles*	Focus on solving *problems*	Focus on solving *problems*
2. Individual learning	Learning is designed to teach the programmed knowledge (P) of lean tools and practices	Learning is designed as a cognitive discovery process of finding, facing, framing and solving problems through insightful questioning (Q)	Learning is designed as a cognitive discovery process of finding, facing, framing and solving problems through insightful questioning (Q)
	(L = P)	(L = P + Q)	(L = P + Q)
3. Group learning	Group members are passive students that follow the instructions of the appointed consultant	Focus on fostering good collaboration and co-learning within groups across the supply chain	Focus on fostering good collaboration and co-learning within groups across the factory
4. Leading with questions rather than statements of "knowledge"	Consultants acting as experts and "telling" what to do	Leaders and external lean experts acting as learning facilitators	Leaders and external lean experts acting as learning facilitators
	Leaders not engaged in the learning process	Leaders actively engaged in the learning process	Leaders actively engaged in the learning process
5. Systems Thinking	Perceiving and practising lean as a set of (standalone) tools and methods	Perceiving and practising lean as a learning system encompassing system *alpha*, *beta* and *gamma*	Perceiving and practising lean as a learning system encompassing system *alpha*, *beta* and *gamma*
6. Respect for people and society	No evidence of caring deeply about the success of employees and customers	The lean learning program was initiated to support suppliers in achieving success	The lean learning program was initiated to develop, enable and empower employees

Table 1.
Cross-case analysis

Reflecting on Case 1, we can explain its failure in adopting lean through the lean-action learning lens (Figure 2), which reveals that (1) the consultants introduced A3 problem-solving methods without focusing on the underlying learning process of following the scientific method of reflection and experimentation. (4) Despite the (rhetorical) intentions, the consultants or leaders did not lead through questioning. Instead, the senior leaders mandated "lean navigators" and consultants to lead the change, using a "hard" consultancy approach of telling and directing. (2) This "hard" consultancy approach to solving problems prevents the employees from learning the process of finding, facing, framing and forming solutions to problems in their own way. (3) Moreover, the group members did not learn together but instead "just" followed the direction of the appointed consultant or "lean navigator". (5) The case did not exhibit any indications of a systems view or establishing a learning system since the engagement with the consultancy was prolonged. The governmental service organisation did not manage to be self-sufficient. (6) Despite the good (rhetorical) intentions, the case did not exhibit any elements of caring deeply about the success of every employee and partner, the satisfaction of every customer and the well-being of the surrounding communities. In contrast to Case 1, Cases 2 and 3 were purposefully designed on the principles of action learning and the adoption of lean as a learning system (see Section 3.2). Hence, we contend

that these two cases exemplify, through the lean-action learning lens (Figure 2), the complementarity of lean and action learning for successful lean system adoption.

6. Conclusion

In this article, we have explored the research question: *What are the theoretical and practical complementarities of lean and action learning and how can these two research streams be synthesised into an integrated theory?* Implicit in the question lies an inquisitiveness and curiosity about why action learning as a theory and practice is absent in the lean literature. In response, we have taken a *gemba* walk through the literature and practices of lean and action learning. We have viewed and noticed a systematic relationship between the two domains by drawing on emergent insights from comparing lean and action learning, a recognisable classroom scenario (see Section 3.2), and three cases (see Section 4.2). Finally, we have outlined the explicit similarities between action learning and lean that reward our curiosity and support our reflections on the association between lean and action learning.

Furthermore, we have explored and reflected on how action learning as both a theory and practice can explain the success and failures of adopting lean. We recognise that both lean and action learning are systemic approaches that cannot be adopted by copying the practice developed over many years and decades. System conditions differ in the way operations are structured, how the work has been designed, how people are paid and rewarded, how measures are used and the policies, procedures and IT systems (Seddon and Caulkin, 2007). From a systemic point of view, many lean implementations have failed because organisations tried simply to copy practices from Toyota without adapting to the conditions of their own systems. Adapting to systemic conditions is a prerequisite for the discovery and utilisation of practical solutions developed and the associated learning.

We contend that the stream of lean literature contributes a valuable but potentially limited perspective on what constitutes a lean system. For its part, however, the action learning stream offers a complementary perspective on adopting and sustaining a lean system. These overlapping theoretical and practical complementarities suggest that the streams are ready for synthesis into the integrated theory, illustrated in Figure 2. Hence, based on our theorising, we present two propositions as new programmed knowledge (P) for designing the underlying learning structures that successful lean adoption demands.

6.1 Emerging propositions

Emerging from the cross-case analysis (see Section 5.2), which is based on our proposed integrated lean-action learning theory (see Figure 2), we propose that if organisations want to solve operational problems as they implement lean systems, they have a valuable opportunity to apply action learning. If conscious and deliberate, this effective integration may improve the sustainability of the outcome. However, those responsible must first understand and acknowledge the problems as systemic in practice through framing and asking insightful questions (system alpha). Next, these groups must conceive and experiment with solutions in the context of the application (system beta). Finally, the decision-makers must critically reflect upon their mental models and behaviours as they learn from their actions towards solving these systemic problems (system gamma). This cycle embodies two integrative propositions emerging from Figure 2.

Proposition 1. Action learning as a theory and practice is foundational to designing effective interventions during lean system adoption.

Second, the extant lean literature consists of an enormous amount of programmed knowledge (P in action learning terms) proposing what (systemic) conditions and practices constitute a

lean organisation (e.g. Shah and Ward, 2003) as well as practical accounts and frameworks for becoming a lean organisation (e.g. Bloom *et al.*, 2013). But where is the programmed knowledge (P) about facilitating the required situational learning to adopt lean practices and frameworks in these conditions? For example, how do people learn to distinguish between puzzles and problems? How do they unlearn the habit of jumping to solutions and providing answers and, instead, begin to ask insightful questions when solving problems? How do people learn to develop a system that fits and offers systemic solutions instead of thoughtlessly implementing a copied practice? Essentially how do people and organisations learn to learn? Our proposition is that action learning can prompt the development of such relevant, useful and useable programmed knowledge (P) for the lean literature.

Proposition 2. Action learning as a theory and practice is foundational to understanding the success of lean system adoptions.

Action learning can be understood and applied as the learning process underlying sustainable lean adoption in actual system conditions. As outlined in Figure 2, the lean-action learning process begins (and ends or rather repeats) with identifying and solving problems through the application of the scientific method (1). This action learning process is governed by two pillars: individual learning (2) and group learning (3), which promotes insightful questions over statements of knowledge (4) as a means to improve the whole system (5), with a goal of both serving and improving society by demonstrating respect to employees, customers, people and partners (6).

In contrast, neglecting to apply an action learning process to lean system adoption can explain the subsequent failure.

To conclude, action learning theory and practice can elevate our understanding of lean beyond categorical descriptions of what constitutes a lean system. Given their complementary nature, action learning enables us to understand better what it takes to adopt and sustain a lean system. By espousing Whetten's (1989) definition of what constitutes a complete theory, we see that the extant lean literature, therefore, offers the programmable knowledge (P) component of what constitutes a lean system (in different contexts) while the theory of action learning offers the complementary programmable knowledge (P) about adopting and sustaining a lean system as a (meta) cognitive and learning foundation. Hence lean and action learning can be regarded as integrated theoretically, offering a more complete understanding of lean as a phenomenon.

6.2 Implications for managers and teachers of lean

According to operation management research, 60–90% of lean implementations fail (Dora and Gellynck, 2015; Jadhav *et al.*, 2014; Pearce *et al.*, 2018). Therefore, we recommend that organisations embarking on adopting lean systems are conscious of designing their interventions for adopting and sustaining lean systems with the philosophy and practice of action learning. Guided by this paper's Figure 2, we recommend that decisions-makers become aware that (1) developing their employees to become proficient problem solvers is foundational for lean system adoption by (2) providing the employees with a supportive learning environment where they can experiment with and reflect on finding, facing, framing and solving problems as opposed to classroom training. Solving the problem is a superior form of learning, (4) which requires leaders and facilitators to ask questions (Q) instead of telling and directing. (3) Learning and solving problems is not a one-person endeavour but takes place within a group, where peers can challenge and learn from each other. (5) Adopt a perspective that lean tools and methods are not to gain short-term improvements but to develop the abilities to find, face, frame and solve problems since every problem poses a learning opportunity. Moreover, solving problems requires a systems viewpoint. Solving a

problem in one part of an organisation otherwise will likely impose a new problem in another part of the organisation. Hence the purpose of lean is to adopt a learning system that (6) cares deeply about the success of every employee, partner, customer and our society.

Finally, we recommend that teachers and students of lean at higher education institutions consider applying an action learning approach to exploit the complementarity between the two domains. Moreover, we believe it also can be beneficial for teachers and students of lean to explore further our proposed integrated lean-action learning theory (Figure 2) when seeking to convey and understand lean thinking in general and lean as a learning system in particular.

6.3 Future research

To paraphrase Molière (1670), "*for over fifty years, lean practitioners have implemented action learning without knowing it*". That said, lean and action learning have historically been two unaffiliated research streams. As we discovered the similarities and complementarity between lean and action learning, as described in this paper, an opportunity for integration emerged. Guided by Coghlan and Coughlan (2023), our theorising had three characteristics:

(1) First, it was *processual*. Our research collaboration has taken place over some six years, during which we have engaged with fellow researchers and practitioners, as well as each other, in evolving our questioning, reflection, learning and writing.

(2) Second, our work was *contextual*. We have engaged actively in lean implementation in practice in various settings. These implementations have contributed to the meta-level questioning, reflection and learning on which we have built our theorising about lean and action learning.

(3) Finally, our dialogue and collaboration have *refined* our previously published work and developed the theoretical and practical links between lean and action learning.

Emerging from our theorising process, we have explored and reflected on the opportunity of how action learning as a theory and practice can explain the success and failures of adopting lean systems. We contend that lean thinkers, being practitioners or academics, have not consciously been aware that action learning is the "secret" or intangible element of successful lean system adoption. Hence, with the awareness of lean and action learning integration provided in this paper, we invite the operations management research community to further theorise about lean and action learning. Furthermore, we suggest applying the integrated lean and action learning lens to future case studies and empirical analysis to advance our understanding of lean system adoption and sustainment.

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Corresponding author
Henrik Saabye can be contacted at: henrik.saabye@velux.com