The role of culture in lean implementation: evidence from the construction industry

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Abstract

The purpose of this study is to investigate how cultural tensions are managed in a service organization going through a lean implementation. We have conducted an in-depth single case study in the construction sector, using paradox theories. The identification of the tensions as either paradoxes or dilemmas is a key contribution of this study, as this clarification indicates how the organizations should manage each conflict to a successful lean implementation. Additionally, the investigation of which lean practices counterbalance specific cultural traits negative to lean may help practitioners reach an effective cultural transformation instead of being limited to a "lean wash".

Keywords: Lean System, Culture, Paradox theories, Construction industry

Introduction

A growing body of researchers and practitioners are exploring lean philosophy and its implementation in the construction sector. On the one hand, the literature has demonstrated lean construction is feasible and can reach successful results (Salem et al., 2006). On the other hand, researchers show concerns regarding a superficial adoption as organizations focus on the implementation of a few specific tools instead of implementing lean thinking as a whole, i. e., the set of principles that, in combination with the practices, constitute the lean system (Tezel, 2017).

Despite the increasing list of both academic and practitioner publications on lean, most organizations still struggle to achieve the expected results of lean implementation (Martínez-Jurado & Moyano-Fuentes, 2014). More specifically, culture has increasingly been suggested as key to lean implementation, being the underlying force that guides organizations in successfully implementing and sustaining lean (Alves & Alves, 2015).

For these reasons, this paper aims to address the gaps found in the literature regarding the relationship between culture and lean implementation in construction service organizations. If an organization's culture is the results of its unique history and context and lean implementation requires a cultural alignment to its principles, it is reasonable to assume that the stablished culture may influence the organizational leanness as well as that a journey to lean implementation fundamentally culminates in changes in the organizational culture. Nevertheless, this interaction is still under-researched, in particular within construction service environments.

It is also surprising to note the lack of lean studies addressing interactions between national culture (NC) and organizational culture (OC), despite the fact that the broader literature on culture emphasizes the importance of these two levels, as well as their differences (Erthal & Marques, 2018). Therefore, we explore the NC influences on the OC and we identify managerial practices used to mitigate the negative impact of NC traits to lean implementation.

In order to deeply dive into those interactions and their repercussions, we have adopted a paradox theory lens (Lewis, 2000). Lean implementations offer a fertile ground for the emergence of paradoxes, which can be described as contradictions embedded within practices, interests and perspectives. It also has been noted that lean itself carries paradoxical principles such as flexibility vs. standardization and focus on employees vs. focus on results (Erthal & Marques, 2018). In addition to that, lean implementation may lead to conflicts between the lean philosophy and the pre-existing OC and NC (Kull et al., 2014; Bortolotti et al., 2015).

In order to unveil such dynamics, we have conducted an in-depth single case study on a multinational organization from the infrastructure sector, here called LCG, which has started the lean implementation journey eight years ago. LCG was founded in 1948 by two friends and started as a small Brazilian construction organization. A few decades later, it had expanded its operations to the infrastructure sector in Latin America, Europe and Africa, reaching more than 40 different countries and, therefore, dealing with multicultural environments – clients, employees, suppliers, legislations, local communities, etc. More recently, LCG has decided to invest in a lean transformation, mainly motivated by an imperativeness to gain more clients and to become more efficient in a context of a severe political-economic crises that erupted in Brazil. The implementation of the lean philosophy in its wholeness is, by itself, a challenge for most organizations. Let alone for LCG, founded in a cultural environment significantly different from the one lean was developed, with strong tradition and cultural values, operating in multiple environments and pressured by a real necessity of delivering effective results. Hence, the case study offers fruitful basis for discussing the ways in which existing NC and OC traits meet lean implementation, which conflicts are resolved and which paradoxes are managed in order to achieve a successful lean implementation. By investigating of this case, we expect to answer the following research question (RQ):

RQ: In what ways are cultural dilemmas resolved and paradoxes managed in a service organization going through a lean implementation?

Theoretical background

Lean construction

Lean started as a production system, developed at Toyota Motor Company around the 1950's with well-defined principles, which relate mainly to identifying customer value, eliminating waste, respecting and developing workers and suppliers, promoting continuous improvement and organizational learning, grounded on a long-term perspective (Liker, 2004; Womack & Jones, 1996). Toyota's success in the automobile industry throughout the decades has encouraged organizations from other industries to implement lean as well and the growing number of lean service studies indicate that this industry may benefit from lean strategy as well as manufacturing shop floors (Liker & Morgan, 2006).

One prominent sector in lean implementation is the construction sector, which has showed growing interest for lean philosophy (Sacks et al., 2010; Tezel, 2017). Once lean practices can be adapted from manufacturing plants to construction sites, lean

construction has shown its ability to positively affect the bottom line of projects (Salem et al., 2006). However, some researchers have raised concerns regarding organizations that adopt a "pseudo-lean" or a "lean wash" strategy (Sage et al., 2012). Pressured by clients while facing internal barriers to adapt and implement the lean philosophy, organizations from the construction sector would limit their implementation to some specific tools, mainly last planner system and visual management (Tezel, 2017). Such "pseudo-lean" implementation leads to limited know-how, lack of standardization and insufficient control of the value stream. Sage et al. (2012, page 1) also highlight the fact that *"lean concepts may transform during its journey with unintended organizational consequences"*. Hence, there is a lack of understanding of how organizations in the construction section must adapt their culture in order to promote the full transition from the traditional Western approach to the lean philosophy.

Culture

The literature provides a wide range of definitions of culture which may lead to several different directions of analysis (Smircich, 1983). For the purpose of this study, we will use the notion of culture as a "collective mental programming", as defined by Hofstede (1983), which means that people are influenced by their experiences throughout life and this results in differences in perception of a same reality. Those influences build a set of values and beliefs that are shared by members of a group and determine the way people think and act within the group context (Schein, 1984).

As a result, aspects of culture are found on different levels such as a professional organization or a religious association. It is important to add to the multilevel notion of culture that the longer a person lives in a specific group or the longer this group exists, the stronger the cultural influences of the group on the individual's perceptions, feelings & thoughts (Schein, 1984). For this reason, we may expect the culture of an organization to be more adaptable than cultural aspects at a country level, for instance. Indeed, the extant literature has approached research on culture within lean context mostly taking a national perspective and/or an organizational perspective of culture (Erthal & Marques, 2018).

Culture of different levels may clash, offering conflicting influences for an individual. In addition, managerial efforts such as lean implementation promote cultural change, hence the existing culture may also clash with the new culture arising from the lean philosophy. Therefore, we resort to the concept of paradox to unveil such clashes regarding cultural differences overtime.

Paradox theory

Paradoxes are described as conflicting demands or opposing perspectives (Lewis, 2000). This notion of *"conflict that needs to be solved"* and *"contradictory elements that are mutually exclusive"* are replaced by the fact that paradoxes are found inherent to organizations and denote the complexity, diversity and ambiguity of organizational life (Cameron, 1986). A deeper understanding of the impacts of paradoxes may promote organizational development as well as help researchers build concepts that closely reflect plurality and change processes throughout organizational life.

Lean implementations offer a fertile ground for the emergence of paradoxes. A recent map of the literature on the role of culture in lean organizations identified paradoxes related to different cultural dimensions and to lean philosophy itself, more specifically, a lack of consensus regarding the dimensions of OC defined by Hofstede et al. (1990) as *process vs. result orientation* and *normative vs. pragmatic approach* (Erthal & Marques, 2018). We infer that such lack of consensus may reflect the paradoxal nature of the lean

system, which simultaneously promotes standardized but flexible processes and a focus on both procedures and customers. For this purpose, we use a paradox theory lens to investigate in greater depth how such paradoxes are actually handled by a service organization implementing lean and dealing with the cultural changes derived from this implementation.

Conceptual framework

In order to deepen the understanding about the influence of culture on lean service organizations and the management of paradoxes inherent to lean, we use four complementary existing frameworks. The first one stablishes the degree of adoption of lean practices, i.e. leanness in the service industry (Malmbrandt & Åhlström, 2013). We understand that becoming a lean organization is a continuous journey and we will use the assessment of leanness to identify how cultural dimensions influence the adoption of the lean practices.

In regard to culture, we will use Hofstede's framework, which is the most cited reference in the NC literature, and whose dimensions are widely tested for differentiation among cultures at a national level. Hofstede (1980) proposes five dimensions for the NC level, namely (1) individualism vs. collectivism – interest for one's wellbeing or for a group's; (2) large vs. low power distance - how a society handles inequalities among people.; (3) masculinity vs. femininity – degree of competitiveness or cooperation; (4) strong vs. weak uncertainty avoidance - degree to which people feel uncomfortable with uncertainty and ambiguity; (5) long term vs. short term orientation – prioritizing present or future goals.

Last but not least, we take a paradox lens (Lewis, 2000) to analyse how the firm respond to controversy between NC and OC, and between the pre-existing OC and lean culture. The paradox lens consists of three elements: (1) *tensions* – what are the contradictions embedded within demands, statements, emotions, practices; (2) *reinforcing cycles* – how defensive reactions reinforce vicious, paralyzing cycles; and (3) *management* – how to avoid being stuck in those cycles. Using this framework, we expect to better identify and represent existing paradoxes within a lean implementation and cultural transformation context, addressing implications for research and managerial practices.

Research design

We frame this research project as intermediate research within the continuum between mature and nascent stages proposed by Edmondson & Mcmanus (2007). Our research draws from separate mature streams of literature (lean, national culture, organizational culture and paradox theory) while intends to "*present provisional explanations of phenomena, often introducing a new construct and proposing relationships between it and established constructs*" (Edmondson & Mcmanus, 2007, pp. 1158). This intermediate approach, which is equivalent to theory elaboration in qualitative research (Ketokivi & Choi, 2014), emphasizes the reconciliation of general theory with contextual idiosyncrasies.

In order to achieve that, we have conducted an in-depth single case study. According to Yin (2009:18), a case study *"investigates a contemporary phenomenon in depth and with-in the real-life context, especially when the boundaries between phenomenon and context are not clearly evident"*, what suits studies on soft/subjective themes such as culture and holistic systems such as lean. Our research approach is qualitative and acknowledging the fluid and somewhat unpredictable aspects of this kind of approach,

we employ an abductive logic, which proposes constantly confrontation of the data with the theory (Sinkovics & Alfoldi, 2012).

Case selection

The selected case is LCG, a multinational from the infrastructure sector. LCG has head offices in Brazil and Europe and operates in over 40 countries in Latin America, Europe, Africa, Asia and the Middle East, with a total of 15,000 direct employees and a gross revenue of about USD1.0 billion. The company has initiated the lean journey eight years ago with one project and due to its significant results, lean adoption has expanded to projects around the world as well as to corporate units. The company has about 120 employees working at Corporate Excellence department, disseminating and supporting lean implementation throughout the company.

Data collection

We have employed multiple methods of data collection (Eisenhardt and Graebner, 2007). Primary data was collected through semi structured in-depth interviews with lean leaders, executives of the company and other key stakeholders. The interviewees were encouraged to answer each question considering the changes along the organization's lean journey, in other words, how it used to be, how it is now and what is still to be accomplished (the interview guide may be requested to the corresponding author). Primary data also includes notes of direct observations and informal conversations during site visits and Hansei events. A Hansei at LCG is a three-full-days meeting that gathers the whole Operational Excellence team together to present on-going projects follow-up, to discuss problems and to define approaches and methods to enable LCG to meet its strategic planning objectives. Secondary data includes internal performance reports, strategic planning reports, quality manuals, standard operating procedures manuals, process improvements reports, internal systems and tools, studies of major lean construction institutes, newspapers' or magazines' pieces on the company, industry or context that was considered relevant. (The detailed list of each data collected may be requested to the corresponding author.)

Data analysis

Both primary and secondary data were analyzed through qualitative coding, supported by a Computer-Assisted Qualitative Data Analysis Software (CAQDAS), more specifically the NVivo software. Coding was based on a progressive approach (Sinkovics & Alfoldi, 2012), conducted in two coding cycles, as prescribed by Saldaña (2009). In the first one, data was classified according to the cultural dimensions, lean practices and the stage of lean implementation. In the first cycle, the aim was to highlight the dilemmas using binary terms such as "on the one hand" and "one the other hand". The second coding cycle has consisted of elaborative coding, which is the process of analyzing first-cycle coding in order to develop theory further by contrasting the current case with previous studies to "support, strengthen, modify, or disconfirm the findings from previous research" (Saldaña, 2009, p.168).

Research quality

Case research quality is about making justified choices and make them explicit (Ketokivi & Choi, 2014). We have followed the quality criteria proposed by Stake (1995), which are research ethics, member checking and triangulation. All the interviewee and participants are previously informed about the participation being voluntary, information

being confidential and with no potential harm to them nor to their organization. Transcripts of the interviews are sent to the interviewees to get member checking and informant consent on the transcript, before using the information in the data analysis phase. We also applied data source triangulation, with participants from multiple organizational levels, departments, locations as well as different roles regarding lean initiative. This increases the confidence in the researchers' explanations of the phenomena (Edmondson & Mcmanus, 2007).

Case analysis

Pre-existing paradoxes

One paradox identified within LCG culture previously to the implementation of lean philosophy is that people from LCG are considered open-minded, flexible and excited about novelties although they demonstrate avoidance to change. Flexibility and openness to novelty might create a belief of easiness to implement new strategies, processes and changes. Conversely, LCG struggles with lean implementation and finds resistance and barriers to change.

Exploring this paradox, we have found frequent differences between what is said and what is done within the organization. In other words, people may say they agree with the changes proposed but they tend to resist or drop the changes because of various factors. We have mapped some possible reasons which are showed in Figure 1.

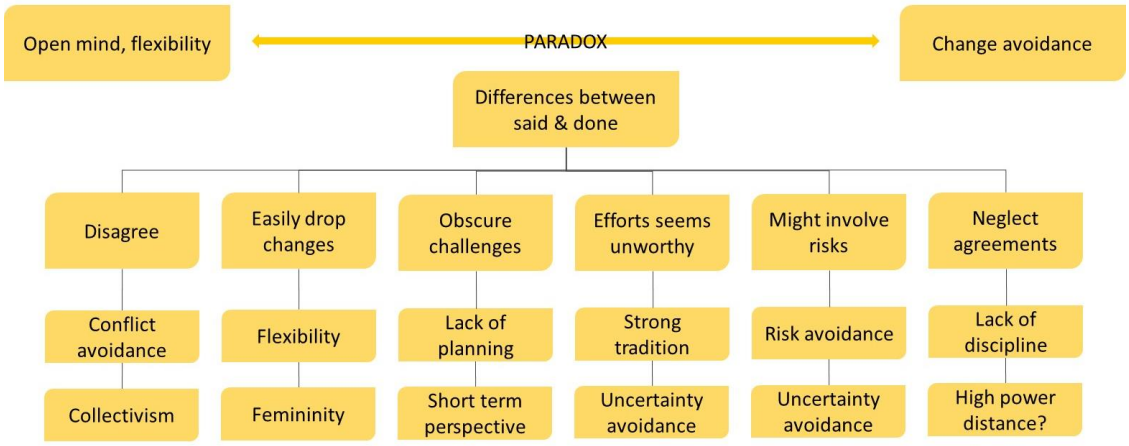

Figure 1: Paradox Open minded vs. Change avoidance

Each of the reasons aforesaid has a connection to Brazilian cultural traits, as shown in Figure 1. The strong uncertainty avoidance might explain the strong avoidance of risks as well as the strong traditions that hinder LCG from reaching out to new possibilities. Similarly, the lack of planning is directly connected to the relatively short-term orientation of Brazilian's culture. Additionally, keeping the harmony among a group's members by avoiding conflicts is linked to a collectivist culture as well as flexibility is linked to a more feminine culture, which is more consensus & life quality driven.

We have identified additional paradoxes that will be explored and detailed later, as this article is a work in progress. Some of them are (a) small vertical & horizontal distance vs. slow decision making; (b) neglecting agreements vs. delivering to clients "no matter what"; (c) good integration & collaboration vs. poor communication; and (d) mistake tolerance vs risk avoidance vs. problems not discussed.

Dilemma resolution versus paradox management

In the new lean context, some of the paradoxical tensions afore mentioned turn into a dilemma rather than to a paradox. That is to say, the alignment with lean philosophy requires some of the controversial cultural aspects to be overcome, inclining to only one side of the paradox.

One example of this situation is the conflict between flexibility and change avoidance. It is imperative that all the organization is opened and committed to the changes involved in the lean transformation. Therefore, in the lean implementation context, it becomes a matter of dilemma and LCG has put great effort into leaving behind the cultural trait of change avoidance. They have emphasized change management initiatives to deal with resistance, such as improving communication, training, worker involvement, small and fast results (known as "quick wins"), active lean leadership that includes the CEO as the lean sponsor and major advocate of lean implementation. The role of the sponsor is also an indication that lean is "here to stay", counterbalancing the cultural trait of non-sticking changes. The lack of planning has been counterbalanced by the adoption of the Last Planner System. With this tool, the organization could realize all the benefits of an effective planning and for this reason it has been successfully established. The use of pilot tests during first years of implementation has contributed to the perception of value as well as to outweigh the risk avoidance, a significant aspect of LCG's culture. The organization has hired a worldwide renowned consulting company, specialized in lean, to also minimize the risks throughout the lean transformation.

LCG is still struggling with two elements involved in the "solution" of what is now understood as the *dilemma* flexibility vs. change avoidance, which are the lack of discipline and the conflict avoidance. The previous has become one of the major flags of the CEO and of the lean team and there have been some improvements towards following agreements and procedures, yet minor. The later, conflict avoidance, will lead us to a new paradox within the lean implementation at LCG, which concerns the operational excellence, as following explored.

Being efficient and achieving great results is one of the major objectives of LCG nowadays. The organization has been aiming to reach higher performance, especially in response to the contextual political-economic crisis. But historically, relationships have always been a priority to the organization, sometimes in detriment of performance. Although the focus on relationships has provided a happy work environment and developed long term solid relationships, a paternalistic culture came along, where conflicts are avoided, problems are not discussed and mistakes are tolerated, as we have already showed.

The lean implementation along with the increase in market competitiveness have aroused in LCG leadership the desire for a more balanced strategy. Similarly, workers claim for a more meritocratic culture, where people are recognized by their exceeding performance as well as consequences are imposed to negative behaviors and results. In this transition, there are some leaders who still favors relationships, although part of the leadership is turning their focuses to actual performance. Nevertheless, in order to develop a performance management, it is vital to develop an operational excellence culture. And the challenge seems to be how to keep the focus on people, providing a supportive work environment, keeping loyalty and commitment at the same time as developing a performance-driven culture within the organization.

So far, LCG has successfully implemented key performance indicators (KPI's) to monitor the processes results as well as adherence to some of lean tools and practices, in a multilevel perspective. All the metrics are available in an *obeya* (control) room and are discussed in regular meetings stablished. In contrast, workers seem dissatisfied with the

measurement system concerning individual performance. The system stablished is based on ABC curve, which incites competition among workers, instead of the collaborative culture proposed by lean. Other criticisms relate to the distortion of classification as A, B or C. People tend to give higher scores to each other as lower scores generate conflicts, added to the fact that the evaluation is a "two-way road". Above all, the main issue seems to be that no clear decision is made or direct action is taken after acknowledging the results of neither the KPI's nor the personal assessment. The totality of interviewees claimed for the implementation of consequences to good and bad behaviors.

Considering first the positive behaviors. Implementing individual's recognition & reward systems is a challenge for LCG as the organization is spread to various countries and organizational levels and each context values different types of recognition. Another relevant factor is to keep the team spirit and the focus on the holistic and long-term results. In addition to that, implementing consequences to undesirable behaviors and lower performance may spread insecurity and fear of making mistakes, which reinforces the risk avoidance and not discussing problems. Those two cultural traits lead us to the paradoxes related to mistake tolerance, which in the lean implementation context also need to be overcome. The interconnections described can be visualized in Figure 2. We realize that the identification of these reinforcing cycles is the first step towards releasing LCG from them (Lewis, 2000). We will continue to explore this paradox and collect more data in the field and in the literature in order to find management strategies to deal with those paradoxes.

We have also identified additional tensions originated or strengthened by lean implementation that are also interconnected to the paradoxes afore described. Some of them are how to promote integration and multiskilled teams in a paternalistic and in-group collectivistic culture; what is the balance between informality and disorder; how to develop workers and promote organizational learning in a hero-based environment. Not to mention the paradoxes inherent to lean itself, such as continuously improving vs. standardizing; risk avoidance vs. innovation; and internal vs. external focus. Those will be properly addressed in a later version, as this article is a work in progress.

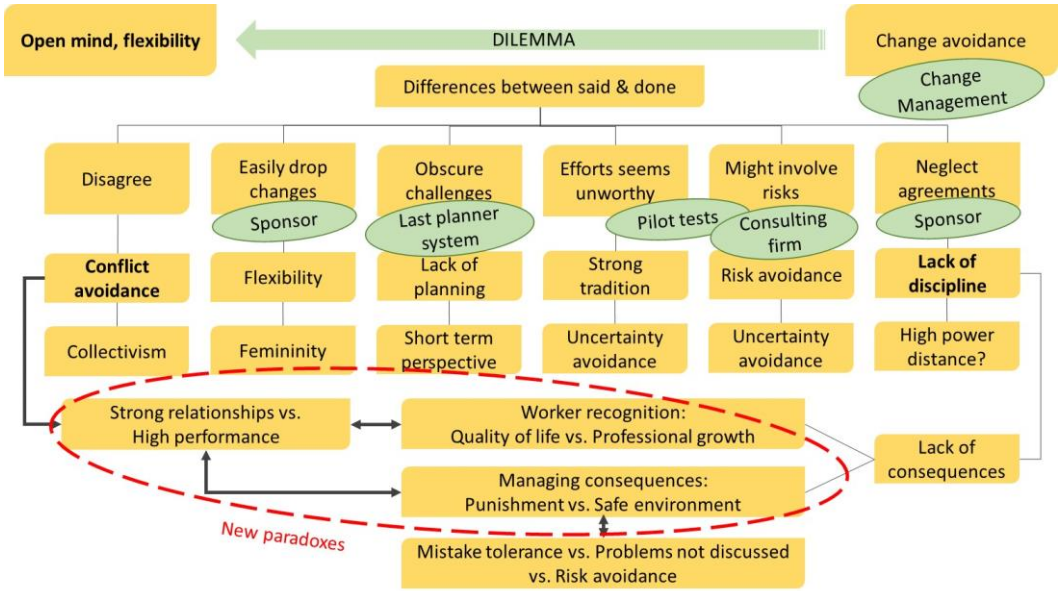

Figure 2: Tensions, interconnections and counterbalancing practices with lean adoption

Conclusions

Theoretical contributions

This case study addresses relevant literature gaps on the interaction of lean and culture and deeply investigates how an OC evolves overtime through the influence of NC and the impact of lean implementation. We have asked the RQ "In what ways are cultural dilemmas resolved and paradoxes managed in a service organization going through a lean implementation?"

We have investigated how the adoption of a new management strategy, specifically the lean system, impact the pre-existing tensions inherent to the OC as well as creates new conflicting interests, perspectives and demands. Part of the pre-existing conflicts have turned into dilemmas with lean adoption, urging the organization to make significant effort to effectively carry out the cultural transformation needed. Part of the conflicts appear to be actual paradoxes, forcing the organization to manage the contradictions in order to achieve the expected results.

The identification of paradoxes and dilemmas that emerge within a lean implementation is a relevant theoretical implication itself. Additionally, this case study corroborates with paradox theories as it describes reinforcing cycles that prevents the organization from being able to properly manage the tensions. As this article is a work in process and as exploring paradoxes is an ongoing and cyclical journey (Lewis, 2000), we expect to better understand how organizations may release themselves from those reinforcing cycles, what is underexplored by the literature so far.

Managerial contributions

We expect to offer a guide to managers dealing with the challenges of the cultural transformation necessary for a successful lean implementation in the construction sector. We have explored the Brazilian context, which may serve as basis for leaders in similar contexts and with similar cultural traits.

The differentiation of the conflicting tensions as either paradox or dilemma is a key contribution of this study, as this clarification indicates how the organizations should manage each conflict to a successful lean implementation. Additionally, the investigation of which lean practices counterbalance specific cultural traits negative to lean may help practitioners reach an effective cultural transformation instead of being limited to a "lean wash". We have also shown that as a NC cannot be changed by an organization, practices intend to counterbalance OC traits that result from NC influence at the organization. Additionally, the present case study corroborates with previous literature in that it reinforces that lean implementation is a long-way journey that demands perseverance and continuous improvement.

Limitations and future research

This research is based on a single case study. As much as it has allowed an in-depth discussion of dilemmas and paradoxes, future research must expand the empirical base in order to map contextual conditions that help explaining how dilemmas are resolved and paradoxes are managed throughout lean implementations in organizations in other industry sectors and exposed to other national contexts.

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