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**THE INTERPLAY OF CULTURE AND LEAN IN SERVICE
ORGANIZATIONS**

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A thesis presented to the Instituto Coppead
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ABSTRACT

LEVI, Alice Monnerat Erthal. **A relação entre cultura e o sistema enxuto em organizações de serviço**. 2019. 149 f. Tese (Doutorado em Administração) - Instituto COPPEAD de Administração, Universidade Federal do Rio de Janeiro, Rio de Janeiro, 2019.

Despite extant research on both culture and lean within the management scholarship, and the recognition of culture as key to a successful lean implementation, the specificities of their interplay are still under-researched. Moreover, service organizations still struggle to adapt the lean principles and practices that have emerged in the automotive sector. Therefore, the purpose of this doctoral thesis is to delve into the interplay between culture and lean implementation in service organizations. The starting point of the thesis is a systematic literature review, which synthesizes over two decades of publications according to the levels of national culture (NC) and organizational culture (OC) and maps which cultural dimensions foster or hinder lean implementation. The review unveils the lack of consensus in the literature and underlines some key paradoxes present in lean organizations. In order to scrutinize such paradoxes, the empirical stage of the research consists of two in-depth single case studies: one on the construction sector and the other on the healthcare sector. Both case studies take an abductive approach exploring the paradox theory as a theoretical lens. The findings offer a dynamic analysis of how culture influence lean implementation, and in turn, how the adoption of lean principle/practices directly impacts and changes the OC. Furthermore, the study presents the defensive mechanisms and counterbalancing actions that organizations adopt in order to manage the tensions derived from this interplay between lean and culture. This identification can guide managers when dealing with challenges of cultural transformation for a successful lean implementation. To the best of our knowledge, no previous study has explored the interplay of lean implementation and culture using a paradox theory lens.

Keywords: Lean Service, Organizational Culture, National Culture, Paradox Theory, Lean Construction, Lean Healthcare .

RESUMO

LEVI, Alice Monnerat Erthal. **A relação entre cultura e o sistema enxuto em organizações de serviço**. 2019. 149 f. Tese (Doutorado em Administração) - Instituto COPPEAD de Administração, Universidade Federal do Rio de Janeiro, Rio de Janeiro, 2019.

Apesar de extensa pesquisa sobre cultura e sistema enxuto na literatura de administração e do reconhecimento da cultura como elemento chave para a implantação do sistema enxuto, as especificidades da relação entre ambos ainda são pouco estudadas. Além disso, as organizações de serviço encontram dificuldades para adaptar princípios e práticas do sistema enxuto tendo em vista seu surgimento no setor automotivo. Assim, o objetivo desta tese de doutorado é aprofundar o conhecimento na relação entre cultura e o sistema enxuto. O ponto de partida é a elaboração de uma revisão sistemática da literatura, que sintetiza mais de duas décadas de publicação de acordo com os níveis de cultura nacional e cultura organizacional e mapeia como as dimensões de cada nível impactam a implementação do sistema enxuto. A revisão revela uma falta de consenso na literatura e destaca alguns paradoxos-chave presentes em organizações enxutas. Com o objetivo de aprofundar o entendimento sobre tais paradoxos, o estágio seguinte da pesquisa consiste em dois estudos de caso únicos em profundidade – um no setor de construção e outro no setor de saúde. Ambos os estudos de caso utilizam uma abordagem abdução suportada pela teoria do paradoxo. Os resultados oferecem uma análise dinâmica de como a cultura influencia o sistema enxuto e de como a adoção de princípios e práticas enxutas impactam e modificam a cultura organizacional. Adicionalmente, o estudo apresenta os mecanismos de defesa e as ações adotadas pela organização visando contrapor tais mecanismos na direção de uma gestão dos paradoxos. Este detalhamento pode auxiliar os gestores a superar os desafios da transformação cultural necessária para uma implantação bem-sucedida do sistema enxuto. A pesquisa não identificou estudo prévio que tenha explorado a relação de cultura e sistema enxuto utilizando a teoria do paradoxo.

Palavras-chave: Sistema Enxuto, Cultura Organizacional, Cultura Nacional, Teoria do Paradoxo, Serviços de Saúde, Construção civil.

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LIST OF ABBREVIATIONS

IDV: Individualism Index

KPI: Key Performance Indicator

OC: Organizational Culture

NC: National Culture

OM: Operation Management

RQ: Research Question

UK: United Kingdom

US: United States

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1 INTRODUCTION

1.1 ON THE CONTEXT

Lean consists of a way of managerial thinking that is grounded on a set of principles and practices that emerged as a production system developed at Toyota Motor Company around 1950 (Krafcik, 1988; Womack, Jones, & Ross, 1990). The lean principles such as waste reduction and continuous improvement along with Toyota's success in the automobile industry throughout the decades have encouraged organizations from other industries to implement lean. The extant literature on lean service corroborates the notion that the benefits that lean provides to manufacturing shop floors may indeed accrue to the service industry (Liker & Morgan, 2006; Malmbrandt & Åhlström, 2013). Studies demonstrate improvements in customer satisfaction (Dickson, Anguelov, Vetterick, Eller, & Singh, 2009), efficiency (Morganti et al., 2014; Tezel, Koskela, & Aziz, 2017) and economic results (Salem, J., Genaidy, & Minkarah, 2006).

Despite the maturity that lean literature has reached, most organizations still struggle to achieve the expected results of lean implementation (Martínez-Jurado & Moyano-Fuentes, 2014). The adoption of isolated tool or practice instead of adopting lean as a holistic socio-technical system hinders the successful lean implementation (Bortolotti, Boscari, & Danese, 2015; Liker & Morgan, 2006). The extant literature finds culture as one of the major barriers to taking this holistic approach (M. L. Smith, Wilkerson, Grzybicki, & Raab, 2012). However, how different levels and specific dimensions of culture affect lean implementations is still unclear (Andersen, Rovik, & Ingebrigtsen, 2014; Goodridge, Westhorp, Rotter, Dobson, & Bath, 2015; Harrison et al., 2016).

Culture is a complex concept that has been widely studied by management scholarship (Hofstede, 1998; Hutnyk, 2016; Schein, 1984; T. B. Smith, Rodriguez, & Bernal, 2011; Song, Moon, Chen, & Houston, 2018). Despite the divergent definitions of culture available (Smircich, 1983), "there is some consensus that organizational culture is holistic, historically determined, and socially constructed, and it involves beliefs and behaviors, exists at a variety of levels, and manifests itself in a wide

range of features of organizational life” (Detert, Schroeder, & Mauriel, 2000:851). That means that external influences build a set of common values within groups of different levels, which will consequently influence the behavior and beliefs of the groups’ members (Hofstede, 1980; Jarnagin & Slocum, 2007; Schein, 1984). Therefore, it is reasonable to expect that significant organizational changes due to lean implementation both influence and are influenced by the beliefs and behaviors previously established within an organization. It is also reasonable to assume that these clashes will expose the organization to a variety of tensions when cultural traits and changes due to lean implementation need to coexist.

1.2 ON THE RESEARCH

As the role of culture in lean service implementation is under researched in the literature and organizations still struggle to manage the cultural transformation needed to a successful lean implementation (Narayanamurthy & Gurumurthy, 2016), this study aims at scrutinizing the interplay of culture and lean. In order to accomplish that, the present research was divided into three consecutive stages, which resulted in one academic paper each (Table 1 presents the main elements of each paper). The starting point of this research was to conduct a systematic review of the literature addressing the role of culture in lean implementation. The objective of this review was to map how the literature on this theme evolved over time as well as how specific cultural dimensions, at both national and organizational levels, influence lean organizations.

The following stages consisted of the empirical investigation on the interplay between lean and culture in the most prominent sectors of lean service, which are the construction and healthcare sectors. The objective at these stages was to explore the cultural tensions in the context of a lean implementation and, for that, we have adopted the paradox theory lens. Paradoxes are described as tensions raised by conflicting demands or perspectives inherent to organizations (Cameron, 1986; Lewis, 2000; Poole & Van de Ven, 1989). Lean implementations offer fertile ground for the emergence of paradoxes due to its paradoxical nature, which simultaneously

promotes standardized but flexible processes as well as a focus both on procedures and customers.

Table 1 – Summary of the three papers

	Paper 1	Paper 2	Paper 3
Title	"National culture and organizational culture in lean organizations: a systematic review"	"Managing cultural paradoxes and dilemmas in lean construction"	"The interplay of lean healthcare and organizational culture: A paradox theory lens"
Outlet	Production Planning & Control - PP&C (published)	International Journal of Operations & Production Management - IJOPM (under review)	Annual Meeting of the Academy of Management - AOM (submitted)
Research question (RQ)	RQ1: How has the literature addressing the role of culture in lean organizations evolved over time, and what are the identifiable trends? RQ2: How do specific dimensions of NC and OC influence lean organizations?	RQ: How are cultural paradoxes and dilemmas managed in a service organisation going through a lean implementation?	RQ: How are cultural paradoxes managed in a healthcare organization going through a lean implementation?
Method	Systematic literature review	In-depth single case study in the construction sector	In-depth single case study in the healthcare sector
Framework of analysis	Streams of lean studies (abductive), NC dimensions (Hofstede, 1980; 1983), OC dimensions (Hofstede)	Lean service (Malmbrandt and Åhlström, 2013), NC dimensions (Hofstede, 1980; 1983), OC dimensions (abductive), Paradox theory (Lewis, 2000)	Lean elements (abductive), OC dimensions (abductive), Paradox theory (Lewis, 2000) and types of paradoxes (Smith & Lewis, 2011)

Although both papers 2 and 3 are case studies and both explore a paradox theory lens, they explore different angles of the interplay between culture and lean. The case study conducted in the construction sector (paper 2) has combined three established frameworks to support the analysis, one covering lean principles, another covering the dimensions of national culture (NC), and another covering the elements of the paradox theory. The organizational culture (OC) was also a subject of this study although the constructs emerged inductively from the data instead of being limited to fit an existing framework. The paradox theory lens enabled the differentiation between paradoxes (i.e. maintained tensions) and dilemmas (i.e. resolved tensions) as well as the unfolding of the defensive mechanisms and managerial actions adopted by the organization when facing the tensions. In

particular, the second paper takes advantage of the fact that the focused organization has international operations to explore relationships between NC, OC and lean. In the case study conducted in the healthcare sector (paper 3), culture was analyzed at the organizational level during a lean implementation effort to unfold the four types of paradoxes proposed by the original framework (Lewis, 2000; W. K. Smith & Lewis, 2011), thus offering a nuanced perspective of varying paradoxes faced by a service firm implementing lean.

The remainder of this thesis is structured as follows. The three papers are presented in sections two, three and four, respectively. Section five presents the conclusions of the study, implications and indications of future research avenues. Please note that the references and appendixes are presented at the end of each paper.

2 FIRST PAPER: Systematic Literature Review

The first paper has been published at the journal Production Planning and Control (impact factor 2.330, listed as CAPES A1 and ABS 3). This article presents a meta-synthesis of the literature on the interplay of culture and lean and is entitled **“National culture and organisational culture in lean organisations: a systematic review”** (Erthal & Marques, 2018). Please find it below and please note we use British English in this paper in accordance to the journal’s guidelines.

ABSTRACT

Despite the extensive literature suggesting that culture plays a key role in lean implementations, no previous review has focused on the topic. This study is a systematic review of the literature that synthesizes over two decades of publications according to the levels of national culture (NC) and organisational culture (OC) and maps which cultural dimensions foster or hinder lean implementation. In terms of NC, this study shows that Japanese cultural traits might hinder lean, such as masculinity and power distance, hence avoiding the over simplification that lean is a country-specific management approach. In terms of OC, the literature review unveils a lack of consensus and underlines two paradoxes, namely the co-existence of both process and result-focused orientations and both normative and pragmatic approaches. This review ultimately offers a relevant agenda for lean research as well as a guide for managers who face the challenge of implementing and sustaining lean in their organisations.

Key words: lean system, Toyota Production System, national culture, organizational culture, systematic literature review

2.1 INTRODUCTION

2.1.1 The lean system

The lean system was developed on the Toyota shop floor, as the company was trying to recover from the defeat of Japan in World War II. The strategy that resulted focused on waste reduction and increased production flexibility (Ohno, 1988), grounded on a focus on customers, continuous improvement, and high worker involvement (Liker & Morgan, 2006; Womack et al., 1990). Toyota's success reached the West in the 1980s and the Toyota Production System was presented to the world as *lean production* after the publication of the landmark book *The Machine that Changed the World* (Womack et al., 1990). Since then, the concept of *lean production* has evolved to a more holistic perspective, based on lean principles of customer value and waste elimination that could be applied beyond the shop floor and to diverse sectors (Womack & Jones, 1996). The authors also emphasize the relevance of a wider perspective over the adoption of some single tool or practice. In the present literature review we will use the term *lean system* to represent this complex system of interrelated socio-technical practices (Bortolotti et al., 2015), based on well-defined principles (Liker, 2004).

Throughout the years, both academics and practitioners have increasingly focused on understanding the potential of this new production paradigm. Despite the maturity that lean has reached and the increasing list of publications on the topic, such as academic papers, books, and how-to guides, most organizations still struggle to achieve the expected results of lean implementation (Martínez-Jurado & Moyano-Fuentes, 2014). According to a global survey of more than 2,000 executives, organizations face inefficiencies at every step of the implementation process (Pustkowski et al., 2014). The barriers to implementing and sustaining lean over time have led to a growing academic interest in the topic (Hines et al., 2008; Lucey et al. 2005; Taylor & Taylor, 2008).

Although previous publications on lean studies did not focus on people-related aspects (Bamber et al., 2014), since the 1980s, culture has increasingly been suggested as key to lean implementation and continuity, being the underlying force that guides managers and workers in successfully implementing and sustaining lean

(Alves & Alves, 2015; Boscari et al 2016; Cagliano et al., 2011; Dora et al., 2016; Kull et al., 2014; Mathew & Jones, 2013; Oudhuis & Olsson, 2015; Van Dun & Wilderom, 2016; Vest & Gamm, 2009).

2.1.2 Culture definitions

Culture consists of a set of values and beliefs shared by members of a group that determine the way people think and act within the group context (Schein, 1984). Thus, organizations will differ from each other because of their culture (Alves & Alves, 2015). Recent studies have supported the notion that cultural factors play a crucial role within business and management field (Boscari, et al., 2016; Gambi et al., 2015; Hasle et al., 2012; Kull et al., 2014), although this theme had already been addressed by earlier researchers, such as Nakane (1970). In her seminal study of Japanese society, Nakane shows that cultural and historical factors are decisive for the success of the Japanese way of managing organizations and that therefore it would not be transferable to other environments.

Taking a different approach, Hofstede (1980) holds that management is culturally dependent once it consists of manipulating intangible symbols that are directly connected with culture. According to Hofstede et al. (1991), aspects of culture are found on different levels, from the national or country to the organizational or departmental level. Hofstede's studies reveal that cultural differences at the national level relate to values acquired in the early years of a person's development and are hence already established when the organization is entered. Conversely, differences in OCs involve corporate practices, which relate to more tangible aspects of culture being learnt at the workplace. Hence culture is time dependent, that is to say, OC aspects are easier to be adapted than NC aspects because the latter is more deeply rooted. Schein (1984, page 12) corroborates this time dependence, stating that *"the longer we live in a culture and the older the culture is, the more it will influence our perceptions, thoughts and feelings."*

Although it seems to be feasible to change an OC, it is not an easy task to accomplish (Hofstede et al., 1991; Schein, 1984). Recent studies addressing this issue state that OC is a fundamental cause of lean failures (Saurin et al., 2011) and note that an appropriate OC is vital for achieving the best results in implementing

lean (Bortolotti et al., 2015, Gambi et al., 2015; Pakdil & Leonard, 2015). At the same time, considering Toyota to be the model organization for lean (Womack & Jones 1996), the literature advocates deeply understanding its OC to replicate it in other organizations and contexts, which has increased the interest in ideas such as the Toyota way (Liker, 2004) and lean thinking (Womack and Jones 1996). In brief, we are seeking to better understand the role that NC and OC can play in organizations at the various stages of maturity regarding their process of lean implementation, i.e., from initial efforts of implementation to long-term efforts of sustaining lean.

2.1.3 Research questions

To the best of our knowledge, no previous review has focused on the role of culture in lean organizations (Narayanamurthy & Gurumurthy, 2016), despite the existence of literature considering culture as a decisive factor to lean success. To fill this gap, the present review maps how the dimensions of NC and OC have been addressed by the extant literature over the years, as well as opportunities for future research on this topic. Our study is grounded in a systematic review of the literature that addresses the following research questions (RQs):

RQ1: How has the literature addressing the role of culture in lean organizations evolved over time, and what are the identifiable trends?

RQ2: How do specific dimensions of NC and OC influence lean organizations?

In answering the RQs, this systematic literature review offers relevant contributions, indicating that although research on the impact of culture on lean has produced some level of consensus, there are still paradoxes that call for further investigation. At the NC level, our review shows a negative impact of some Japanese cultural traits on lean. In particular, power distance seems an under-researched NC dimension. At the OC level, we unveil a paradox regarding two OC dimensions, namely the dimensions of *process vs. result orientation* and *normative vs. pragmatic approach*. Most importantly, we highlight the lack of studies looking at the possible interactions between NC and OC, in particular regarding the service sector, underlining that cultural misinterpretation often culminates in superficial lean adoption.

The remainder of this paper is structured as follows. The next section describes the methodology employed for the systematic review. Section 3 presents the meta-synthesis of the literature. The last section offers concluding remarks, indicating theoretical and managerial contributions as well as the limitations of the study and directions for future research.

2.2 METHODOLOGY

2.2.1 Systematic review protocol

The methodology employed in this study is a systematic literature review, which adopts “*a replicable, scientific and transparent process*” (Tranfield et al., 2003, p. 209), minimizing researcher bias and providing an audit trail of all steps (Cook et al., 1997). The systematic approach has spread significantly in operations management (OM) studies in past years (Thome et al., 2016) and it has also been adopted to map the literature regarding other lean-related subjects (Andersen et al., 2014; Gosling & Naim, 2009; Hasle et al., 2012; Holden, 2011; Moyano-Fuentes & Sacristán-Díaz, 2012; Naim & Gosling, 2011; Negrão et al. 2017).

The research engine chosen for the present literature search was the *ISI Web of Science*, which covers the top journals not only in the field of general management but also health studies and engineering, hence avoiding a restrictive review of business studies. Brainstorming was used to select keywords related to lean. Subsequently, snowballing was used to add keywords to the search as they were found in a preliminary screening of the literature, resulting in the following list of search keywords: "lean management", "lean manufacturing", "lean system", "lean production", "lean suppl*", "lean distribution", "lean *sigma", "lean IT", "lean construction", "lean service", "lean health*care", "lean design", "lean thinking", "lean culture", "lean philosophy", "lean implement*", and "Toyota". The final research string combined the above keywords list with the term cultur*. We have applied this research string on the *topic* field and the initial search brought up 359 articles.

The studies were then filtered according to a set of inclusion and exclusion criteria, as shown in the PRISMA flow diagram (Moher et al., 2009) presented in Figure 1. The

first inclusion criterion filtered English-language papers published in peer-reviewed journals. Therefore, dissertations, books, unpublished working papers and conference papers were excluded. There was no criterion regarding initial date of publications, but the final date was Dec 2016. This reduced the sample to 235 articles.

The next step consisted of a quality assessment, where papers of journals with no impact factor (based on the Thomson Reuters listing) were also excluded, which downsized the sample to 115 articles. Following this, the in-depth examination of the abstracts reduced the sample to 73 papers. The articles excluded at this point mentioned lean or Toyota or culture in the abstract as secondary issues (for example, mentioning the Toyota company but not its system) or even in a different meaning, such as one study about the agricultural sector. To avoid researcher bias (Thome et al., 2016), the main author conducted in-depth analysis of the abstracts and the second author double-checked all the borderline cases.

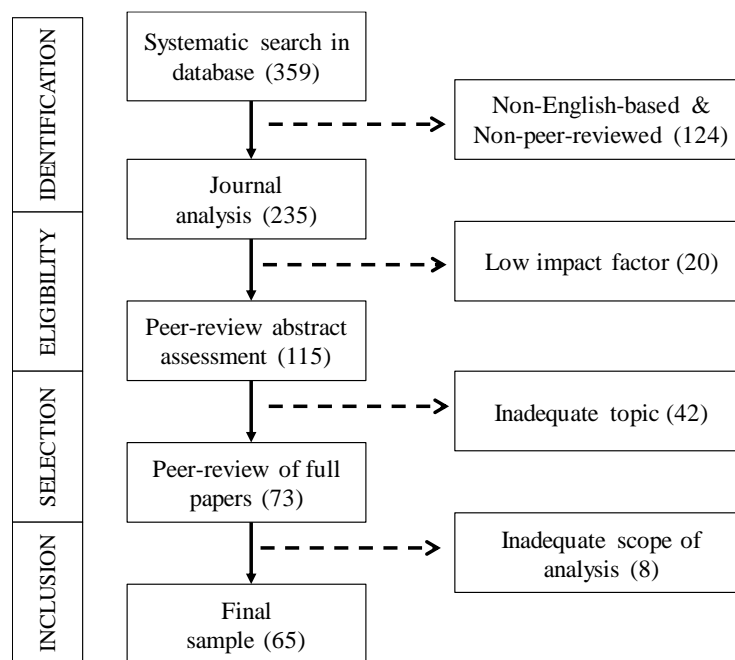


Figure 1 - Study selection and evaluation
Source: Based on the PRISMA flow diagram (Moher et al., 2009)

The final step before the meta-synthesis was the full assessment of the 73 papers, which was conducted by the main author. First, the full assessment led to the additional exclusion of eight studies, thus leaving the final sample with 65 pertinent to our research topic. The exclusion criteria at this point consisted of articles (a) mentioning lean as a background for other main issues (three articles), such as technology implementation; (b) limiting the scope of lean to one of its techniques (three articles), such as “5S organizations”, “standardization” or “six sigma”; and (c) articles with a mismatch between research design and data collection, which were excluded to avoid adding questionable empirical findings to the meta-synthesis (two articles). Then, the final sample of 65 articles was classified by the main author in terms of authors, titles, journals, years of publication, methodological and contextual classifications, and major contributions (see Appendix A for details).

2.2.2 Data analysis

2.2.2.1 RQ1 framework

After conducting a longitudinal analysis of the empirical studies, we identified four different streams of lean studies. The first stream, here called *lean transplantation*, represents the transference of lean from an organization which has this expertise to another which does not. The second stream consists of studies addressing organizations becoming lean by their own motivations and means and is here identified as the *lean implementation* stream. Some examples of quotes from the articles used to classification in this stream are “lean implementation was only in its beginning during this project...” (van Leijen-Zeelenberg et al., 2016) and "both Firms C and V seek to implement company-specific lean production systems in all their factories worldwide" (Netland, 2016). The third stream, here called *lean continuity*, concerns studies addressing the continuity of the system over time, discussing the challenges of sustaining its benefits across the years. Example of quotes from studies classified in this stream are "the introduction of lean production (in the company) in the 1980s..." (Richardson et al. 2010) and "LP is deeply embedded in Scania's organizational life." (Alpenberg & Scarbrough, 2016). There are also studies addressing both streams, such as van Dun & Wilderom, 2016, who state that "The 25 teams had, on average, adopted lean for two years and four months. Two teams had

practiced lean for more than seven years". Parallel to the development of lean manufacturing, the fourth and last stream consists of *lean service*.

2.2.2.2 RQ2 framework

We have chosen Hofstede’s scales as the analytical framework to answer RQ2. As mentioned in Section 1.2, Hofstede et al. (1991) analyzes culture according to two levels, NC and OC. After conducting a large scale cross-national culture study (same company, multiple countries) (Hofstede, 1980) and, a decade later, a large cross-organizational culture study (same country, multiple companies) (Hofstede et al., 1991), Hofstede and colleagues propose five dimensions for the NC level and six dimensions for the OC level, as shown in Table 2. Although later versions of the model have added other dimensions, they will not be used in the present review, because they were not tested in Hofstede’s original large-scale studies.

Hofstede’s work has been criticized, particularly for the fact that its first research may be outdated (Fernandez et al., 1997; Kull et al., 2014). This review uses the framework as a tool for synthesizing the literature, since most of the studies in our sample mention Hofstede. The GLOBE¹ framework was presented as an updated version of Hofstede’s work (House et al., 2004). Its proponents posit that because it uses the same dimensions to assess both NC and OC, these two dimensions thus become more comparable (Bortolotti et al., 2015; Jung et al., 2009). However, we believe that using GLOBE’s framework could restrain the synthesis and make the NC–OC classification ambiguous. Hence, we assume the two levels of culture to be two different phenomena and, supported by the widespread usage of Hofstede’s framework in the OM literature (Cagliano et al., 2011; Oudhuis & Olsson, 2013; Wiengarten et al., 2015), we confirm it as our analytical framework.

Table 2 - Hofstede’s (a) NC Dimensions and (b) OC Dimensions

(a) NC Dimensions	
Individualism: personal needs and goals are prioritized; loose ties between individuals; everyone is expected to look	Collectivism: the needs and goals of the group are prioritized; strong in-groups integration and protection in exchange of

¹“GLOBE is a research project developed by a group of social scientists and management scholars worldwide to define a culture measurement model” (House et al., 2004).

after themselves and their immediate family	unquestioning loyalty
Long term orientation: focus on the future, on long-term fulfillment, valuing perseverance, persistence and saving; adaptations are necessary according to circumstances	Short term orientation: focus on immediate results and gratification; maintenance of time-honored traditions and norms while viewing societal change with suspicious
Strong uncertainty avoidance: efforts are made to minimize or avoid ambiguous situations, such as planning and standardization	Weak uncertainty avoidance: people are comfortable with ambiguous situations; let the future happen instead of trying to control it
Large power distance: hierarchy and unequal distribution of power are expected/accepted	Small power distance: inequality in society should be minimized; less centralization of power and decisions
Masculinity: there are different rules for men and women; tough and assertive behavior is encouraged	Femininity: men's and women's values and roles are similar; preference for cooperation and consensus-orientation

(b) OC Dimensions	
Tight control: people are very cost-conscious, punctual and serious; there is a very strict work discipline	Loose control: loose internal structure, a lack of predictability, and little control and discipline; no one thinks of costs and meeting times are kept approximately
Employee-oriented: personal problems are taken into account, organizations are responsible for worker welfare and important decisions are made by groups	Job-oriented: strong pressure to get the job done, organizations not interested in the workers welfare and important decisions made by individuals
Professional: people think three years ahead or more, the identity of an employee is determined by his profession/the content of the job; job competence is the only hiring criterion	Parochial: employees are very short-term directed, there is strong social control to be like everybody else and social and family background are considered in hiring people
Open system: both organization and its people are open to insiders and outsiders, almost anyone would fit into the organization and newcomers are immediately welcome	Closed system: organization and people are closed and secretive, only very special people fit in organization and new employees need more than a year to feel at home
Process-oriented: people avoid risks, spend limited effort on their jobs and each day is pretty much the same	Results-oriented: people are comfortable in unfamiliar situation, put maximal effort, each day brings new challenge
Normative: major emphasis on correctly following organizational procedures, which are more important than results; high standards regarding business ethics/honesty	Pragmatic: major emphasis on meeting customer needs, results are more important than procedures and a pragmatic rather than an ethical attitude prevails

Source: Hofstede (1980, 1991, 1998)

2.3 META-SYNTHESIS OF THE LITERATURE

This section presents a meta-synthesis (Denyer & Tranfield, 2006; Thome et al., 2016) of the 65 articles addressing the role of culture in lean organizations, published between 1994 and 2016. We provide a descriptive analysis of the sample, followed by a longitudinal discussion of the evolutionary streams of the empirical studies addressing culture in lean organizations (RQ1), and we finish with a detailed account of how the extant literature discusses NC and OC, and in what ways these levels relate to lean (RQ2).

2.3.1 Descriptive analysis of the sample

The descriptive analysis in in Table 3 shows the growing number of articles published per year and more specifically the growing number of empirical and quantitative studies.

Moreover, there is a clear predominance of studies in the manufacturing sector, and as expected, the automotive sector is the most-studied sector, followed by aerospace and electronics. The service sector is present in 30% of the studies. The first service-focused study was published in 2004, and since then, their number has only increased, covering mainly healthcare, construction, and distribution sectors.

Table 3 - Methodological choices of the sample

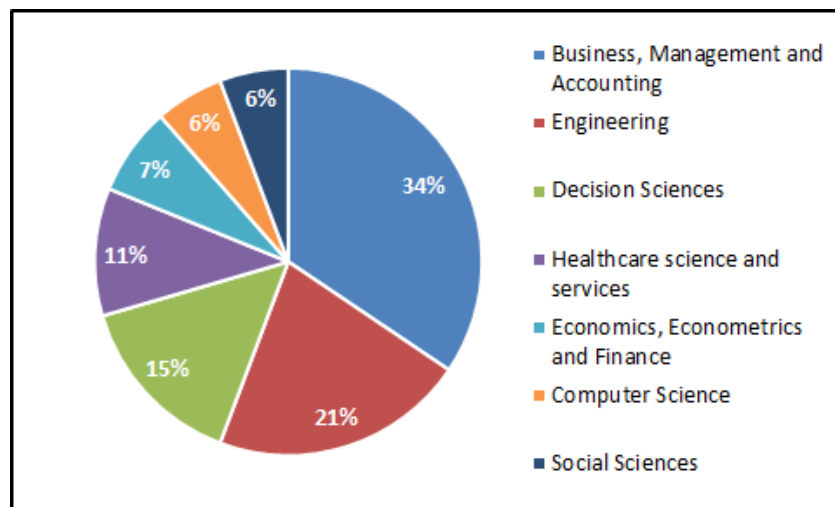
Time Period	Quantity	Study Type	Research Strategy*	Industry Sector*
1994–2003	9 articles	56% empirical 33% theoretical 11% literature review	100% qualitative	100% manufacturing
2004–2013	25 articles	80% empirical 12% theoretical 8% literature review	65% qualitative 20% quantitative 15% mixed	70% manufacturing 25% service 5% both
2014–2016	31 articles	90% empirical 3% theoretical 6% literature review	54% qualitative 39% quantitative 7% mixed	64% manufacturing 29% service 7% both

Total	65 articles	81% empirical 11% theoretical 8% literature review	62% qualitative 28% quantitative 9% mixed	70% manufacturing 24% service 6% both
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*% of the sub-sample of empirical studies

The review shows that case study is the dominant research method amongst qualitative studies, including both single and multiple cases. Action research accounts for one-third of the service-sector studies. Within the quantitative studies, the survey is the only method used. The full list of the research method applied by each study is in Appendix A.

Regarding the research outlets, while the literature seems scattered among journals (i.e. most journals are only represented by one paper and there is a maximum of four papers per journal), the three most representative subject areas are: business and management, engineering, and decision sciences, accounting for 70% of the sample (see Figure 2).



Note: Some journals cover more than one subject area
Figure 2 - Subject areas of journals

2.3.2 RQ1: How has the literature addressing the role of culture in lean organizations evolved over time, and what are its identifiable trends?

The four different streams in the adoption of lean mentioned in section 2.2.1 are following discussed. Figure 3 presents the distribution of the empirical articles

through the years, in addition to providing information to answer RQ1, such as the culture level (NC, OC, or both) and the research strategy (qualitative, quantitative, or mixed) adopted by each study.

Stream 1: lean transplantation

We would expect to find that the first paper from the sample address the challenges of the transference of lean from a Japanese lean company to Japanese subsidiaries, acquisitions, or joint ventures in the West. In this context, cultural differences, especially in NC, are highlighted as a major barrier for lean transplantation, often experiencing a range of inter-country conflicts. The first three empirical studies (dating from 1994 to 1996), are of Japanese transplants of lean to the US or Western Europe, followed by a transplant from the US to the UK, five years later.

Although recent scholarly attention has been focused on streams 2–4 (as discussed in the following), *lean transplantation* studies reappeared by 2013. Despite the 10-year gap between such studies, the fact that two longitudinal studies (James & Jones, 2014; Mathew & Jones, 2013) were followed by additional NC- and OC-focused transplantation studies indicates that this is still an unsettled issue. Two of these studies (Brunet-Thornton et al., 2016; Oudhuis & Olsson, 2013) investigate Japanese lean transplants to the West, as do studies from previous decades. The other two studies (Boscari et al., 2016; Zimmermann & Bollbach, 2015) present a new context, where European organizations intend to transplant lean back to East Asia, China in particular. This clearly shows that lean has spread from East to West, and then within global organizations from headquarters to subsidiaries, up to the point that Western organizations now face the challenge of transplanting their adapted versions of lean to their Eastern subsidiaries.

Stream 2: lean implementation

These studies addressed Western organizations that struggle with internal resistance to implement lean. Most studies in the *implementation* stream are single-country studies and focus on OC aspects to explain success factors and constraints to implementation. Some studies also address both OC and NC levels, and only two focus exclusively on NC level: one of them shows that some dimensions of NC might explain different patterns in the adoption of specific lean practices (Cagliano et al.,

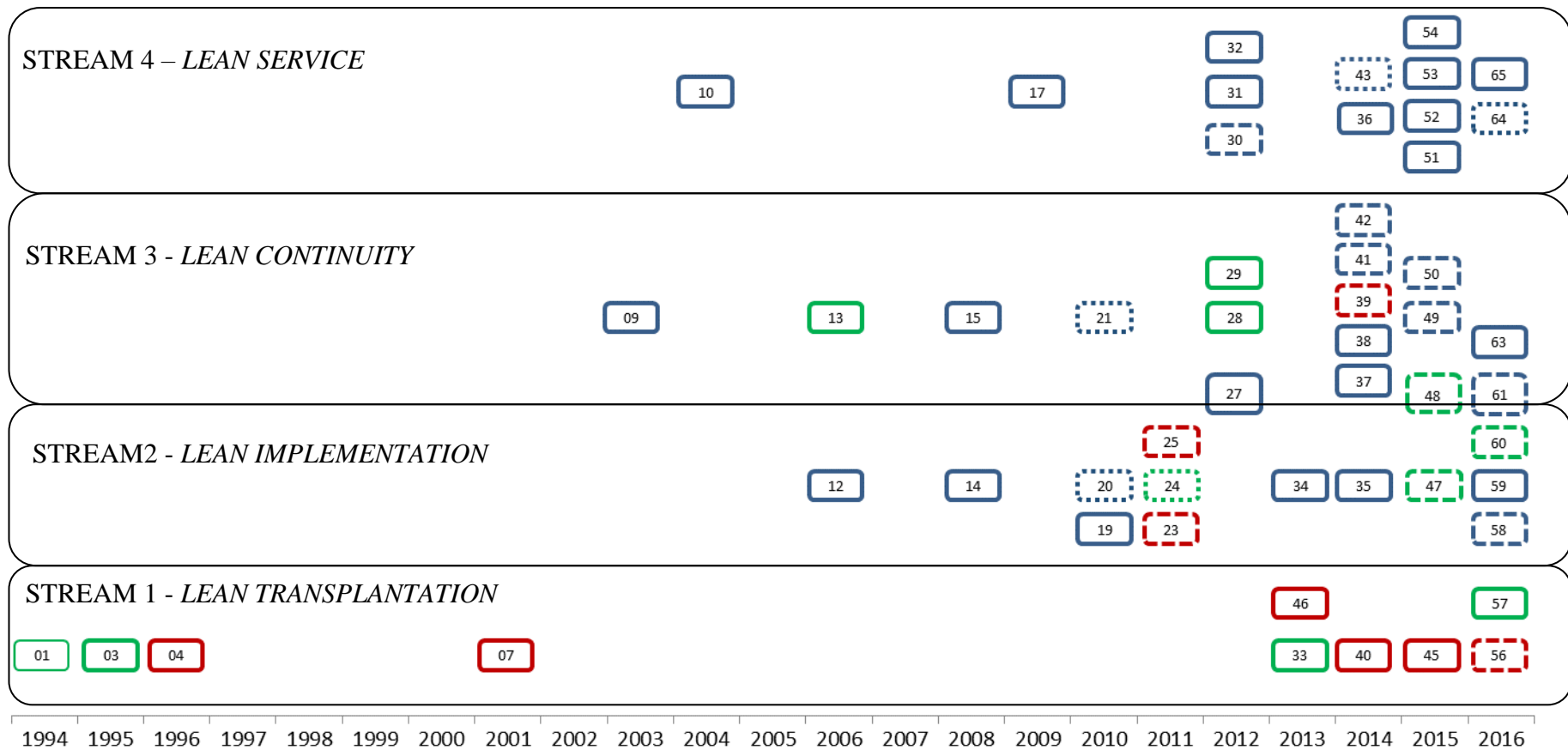
2011) and the other study compares the degree of lean implementation in China and the US (Hofer et al., 2011).

Stream 3: lean continuity

Parallel to the *implementation* stream, the studies of the *lean continuity* stream initially addressed Japanese and other Eastern companies and focused on OC aspects, as expected, given their nationality proximity to the Japanese origin of lean. Western companies later also began to focus on achieving higher and sustained performance with lean adoption. Some of them addressed the expansion of lean beyond the shop floor (Fullerton et al., 2014; Jayamaha et al., 2014), i.e., incorporating other departments such as logistics, marketing, sales, and accounting. Despite the predominance of OC-focused studies addressing *lean continuity*, as in the *implementation* stream, researchers also investigated the role of both the dimensions of NC and OC, some of them focusing more on the dimensions of OC and mentioning Japanese cultural traits as a background to their studies (Mehri, 2006), some addressing the influence on lean of some dimensions of both levels of culture (Pohl, 2012; Shim & Steers, 2012) and some investigating specifically the degree of influence of NC and OC on lean efficacy (Wiengarten et al., 2015). There is only one NC-focused study in this stream (Kull et al., 2014), and it investigates whether variation in NC dimensions influences lean effectiveness.

Stream 4: Lean service

With the success in manufacturing, service sectors, such as construction, distribution, and healthcare, have tried to implement lean. Some service-focused studies restrict lean implementation to specific divisions (Dickson et al., 2009; Smith et al., 2012; Zarbo et al., 2015). In these studies, lean is often considered a quality improvement tool rather than a holistic system, and is associated with terms such as “quality culture”, “continuous improvement culture”, and “safety culture” (Harrison et al., 2016; Vest & Gamm, 2009). Most service-focused studies highlight the cultural differences between manufacturing and service, emphasizing the challenges of adapting lean to the service context (Condell et al., 2004; Pohl, 2012). Consequently, all lean-service studies are OC-focused. Finally, it is important to note the recent growth of studies focused on the service sector, as indicated in Figure 3.



Note: Figure contains only empirical studies. Each number refers to an article from the sample, as listed in Appendix A.
 Border colors: green = NC & OC; red = NC; blue = OC. Continuous border = qualitative studies; dashed border = quantitative studies; dotted border = mixed studies.

Figure 3 - Longitudinal analysis of lean empirical studies

2.3.3 RQ2: How do specific dimensions of NC and OC influence lean organizations?

This section addresses the role of cultural aspects in lean organizations, in the following order: NC, OC, and the interaction between the two.

NC level

The majority of NC-focused papers use Hofstede’s NC framework to some degree, whether making reference to his work (Graen & Hui, 1996; Kull et al., 2014), or using some of his NC dimensions (Brunet-Thornton et al., 2016; Oudhuis & Olsson, 2013; Zimmermann & Bollbach, 2015), or even adopting his full framework (Cagliano et al., 2011; Hofer et al., 2011; Rafferty & Tapsell, 2001). Appendix A presents the level of adoption of Hofstede’s work by each study from the sample. We have matched the cultural traits discussed in the studies not based on Hofstede with his NC dimensions, as exemplified by the quotes in Table 4.

Table 4 also summarizes the classification of each empirical article into the five NC dimensions, showing which ones are stated as Japanese cultural traits, as well as the studies’ conclusions regarding how each dimension impacts lean organizations. Positive impacts include performance improvements, such as delivery (on time and on demand), lead time, quality, productivity, customer satisfaction, number of workers to hours worked, floor space, takt time, environmental outcomes, inventory, cost, safety, cycle time, return on assets, overall profitability, market share, and others. Negative impacts mainly include higher resistance to change and to sustaining changes among leadership and/or employees.

According to Hofstede et al. (1991), Japanese culture shows a high level of collectivism and a low level of individualism, long-term orientation, strong uncertainty avoidance, masculinity, and relatively large (boarder line) power distance, which corroborates the studies from the sample, as shown in Table 4. Notwithstanding this consensus, there is literature that presents opposing views on how certain NC dimensions effect on lean success, as will be detailed below.

Table 4 - NC Dimensions and their impact on lean organizations

Hofstede’s NC Dimensions	Japanese cultural	Effects on lean success		
		Positive	Negative	Insignificant

	traits			
High Collectivism <u>Exemplary quote:</u> "The concepts of loyalty and identification with the company are stressed in Japanese systems" - James & Jones, 2014	3, 7, 13, 29, 46, 48	23, 29, 33, 40, 48	45	39, 60
Long-term orientation <u>Exemplary quote:</u> "...traditional Japanese practice of hiring people at lowest level, offering life-long career based on seniority" - Botti, 1995	3, 40, 56	25, 28, 29, 57	39	-
Strong uncertainty avoidance <u>Exemplary quote:</u> "...Japanese managers stress the importance of 'doing what is decided to be done'" - Brunet-Thornton et al. 2016	7, 29, 46, 56	29, 33, 39, 40, 45	23, 25	-
Large power distance <u>Exemplary quote:</u> "Those who had the power were located toward the center of the section, close to the section leader, and those who were least important were seated at the edge." – Mehri, 2006	1, 7, 13, 23, 29, 46, 47, 56	13, 29, 33	23, 25, 40, 45, 47, 57	39
Masculinity <u>Exemplary quote:</u> "In observing the role of women..., I also saw how women are coerced into traditional gender roles." - Mehri, 2006	13, 24	-	23, 33, 39, 40	-

A widely studied NC dimension is *individualism / collectivism*. According to most studies (five articles), high collectivism fosters lean, because lean practices are team-based and workers are expected to cooperate across organizational units or groups to maximize return to the company as a whole (Cagliano et al., 2011; Shim & Steers, 2012; Wiengarten et al., 2015). Loyalty to the company (Botti, 1995; James & Jones, 2014) and devotion to work (James & Jones, 2014; Mathew & Jones, 2013; Oudhuis & Olsson, 2015) are well known Japanese cultural traits related to *collectivism*, also mentioned by the researchers. Only one study, conducted in China, suggests the negative influence of *collectivism* on lean (Zimmermann & Bollbach, 2015). The fact that Chinese *collectivism* relates to the family and not to the organization, as in Japan, might explain this controversial finding. Other studies indicate that belonging to an individualistic or to a collectivistic culture does not have a significant impact (Kull et al., 2014; Netland, 2016), denoting a divergent view.

Overall, studies addressing *long-term orientation* position this dimension as a Japanese cultural trait (Botti, 1995; Brunet-Thornton et al., 2016; James & Jones, 2014) with a positive impact on lean (Boscari et al., 2016; Hofer et al., 2011; Pohl, 2012; Shim & Steers, 2012). The willingness to sacrifice short-term results for long-term success is a foundation of lean implementation (Boscari et al., 2016; Hofer et al., 2011). In addition, the *long-term orientation* benefits long-term relationships (with workers and suppliers), focusing on the long-term planning and development of both people and products (Hofer et al., 2011; Pohl, 2012; Shim & Steers, 2012;). Against those findings and their own initial expectation, Kull et al. (2014) found that countries that value long-term orientation will struggle to achieve lean effectiveness. They suggest that making short incremental improvements and being responsive to current demand might make it harder for lean organizations to adopt a long-term perspective.

The extant literature identifies the Japanese cultural trait of high *uncertainty avoidance* as positive for lean success (five articles). The researchers emphasize the importance of reducing uncertainty to achieve stability, through advanced and systemic planning (James & Jones, 2014; Kull et al., 2014; Mathew & Jones, 2013; Shim & Steers, 2012). Workers must be alert to potential problems, but new solutions must be tested and approved before being implemented, avoiding drastic changes (Kull et al., 2014; Shim & Steers, 2012). Conversely, two groups of researchers found that *uncertainty avoidance* negatively affects lean, in that it hinders empowerment, as it leads to workers who prefer following order from superiors to making autonomous decisions (Cagliano et al., 2011; Hofer et al., 2011).

Although the extant literature addresses *large power distance* as a Japanese cultural trait (eight articles), most studies focus on its negative effects on lean success (six articles). According to these studies, restrictions from exposing problems and sharing opinions inhibits workers' participation in problem solving and continuous improvement, which are two major lean principles. Multi-functional teams are also less likely to work properly, since workers assume superiors *know better* and do not feel comfortable having different hierarchical levels working as a team (Cagliano et al., 2011). The fear of losing face, which is the fear of bringing shame to their superiors and to their group, is also mentioned as a barrier to worker participation (Li et al., 2015; Oudhuis & Olsson, 2015; Rafferty & Tapsell, 2001). Opposing views state that hierarchy is part of lean culture and that it acts as a

discipline engine, reinforcing compliance with procedures and is also a critical success factor to lean (Mathew & Jones, 2013; Mehri, 2006; Shim & Steers, 2012). Obedience, for example, is specifically mentioned as positive for lean by Cagliano et al. (2011). Although they expected to find *power distance* as a negative moderator, Kull et al. (2014) found it to be insignificant in survey.

Some studies address the dimension of *masculinity* (six articles), another Japanese cultural trait present in lean organizations (Losonci et al., 2011; Mehri, 2006). It is unanimously identified in its negative impact on lean practices, such as empowerment and functional teams (Cagliano et al., 2011). Feminine cultures seem to better handle autonomy and job rotation, both essential to lean success. Two studies conducted in India (James & Jones, 2014; Mathew & Jones, 2013) mention the difficulty workers have in dealing with certain tasks considered by them to be women’s work, such as keeping the work area clean, as a result of the different roles for men and women found in *masculinity*. The aspect of assertiveness in the *masculinity* dimension also seems to reduce lean effectiveness, because aggressive and confrontational behaviors hinder workers’ cooperation in problem detection and solving and inhibiting the development of cooperative ties among workers and supervisors (Kull et al., 2014).

OC level

In contrast to the wide application of Hofstede’s NC scale amongst our studies, we did not find papers employing Hofstede’s full OC scale, although all studies mention cultural traits that can be considered equivalent to at least one of Hofstede’s dimensions of OC. Only two studies use Hofstede’s exact terms of process orientation (Pereira et al., 2014) and employee orientation (Bhasin, 2012). In all other cases, the cultural traits identified in lean organizations were matched to Hofstede’s OC model to synthesize the OC dimensions into one framework. Table 5 synthesizes the classification of the empirical articles from the sample, indicating exemplary quotes from the articles.

Table 5 - OC Dimensions present in lean organizations

Hofstede's OC Dimensions

<p>Tight Control <u>Articles:</u> 1, 9, 10, 12, 13, 14, 15, 17, 29, 31, 33, 34, 35, 36, 37, 41, 43, 51, 52, 53, 54, 57, 59, 60 <u>Exemplary quote:</u> "in order to reduce set up time, the company initiated video recording of worker's activities." (Dora et al., 2016)</p>	<p>Loose Control: -</p>
<p>Employee-oriented <u>Articles:</u> 3, 9, 10, 12, 14, 17, 19, 21, 24, 27, 30, 34, 35, 37, 38, 42, 48, 50, 51, 53, 54, 57, 59, 60, 63, 65 <u>Exemplary quote:</u> "Scania is also characterized by an extreme focus on work-life balance." (Alpenberg & Scarbrough, 2016)</p>	<p>Job-oriented <u>Articles:</u> 1, 13, 36 <u>Exemplary quote:</u> "above all else productivity takes priority" (Mulholland & Stewart, 2014)</p>
<p>Professional <u>Articles:</u> 10, 12, 27, 29, 30, 42, 50, 53 <u>Exemplary quote:</u> "...lean management team quickly woke up to the fact that the problems had to be worked through, and long-term corrective actions put in place." (Lee-Mortimer, 2006)</p>	<p>Parochial <u>Articles:</u> 13 <u>Exemplary quote:</u> "Management through social control: the highly controlled social order" (Mehri, 2006)</p>
<p>Open System <u>Articles:</u> 1, 3, 9, 12, 14, 15, 24, 27, 28, 30, 31, 32, 34, 35, 37, 41, 42, 43, 48, 49, 50, 51, 52, 53, 54, 57, 59, 60, 61, 63, 64, 65 <u>Exemplary quote:</u> "There was a positive significant correlation between team members' information sharing and lean-team effectiveness" van Dun & Wilderom, 2016)</p>	<p>Closed System <u>Articles:</u> 13 <u>Exemplary quote:</u> "A culture of rules coerces employees to share attitudes, values, and goals as defined by the group, the team, or the entire corporation." (Mehri, 2006)</p>
<p>Process-oriented <u>Articles:</u> 24, 27, 29, 30, 32, 33, 34, 35, 36, 37, 42, 53, 54, 65 <u>Exemplary quote:</u> "At Toyota, the prevailing culture reinforced efforts aimed at systematizing operations and minimizing and mitigating uncertainty" (Shim & Steers, 2012)</p>	<p>Results-oriented <u>Articles:</u> 1, 14, 27, 28, 3C7:C83, 34, 36, 37, 38, 42, 52, 53, 54 <u>Exemplary quote:</u> "There was a clear identification that Lean requires considerable effort; many organisations surveyed overstrained their managers with the additional duties." (Bhasin, 2012)</p>
<p>Normative <u>Articles:</u> 3, 9, 31, 36, 37, 47, 51, 58, 60, 61, 64, 65 <u>Exemplary quote:</u> "I do hear conversations around standardization and doing standard work that has become normal conversation. Those two terms are part of our culture now." (Harrison et al., 2016)</p>	<p>Pragmatic <u>Articles:</u> 1, 10, 17, 42, 61 <u>Exemplary quote:</u> "By designing a system that enables employees to be successful in meeting customer demand ... one can meet the challenges of eliminating waste and build an improved, efficient system." (Condell et al, 2004)</p>

Table 5 shows there is clear consensus regarding the *tight versus loose control* dimension, where strict control is emphasized as a lean trait in 24 articles, with no article suggesting otherwise. These studies underline the relevance of monitoring and controlling quality and practices during lean implementation (12 articles) and continuity (seven articles), where measurement is valued by both leaders and staff (Goodridge et al., 2015). Researchers are also alert to the fact that lean requires an organization to have specific performance metrics and reward systems in place (Fullerton et al., 2014; Martínez-Jurado et al., 2014; Netland, 2016; Wang, 2008). Additionally, the importance of a waste-reduction mindset is highlighted as an element of both lean and a *tight control* approach (six articles). It should be noted that there some criticisms to the above lean aspects, such as Mulholland & Stewart (2014), who advocate that lean leads to workers being monitored on a full time basis, eventually in an oppressive way.

Employee-oriented elements (26 articles) are characterized as those showing the importance of the corporate value “*for an organization to prosper, employees must prosper*” (Botti, 1995). Examples include fostering leadership and people commitment and participation (16 articles), promoting workers’ belief in the importance of lean implementation (Boscari et al., 2016; Goodridge et al., 2015; Losonci et al., 2011; Martínez-Jurado et al., 2014), improving the work environment and work–life balance (Alpenberg & Scarbrough, 2016; Dora et al., 2016; Martínez-Jurado et al., 2013), involving workers in the problem-solving and decision-making process (14 articles), and creating a safe environment for staff member to offer ideas, where workers’ opinions and proposals are taken into consideration (Bortolotti et al., 2015; Dora et al., 2016; Goodridge et al., 2015; Martínez-Jurado et al., 2014). Additionally, respecting employees (Bortolotti et al., 2015; Dora et al., 2016; Hung et al., 2015; Jayamaha et al., 2014) and supporting opportunities for their personal growth (Pereira et al., 2014; Smith et al., 2012) were also emphasized. Additionally, the extensive literature notes significant training efforts (23 articles) for developing a continuous-learning organization (six articles). The training concerns both managers and employees and regards both lean culture and tools (17 articles) as well as the development of a multi-skilled flexible workforce (Boscari et al., 2016; Lee-Mortimer, 2006; Lee-Mortimer, 2008; Losonci et al., 2011; Martínez-Jurado et al., 2014). Adopting joint and agreed-upon negotiation with unionization (Dora et al., 2016;

Martínez-Jurado & Moyano-Fuentes, 2014; Martínez-Jurado et al., 2014) may also contribute to the building of a lean environment and characterize an employee-oriented approach.

However, despite the significant requirement for workers' development and participation and any effort towards its achievement, Richardson et al. (2010) identify a relevant gap between what workers want and what they get. Three studies put forward opposing views, suggesting that lean organizations produce high pressure to perform at the expense of the workers' wellbeing, which implies a *job-oriented* culture. These latter studies find that lean reduces worker autonomy, creativity, innovation, and professional skills, allowing exposure to dangerous conditions, accident cover-ups, excessive overtime, and poor quality of life for the workers (Cutcher-Gershenfeld et al., 1994; Mehri, 2006; Mulholland & Stewart, 2014).

Studies suggest that lean organizations adopt a *professional*, not a *parochial* approach (eight studies), covering mainly elements of a long-term view, such as long-term corrective actions (Bhasin, 2012; Lee-Mortimer, 2006; Shim & Steers, 2012) and the practice of elimination of root causes (Condell et al., 2004; Goodridge et al., 2015; Jayamaha et al., 2014; Smith et al., 2012). In the opposition, Mehri (2006) suggests that there is social control within lean organizations and a competitive environment between divisions, both typical elements of a *parochial* culture. Surprisingly, no study refers to hiring criteria or discussion of the identity of an employee being determined by his profession, both important elements of the *professional versus parochial* dimension of OC, according to Hofstede (1998).

Most studies highlight the benefits of adopting an *open system* approach (32 articles) and discuss the importance of a wide-shared vision and corporate goals (Goodridge et al., 2015; Netland, 2016; Zarbo et al., 2015), intensive training for socializing workers into the new culture (Boscari et al., 2016; Goodridge et al., 2015; Harrion et al., 2016; Martínez-Jurado et al., 2014; Rothenberg, 2003), and transparency and integration within and outside the organization (18 articles). The importance of having tools, jobs, and processes clearly understood (Glover et al., 2015; Goodridge et al., 2015; Jayamaha et al., 2014; Martínez-Jurado et al., 2013) as well as an overall mindset of making things simple (Pereira et al., 2014) is also noted. A hands-on management style is emphasized, leading to the proximity of management to day-to-day activities (Goodridge et al., 2015; Jayamaha et al., 2014;

Losonci et al., 2011; Martínez-Jurado et al., 2014; Rothenberg, 2003; Zarbo et al., 2015) and knowledge and information sharing (Boscari et al., 2016; Hung et al., 2015; Jayamaha et al., 2014; Van Dun & Wilderom, 2016). Visual management (nine articles), another well-known lean principle, and effective communication (14 articles), also widely addressed in the lean literature, are closely related to the *open system* culture and are indicated as critical to lean success. Similarly to the previous dimension of *professional versus parochial*, the only antagonistic view regarding lean as an *open system* is put forward by Mehri (2006). He suggests that management refusal to share information and a posture among production engineers of always remaining guarded are elements of a lean culture, which would denote a *closed-system* approach.

It is important to notice that conflicting views on the above OC dimensions are raised solely by three studies (Cutcher-Gershenfeld et al., 1994; Mehri, 2006; Mulholland & Stewart, 2014), which criticize not only these dimensions, but the lean system as a whole. In the following, we will discuss the two dimensions where there is less consensus on how they correlate with lean.

The literature offers conflicting evidence on the dimension *process versus result orientation*. Half of the articles find lean closely related to a *process-oriented* approach (14 articles), while the other half indicate a *result orientation* in lean organizations (13 articles). Pereira et al. (2014) and Shim & Steers (2012) associate lean with an active risk-reduction strategy, denoting a *process-oriented* culture, while for Bhasin (2012), lean puts people in maximal levels of effort, which is a trace of a *result-oriented* approach. Various studies indicate that process standardization is a key element of lean (14 articles), but Lee-Mortimer (2008) and Hung et al. (2015) hold that, despite standardization, routines within lean organizations bring new challenges each day (a *result-oriented* element). Therefore, process innovation and flexibility are key to adapting to these unforeseen challenges. Moreover, flexibility relates to the logic of continuous improvement, a core lean principle, often mentioned by the studies examined in this review (12 articles). The conflicting view is also present within certain studies, which identify both aspects in lean organizations (eight articles). In such studies, workers follow narrow plans and standard practices but are also pushed to reach higher levels of productivity in short periods of time without the

establishment of new procedures. Hence, there are conflicting findings regarding on whether standardization or flexibility should be adopted to maximize lean success.

The fifth and last dimension is the *normative versus pragmatic*. Some studies highlight cultural traits that point to a *normative* approach (11 articles), such as valuing correctly following organizational procedures more highly than results (Pereira et al., 2014), emphasis on strong discipline (Mulholland & Stewart, 2014; Netland, 2016; Zarbo et al., 2015), and standardized documentation or control (Leijen-Zeeleberg et al., 2016; Sage et al., 2012). Ethics, justice, honesty, and trust, additional elements of the normative approach, were as well mentioned as critical factors within the OC to ensure lean readiness (Botti, 1995; Li et al., 2015; Pereira et al., 2014; Rothenberg, 2003; Sage et al., 2012; Shokril et al., 2016; Van Dun & Wilderon, 2016). By contrast, customer orientation (five articles) suggests that the *pragmatic* approach is preferable, especially because of the major emphasis on satisfying customer needs. Therefore, the extant literature shows divergent views on these last two dimensions, i.e., *normative versus pragmatic* and *process versus result orientation*.

The papers we reviewed also indicate other success factors, such as teamwork, leadership support, and the adoption of a change management strategy to overcome resistance and sustain results, but we see these as best practices for any strategy implementation, such as balanced scorecard and customer relationship management, not particularly for lean.

Interaction between NC and OC dimensions

Eleven articles from the sample mention aspects of both NC and OC, but only one study specifically investigates the relationship between the two cultural levels. Wiengarten et al. (2015) compare the dimension of national collectivism (individualism index [IDV]) proposed by Hofstede et al. (1991) with organizational collectivism, which was based on the sub-dimensions of widely shared vision, employee involvement, and employee training and education. Taking for granted that Japanese culture ranks high in collectivism, Weingarten et al. (2015) investigate whether low collectivism at the national level can be compensated for at the organizational level. They propose national collectivism as the dominant force moderating performance and, therefore, posit that its potential disadvantages cannot

be fully counterbalanced by high levels of organizational collectivism. It is important to note that the low IDV range amongst the participant countries in this study may compromise its conclusions. While Hofstede’s rank ranges from index numbers 6 to 91 (Hofstede et al., 1991), their survey considers only countries ranging from 70 to 91. Additionally, the fact that their study was focused on small to medium-sized enterprises might have also influenced the results.

2.4 CONCLUSIONS

Overall, our review classifies research on lean and culture according to (i) four identified streams, namely lean transplantation, lean implementation, lean continuity, and lean expansion to non-manufacturing organizations, (ii) methodological approaches (qualitative or quantitative; single- or multi-country studies), and (iii) cultural levels (NC, OC, or both).

2.4.1 Theoretical contributions

Despite the extant research on lean, while this review indicates some level of consensus, there still remain unanswered questions. On the one hand, recent studies examine the success of lean in different countries and industry sectors, leaving no doubt about its transferability. On the other hand, researchers still seem to be struggling to understand the impact on lean of specific dimensions of cultural levels (NC and OC). Surprisingly, our review shows no difference between dimensions across all streams, as presented in Table 6 below.

Table 6 - Culture dimensions across lean streams

Culture		Lean stream			
Level	Dimension	Lean transplantation	Lean implementation	Lean continuity	Lean service
NC	High collectivism	33, 40	23, 48	29, 48	-
	High orientation long-term	57	25	28, 29	
	Strong uncertainty avoidance	33, 40, 45	-	29, 39	
	Small power distance	40, 45, 57	23, 25, 47	-	

	Low masculinity	33, 40	23	39	
OC	Tight control	1, 33, 57	12, 14, 34, 35, 59, 60	9, 13, 15, 29, 37, 43	10, 17, 31, 36, 41, 51, 52, 53, 54
	Employee orientation	3, 57	12, 14, 19, 24, 27, 34, 35, 48, 59, 60	9, 21, 27, 37, 38, 42, 48, 50, 63	10, 17, 30, 51, 53, 54, 65
	Professional orientation	-	12, 27	27, 29, 42, 50	10, 30, 53
	Process orientation	33	24, 27, 34, 35, 65	27, 29, 37, 42, 65	30, 32, 36, 53, 54
	vs. Results orientation	1, 33	14, 27, 34	28, 37, 38, 42	36, 52, 53, 54
	Normative orientation	3	47, 58, 60, 65	9, 37, 65	31, 36, 51, 64
	vs. Pragmatic orientation	1	61	42, 61	10, 17

Our review highlights some relevant cultural idiosyncrasies regarding the impact of NC onto lean organizations. Although the extant literature has identified strong *uncertainty avoidance*, *high collectivism*, and *long-term orientation* as positive for lean among dimensions of NC, it is intriguing that other Japanese cultural traits are found to inhibit lean implementation and continuity. One example is the consensus among the studies from the sample about the negative impact of masculinity on lean. The fact that only three studies have addressed this dimension and none of them deeply discussed how organizations can cope with a high masculinity culture indicates a significant gap in the literature that needs further investigation.

Another NC dimension identified as somewhat contradictory to Japanese culture is *large power distance*. In this case, the researchers referred to different aspects of the same dimension. On the one hand, some studies found high power distance as positive to lean focused on the fact that the leadership is highly respected and represents a symbol of security and stability. On the other hand, the majority of studies highlight the negative impact of a *large power distance* culture considering it might hinder willingness of workers to express disagreement with their leaders, therefore restricting workers' participation in problem solving and continuous improvement. Therefore, it seems that this particular dimension combines sub-

dimensions that can both foster and hinder lean, leading to another paradox regarding culture and lean.

Another significant research gap is the lack of service-focused studies exploring the NC level. The fact that all service-focused studies from the sample are single-country studies restricts the discussion of the NC level. Furthermore, service organizations are rarely global hence it is difficult to conduct NC-focused studies in the service industry.

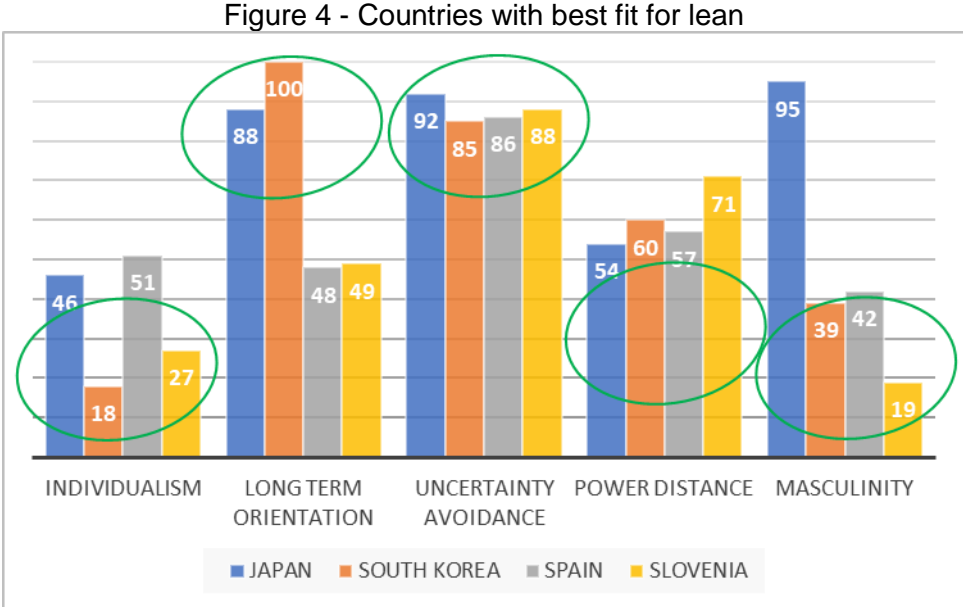
Regarding the OC level, we show that *tight control*, *employee-oriented*, *professional*, and *open system* approaches seem to align with lean. Exceptions relate to a few articles that present a more critical view of the impact of lean onto workers' well-being. Interestingly, such articles are mostly from subject areas other than OM. Moreover, the lack of consensus regarding the dimensions of *process vs. result orientation* and *normative vs. pragmatic approach* seems to reflect a paradox. It is important to note that most studies 'pick one side' of this two OC dimension and few acknowledge an actual paradox, i.e. a system that is simultaneously standardized but flexible and that focuses on both procedures and customers.

In terms of the NC and OC interactions, only one study analyzes their joint influence (Wiengarten et al., 2015), suggesting a predominance of NC over OC, but restricted to *collectivism* traits, such as integration into cohesive groups, widely shared vision, employee involvement, and employee training and education. Moreover, the fact that that study is conducted in countries with a similar degree of collectivism can be questioned. Most importantly, it is surprising to note the lack of lean studies studying NC and OC interactions, despite the fact that the broader literature on culture emphasizes the importance of these two levels, as well as their differences.

2.4.2 Managerial contributions

Regarding the NC level, organizations located in countries culturally similar to Japan should not assume that it will be easy to implement lean, just as organizations in countries different from Japan should not relinquish the idea of implementing it. Organizations in regions such as North and Northeast Europe and Anglo countries will face higher barriers in implementing and sustaining lean because their culture present high *individualism* and low *uncertainty avoidance*. Latin America, African and

Arabic speaking countries might face barriers was well, considering a predominant culture of high *power distance*, low *uncertainty avoidance* and a *short-term orientation*. Conversely, organizations located in regions such South and Central Europe, the former Soviet Union countries and part of Asia will find a fertile soil for lean. They tend to have a culture of high *uncertainty avoidance* and relatively low *masculinity* and low *individualism*. Although no single region or country represents full alignment with the NC traits identified as positive to lean, countries such as Spain and Slovenia are surprisingly fit for lean, as well as South Korea, which has a culture similar to Japan but with much lower *masculinity*. Figure 4 shows those countries' scores in each NC dimension, according to Hofstede updated survey (Hofstede, 2017).



Note: The green circles indicate the best fit for lean

Regarding the OC level, our review shows a clear orientation for three dimensions and a paradox for the remaining two. To cope with such paradoxes is challenging, hence the high number of unsuccessful lean implementation cases. Nevertheless, managers should recognize pre-existing cultural influences and be perseverant in adopting practices that will slowly (re)shape the organization's culture.

Hence, it is fair to conclude that, although organizations should recognize which NC traits support lean adoption, they should also understand that there is limited room for managerial action in NC. However, there are also dimensions of OC that can be positive for the success of lean, and OC is dependent on a set of decisions at managerial discretion. In other words, an adequate mix of dimensions of OC may

eventually counterbalance the negative effects of NC dimensions that could hinder lean adoption.

2.4.3 Limitations

There are three limitations in this study worth discussing. First, one may argue that the distinction between NC and OC may be hard to define. Nevertheless, we believe the decision to maintain this distinction allowed us to be more inclusive than exclusive, given the diversity of dimensions identified in the sample of papers.

Second, the meta-synthesis of cultural dimensions in our study was based on Hofstede's scale. Given that Hofstede's work is not a consensus reference point within the culture literature, adopting an alternative framework, such as the GLOBE, could have led the meta-synthesis in another direction. Yet, we believe this choice supported our first point of taking a more inclusive set of dimensions (in line with Hofstede's distinction between NC and OC) instead of a more exclusive approach, as the one taken by GLOBE, for example (as the GLOBE framework uses the same list of dimensions for both NC and OC (House et al., 2004).

The third limitation was the restriction of the search to peer reviewed articles, leaving aside books and how-to-guides that are also part of lean body of knowledge. Finally, the choice of the *ISI Web of Science* database is another restriction, as the consideration of other research databases could have led to the inclusion of additional articles. Still, we were careful to check whether this database included the most important publications in the field of OM.

2.4.4 Future research

This review underlines a number of paradoxes regarding the relationship of culture and lean, which deserve further investigation. Firstly, as the extant literature acknowledges that two major traces of the Japanese culture hinder lean implementation, namely high *masculinity* and high *power distance*, future studies could clarify how successful lean organizations in Japan have can outweigh such cultural traits, that is to say, what other cultural traits at both NC and OC levels can counterbalance the negative impact of high masculinity and high power distance onto lean. Additionally, the dimension of power distance deserves further attention, as it

seems that one its sub-dimensions may actually drive lean: respected leadership as a symbol of security and stability, representing a paradox in itself.

Secondly, expanding on the previous research gap, as no country possess the perfect match of NC dimensions that are positive to lean, all organization will face NC barriers to some extent when implementing lean. As the OC is portrayed as the level where there is managerial discretion, a broader investigation of the interactions between NC and OC in different countries could clarify the extent to which the latter can actually overcome the former. Such a study would help organizations to (a) identify the NC dimensions that hinder lean and (b) explore the OC dimensions that can counter-balance NC barriers.

Thirdly, the fact that all studies looking at the service sector were restricted to the OC level constitutes another significant research gap. A multi-country study looking at the impact of NC on lean service organizations could unveil the idiosyncrasies of this relationship when lean is applied to services.

Finally, the contradictory views regarding two specific OC dimensions (namely *process vs. results* & *normative vs. pragmatic* orientations) highlight a relevant research gap. More specifically, although these dimensions seem to represent a paradox rather than a trade-off, i.e. organizations should excel in both sides simultaneously, instead of making a choice; the extant literature does not yet recognize such paradox, meaning that most studies indicate either one side or the other as fit for lean. Besides investigating whether organizations that master the paradox are able to out-perform others regarding lean, future research should also help managers to understand how such balance can actually be achieved.

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Appendix A: Classification of papers in the systematic literature review

Id #	Authors	Year	Research Method	Industry Sector	Country	NC / OC	Culture Framework	Contribution
1	Cutcher-gershenfeld, J. et al.	1994	Multi Case Study	Manuf - Multi-sector	USA	Both	other / no framework reference	A large-scale study of the cross-cultural diffusion of U.S. and Japanese work practices shows the mixing of transplanted best in class work practices with host country's practices. Type of product, technology, layout, organizational structure and culture are critical in the choosing a system and there are trade-offs involved.
2	Hoogvelt, A.; Yuasa, M.	1994	Theoretical	Not specified	-	NC	other / no framework reference	Lean included a variety of Japanese cultural and social values, such as 'loyalty', 'collectivism', and most importantly, the Japanese sense of self and the fear of losing face. Lean only works with long-term commercial relationships and implicit contracts based on mutual trust and unspoken understandings, as in Japan.
3	Botti, H. F.	1995	Single Case Study	Manuf - Clothing	Italy	Both	other / no framework reference	The study about a Japanese company struggling to implement the Japanese model in Italy denotes that differences in NC and OC might lead to asymmetric expectations and compromise implementation. A change strategy helps to overcome the barriers and the success of implementation is measured by examining the trust relations.
4	Graen, G.; Hui, C.	1996	Action Research	Manuf - others	Japan USA	NC	reference to Hofstede's work	In cross-cultural partnership building, parties from both cultures need to work together to create a third culture which a new way of thinking about and doing things which are compatible with each of the original cultures and works effectively with the technology of the organization.

5	Whiston, T. G.	1997	Theoretical	Manuf & Service	-	OC	other / no framework reference	Lean principles and tools are a way of achieving managerial and design functions integration, a key issue to firms. It requires a restructuring of the company, which may include: introduction of cross-matrix communication systems; multidisciplinary and inter-functional training; flattening of organizational pyramids; multi-functional project teams.
6	Power, D. J.; Sohal, A. S.	1997	Literature Review	Not specified	-	OC	other / no framework reference	The central role of the human variable to the success of a lean operation, coupled with the stresses that are created within the organization for changes in management style and structure, emphasize that these are issues that are of critical importance when implementing and operating lean.
7	Rafferty, J.; Tapsell, J.	2001	Single Case Study	Manuf - others	UK	NC	Hofstede's model	Cultural influences are a significant constraint in the successful implementation of teams; the adoption of both lean production and self-managed team conjoint implementation has proved less successful. Lean reflects the hierarchical nature of Japanese culture, while self-managed work teams emphasizes autonomy and independence in decision making.
8	Green, S. A.; May, S. C.	2003	Theoretical	Service – Construction	-	OC	other / no framework reference	Lean construction, as other management ideas embraced by re-engineering, are attractive to this industry because it reflects and reinforces the existing dominant competitive thinking. But it serves only to justify the shift towards bogus labor-only subcontracting and the associated reduction of employment rights.
9	Rothenberg, S.	2003	Single Case Study	Manuf - Automotive	USA	OC	other / no framework reference	The no lay-off policy and other cultural artifacts supported an environment of greater trust. The culture of collaboration and trust increased the social capital in the organization, which supported worker participation in environmental initiatives and other performance areas.

10	Condel, J. L.; Sharbaugh, D. T.; Raab, S. S.	2004	Action Research	Service - Healthcare	USA	OC	other / no framework reference	There are resistances to lean implementation, especially because of its origin in manufacturing industry. But a change strategy may consist of understanding lean as a long-term commitment and empowering staff in problem solving to meet customer demands.
11	Liker, J. K.; Morgan, J. M.	2006	Theoretical	Service - Multi-sector	-	Both	other / no framework reference	Toyota faced the challenge of spreading the unique blend of Toyota and Japanese culture to different cultures and sectors. The way is to try to deeply understand the lean principles, what it means to become a lean learning organization, and the hard work required to build such a culture piece by piece over many years.
12	Lee-Mortimer, A.	2006	Single Case Study	Manuf – others	UK	OC	other / no framework reference	A lean implementation journey brought up some new problems but management team realized that the problems had to be identified and fully resolved, with instant support and management visual charts, which proved much more efficient in problems identification and continuous improvement.
13	Mehri, D.	2006	Ethnographic study	Manuf – Automotive	Japan	Both	other / no framework reference	Fundamental elements of lean culture are missed by Western observers, such as the human costs behind high productivity and profitability achievement. There is a culture of rules in Japanese companies which covers newcomers training, what is observed and learnt on daily basis and what is known after many years living in Japan for many years.
14	Lee-Mortimer, A.	2008	Single Case Study	Manuf – others	UK	OC	other / no framework reference	Learning lessons from previous lean implementation experiences made a company's adoption of additional lean tool to be phased, combined with broad involvement, widespread training and the addressing of cultural issues.
15	Wang, B.	2008	Single Case Study	Manuf - Optic	China, Taiwan, Philippines	OC	other / no framework reference	Lean implementation yielded positive results in all three locations studied but differences in results were caused by differences in the stability of the manufacturing process, in the support from executive managers, and in the quality and solidarity of the employees.

16	Green, S. D.; Harty, C.; Elmualim, A. A.; Larsen, G. D.; Kao, C. C.	2008	Theoretical	Service – Construction	-	Both	other / no framework reference	NC perspective relates to UK policies enforcing the discourse of competitiveness. Lean construction and other "improvement recipes" may be rational for individual firms (OC), but the systemic effect across the sector is very harmful. Currently, important counter-discourses promote the ideas of sustainability and corporate social responsibility.
17	Dickson, E. W.; Anguelov, Z.; Vetterick, D.; Eller, A.; Singh, S.	2009	Multi Case Study	Service – Healthcare	Not specified	OC	other / no framework reference	Lean principles adapted to the local culture of care delivery can lead to cultural changes and sustainable improvements in healthcare. These improvements are not universal and are affected by leadership and frontline workforce engagement.
18	Vest, J. R.; Gamm, L. D.	2009	Literature Review	Service – Healthcare	USA	OC	other / no framework reference	This review identified that, while the examined transformations advocate a cultural change, few of the reviewed studies examined indicators resembling OC. And, despite the positive features stated by the studies, the vast majority had methodological limitations that might undermine the validity of the results.
19	Yamamoto, Y.; Bellgran, M.	2010	Action Research	Manuf – others	Sweden	OC	other / no framework reference	A practical way of conducting a lean transformation, which requires an organizational cultural change, consists of creating the need for improvement, letting problems come to surface and involving people in solutions and the learning process. Institutionalizing the new mindset depends on the leadership/management and people commitment.
20	Saurin, T. A.; Ribeiro, J. L. D.; Marodin, G. A.	2010	Case Study + Survey	Manuf & Service	Brazil USA México	OC	other / no framework reference	Deeply understanding the lean culture is the most cited interest of managers when discussing lean. The major barriers to implementation are difficulties to adapt lean principles to each firm culture and context and put them into practice, added to major resistance to change among all organizational levels.

21	Richardson, M.; Danford, A.; Stewart, P.; Pulignano, V.	2010	Case Study + Survey	Manuf - Automobile and Aerospace	Italy UK	OC	other / no framework reference	lean and high-commitment work regimes in both the Italian and the UK cases have failed to deliver effective voice mechanisms despite the desire, expressed by employees, for greater direct and indirect influence over workplace issues. Results from this study suggest that despite the efforts, the gap between what workers want and what they get is considerable.
22	Holden, R. J.	2011	Literature Review	Service – Healthcare	-	not spec.	other / no framework reference	Patient care usually improve after lean implementation. Although the effects of Lean on employees were rarely discussed or measured systematically, there were some indications of positive effects on employees and on organizational culture.
23	Cagliano, R.; Caniato, F.; Golini, R.; Longoni, A.; Micelotta, E.	2011	Survey - 2nd db	Manuf – others	Multi-country	NC	Hofstede's model	Both NC dimensions and economic development play a significant role in the adoption of lean practices. There is not a clear dominance of one dimension over the other, but NC appears to be more important overall. The practices are positively correlated with each other, thus suggesting frequent joint adoptions.
24	Losonci, D.; Demeter K.; Jenei, I	2011	Case Study + Survey	Manuf – Automotive	Hungary	Both	reference to Hofstede's work	Belief, commitment, work method and communication have a direct effect on workers' perceptions regarding the lean success. In moderate change workers perceive work method and commitment as main success factors, conversely to communication and belief in radical change context. Study shows that lean does not soften gender segregation and hierarchy present in the organization.
25	Hofer, A. R.; Hofer, C.; Eroglu, C.; Waller, M. A.	2011	Survey - 1st db	Manuf – multi-sector	USA China	NC	Hofstede's model	First, lean practices have been adopted in China to a greater extent than in the US. Second, the rate of adoption seems to be fairly comparable across different industries. And third that, while several economic factors function as enablers for the implementation of these practices, various social processes and cultural traits in China still hinder the full adoption of lean production.

26	Kruskal, J. B.; Reedy, A.; Pascal, L.; Rosen, M. P.; Boiselle, P. M.	2012	Theoretical	Service – Healthcare	-	not spec.	other / no framework reference	Implementing a lean approach implies never losing sight of what the customer wants, knowing that lean transformation is an ongoing commitment by all leadership and staff members and that each one contributions are encouraged and respected.
27	Bhasin, S.	2012	Case Study + Survey	Manuf – others	UK	OC	other / no framework reference	A successful implementation requires a systematic and controlled change strategy and every company needs to find its own way to implement lean - a never-ending journey. The articles identify the major motives to lean adoption, the firm's aspirations with lean implementation, the impact on individuals and the performance of lean.
28	Pohl, H.	2012	Multi Case Study	Manuf – Automotive	Japan	Both	other / no framework reference	Despite opposing views, the study shows that Japanese continuous improvement culture might support radical innovations and highlights the NC and OC traits accountable: intensified knowledge development, gradual supplier involvement and parallel pursuit of alternative product concepts and close attention to early users/customers' demand.
29	Shim, W. S.; Steers, R. M.	2012	Case Study	Manuf – Automotive	Japan, Korea	Both	GLOBE model; reference to Hofstede's work	Findings suggest that the success of both Toyota & Hyundai has been based on different NCs and leadership styles which helped create and sustain different OCs. At Toyota, the culture reinforced efforts aimed at systematizing operations and minimizing and mitigating uncertainty. And the Japanese tend to favor a culture characterized by risk avoidance and commitment to the larger family and society.
30	Smith, M. L.; Wilkerson, T.; Grzybicki, D. M.; Raab, S. S.	2012	Action Research	Service – Healthcare	Not specified	OC	other / no framework reference	Through culture change and implementation of specific work process changes, lean implementation may improve pathology patient safety. The study found a decrease in process-dependent near-miss events, although the frequency of operator-dependent near-miss events did not significantly improve.

31	Sage, D.; Dainty, A.; Brookes, N.	2012	Ethnographic study	Service – Construction	UK	OC	other / no framework reference	While lean implementation is supposed to represent a wide structural OC change, when put into practice, it is translated (and transformed), being limited to a waste elimination effort or, at the most, to industrial partnering and knowledge sharing initiatives.
32	Jaca, C.; Santos, J.; Errasti, A.; Viles, E.	2012	Action Research	Service – Distribution	Spain	OC	other / no framework reference	OC change is possible through worker participation in process improvement. The main elements for achieving both motivation and participation have proved to be training, teamwork and recognition. The adoption of lean also implies a change in management mentality.
33	Mathew, S. K.; Jones, R.	2013	Single Case Study	Manuf – Automotive	India	Both	other / no framework reference	The paper reports how Toyota Way shares three common features with Brahminism – renunciation, performance, and perfection – and how antipathy towards the manner in which these features were implemented in India caused significant resistance amongst the production workforce.
34	Martínez-Jurado, P. J.; Moyano-Fuentes, J.; Jerez Gomez, P.	2013	Multi Case Study	Manuf – Aerospace	Spain	OC	other / no framework reference	Lean implementation should be conducted in phases and in each phase there are key elements to its success, such as managing resistance, training, communication, reward system, and others. The elements interact with each other, in a systemic viewpoint, in order to understand the sequence that leads to the cultural change associated with lean.
35	Martinez-Jurado, P. J.; Moyano-Fuentes, J.; Jerez-Gomez, P.	2014	Multi Case Study	Manuf – Aerospace	Spain	OC	other / no framework reference	A model was developed to understand the sequence (phases and critical factors) that leads to the cultural change associated with lean. Five main factors are found in the other three phases of the adoption and implementation process: training, communication, rewards, job design, and work organization.

36	Mulholland, K.; Stewart, P.	2014	Single Case Study	Service – Distribution	UK	OC	other / no framework reference	The article argues that the adoption of lean system has brought high pressure on workers, who are supposedly paying for the increase in productivity through reduced earnings, minimal workplace autonomy and an unprecedented increase in the pace of work (without being accompanied by smatter working practices).
37	Pereira, R.; Ro, Y. K.; Liker, J. K.	2014	Multi Case Study	Manuf – Automotive	USA Japan	OC	other / no framework reference	Firms still struggled to adapt Toyota product development practices because differences in OC. Toyota adopt an active risk reduction strategy, involves workers in decision making processes; possesses deep technical competency, use extensive visual communication, appears to be more process-oriented and trusts its suppliers.
38	Martinez-Jurado, P. J.; Moyano-Fuentes, J.	2014	Multi Case Study	Manuf – Aerospace	Spain	OC	other / no framework reference	Without the engagement of the whole organization to lean adoption, the initiative will failure. Success factors identified were: a prior total quality culture, top managers' full commitment, a full-time organizational structure, joint negotiation with unionization and the use of a variety of mechanisms to overcome skepticism/resistance.
39	Kull, T. J.; Yan, T.; Liu, Z.; Wacker, J.	2014	Survey (secondary data)	Manuf - Multi-sector	Multi-country	NC	GLOBE model; reference to Hofstede's work	LM is most effective in countries that value high uncertainty avoidance, low assertiveness, low future orientation, and low performance orientation. Human orientation, in-group collectivism and institutional collectivism are found to be insignificant. This "ideal" culture differs from Japanese mainstream culture.
40	James, R.; Jones, R.	2014	Single Case Study	Manuf – Automotive	India	NC	other / no framework reference	Lean transference efficacy depends on the unique cultural, social, historical and environmental factors peculiar to the host country. HRM adaptations might be needed to Indian transplant, such as additional hierarchic organizational levels, more worker empathy, lower productivity rates, and recognition of national trade unions.

41	Fullerton, R. R.; Kennedy, F. A.; Widener, S. K.	2014	Survey (primary data)	Manuf - multi	USA	OC	other / no framework reference	Lean manufacturing has a significant relationship with operations performance as does lean management accounting practices. One of them, visual performance measures, is directly related to operations performance, which in turn is directly related to financial performance.
42	Jayamaha, N. P.; Wagner, J. P.; Grigg, N. P.; Campbell-Allen, N. M.; Harvie, W.	2014	Survey (secondary data)	Manuf - Automotive	Multi-country	OC	other / no framework reference	People development has no direct effect on outcomes, but it has an indirect effect by leveraging process improvement. Toyota's people development capabilities are unique, hard to achieve. A core finding is that people development should be understood as an integral component of a complete lean implementation.
43	Morganti, K. G. et al.	2014	Case Study + Survey	Service - Healthcare	USA	OC	other / no framework reference	OC is one of major contributors to quality improvement success. Intensive lean training has a positive effect on cultural achievements, on implementing improvements and on company's outcomes. Although cultural achievements appeared to be more difficult to attain.
44	Andersen, H.; Rovik, K. A.; Ingebrigtsen, T.	2014	Literature Review	Service - Healthcare	-	not spec.	other / no framework reference	The study identified 23 facilitators (of change) associated with successful interventions, although little is known about which facilitators are most important. One of the main facilitators is a supportive OC. Findings suggest that characteristics and local application of lean, in addition to strategic and cultural capability, should be given further attention in healthcare quality improvement.
45	Zimmermann, A.; Bollbach, M. F.	2015	Multi Case Study	Manuf - Automotive	China	NC	some Hofstede's dimensions	Institutional (management norms, legal system, education system and manufacturing norms) and cultural (Confucian values, high power distance, "face", high context communication style, language and collectivism) context of China might represent a significant barrier to the lean transfer to this country today and in the near future.

46	Oudhuis, M.; Olsson, A.	2013	Single Case Study	Manuf - Metal	Sweden	NC	some Hofstede's dimensions	NC traits such as perfection, obedience, uncertainty avoidance, long term view and other Japanese culture elements opposes Swedish cultural traits of participation, self-government, equality and creativity. Such different mindsets cannot be ignored, but can be handled through understanding and by taking them into regard.
47	Li, B. B.; Nahm, A. Y.; Wyland, R.; Ke, J. Y.; Yan, W.	2015	Survey (primary data)	Manuf - multi	China	Both	some Hofstede's dimensions	This research shows that leadership can be an engine for changes in OC, starting from workers' trust, more secure workplaces, and freely participation in improvement projects without fearing the loss of face. Chinese workers will participate in problem-solving when a conducive OC evolves, but results indicate that this has not been reached yet.
48	Wiengarten, F.; Gimenez, C.; Fynes, B.; Ferdows, K.	2015	Survey (primary data)	Manuf - multi	Multi- country	Both	some Hofstede's dimensions; reference to GLOBE	National collectivism is the dominant force moderating performance and its potential disadvantages cannot be fully counterbalanced by organizational collectivism (plant wide shared vision, mission and goals, employee involvement and employee training and education).
49	Glover, W. J.; Farris, J. A.; Van Aken, E. M.	2015	Survey (primary data)	Manuf - multi	USA	OC	other / no framework reference	The ability to sustain the results of a Kaizen event after significant time is in part explained by the extent to which management and the workforce are accepting of change. Additionally, higher perceptions of accepting changes appear to be evident in work areas that encourage learning and stewardship among their employees.
50	Bortolotti, T.; Boscari, S.; Danese, P.	2015	Survey (secondary data)	Manuf - others	Multi- country	OC	GLOBE model; reference to Hofstede's work	Successful lean plants show higher institutional collectivism, future orientation, humane orientation, and lower level of assertiveness than unsuccessful lean plants. The last one is typical only of successful lean plants, when compared to high performers in general. In addition, successful plants use more "soft LM practices" than unsuccessful plants.

51	Zarbo, R. J.; Varney, R. C.; Copeland, J. R.; Angelo, R. D.; Sharma, G.	2015	Action Research	Service - Healthcare	USA	OC	other / no framework reference	Daily management reinforces the cultural expectations of continuous improvement through leaders, managers and workforce engagement and alignment with corporate goals. The processes that employed more metrics and used targeted short-term metrics showed more improvements.
52	Ko, C.; Kuo, J.	2015	Single Case Study	Service - Constructio n	Taiwan	OC	other / no framework reference	With a waste-reduction focus, the adoption of <i>Andon</i> systems to establish an on-site quality control culture, added to <i>Kanban</i> system to achieve continuous flow, are found successful in increasing value to formwork engineering.
53	Goodridge, D.; Westhorp, G.; Rotter, T.; Dobson, R.; Bath, B.	2015	Case study	Service - Healthcare	Canada	OC	other / no framework reference	The study presents some dichotomies which challenges lean implementation, such as using highly structure processes while promoting flexibility and continuous improvement. The study highlights the importance of the leadership role and suggests that developing appropriate OC and leadership capacity should precede other systemic changes.
54	Hung, D.; Martinez, M.; Yakir, M.; Gray, C.	2015	Single Case Study	Service - Healthcare	USA	OC	other / no framework reference	A culture of innovation and collaboration together with empowerment of staff at all levels and visual display of performance metrics are identified as specific drivers of change for a successful lean implementation.
55	Alves, J. R. X.; Alves, J. M.	2015	Theoretical	Manuf	-	OC	other / no framework reference	This study proposes a model of production management and its implementation methodology, integrating the lean principles and sustainability, supported by a OC transformation. Cultural transformation is infused in the model by organizational actions that provide knowledge and facilitate the development of employee potential, aiming to change attitudes, values, behaviors and outcomes.

56	Brunet-Thornton, R.; Koza, M.; Bures, V.	2016	Survey (primary data)	not specified	Japan Czeck	NC	some Hofstede's dimensions	Data from the survey show that both Czech and Japanese employees have similar values related to work and neither job satisfaction nor number of conflicts is connected with TPS training. It was not possible to determine whether values inherent to Japanese management are closer to the values proposed by the TPS than the values inherent to Czech management.
57	Boscari, S.; Danese, P.; Romano, P.	2016	Single Case Study	Manuf - Eletronic	Italy China USA	Both	some Hofstede's dimensions	International team work and secondary mechanisms are important to perform training, sense giving, adaptation and pressure, which will hamper the success of a lean transfer initiative.
58	Shokri, A.; Waring, T. S.; Nabhani, F.	2016	Survey (primary data)	Manuf - multi	Germany	OC	other / no framework reference	The study found a strong positive association between the core competence of people and organizational culture with readiness for commencing lean in the manufacturing SMEs studied. The core values of people, education level and the vision of making continuous quality improvement were identified as key variables in promoting lean readiness in these manufacturing SMEs.
59	Dora, M.; Kumar, M.; Gellynck, X.	2016	Multi Case Study	Manuf - Food	Belgium	OC	other / no framework reference	The findings confirm that factors such as commitment of top management, training, resources, organizational culture, and structure were important to lean implementation success. The culture of the company (e.g. communication, respect, discipline) proves to be a very important determinant for successful lean implementation.
60	Netland, T. H.	2016	Survey (primary data)	Manuf - Auto & Quemical	Multi	Both	some Hofstede's dimensions	The study found that to succeed with the implementation of lean, managers should: (1) commit to, lead and take an active part in the lean program; (2) provide and attend training and education; (3) have a long-term plan and follow it up on a day-to-day basis; (4) allocate resources and share the gains; (5) apply lean tools and techniques.
61	van Dun, D. H.; Wilderom, C. P. M.	2016	Survey (primary data)	Manuf & Service	Netherlands	OC	other / no framework reference	The study shows that lean work teams are more effective when their leaders endorse self-transcendence and reject conservation values while their employees share a lot of information.

62	Rafique, M. Z.; Ab Rahman, M. N.; Saibani, N.; Arsad, N.; Saadat, W.	2016	Literature Review	not specified	-	OC	other / no framework reference	This literature review highlights the main barriers that affect the lean implementation in the manufacturing industry, which are OC, top management commitment, poor employee administration, lack of finances, unbalanced inventory control, unstable customer handling and longer lead times.
63	Alpenberg, J.; Scarbrough, D. P.	2016	Case study	Manuf - Auto	Multi	OC	other / no framework reference	The communication practices of blending, positive engagement, and soft words exist in all embedded lean work contexts, while the practices of separation, negative engagement, and hard words exist in failed lea.
64	van Leijen-Zeelenberg, J. E. et al.	2016	Case Study + Survey	Service - Healthcare	Netherlands	OC	other / no framework reference	Willingness to change and openness among employees increased after the intervention, indicating effects beyond operational aspects like waste reduction. Employee satisfaction with communication in the organization rose significantly, whereas employee satisfaction with autonomy and participation was significantly lower.
65	Harrison, M. I. et al.	2016	Multi Case Study	Service - Healthcare	USA	OC	other / no framework reference	Main success factors regarding lean projects were the organization's existing culture of quality improvement, IT support and resources supporting staff training and hiring of external experts. Lean initiative was considered as one more quality tool and, therefore, did not readily change organizational culture.

3 SECOND PAPER: Case study on the construction sector

The second paper is (at the time of submission of this thesis to the examiner board) under review at the journal International Journal of Production & Operations Management (5-year impact factor 4.371, listed as CAPES A1 and ABS 4). This is a case study on one of the largest organizations of the construction sector in Brazil and the paper is entitled “**Managing cultural paradoxes and dilemmas in lean construction**”. Once again, the paper is co-authored solely by Alice Erthal and Leonardo Marques. Please find it below and note it is also written in British English.

ABSTRACT

Purpose: This study investigates how cultural tensions are managed in a service organisation going through a lean implementation. We analyze the interactions between organisational culture (OC), national culture (NC) and the lean system.

Methodology: This study consists of an in-depth single case study in the construction sector, taking an abductive approach and employing the paradox theory as a theoretical lens.

Findings: The findings offer a dynamic analysis of how NC and prior OC influence lean implementation, and in turn, how the adoption of lean practices directly impacts and changes the OC.

Research implications: The study shows through the paradox theory that the implementation of the lean system may turn a paradox into a dilemma and a dilemma into a paradox, reshaping the OC. We also discuss the defensive mechanisms and counterbalancing actions taken to manage tensions. The findings also evidence the lack of a single framework to deal with the complexity and uniqueness of an OC.

Practical implications: The authors identify lean practices that counterbalance specific cultural traits and the managerial actions adopted to overcome defensive mechanisms that reflect resistance to change. These reflections can guide managers when dealing with challenges of cultural transformation for a successful lean implementation.

Originality/value: Although researchers and practitioners have recognized the relevance of the interplay of NC and OC in lean implementation, no previous study has scrutinized their role using a paradox theory lens.

Keywords: Lean, National Culture, Organisational Culture, Paradox theory, Construction sector

3.1 INTRODUCTION

The urgency for the implementation of lean practices in the construction sector is motivated by the fact that productivity in the construction sector has decreased by over 20 percent over the past 40 years while manufacturing productivity has more than doubled in the same period (Dumit *et al.*, 2012). The growing body of researchers and practitioners exploring the so-called lean construction corroborates a growing interest in the topic. On the one hand, the literature has demonstrated that lean construction is feasible and can achieve significant results (Salem *et al.*, 2006). On the other hand, researchers show some concerns regarding superficial adoptions of lean practices, as construction organisations focus on the implementation of a few specific tools instead of implementing lean as a whole, i.e., the set of principles that, in combination with the practices, constitute the lean system (Tezel *et al.*, 2017).

Despite the increasing list of publications on lean implementation, both from academics and practitioners, most organisations still struggle to achieve the expected results (Martínez-Jurado and Moyano-Fuentes, 2014). Researchers identify culture as an underlying force that guides organisations in successfully implementing lean (Alves and Alves, 2015, Cagliano *et al.*, 2011; van Dun and Wilderom, 2016). An organisation's culture is the result of its unique history and context and is also influenced by the culture of the country where it operates. As lean implementation requires a cultural alignment to its principles, it is reasonable to assume that both national culture (NC) and organisational culture (OC) may influence lean implementation. At the same time, lean implementation may require changes in the OC itself, which may be hindered or fostered by the NC. Although the broader literature on culture emphasizes the relevance of both the national and organisational levels (Hofstede *et al.*, 2010; Liker and Morgan, 2006; Wiengarten *et al.*, 2015), the

interactions between NC and OC and their interplay with lean remains under-researched within the service operations management literature.

In order to properly analyze these interactions and their repercussions, we have adopted a paradox theory lens (Lewis, 2000). Lean implementation offers fertile ground for the emergence of organisational tensions, i.e., contradictions embedded within practices, interests and perspectives. These contradictions may be classified as dilemmas, which represent either/or choices, or paradoxes, which represent opposing forces that need to coexist (Smith and Lewis, 2011). It has been noted that lean itself carries paradoxical principles (Womack *et al.*, 1990), such as flexibility versus standardization, focus on employees versus focus on results, lower cost versus higher quality, employee empowerment versus strict control (Eisenhardt and Westcott, 1988; Erthal and Marques, 2018; Peltokorpi, 2008; Yoon and Chae, 2012). In addition, the literature shows that organisational changes accentuate organisational tensions (Cameron, 1986). Therefore, taking a cultural perspective, lean implementation may raise conflicts between the lean system and the pre-existing OC and NC (Kull *et al.*, 2014; Bortolotti *et al.*, 2015), which supports the use of the paradox theory for the present study.

We have conducted an in-depth single case study on a multinational organisation from the construction sector, here referred to as LCG. LCG has expanded from a local family organisation to one of Brazil's largest construction companies, currently operating in more than 40 countries. LCG started a lean transformation about eight years ago, mainly motivated by an imperative to deliver effective results in a context of severe political-economic crises. For LCG, the challenge of implementing lean in full is aggravated by a strong OC highly influenced by the Brazilian NC. Hence, this case study offers a fruitful basis for discussing the encounter between existing NC and OC traits and lean implementation, and how conflicts are managed in order to achieve a successful implementation of lean. The main research question we seek to answer in this work is: *How are cultural paradoxes and dilemmas managed in a service organisation going through a lean implementation?*

3.2 THEORETICAL BACKGROUND

3.2.1 Lean construction

Lean began around 1950 as a production system developed at Toyota Motor Company. Lean consists of a set of principles and practices related mainly to the identification of customer value, waste elimination, continuous improvement, and taking a long-term perspective (Liker, 2004; Womack and Jones, 1996). Toyota's success in the automobile industry throughout the decades has encouraged organisations from other industries to implement lean. The extant literature on lean service corroborates the notion that the benefits that lean strategy provides to manufacturing shop floors may indeed accrue to the service industry (Liker and Morgan, 2006; Malmbrandt and Åhlström, 2013).

Within the service industry, the construction sector has shown a growing interest in the lean system (Sacks *et al.*, 2010; Tezel *et al.*, 2017). Despite the higher level of uncertainty involved in construction projects when compared to manufacturing processes, lean construction shares common elements with lean manufacturing and has shown an ability to positively affect the bottom line of construction organisations (Salem *et al.*, 2006). Conversely, some researchers have raised concerns regarding construction organisations that adopt a “pseudo-lean” or a “lean wash” strategy (Sage *et al.*, 2012). They claim that organisations from the construction sector would limit their implementation of lean to a few specific tools in order to comply with market demands and to avoid dealing with internal barriers to adapting and implementing the lean system (Tezel *et al.*, 2017). Sage *et al.* (2012, p. 1) add that “lean concepts may transform during its journey with unintended organisational consequences”. Therefore, there is a need to understand how organisations in the construction sector should adapt their OC to promote a full transition from the traditional Western approach to the lean system.

3.2.2 Culture

The literature provides a wide range of definitions of culture (Smircich, 1983). In this study, we will adopt Hofstede's (1980; 1983) notion of culture as a “collective mental programming”. This means that people are influenced by their experiences

throughout life, which results in differences in their perception of the 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 (Jarnagin and Slocum, 2007; Schein, 1984).

Aspects of culture are found on different levels, such as professional organisations or religious associations (Hofstede, 1980). It is important to add to this multilevel notion of culture that the longer a person lives in a specific group, or the longer this group exists, the stronger are the cultural influences of the group on the individual's perceptions, feelings and thoughts (Schein, 1984). For this reason, we may expect the culture of an organisation to be more adaptable in comparison with cultural aspects at a national level. Nevertheless, to really understand an OC, it is crucial to know the wider culture that has influenced beliefs about this OC (Bryson, 2008; Hofstede *et al.*, 2010). The extant literature has approached research on the impact of culture on lean implementation by focusing either on OC or NC, but only rarely has it considered both (Erthal and Marques, 2018).

Cultural factors at different levels may clash, leading to conflicting influences for an individual or an organisation. In addition, managerial efforts such as lean implementation demand deep cultural change; hence the existing OC may also clash with the new OC arising from the lean implementation. We adopt the concept of paradox to disclose these clashes regarding cultural differences over time.

3.2.3 Paradox theory

Paradoxes are described as conflicting demands or opposing perspectives that coexist (Lewis, 2000; Lüscher and Lewis, 2008; Poole and van de Ven, 1989). The notion of “conflict that needs to be solved” and that of “contradictory elements that are mutually exclusive” are replaced by an understanding that paradoxes are inherent to organisations and denote the complexity, diversity and ambiguity of organisational life (Cameron, 1986). Therefore, paradox theory proposes “an alternative approach to (eliminating) tensions, exploring how organisations can attend to competing demands simultaneously” (Smith and Lewis, 2011, pp. 381), which facilitates long-term performance (Lewis, 2000). A deeper understanding of the impact of paradoxes may promote organisational development, and also may help

researchers to build concepts that more closely reflect plurality and change processes throughout organisational life.

Lean implementations offer fertile ground for the emergence of paradoxes. A recent systematic review of the literature on the role of culture in lean organisations (Erthal and Marques, 2018) identified paradoxes related to different cultural dimensions and to the lean system itself. The review identifies a lack of consensus regarding the two dimensions of OC defined by Hofstede *et al.* (1990) as *process vs. result orientation* and *normative vs. pragmatic approaches*. The researchers infer that such a lack of consensus may reflect the paradoxical nature of the lean system, which simultaneously promotes standardized but flexible processes as well as a focus both on procedures and customers. For this purpose, this study employs a paradox theory lens to investigate in greater depth what the tensions are and how such tensions are managed by a construction company implementing lean and dealing with the cultural changes deriving from such an implementation.

3.2.4 Paradoxes in lean implementation

In order to map the extent to which the concept of paradox has already been discussed within the literature on lean, we have employed a systematic search (Moher *et al.*, 2009) using the research engine ISI Web of Science. The research string, applied on the *topic* field, included the term *paradox** and terms related to *lean*, such as *lean system* and *Toyota*. The initial search returned 47 documents. We excluded non-peer-reviewed articles (nine) and studies unrelated to business management (twelve). We then analyzed the abstracts of the remaining 26 articles and excluded an additional six articles in which the concept of paradox was not used in our sense of opposing forces that should coexist. The final sample consists of 20 articles from 1995 to 2017. These studies were categorized by the tensions addressed, the conceptual approach taken, and the role played by culture. The complete list of the articles studied, including references and analysis, is found in Appendix B.

Two types of paradox stand out among the studies. One refers to the so called “second Toyota paradox”, which consists of the apparently counterintuitive concept of achieving faster product development by delaying the choices and decisions

regarding the product being developed (Ward *et al.*, 1995). The five articles addressing this paradox build on the design theory known as “set-based concurrent engineering” and they do not consider cultural aspects in their analysis (Biazzo, 2009; Malak *et al.*, 2009). Nevertheless, some authors recognize the important role of OC in dealing with the changes resulting from new product development and in successfully managing this paradox (Belay *et al.*, 2014; Ford and Sobek II, 2005).

Another widely investigated tension within lean implementation is the *flexibility and standardization* paradox. This paradox relates to two core and *a priori* conflicting principles of lean systems (Liker, 2004), and is the subject of ten articles, constituting half of our sample. Drawing mainly on the ambidexterity theory, these studies propose diverse managerial actions to accommodate both sides of the paradoxical principles, such as meta-routines and partitioning (Adler *et al.*, 1999), team participation and inter-team collaboration (Lantz *et al.*, 2015), employee involvement and experimentation (Maalouf and Gammelgaard, 2016), and structural separation and integration (Aoki and Wilhelm, 2017). Culture is the central theme of two studies (Chuang *et al.*, 2011; Pereira *et al.*, 2014) and is considered by the others as either promoting the paradox through cross-cultural differences (Adler *et al.*, 1999; Maalouf and Gammelgaard, 2016; Yoon and Chae, 2012) or supporting paradox management (Maalouf and Gammelgaard, 2016; Peltokorpi, 2008; Spear and Bowen, 1999). The remaining articles address specific paradoxes, most of which recognize only the influence of OC or NC on the emergence and management of tensions, as detailed in Appendix B.

Overall, despite the fact that studies addressing paradoxes in a lean context recognize cultural aspects as a key to lean implementation, culture generally appears, with a few exceptions, as a secondary or contextual element rather than making up the central theme. We identify only one article (Maalouf and Gammelgaard, 2016) that builds on the paradox theory following the framework proposed by Lewis (2000; Smith and Lewis, 2011). Therefore, the potential of paradox theory to unveil the challenges of lean implementations remains to be fully explored.

3.2.5 Theoretical framework

Our analytical framework combines complementary elements derived from three already established frameworks, one covering lean principles, another covering the dimensions of NC, and another covering the elements of the paradox theory. For the OC, we will not draw from any particular framework, as we understand culture at this level to be specific and unique, and therefore allow the constructs to emerge inductively from the data instead of limiting the findings to fit an existing framework. The elements of the analytical framework and their inter-relations are represented in Figure 1. OC1 stands for the LCG culture previous to lean implementation and OC2 represents the LCG culture after implementing lean. The lean system is represented by its principles according to a framework developed to assess the degree of adoption of lean in the service industry (Malmbrandt and Åhlström, 2013). Figure 5 also shows the influence of NC over both OC1 and OC2 as well as the paradox theory lens through which the data will be analyzed.

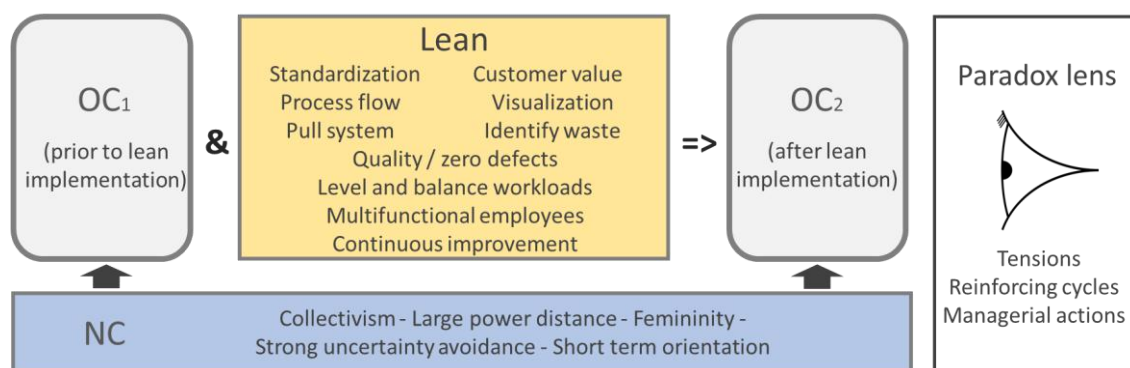


Figure 5 - The conceptual framework

In regard to culture, we will use Hofstede's framework for the NC level, which is by far the most cited reference in the literature, and whose dimensions are widely tested for differentiation among cultures at a national level (Pagell *et al.*, 2005). Hofstede (1980; 1983; *et al.*, 2010) propose five dimensions for the NC level. The continuously updated studies classify Brazilian culture as (1) *collectivistic* – interest in a group's wellbeing takes priority over one's own interest; (2) *large power distance* – inequalities in society are well accepted among people; (3) *feminine* – emphasizing cooperation over competitiveness; (4) *strong uncertainty avoidance* – people feel

uncomfortable with uncertainty and ambiguity; and (5) *short term orientation* – prioritizing virtues related to the past and present over future goals and rewards.

The final pre-existing framework concerns the paradox theory, used to analyze how an organisation responds to controversies between NC and OC, and between the pre-existing OC and lean. The paradox theory lens consists of the identification of three elements: (1) *tensions* – what are the contradictions embedded within demands, statements, emotions and practices; (2) *defensive mechanisms* – how defensive reactions reinforce vicious, paralyzing cycles; and (3) *managerial actions* – how to avoid being stuck in those cycles (Lewis, 2000). Using this framework, we expect to better identify and represent existing paradoxes within a lean implementation and cultural transformation context, with implications for research and managerial practices.

3.3 RESEARCH METHODOLOGY

3.3.1 Research design

We frame this research project as an intermediate research on the continuum between nascent and mature stages proposed by Edmondson and McManus (2007). Our research draws from separate mature streams of literature (lean, NC, OC and paradox theory) while intending to “present provisional explanations of phenomena, often introducing a new construct and proposing relationships between it and established constructs” (Edmondson and McManus, 2007, p. 1158). This intermediate approach focuses on theory elaboration, whereby the reconciliation of established general theory with contextual idiosyncrasies allows for the elaboration of new theory (Ketokivi and Choi, 2014).

We have chosen a qualitative research approach. We employ an abductive logic, which proposes constant confrontation of the data with the theory (Sinkovics and Alfoldi, 2012). We have conducted an in-depth single case study. According to Yin (2009, p. 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”. This suits studies on soft, subjective themes such as culture and on holistic systems such as lean. In addition to the subtle and

relatively intangible nature of the theme, our rationale for choosing a single case is based on the complexity of the study, which calls for deeper data collection and profound analysis. As discussed in the following subsections, we have collected a substantial amount of data. We have explored the data to identify paradoxes and dilemmas, considering the pre-lean and post-lean implementation stages. For the post-lean paradoxes, we have identified both the defensive mechanisms and managerial actions undertaken by LCG.

The unit of analysis of the present study is the organisation, as our subject of analysis is the OC and its interplay with NC and with the lean system. Although tensions faced by an organisation manifest at multiple levels (Lewis, 2000), in the present study we focus on ambiguous messages and systems contradictions at an organisational level, such as divergent goals/demands and reward systems. This is consistent with Denison *et al.* (2014), who identified a shift from individuals to organisations as the primary unit of analysis in OC studies.

3.3.2 Case selection

This in-depth single case study was conducted at LCG, a multinational organisation in the construction sector, founded in Brazil by two friends in 1948. Today, with a total of 15,000 direct employees and a gross revenue of about US\$1 billion, it has head offices in Brazil and Europe and operates in over 40 countries in Latin America, Europe, Africa, Asia and the Middle East. LCG has been selected because of its long-term efforts at lean implementation and because of the operational and economic results achieved through lean adoption. The suitability of LCG for the present study is also strengthened by its multicultural environment, which aids in the investigation of NC influence.

LCG is recognized by lean construction specialists interviewed by the main author as well-advanced in lean. The journey towards becoming lean was initiated at LCG with a construction project undertaken eight years prior to data collection. The significant accomplishments of this project encouraged LCG to expand lean to other plants and to corporate units. The company has about 120 employees working in its Operational Excellence department, disseminating and supporting lean implementation throughout the organisation. They have conducted more than 4,000 workshops on

problem solving and idea generation, achieving a total of U\$142 million in operational savings in 2017.

3.3.3 Data collection

We have employed multiple methods of data collection (Eisenhardt and Graebner, 2007). The primary source of data was semi-structured in-depth interviews conducted with a range of LCG workers of different nationalities and from different departments and hierarchical levels. According to Yoon and Chae (2012), the majority of previous research on paradox management focuses on top management teams, which may limit the understanding of the system configuration. To bridge this gap, our set of interviewees include not only lean leaders and executives, but also managers and staff members who were directly involved in lean implementation or were affected by the change (see Appendix C for a detailed list of interviews).

The main author conducted all 17 of the interviews, with an average duration of one hour. In all, the data amounted to 103,352 words once transcribed. The interviewees were encouraged to answer questions about the changes along the lean journey at LCG, i.e., how it used to be, how it is now and what is still to be accomplished. The interview protocol (Appendix D) comprises four sections, as follows: (1) *interviewee background* – with questions related to the experience at LCG and with lean; (2) *lean assessment* – concerning the adoption of lean principles and practices; (3) *culture* – exploring OC & NC traits; and (4) *paradoxes and dilemmas* – aiming to explore existing tensions, defensive mechanisms and managerial actions to deal with the tensions. We conducted two rounds of interviews. During the first round, we focused on sections 1, 2 and 3 of the protocol. After analyzing those transcripts, we identified the tensions present at LCG prior to lean implementation as well as the impact of lean adoption on these tensions. We then conducted a second round of interviews about six months after the first to validate the tensions identified and to explore in depth how the organisation deals with them. Because of the unavailability of three interviewees from the first round, we have included in the second round two additional professionals who provided a complementary perspective.

In addition to the interviews, primary data collected includes notes from direct observations and informal conversations during a Hansei event. A Hansei is a three

full-day meeting that gathers the Operational Excellence team together to discuss on-going projects and problems and to define actions towards meeting the strategic objectives. Benchmarking visits and interviews with lean specialists in Germany and in the U.S. helped garner a better understanding of the specificities of lean construction, as well as highlighting some NC differences. The findings presented in the next section are supported and interpreted through verbatim quotes from the primary data. Secondary data, such as internal reports and general publications on the company and industry, was used to enrich the understanding of the context surrounding lean implementation at LCG.

3.3.4 Data analysis

The transcriptions of the interviews and the notes from the Hansei were analyzed through qualitative coding, supported by computer-assisted qualitative data analysis software (NVivo). Coding was based on a progressive approach (Sinkovics & Alfoldi, 2012), conducted in two coding cycles, as prescribed by Saldaña (2009). In the first cycle, data was classified according to the cultural traits, the adoption of lean principles and practices, and the barriers and success factors identified throughout the lean journey. The aim in this cycle was to highlight the paradoxes and dilemmas by identifying contradictions and occasions of binary speech. The second coding cycle consisted of elaborative coding, which is the process of analyzing first-cycle coding and contrasting the current case with previous studies in order to “support, strengthen, modify, or disconfirm the findings from previous research” (Saldaña, 2009, p. 168).

Quotes from the different interviewees indicate existing tensions pre- and post-lean implementation and we have chosen the most prevalent of these to analyze. The tensions analyzed were classified as either a paradox, when both sides coexist, or as a dilemma, when the organisation prioritizes only one side. Figure 6 summarizes the framework of analysis. Paradoxes and dilemmas are represented by one-way and two-way arrows, respectively, which connect the two poles of the tension. For each tension, we have mapped the conflicting elements involved, i.e., the factors of the tension that correspond to the first-order coding. Those elements are represented in white boxes, as the most superficial and tangible layer of the LCG culture (Schein,

1984). Each factor was then linked to LCG values, described as the middle level of culture by Schein (1984) and represented in the second row with light grey boxes. Following this, we unfolded the LCG values into the corresponding dimensions of the NC in the country where the organisation was located. The NC dimensions (dark grey boxes) constitute the more intangible and rooted level. The final elements are the lean principles and practices that may turn a paradox into a dilemma or vice-versa. They are represented by green balloons close to the cultural trait they impact more directly.

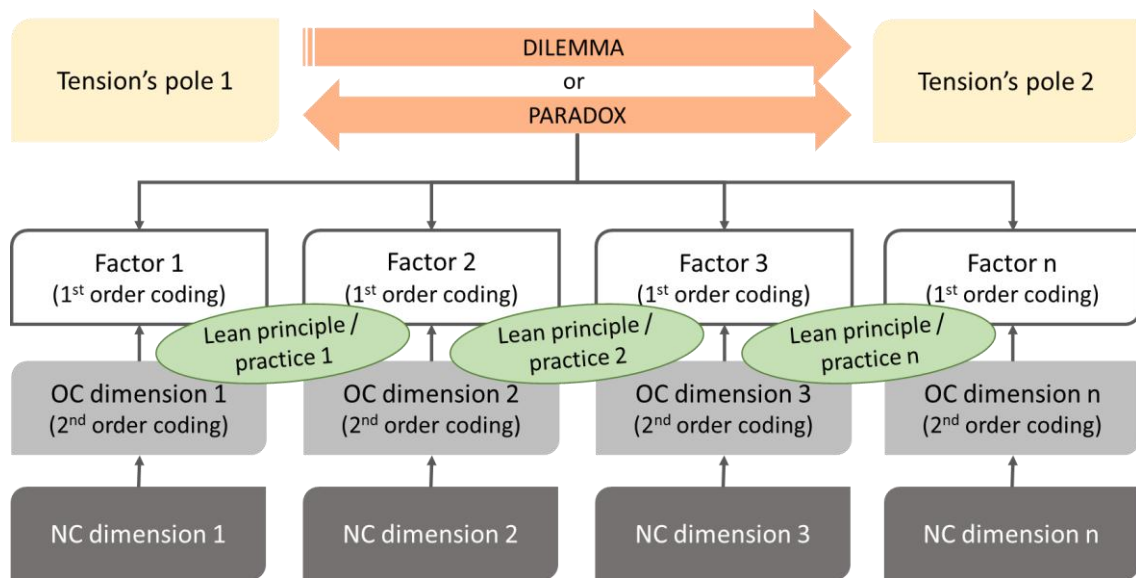


Figure 6 - The framework of analysis

3.3.5 Research quality

Case research quality is about making justified choices and making them explicit (Ketokivi and Choi, 2014); hence our detailed explanations of each step undertaken throughout the research. We have also followed the quality criteria proposed by Stake (1995), which are research ethics, member checking and triangulation. All interviewees were informed prior to interview that participation was voluntary, information was confidential and that there was no potential harm to them nor to their organisation. Transcripts of the interviews were sent to the interviewees to get member checking and consent on the transcript. We also applied data source triangulation, with participants taken from multiple organisational levels, departments,

locations and roles regarding lean initiatives. This increases the confidence in the researchers' explanations of the phenomena (Edmondson & McManus, 2007).

3.4 CASE ANALYSIS

3.4.1 Pre-existing OC paradox

The analysis of the data collected highlights some underlying cultural tensions prior to lean implementation. One of these is that people from LCG are seen as flexible and excited about novelties: "People here are open-minded, have the guts of doing things in a different way, they like new things" (I3), although they contradictorily tend to resist or not to pursue the implementation of the novelty: "We find a lot of difficulties for people to adhere to the changes, resistance indeed. Some people want to make it harder to change" (I4). The openness to novelty found in OC₁ might create a belief in the easy implementation of new strategies, processes and changes. Conversely, LCG has experienced resistance to lean implementation. As both openness to novelty and resistance to change coexisted and interacted at LCG prior to lean implementation, we have classified this tension as a *pre-existing paradox*. Exploring this tension, we have mapped five factors, from the first-order coding, that sustain the paradox. Following the framework proposed in Figure 6, each factor has been connected with both OC and NC traits. The following paragraphs detail these elements, which are also summarized in Figure 7. Exemplary quotes are used below to illustrate the analysis, with additional quotes provided in Appendix E.

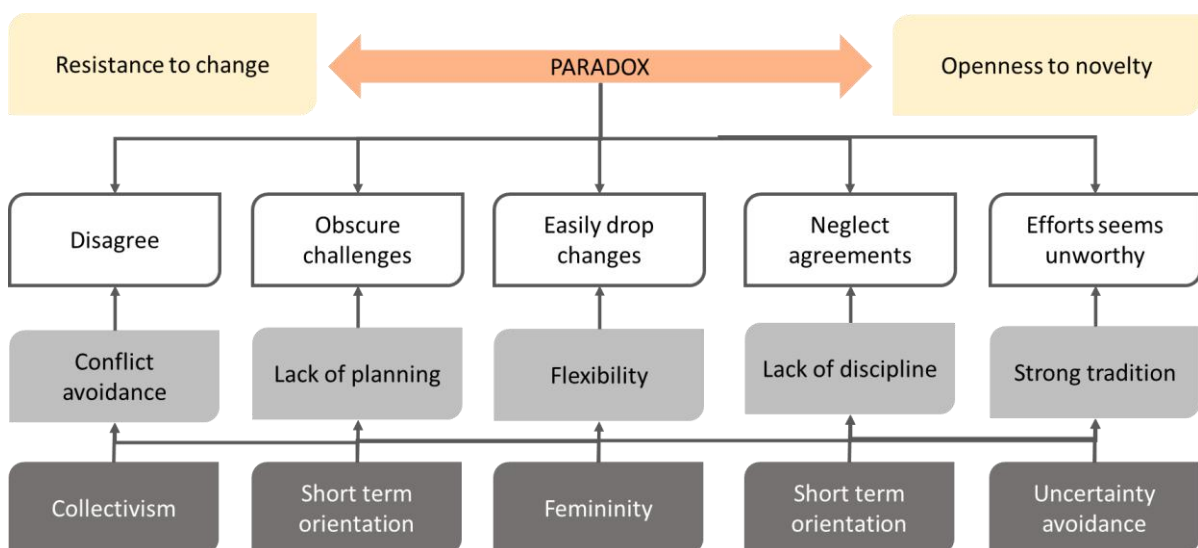


Figure 7 - Pre-existing OC paradox

One factor sustaining the paradox is the disagreement of people with the change even though they choose not to externalize it: “people are afraid of saying what they really think” (Hansei event). The manager of operational excellence in Latin America emphasizes: “People here do not say ‘I don’t like this and I’m not going to do it’. Instead, they say ‘wow, this is great, five stars!’. Then they turn away and say ‘this is insane, he’s crazy’”. We found that: “People disagree but because they avoid conflict, they don’t say so” (I11). This behavior relates to conflict avoidance (Hurley and Hult, 1998; Ke and Wei, 2008), a strong LCG cultural trait that is also present in the Brazilian culture. According to Hess and da Matta (1995), Brazilian leaders are expected to exercise control in a friendly, non-confrontational manner. Keeping harmony among a group is also a demonstration of a collectivist culture, and the avoidance of conflict to preserve “face” reflects a short-term orientation (Hofstede *et al.*, 2010). Both of these are considered Brazilian cultural traits.

Another factor identified is a lack of awareness among people of the actual challenges they will encounter: “Not everyone knows 100% about what is being proposed and knowing it will give them extra work. (...) Maybe because they ignore the full perspective, they don’t see the importance of the change and that’s a major issue” (I16). This lack of awareness is the result of inefficient planning (Crofton and Dale, 1996): “Everything here is very little planned, we are too reactive instead of proactive, what should be well planned ends up being done at short notice” (I8). Developing ad hoc responses to changes and focusing primarily on the here-and-now (Detert and Schroeder, 2000; Reynolds, 1986) can be directly connected to the relatively short-term orientation of Brazilian culture (Hofstede *et al.*, 2010). A Peruvian engineer (I2) corroborates this: “We (LCG) have the same vision that Brazil has, a short-term view, especially when compared to Japanese. We do not dedicate proper time to planning.”

We found that people drop the novelties/changes easily in favor of new ideas or demands: “I believe LCG is too passionate about novelties. It’s a trend. People love what is new. And drops it as easily. We see that happening a lot in here” (I10). This “enthusiasm and energy facing changes” (I9) is directly linked to flexibility, a widely studied OC dimension (Quinn and Rohrbaugh, 1983; Reynolds, 1986; Zammuto,

1992), which is also a significant trait in Brazilian culture (Tanure and Duarte, 2005). A manager from the Europe/Africa/Asia division also elaborates on this connection: “Brazilian people accept more easily the changes but because they do so, they also drop the changes more easily in order to accept the next change” (I8). Furthermore, flexibility may be linked to a more feminine culture, as found in Brazil, opposed to the more assertive behavior found in masculine cultures (Hofstede *et al.*, 2010). The short-term orientation may reinforce the difficulties in sticking to an initiative for a longer period of time: “What is true today, tomorrow is a lie” (I8).

In addition to the aforementioned factors, people frequently neglect agreements and procedures, leaving room for acting in ways that diverge from previous agreements: “We have conducted internal interviews and the major criticism was that we don’t follow what is written on the wall, we don’t do what we are supposed to” (I4). The CFO complements: “everybody wants improvements, but no one wants to follow the procedures needed to reach the improvements”. This lack of discipline reflects an OC based on loose control (Hofstede *et al.*, 1990), in “a culture that facilitates noncompliance or the institutionalization of misconduct” (Schnatterly *et al.*, 2018, p. 2414). Non-Brazilian workers perceive a different approach to discipline when comparing with their countries of origin, linking the lack of discipline straight to the Brazilian culture: “Simple things like being on time, defining delivery dates, following a process... it is a huge difficulty for Brazilian people” (I9). Hofstede *et al.* (2010) reinforce the notion that people from cultures that, like Brazil, feature high uncertainty avoidance and short-term orientation, show less discipline.

The final factor emerges from LCG people avoiding change because they do not want to take on the effort demanded by change: “The thing here is that people say ‘let’s do it’ but they don’t actually do it” (I9). LCG has a cultural trait of a strong sense of tradition; it “has a very strong culture” (I2, I6, I8, I14). In this type of culture, “the sense of ‘rightness’ of existing arrangements are deeply ingrained, making it more difficult to change them” (Zammuto, 1992). LCG people deeply believe they know better as “we have been working this way for the past 50 years. We are very good on what we do. We have the best solutions” (Hansei event). Two Brazilian cultural traits may have contributed to build the strong sense of tradition that hinders the LCG from reaching out to new possibilities. They are strong uncertainty avoidance, where “what

is different is dangerous” (Hofstede et al., 2010, p. 203), and short-term orientation, an orientation towards the past instead of the future.

The analysis of the data shows evidence of unplanned OC development and highlights underlying tensions. OC's evolve over time and usually are not planned or intentionally created (Jarnagin and Slocum, 2007). On the contrary, OC's tend to reflect the founders' values and are shaped by involuntary cultural and contextual influences, such as the NC where the organisation was founded. Although tensions are inherent to organisational systems, they may lie dormant until an external or internal stimulus, such as the implementation of the lean system, incites systemic changes (Maalouf and Gammelgaard, 2016; Smith and Lewis, 2011). In the new lean context at LCG, the aforementioned tension was awakened. More specifically, as lean implementation involves significant changes in the organisation, LCG has put great effort into leaving the cultural trait of change avoidance behind. This means that what was a paradox is shifted into a dilemma, i.e., the tension is managed by choosing only one of the opposing alternatives, which in this case is openness to novelty.

3.4.2 Shifting from paradox to dilemma

In order to move the organisation towards openness to novelty, LCG has adopted initiatives aligned with lean principles and practices to deal with resistance, as shown in Figure 8. The countermeasure brought by lean implementation to deal with the fact that, to avoid conflict, people do not declare their disagreement, is encouragement of open communication among departments, units and hierarchical levels. The idea is to make messages reach all employees throughout the organisation and to promote spaces where people can feel comfortable to make their opinions heard: “We have created the LCG talks, which are webinars that the President conducts once a month. People participate making comments or questions of any kind. And people actually do it” (I10). Interviewees also emphasize the new office's alignment with the open-space concept, and the lean visual instruments such as *andon* signs, A3's, *pokayokes*, the production planning board, and *heijunka* boxes (I3, I5, I7, I14, I14, I15).

Open communication and follow-up meetings (“check-in/check-out daily meetings, meetings to discuss the results on a two-week basis, meetings to discuss problems, department meetings, managerial meetings, etc.” (I8, I17)) also have a positive effect on promoting wider perspectives and more detailed planning and follow-up communication. Together with the Last Planner System, a planning software specific for lean construction, the organisation is able to realize all the benefits of effective planning. For this reason, it has been successfully established: “Among all the tools implemented, in my opinion the Last Planner System is the most successful. It is the one that receives more compliments because it’s the most effective one” (I8).

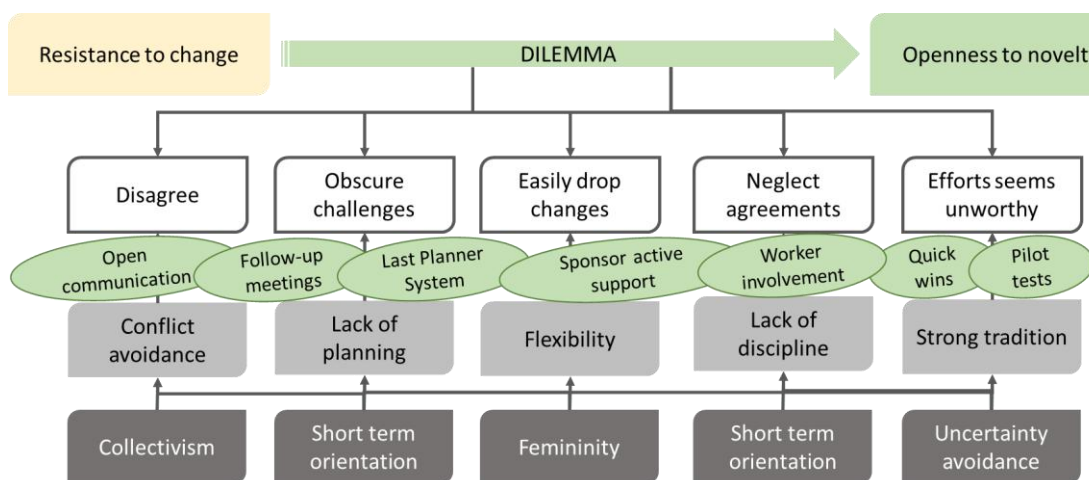


Figure 8 - Shifting from paradox to dilemma

The other factors were minimized by lean principles as well. The role of the sponsor, for example, represents an indication that lean is “here to stay”, counterbalancing the cultural trait of not sticking to changes. LCG has been counting on an active lean leadership that includes the CEO as the lean sponsor and major advocate of lean implementation: “Our main sponsor is our CEO. He loves lean, all he talks about is lean.” (I5).

Along with their support for lean implementation, the leadership at the highest level has established a “mantra within LCG. It’s the CEO’s flag. He keeps repeating that if we say something, we need to keep our word, internally and externally.” (I7). Discipline, one of the major tenets of the CEO, plays a crucial role to lean success (Brunet- Thornton *et al.*, 2016). The CEO and the lean team recognize the involvement of leaders and workers as a complementary key factor. The

implementation of tools and practices promote “the feeling of belonging and of being part of it” (I5): “Our CEO is helping even more in this process. He has done more meetings with more people, involving more people in the process” (I7).

To deal with the factor related to change being considered not worth the effort, LGC used the concepts of “quick-wins” (small and fast results) and pilot tests during the first years of lean implementation: “Only last year we conducted more than 3,200 Kaizens. We have a million examples of improvements due to small changes” (I5). Therefore, the ability to achieve better results through the implementation of continuous improvements and other lean practices has contributed to an improved perception of the value of change within LCG: “An internal survey with all the contract managers showed that 100% of them believe in the changes promoted, 80% see behavioral changes and 94% are happier to work according to lean. And they have been working here for 20, 30 years, what makes it harder for them to change” (I10).

Despite the efforts and accomplishments, LCG is still struggling with one element involved in the “solution” of what is now understood as the *dilemma* of openness to novelty versus resistance to change, that is conflict avoidance. We have found that, in addition to inhibiting workers from voicing their opinions, this cultural trait discourages the reporting and discussion of problems. A deeper exploration of this issue brings to light another significant LCG trait, which is that relationships are considered a priority. In the next subsection we unfold this element and discuss the impact made upon it by lean implementation.

3.4.3 Pre-existing OC dilemmas

The focus on relationships at LCG has provided a happy and secure work environment supported by long-term solid relations. LCG has developed an OC based on paternalism and personalism, where conflicts are avoided, “heroes” are admired, problems are not discussed, and mistakes are widely tolerated with no direct consequences whatsoever. Figure 9 presents the elements unfolding from this cultural trait at three linked levels of analysis: first-order coding, OC dimensions and NC dimensions.

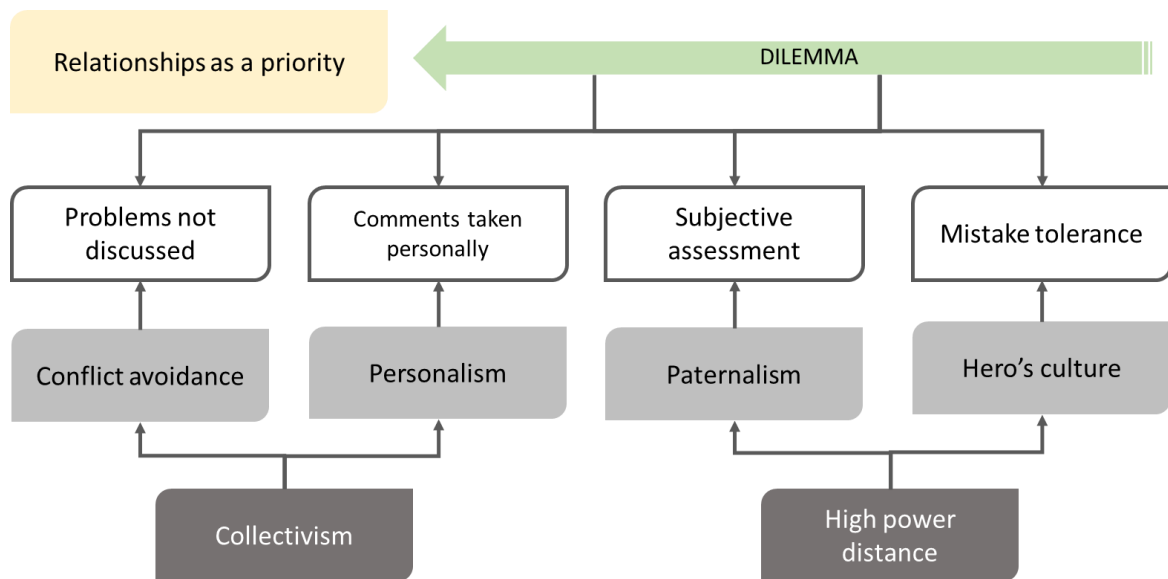


Figure 9 - Pre-existing OC dilemma

The analysis of the data has revealed four factors regarding the focus on relationships at LCG. One factor is that people are not comfortable in discussing problems: “We don’t have an environment to talk about problems” (Hansei); “We have this issue of not bringing up the problems” (I1); “We were ‘raised’ here believing that talking about problems was a bad thing” (I5). And this is linked with the cultural trait of conflict avoidance: “This is not a company where we confront” (I9). The CFO concurs: “It is not only about avoiding problems, it is about avoiding conflict. If someone doesn’t agree with us, let’s leave him out and do it anyway. This is how people act here.” As discussed in the previous subsection, conflict avoidance is a strong OC trait mainly connected with the Brazilian collectivist culture.

The second factor consists of comments being taken personally. Actors have a tendency to react personally and emotionally to cognitive debates: “Depending on the meeting I’m in, if I use harsh words pressuring for results, the guy gets angry and doesn’t talk to me anymore. It becomes personal” (I3). This LCG cultural trait is identified as personalism (Mooney et al., 2007), and is also mentioned as a Brazilian cultural trait (Caldas, 1997; de Hilal et al., 2009; Hess and da Matta, 1995; Tanure and Duarte, 2005). The strategic planning manager substantiates: “I have worked with Americans and they say what needs to be said and not one gets upset. In Brazil we think ‘oh, the guy doesn’t like me because he said that about my performance’.

As a German, I have difficulties in dealing with this behavior” (I6). The predominance of personalism in professional relations is also a characteristic of a collectivist culture (Hofstede *et al.*, 2010).

The third factor is a frequently discussed issue among interviewees: the subjective assessment of workers’ performance, which is directly linked to a paternalistic culture at LCG: “A gigantic number of people score higher than 8 in our 360-degree feedback, where maximum is 10. No one gives low scores. If you get a nine, you are negatively surprised. Our assessments are too paternalistic. It is in the company’s culture” (I1). Paternalism is defined as the propensity to protect people in work environments or other contexts similarly to a father with his family, and is also identified as a Brazilian cultural trait (Caldas, 1997). Corroborating with this, Hofstede *et al.* (2010) contend that leaders are expected to protect ‘their ones’ in countries that score high in power distance dimension, such as Brazil.

The final factor relates to an over-tolerance for mistakes: “Some people here make consecutive errors. We make a lot of mistake and fix too little” (I4). Mistakes are tolerated within groups and solved through strong relationships and the “hero” culture. Alongside the aforementioned paternalism, in high power distance cultures leaders are expected to be in charge of decisions, to overcome mistakes and problems as they emerge (Hofstede *et al.*, 2010). The perception of leaders as heroes in Brazilian culture has also been identified by other researchers (Casado, 2018; Hess and da Matta, 1995).

In summary, relationships have historically been a priority for the organisation, sometimes to the detriment of performance: “Our company has always been a relationship company. We were not focused only in Engineering. The problems were solved by relationships, internally and with clients.” (I7). And the loyalty and commitment of LCG workers comes along with this: “People are passionate about our company and their work here. It seems crazy, but people are passionate” (I1). On the other hand, with an increase in market competitiveness and as a response to political-economic crisis, being efficient and achieving better results has become one of the major objectives of LCG: “In 2014/2015 the corruption scandal blew up and lean switched from good practices and an aspiration to the company’s strategy” (I10).

Therefore, the implementation of lean raises an underlying tension concerning the maintenance of strong relationships and a high level of loyalty and commitment while promoting a performance-driven culture within the organisation: “We are not going to change to a company 100% focused on results and performance. We will keep concerned about interpersonal relations, this is a company’s value” (I16). Therefore, what used to be a dilemma (Lüscher and Lewis, 2008), i.e. an either/or situation in which relationships prevailed, has turned into what can be categorized as a performing-organizing paradox (Smith and Lewis, 2011). It now consists of sustaining both high commitment and high performance.

3.4.4 Shifting from dilemma to paradox

The implementation of lean has counterbalanced cultural traits that foster the relational culture to the detriment of achieving higher performance. Figure 10 summarizes the lean principles that mostly impact each factor as well as the defensive mechanisms and the actions adopted to manage the paradox of relationships versus performance, as following discussed. The principle of seeing problems as opportunities works on changing the perception of conflict over problems to see in them a chance to learn and improve performance. Open and clear communication counterbalances personalism by clarifying goals and roles, making it easier for people to comment more directly. The subjective, paternalistic assessment based mainly on relationships loses its place when a performance measurement system is implemented. Measuring performance also counterweighs the over-tolerance for mistakes, and promotes team work instead of stimulating heroism.

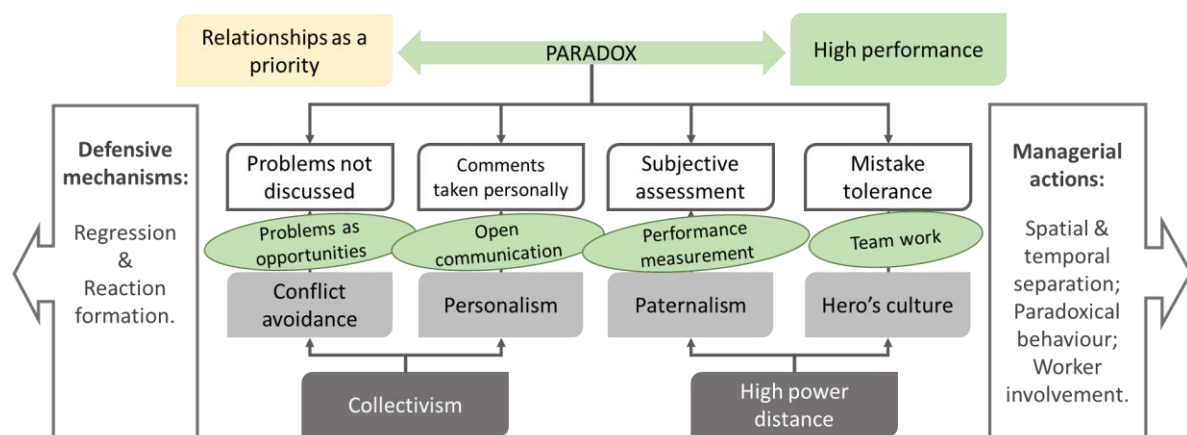


Figure 10 - Shifting from dilemma to paradox

Despite the positive impact of lean principles towards a high-performance culture, it is about “a 70-years-old culture changing in six” (I10). Throughout the transformation journey, it is to be expected that actors will adopt defensive mechanisms, which may keep the organisation stuck in reinforcing cycles instead of balancing both sides of the paradox. One example is that some leaders still prioritize relationships over performance, reinforcing OC₁ traits: “There are people who still focus on relationships, keeping good relations and avoiding confrontation, sometimes in detriment of results” (I6). This mechanism of resorting to actions that worked in the past, defined as regression (Lewis, 2000), is found in the literature concerning similar types of paradox (Maalouf and Gammelgaard, 2016). The other defensive mechanism identified is a strong opposition to what is considered new (and therefore threatening): “The leader tells people they should disagree. When someone disagrees, he doesn’t like it. So people end up not talking anymore” (I14). This type of mechanism is called reaction formation (Lewis, 2000), adopted especially in organizing paradoxes (Lewis, 2000; Maalouf and Gammelgaard, 2016).

LCG has implemented a variety of managerial actions to deal with the aforementioned defensive mechanisms. Activities at opposing poles were split temporally and spatially: “You have to force the change in the beginning” (I11); “Our transformation team had to be a separate unit directly under the president’s umbrella” (I10). Another managerial action is the flexible behavior adopted in the implementation of lean: “We had the care, patience and attention through the years, trying to change people’s mindset” (I10). As an example, care was taken over the exposure of processes’ results and adherence to lean practices, so as to respect the cultural traits of personalism and conflict avoidance: “We have started to put the A3’s to move around, getting constructive feedbacks from related professionals” (I11). The flexibility adopted as a managerial strategy reflects a paradoxical behavior among leaders who strongly encourage performance improvement whilst maintaining close relationships and a good work environment. This paradoxical behavior, the spatial and temporal separations, and the emphasis on strategies to engage workers are effective managerial actions at LCG that have also been found to be effective by previous studies (Lewis, 2000; Maalouf and Gammelgaard, 2016).

3.5 CONCLUSIONS

3.5.1 Theoretical contributions

This case study investigates how an OC evolves over time when exposed to the influence of NC and the adoption of a new management strategy, in this case the lean system. By answering the research question *“How are cultural paradoxes and dilemmas managed in a service organisation going through a lean implementation?”*, we have scrutinized the pre-existing tensions inherent to the OC, the development of new tensions brought by lean implementation and the use of lean principles and practices to manage those tensions.

Our study contributes to filling gaps in the literature regarding the interplay of lean and culture through a paradox theory lens. First, we have found that the implementation of the lean system may turn a paradox into a dilemma and a dilemma into a paradox. The identification of paradoxes and dilemmas that emerge within a lean implementation is in itself a relevant theoretical implication. Second, the tensions we have analyzed in the present study were underexplored by the extant literature, as our systematic review showed. Third, this case study contributes to the paradox theory literature as it describes the defensive mechanisms that prevent the organisation from properly managing cultural tensions, as well as how organisations may release themselves from those mechanisms, which is also an underexplored element in the paradox literature. Fourth, the findings evidence the lack of a single framework to deal with the complexity and uniqueness of an OC. And, finally, to the best of our knowledge no previous study has scrutinized the role of NC and OC in lean implementation using a paradox theory lens. We show evidence that NC traits and prior OC influence lean implementation. In addition, we identify that the adoption of lean practices directly impacts the OC and may also help the organisation to develop a new OC. In the long run, the new OC may counterbalance the NC traits that hinder the lean transformation, thus supporting a successful lean implementation.

3.5.2 Managerial contributions

We offer a guide to managers dealing with the challenges of the cultural transformation necessary for a successful lean implementation in the construction sector. This guide should be extendable to other sectors, especially in the service industry. The division of the conflicting tensions into either paradoxes or dilemmas is a key contribution of this study. This clarification indicates how an organisation should manage each conflict to achieve a successful lean implementation. Additionally, the investigation of which lean practices counterbalance specific cultural traits that are negative to lean may help practitioners reach an effective cultural transformation instead of being limited to a “lean wash”. We have also shown that while a NC cannot be changed by an organisation directly, organisational practices can counterbalance OC traits that result from NC influence.

Although we have specifically explored the Brazilian context, the findings may be useful for organisations in contexts with similar cultural traits, i.e., collectivistic, short-term oriented, feminine, with high uncertainty avoidance and high power distance. Latin countries, and others including Greece, South Korea, Russia and Turkey, share most of these cultural traits (Hofstede, 1980; Hofstede *et al.*, 2010). In addition, lean implementation in any other country may benefit from using the framework to contrast NC barriers with OC counterbalancing actions. Moreover, the study proposes a framework for the analysis of cultural tensions that may benefit organisations going through cultural clashes provoked by the implementation of management systems other than lean.

3.5.3 Limitations and future research

This research is based on a single case study. As much as the single-case approach allows an in-depth discussion of paradoxes and dilemmas, future research should expand the empirical base in order to build a broad picture of the paradoxes and dilemmas present in lean implementations in varying organisational and cultural contexts.

We recognize the complexity of investigating culture, given its multi-layered nature. Although there is a subtle line between NC and OC, the distinction of culture levels is

supported by extant literature (Hofstede, 1980; Schein, 1984; Wiengarten *et al.*, 2015). Future studies could take a step further towards investigating multiple cultural levels such as regional cultural traits, especially in continental countries such as Brazil, and subcultures within the organisation, unveiling paradoxes and dilemmas emerging from clashes between levels.

Furthermore, the complexity of culture relies on the fact that the culture of a group is not an average of the individual reactions. Rather it is the most common reaction in the same group of people (Hofstede *et al.*, 2010). We have tried to overcome this limitation by interviewing workers at multiple levels and functions, comparing and contrasting the different perceptions. As exploring paradoxes is an ongoing and cyclical journey (Lewis, 2000), we call for future exploration of other cultural paradoxes and dilemmas present in lean implementation as well as their interconnections.

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Appendix B – Systematic search

YEA	AUTHOR	JOURNAL	TENSIONS	PARADOX / THEORETICAL APPROACH	CULTURE APPROACH
1995	Ward et al.	Sloan Manag Rev	Slow decisions & Fast delivery (The second Toyota paradox)	Seminal article on the second Toyota paradox - a design theory called "set-based concurrent engineering". The concept seemed counterintuitive: go faster in the product development process by considering a broader set of alternatives earlier and delaying certain decisions.	Does not address culture.
1999	Adler et al.	Organization science	Flexibility & Efficiency	Based on ambidexterity theory, identifies four mechanisms to manage the paradox - meta-routines, partitioning, switching, and ambidexterity.	States that cultural differences are a cause of ambidexterity.
1999	Spear & Bowen	HBR	Flexibility & Stability/Standardization	Argues that focusing only on tools instead of on lean principles inhibits the management of the paradox and that the rigid specification is the very thing that makes the flexibility and creativity possible (prior to paradox theory).	Does not mention the term culture although the central theme of the Toyota DNA directly refers to Toyota's OC.
2005	Ford & Sobek	IEEE Transac on Eng Manag	Slow decisions & Fast delivery (The second Toyota paradox)	Addresses a strategy termed set-based development, which enables Toyota to achieve faster development by intentionally delaying alternative selection. This study adapts real options concepts to partially explain this paradox and a simulation model is used to show that converging too quickly or too slowly degrades project value.	Slightly mentions the importance of an (not so common) OC that values broad search for alternative solutions when managing the paradox of slower decisions and faster delivery in product development.
2006	Sewell & Barker	AMR	Coercion & Care	Builds on paradox theory, proposing the adoption of an ironic perspective on the competing discourses of coercion and care in order to move beyond the surveillance paradox. Concludes that "many watching many" may be a successful strategy for managing the paradox, therefore combining coercion and care.	The discussion about an approach of coercion or care surveillance surround the organizational culture, i.e., cultural norms, customs and practices, although culture is not directly analysed.
2008	Peltokorpi	Int. J. Tech Manag	Flexibility & Stability	Drawing from the knowledge-creation theory, organisational routines are described as sources for stability and flexibility, enabling and constraining thought and action of organisational actors.	Does not directly mention culture although states that routines and their development are influenced by ideals and values of intentional but contextually embedded individuals.
2009	Biazzo	J Prod Innov Mang	Slow decisions & Fast delivery (The second Toyota paradox) / Flexibility & Stability	Develops a three-dimensional framework to overcome the paradox of flexibility & standardization in PD, based on the degree of structuration in process design, the degree of intersection between problem-formulation and problem-solving, and simultaneity in task execution.	Does not consider the cultural influence in the choice and execution of the different strategies discussed as the study is limited to propose a framework that clearly identify the elements involved in the paradox.
2009	Malak et al.	Computer-Aided Design	Slow decisions & Fast delivery (The second Toyota paradox)	Combines the perspective of set-based design with the framework of multi-attribute utility theory and the mathematical representation of imprecision into a single approach to conceptual design.	Does not address culture, focusing on a general approach to making conceptual design decisions that combines the formal tradeoff analysis of multi-attribute utility theory with the elimination-based perspective of set-based design.
2011	Chuang et al	Cross Cultural Manag	Standardization & Localization	The structural paradox in retail multinational corporation lies in the balance between their objective in enforcing standardization (direct transfer of strategic assets) and the need to conduct localization to ensure customer acquisition.	Culture is the central theme as the study address the cross cultural barriers faced by two retail giants as they attempt to replicate in China their lean retailing successes elsewhere in the world.

YEA	AUTHOR	JOURNAL	TENSIONS	PARADOX / THEORETICAL APPROACH	CULTURE APPROACH
2011	Elg et al.	TQM&BE	Broaden & narrow quality field	Based on the quality management literature, the study investigates the role of quality management and the ambiguity of broadening the scope of the field and being specializing the quality profession.	Does not address culture, only organizational context limited to the main focus of quality department and to the importance of related concepts, such as lean and ISO.
2012	Yoon & Chae	IJHRM	Flexibility/Innovation & Stability/Efficiency	Builds on the concept of 'contextual ambidexterity' which operates at the level of whole organization. Firms that successfully accomplished innovation and efficiency objectives simultaneously were those that were able to mix paradoxical practices: decentralization & control mechanisms and the divergent HR practices.	The study assumes the premise that differences in culture and economic development between two countries may have generated different patterns of dealing with incompatible demands within competing organizations.
2014	Belay et al	Adv Manufacturing	Slow decisions & Fast delivery (The second Toyota paradox)	Developes models to analyze the effect of set-based designed compared with traditional design and results show improvement in cost and in leadtime.	Culture is not mentioned although the authors acknowledge that competing with new products demands radical change and continuous efforts and that this may involve culture and mindset.
2014	Pereira et al	IEEE Transac on Eng Manag	Flexibility & Stability	Uses a OC framework to investigate two paradoxes - internal integration & external adaptation and change & stability using five dimensions of OC: risk taking, outcome orientation, people orientation, team orientation, and stability.	Culture is the central theme and the study finds that the unsuccessful implementation of best practice in product development can be explained by a lack of an OC that sustains and facilitates the best practices.
2015	Hong & Snell	J of World Business	Cooperative & Competitive routines	Applies yin-yang theory to explain how a focal firm and its suppliers are engaged in both competitive and cooperative routines to drive knowledge development. The previous supported the creation, integration and dissemination of a common knowledge base, while the later comprised mechanisms for a fair and effective supplier selection and retention.	Assumes that culture and organizations are intrinsically require both variation and harmony. Additionally, as the case analyzed is of a China-based Japanese multinational firm and its local suppliers, the influence of Japanese management culture on the supplier's OC is seldom recognized along the article.
2015	Lantz et al	J of Workplace Learning	Flexibility/Innovative teamwork & Stability/Standardized work	Indicates that the paradox between standardized work and innovative teamwork can be dissolved by team participation in the decisions regarding work design and inter team collaboration, which develop a shared understanding of team goals and strategies and stimulate team learning processes team proactive behaviour. Highlights that team collaboration with support functions is also important for creating learning processes as well for performance.	Does not address culture although acknowledges that a team is embedded in a broader system context that defines team tasks demands, which significantly impacts team innovation.
2016	Maalouf & Gammelgaard	IJOPM	Flexibility & Stability	Applies the paradox theory to investigate paradoxes emerging from the implementation of lean tools and how they have been managed. The study identifies four paradoxes (standards & autonomy; work harder & work smarter; functional & team role; old & new role) of three different types and details the tensions, defensive mechanisms, managerial responses and the outcomes of each paradoxical situation.	Identifies that sub-organizational cultures promote tensions between cross-functional teams and recognizes that contextual factors, such as communication patterns of top-management influences the outcomes of the organizational paradoxes in lean.
2017	Aoki & Wilhelm	Organization science	Flexibility/Exploitation & Stability/Exploration	Builds on ambidexterity and paradox theory, investigating how to manage the exploration-exploitation paradox in a buyer-supplier relationship. Structural separation and structural integration are found as two organizational systems that can help buying firms achieve both short-term and long-term benefits with their long-standing suppliers.	In addition to Toyota culture perceiving contradictions positively and problems as opportunities, the study finds that buying firms can successfully motivate supplier to address deliberately created paradoxical tensions by offering requisite security that their efforts to address challenges will eventually be rewarded.
2017	Safina & Khokhlov	Int J of Quality Research	Environmental friendliness & Cost effectiveness	Proposes that an assessment of all existing factors and conditions operating in the national economy allows the organizations to determine their own strategic guidelines and to find a compromise solution in the paradox of energy consumption: maximizing profits and the need to reduce long-term environmental consequences.	Does not address culture, only the conditions of national economies, such as the presence of natural conditions (eg: stable solar radiation, availability of biomass resources, etc), financial capacity, government subsidies, developed infrastructure.
2017	Soliman & Saurin	J of Manuf Systems	Complexity & Simplicity / standardize & flexibility	Builds on the complexity theory, by identifying six main complexity definitions, examples of sources of complexity and the lean approach to manage each complexity. Also concludes that lean practices can manage multiple competing goals although implementation order matters and that lean efforts should be concerned with disentangling necessary from unnecessary complexity.	Diversity of cultural aspects is identified as an attribute to complexity as well as a decrease in complexity as lean culture matures within the organization.
2017	Tay et al	Oper Manag Research	Resource efficiency & flow (Efficiency paradox)	Discusses the contradiction that maximizing the efficiency of individual resources results in more inefficient system. The findings indicate that low levels of capital resource intensity and service uniqueness, combined with high levels of service variety and interdependency, will generate a dominant flow efficiency, which will sustain successful project outcomes.	Does not address culture although identifies four contextual factors, which combined may determine the orientation of a project toward resource or flow efficiency.

Appendix C – Data collection

LCG data collection	Id #	Years at LCG	Date	Communication	Duration
Director - Excellence and Innovation	I5	10 yrs	Jul 6th 2017	Video call	70'
Manager - Strategic Planning	I6	10 yrs	Ago 11th 2017	Phone call	50'
			Ago 15th 2017	Phone call	32'
Manager - Excellence and Innovation	I9	6 yrs	Ago 24th 2017	Phone call	70'
Manager - Operational Excellence in Europe, Africa, Asia	I8	5 yrs	Ago 31st 2017	Video call	77'
Manager - Operational Excellence in Latin America	I3	6 yrs	Sep 4th 2017	In-person	47'
Site engineering & lean specialist - Latin America	I2	11 yrs	Sep 4th 2017	In-person	46'
Hansei event			Sep 4th & 5th 2017	In person	12h
Senior analyst - Performance & Goals	I1	5 yrs	Sept 12th 2017	Phone call	46'
Senior analyst - People & Management	I4	9 yrs	Sep 16th 2017	Phone call	35'
CFO (Chief Financial Officer)	I7	12 yrs	Mar 8th 2018	In person	40'
Benchmark visit & lean specialist interview (BMW Munich)			Jun 15th 2018	In person	4h
Director - Excellence and Innovation	I10	10 yrs	Jul 25th 2018	In person	1h 56'
Manager - Excellence and Innovation	I11	6 yrs	Jul 25th 2018	In person	52'
VP - Business Development	I12	23 yrs	Jul 25th 2018	In person	59'
Senior analyst - Performance & Goals	I13	5 yrs	Jul 25th 2018	In person	43'
Manager - Strategic Planning	I14	10 yrs	Ago 17th 2018	Phone call	46'
Senior analyst - People & Management	I15	9 yrs	Ago 20th 2018	Phone call	41'
CFO (Chief Financial Officer)	I16	12 yrs	Ago 22th 2018	In person	28'
PMO - Standards, norms & procedures	I17	6 yrs	Sep 21th 2018	In person	60'
	Total	Average	Period		Total
Number of interviews	17	9 yrs	From Jul 6th 2017 to Sep 21th 2018	Interviews	16h
Number of interviewees	13			Observations	16h

Appendix D – Interview protocol

Interview protocol
1.1) What is your current function and department? Do you have subordinates? How many?
1.2) How long have you been working at this organization? And with lean?
1.3) What is your nationality? In what country do you work? Do you have any interface with other nationalities within your work?
2.1) How is the relationship between your organization and the customers?
2.2) How are the processes organized and how standardized are the tasks?
2.3) How is the planning in your organization?
2.4) What is the quality approach adopted by the organization?
2.5) Is the pull system adopted in any degree?
2.6) How are visual signals/information used?
2.7) How is the measurement/performance system?
2.8) How are the teams organized?
2.9) Is there a clear focus to improvement and a structured problem solving? How is the employee participation in that?
2.10) What would you say were/are the main barriers to lean successful implementation at your organization?
3.1) How would you describe your company to a new CEO, who just came from another company? What would be the main characteristics that define your organization? What is valued by leadership? And by the employees? What is encouraged to be pursued? What is desired to be changed? What characteristics seem that will never change?
3.2) What are the dominant characteristic of your organization? What are the emphasis of your organization? What is the glue that holds your organization together?
3.3) What differences or conflicts you believe are due to different nationalities within the organization?
4.1) What are the tensions that you and your unit faced during lean transformation?
4.2) What are the actions taken for dealing with those challenges? To what extent were they successful?
4.3) (explain the dilemma of Flexibility vs. Change avoidance:) What are the actions taken to deal with the fact that: a) people actually disagree with the change/novelty but they do not say it b) people tend to easily drop changes c) the detailed challenges are obscured, making them agree without having the full picture d) the efforts seem unworthy e) it might involve risks and the organization avoid risks f) people simply neglect agreements
4.4) Do you recognize a conflicting demand for improving performance while keeping strong relationships and high commitment among employees? Is there any group of people who think they should choose/prioritize one of both, that they cannot co-exist? In this case, how do they manifest their priority? When/how/why did tension emerge? What are the actions taken by your department to deal with this conflict? Does it differ from other departments? To what extent are those actions successful? What else could be done?
4.5) Do you recognize a tension between punishment and safe environment when managing consequences? Is there any group of people who think they should choose/prioritize one of both, that they cannot co-exist? In this case, how do they manifest their priority? When/how/why did tension emerge? What are the actions taken by your department to deal with this conflict? Does it differ from other departments? To what extent are those actions successful? What else could be done?
4.6) Do you recognize a conflicting demand for providing quality of workers' life as well as professional growth? Is there any group of people who think they should choose/prioritize one of both, that they cannot co-exist? In this case, how do they manifest their priority? When/how/why did tension emerge? What are the actions taken by your department to deal with this conflict? Does it differ from other departments? To what extent are those actions successful? What else could be done?

Appendix E – Exemplary quotes

Factors & Dimensions	Exemplary quotes
Conflict avoidance	“We have a very strong culture of avoiding conflicts in here. So, when something needs to be put on the table, the person simply doesn’t do it” (I3); “I work directly with the president and I talk to him about what needs to be done but he seems to avoid confrontation, creating more KPI’s (key performance indicators) instead of acting directly on the person responsible for the problem. Our culture is of avoiding conflicts yet.” (I6).
Obscure challenges	“Sometimes people propose some change that they don’t even know the magnitude of it. The idea may be simple but the execution is complex. That’s why sometimes the first reaction is to show enthusiasm but afterwards people get discouraged” (I14).
Easily drop changes	“We see people here working to redesign a process without even understanding it. Redesigning for redesigning” (I9).
Neglect agreements	“There are some things asked by the CEO or by the directors that people question a lot. It looks like an anarchy. The guy agrees to deliver something to the CEO by a specific date and he simply do not deliver it.” (I6); “In our company the rules change a lot, and sometimes they are not followed.” (I9)
Lack of discipline	“Here in Brazil there is always a reason for not following the agreement. I feel that they (Brazilians) like to have the processes and procedures defined but that doesn’t mean they will follow them,” (I3)
Efforts seem unworthy	“We like the new ideas but when the time comes to put them in practice, it’s a lot of work. And overload of work discourages people sometimes. You are a human being, you are tired and ‘fed up’.” (I10)
Strong tradition	“We were recently in an event that involves the whole organization and we were watching the company’s founder, who explained how the company worked and the values are the same we have today. This is tradition. (...) Our tradition is very strong, indeed.” (I9).
Open communication	“We have been working for a year telling people to speak up, that we are there to listen, and there will be no type of retaliation” (I15); “Lean has helped us a lot in dealing with our culture of conflict avoidance. The number of meetings we have, the Hansei events, a lot of things the lean team is doing here minimizes this.” (I16);
Sponsor active support	“It’s clear for everyone that we are going to this direction. Our CEO has diffused lean throughout the company as our management system. To be a lean company is one of our strategic objectives.” (I17).
Worker involvement	“We have the Study Action Teams, SAT’s, which are groups that discuss books related to the culture we want to build. We have had more than 250 people involved in this. The president group in on their eighth book.” (I5); “We have created multi-skilled teams to discuss and solve problems together. People participate in the solutions and compromise with the change.” (I6).
Quick wins	“We have started with a very small team, about seven people, working in one specific project.” (I2); “When you show results, when you sell a lean project, it’s very clear that this is the solution so everybody gets excited. No one can say ‘this does not work, I don’t want this’. The results of our first project were so good that we decided to expand the implementation.” (I7).
Paternalism	“The individual evaluation, according to internal feedbacks about this tool, is paternalistic. People protect themselves, because they know they will also be evaluated later and that the information there will count for future decisions.” (I4); “It’s almost a paternalism. I believe people tend to protect their team, the ones closer, to create bonds with people around. And this may favor people that actually perform worse than others. (...) So one may say: ‘That guy was promoted because he knows Mr. so and so.’” (I9).
Mistake tolerance	“We don’t have a culture where deviations bother us. Deviations are easily accepted among all hierarchical levels, from the production engineers to the president. There is a huge accommodation regarding deviations among all of us, probably including me.” (I8); “At the end, we are good in production because ‘when things get ugly, I go there and solve the problem’. Our managers still believe they go there and solve whatever issue exists. It’s 100% hero’s culture.” (I9).
Relationships as a priority	“We had a principle here called ‘Nurture long term relationships’. For me this is LCG main principle” (I1); “I think most people still values more the relationships. For example, our costs are higher than they should be mostly because of relational bonds” (I6);
Sense of owner	“People here truly have a sense of owner. People believe in LCG, apart from the challenges we might face.” (I2).

Factors & Dimensions	Exemplary quotes
High performance	"Our company is going through a hard time, with few contracts, having to reduce costs forcefully and to be more productive." (I8); "We are trying to survive in a market that has turned upside down" (I6);
Defensive mechanism: Regression	"People still protect who are part of their group, who are closely related" (I9). "One of our "hardest" directors was talking about the importance of generating actions during a board meeting. As they could not formally establish who will be responsible and the deadline of each action they agreed on, I sent a list of the actions to him afterwards. He told me to check with everyone else first, although they'd already agreed during the meeting. Some directors ignored it. Others told me to rewrite it in a less aggressive way, leaving the deadlines out." (I11).
Defensive mechanism: Reaction formation	"People manifest their disagreement with gossip, complaints. They are jealous of the lean team because of their closeness to the CEO and their visibility. They use weak arguments against the change, so it's not a constructive discussion. It's about creating conflicts in a company where conflicts are problems, so we get stuck." (I17); "People here have grown hiding problems, specially the middle manager, wanting to be the hero, the one who doesn't bring out problems. You tell these people now they need to talk about problems, which will be taken to the president, they get offended. (...) Until today people fight because they disagree their KPI sign is red. 'It is red because you didn't reach the goal.' But they try to justify the non-achievement, they don't want to have it as a red-sign in their records, although it reflects the actual results." (I10).
Managerial action: temporal & spatial separation	"You have to force the change in the beginning, so we told people what to do and it was mandatory to strictly follow our guidelines. We developed more discipline and delivered a system that generated more value than before. But then we realize it was too rigid. People acted like robots, sometimes in a 'stupid compliance'. Now we have a wider implementation script and we analyze for each context, what really aggregates value." (I11); "Our transformation team had to be a separate unit directly under the president's umbrella. It was like we had a "license" to be the informant and we were trained by the consulting company to do it, to know what problems to escalate. Today we are working on giving back the ninjas (lean-team responsible for follow-up activities) to the project sites and departments or even incorporating their function as the project managers' attributions." (I10)
Managerial action: paradoxical behaviour	"The guy is 40% red in his cost indicator and he says that next month he'll be 100% green. You don't see how the A3 could enable this achievement but if you say so in front of everyone, he gets too exposed and turns away. So we have started to put the A3's to move around, getting feedback and constructive comments from related professionals. (...) The project manager and the commercial team didn't have enough information to manage. Now the information is accurate and available on the wall and the discussions can be more productive. This is how the processes help to reveal and solve the problems" (I11). "It's about the way you promote the changes. I think people understands well the necessity to change, they just disagree with the way it's handled. We were too harsh in the beginning but now we are on the right path." (I16); "We dismiss people for cultural clash, not because they make a mistake. Our CEO believes we need to help them improve their performance. Off course if he constantly makes mistakes, we let him go. And it's the same with the resistance. We want to make sure we have tried everything possible before letting anyone go." (I10). "Our implementation strategy was very effective because we had the top-down, with the president telling everyone to do it, and bottom-up, as we had the ninjas working directly in the operation to make it happen. (I17). "Part of the project includes the discussion of best practices. We need to keep that in mind and make the necessary adjustments along the way." (I16).

4 THIRD PAPER: Case study on the healthcare sector

The third paper has been submitted to AOM in January 15th. It is a single case study on the healthcare sector, entitled “**The interplay of lean healthcare and organizational culture: A paradox theory lens**”. The third paper is co-authored by Alice Erthal, Leonardo Marques and Marianna Frangeskou (from Tilburg University, Netherlands) who has had a minor participation in reviewing the overall paper. Please find it below and note this third paper has been written in American English.

ABSTRACT

The purpose of this research is to use a paradox theory lens to investigate in greater depth what are the cultural tensions in a healthcare organization implementing lean and how such tensions are managed. An in-depth single case study conducted at a private specialized hospital has allowed a classification of cultural tensions according to the four categories proposed by paradox theory - learning, organizing, belonging and performing. The case analysis scrutinizes the role of organizational culture (OC) dimensions and lean principles and practices as either defensive mechanisms that offer resistance to change or managerial actions that support lean implementation. The study offers a guide to managers dealing with cultural resistance that naturally emerges as a response to changes that are needed for a successful lean implementation. To the best of our knowledge, no previous studies have explored the interplay of lean implementation and OC using a paradox theory lens.

Key words: Lean Healthcare, Organizational Culture, Paradox theory.

4.1 INTRODUCTION

Lean consists of a way of managerial thinking that is grounded on a set of principles and practices that emerged in the Toyota Production System (Krafcik, 1988; Womack & Jones, 1996). The principles of value creation, waste reduction and continuous improvement that have been fiercely debated in the manufacturing context (Bhamu &

Singh Sangwan, 2014; Jasti & Kodali, 2014; Stone, 2012), have also stimulated the interest of service organizations (Liker & Morgan, 2006; Malmbrandt & Åhlström, 2013; Narayanamurthy & Gurumurthy, 2016; Samuel, Found, & Williams, 2015; Suárez-Barraza, Smith, & Dahlgaard-Park, 2012). Despite the dissemination of lean, organizations still face obstacles when trying to conduct a successful lean implementation (Martínez-Jurado & Moyano-Fuentes, 2014; Negrão, Godinho Filho, & Marodin, 2016). Challenges in lean implementation result from the need to fully incorporate the principles and practices on daily-basis (Hadid, Mansouri, & Gallear, 2016; Liker, 2004).

Organizational culture (OC) misfit has appeared as a prevailing challenge for lean implementations (Alves & Alves, 2015; Cagliano et al., 2011; Kull, Yan, Liu, & Wacker, 2014; Vest & Gamm, 2009). Assuming that OC is socially and historically constructed and that OC directly influences beliefs and behaviour of the organization's members (Detert et al., 2000; Schein, 1984), it is reasonable to infer that the lean implementation influences and is influenced by the OC previously established within an organization. However, so far this interplay between lean and the OC is under-researched in the management scholarship (Erthal & Marques, 2018).

Cultural clashes derived from the interplay of lean and the OC can be accentuated depending on the industry sector of the organization, as culture exists at a variety of levels (Hofstede, 1998). The bigger the distance of the industry from the automotive sector, the bigger the cultural misfit. One prominent example is the healthcare sector (Gupta, Sharma, & Sunder M, 2016), which presents significant differences from the context where lean was first developed (Andersen et al., 2014; D'Andreamatteo, Ianni, Lega, & Sargiacomo, 2015). Despite the proven benefits of lean implementation in medical and operational outcomes (Gowen, McFadden, & Settaluri, 2012; Harrison et al., 2016; Suárez-Barraza et al., 2012; Vest & Gamm, 2009), the challenges to implement lean in the healthcare reality is still present (Andersen et al., 2014; Gupta et al., 2016). The extant research shows that considerable shortcomings in the delivery of effective and reliable care persist (Boyer, Gardner, & Schweikhart, 2012). Additionally, healthcare organizations frequently interpret lean as a quality-improvement method rather than a strategy for organizational transformation (Harrison et al., 2016). The lack of reliable evidence of

successful lean implementation in healthcare organizations indicates resistance from healthcare professionals to adopt lean. Hence, there is a call for more empirical studies exploring lean implementation (Andersen et al., 2014).

For this reason, this study aims to explore the interplay of lean and OC in a healthcare context/environment. Paradox theory provides a useful lens to such an endeavor (Lewis, 2000). This theory states that a paradox “entails a both/and mindset that is holistic and dynamic” (Lewis & Smith, 2014:129). In other words, a paradox represents opposing forces that should coexist and thus be managed instead of insisting on a decision in favor of one or the other. The paradox theory lens in this study is motivated by complementary reasons. First, organizational changes accentuate organizational tensions (Cameron, 1986). As lean implementations promote significant and continuous changes throughout the organization, this process is constantly creating tensions (Eisenhardt & Westcott, 1988), in particular related to the OC (Bortolotti et al., 2015). Second, lean itself carries paradoxical principles, such as flexibility versus standardization, and employee empowerment versus strict control (Peltokorpi, 2008; Womack et al., 1990; Yoon & Chae, 2012). Third, the healthcare organizations face their own tensions such as limited time and resources to invest in customer service versus employee training, while being challenged by increasing costs and stringent customers that expect better patient care standards (Cleland, Roberts, Kitto, Strand, & Johnston, 2018).

Despite the fit of the paradox theory as a theoretical lens to study lean implementations, to the best of our knowledge no previous study has specifically addressed the interplay of lean healthcare and OC, except for one study by (Maalouf & Gammelgaard, 2016). However, this study does not directly address OC in lean implementation neither the specificities of the healthcare sector. In order to fill this gap, we ask the following research question (RQ): *How are cultural paradoxes managed in a healthcare organization going through a lean implementation?* To answer this question, we have conducted a single-case study at a private specialized hospital that is going through a lean transformation. On the one hand, this hospital embraces 75% of the market-share in the state where it operates while achieving a 95% rate of customer satisfaction. The selected case is also peculiar for being a family-owned business, which are known to have strong relational bonds and

emotional commitment. Strong bonds and commitment promote loyalty and a sense of belonging among workers, at the same time that it inhibits the manifestation of disagreements or questioning (Ainsworth & Cox, 2003) and leads to a less professional management approach (Tanure & Duarte, 2005). Those cultural traits are also found in healthcare organizations (Powell & Davies, 2012; van Leijen-Zeelenberg et al., 2016).

The case fits in our study because, on the other hand, the hospital faces increasing competition and the country is under a severe economic crisis. Adopting an abductive approach, we have conducted semi-structured interviews with employees from a variety of hierarchical levels and departments as well as we have experienced 38 hours of participation in lean workshops in the focused healthcare organization. The case analysis revealed examples of the four types of paradoxes suggested in the literature, that is, the paradoxes of learning, organizing, belonging and performing. We discuss how OC traits support the defensive mechanisms that resist to change as well as how both OC and lean elements promote the managerial actions necessary to overcome such resistance.

4.2 THEORETICAL BACKGROUND

4.2.1 Lean Healthcare

The successful results achieved by Toyota in the last decades have stimulated researchers and practitioners to delve into its managerial system to understand how to reproduce its characteristics in other organizations (Narayanamurthy & Gurusurthy, 2016). The worldwide dissemination of lean began with an attempt to implement some of the lean practices, such as value creation and the pull system. As a result, the recurring failures have raised the acknowledgement that the adoption of isolated practices are not enough (Hadid et al., 2016; Liker & Morgan, 2006). Several decades after the consolidation of the Toyota Production System, lean is now widely understood as a socio-technical system (Bortolotti et al., 2015; Hadid et al., 2016; Shah & Ward, 2007), which aims to maximize efficiency through waste elimination,

continuous improvement and commitment of the members of the organization (Womack & Jones, 1996).

The understanding of lean as a holistic socio-technical system grounded in principles more than practices has allowed lean implementation in industries other than the automotive (Liker & Morgan, 2006; Malmbrandt & Åhlström, 2013). Within service organizations, one prominent sector is healthcare. Hospitals and other healthcare organizations around the world are facing growing demands to improve efficiency and effectiveness to deliver higher-quality service with fewer resources (Blumenthal & Dixon, 2012; Ferraz, 1998; Hung, Martinez, Yakir, & Gray, 2015; Paim, Travassos, Almeida, Bahia, & Macinko, 2011). Lean has been increasingly identified as the way to fulfil these demands. The extant literature reports benefits of lean implementation in improving both medical and operational outcomes, such as decrease in length of stay, increase of patient satisfaction (Dickson et al., 2009) and job satisfaction (Holden, 2011), safety improvement (M. L. Smith et al., 2012), quality improvement and waste reduction (Condell, Sharbaugh, & Raab, 2004; Morganti et al., 2014).

However, despite the above accomplishments, healthcare organizations face particular challenges when trying to implement lean. First, the difference from the automotive sector, as the healthcare sector involves higher complexity and higher variability of inputs and outputs. Second, lean is often perceived only as a quality improvement method rather than a holistic and integrated management system (Harrison et al., 2016). As a result, lean healthcare tends to be implemented in a superficial way, focusing on simple tools and techniques (Costa & Godinho Filho, 2016). This simplification inhibits the achievement of lean's full potential that includes mindset transformation (D'Andreamatteo et al., 2015; Hung et al., 2015). Third, the profile of healthcare professionals who are mostly autonomous and lack managerial skills leads to resistance to lean. The physicians' resistance to standardized work, their unavailability to work on improvement efforts, and the resistance to transfer management responsibilities to non-physicians are some of the barriers found (Hung et al., 2015). In addition, a fourth challenge is the lack of reliable evidence and the methodological limitations of existing studies which may undermine the validity of the

results, therefore reinforcing the resistance (Andersen et al., 2014; Vest & Gamm, 2009).

We posit that the underlying element common to all those challenges is the OC of the healthcare organizations implementing lean. There is a growing consensus that OC plays a fundamental role in lean implementations (M. L. Smith et al., 2012) but how specific OC dimensions affect lean implementations is still unclear (Andersen et al., 2014; Goodridge et al., 2015; Harrison et al., 2016).

4.2.2 Organizational Culture

Culture is a complex concept that has been widely studied by management scholarship (Hofstede, 1998; Hutnyk, 2016; Schein, 1984; T. B. Smith et al., 2011; Song et al., 2018). Despite the divergent definitions of culture available, Detert et al. (2000:851) propose that “there is some consensus that organizational culture is holistic, historically determined, and socially constructed, and it involves beliefs and behaviours, exists at a variety of levels, and manifests itself in a wide range of features of organizational life”. In other words, external influences build a set of common values within a group, which will consequently influence the behavior and beliefs of the group’s members (Hofstede, 1980; Jarnagin & Slocum, 2007; Schein, 1984). Therefore, it is reasonable to expect that significant organizational changes due to lean implementation both influence and are influenced by the beliefs and behaviours previously established within an organization. It is also reasonable to assume that these clashes will expose the organization to a variety of paradoxes when OC traits and changes due to lean implementation need to coexist.

4.2.3 Paradox Theory

Paradoxes are described as tensions raised by conflicting demands or perspectives inherent to organizations, denoting the complexity, diversity and ambiguity of organizational life (Cameron, 1986; Lewis, 2000; Luscher & Lewis, 2008; Poole & Van de Ven, 1989). The paradox theory suggests that when facing a paradox, organizations tend to choose the side that is more familiar to the group, raising defensive mechanisms that block the other side of the paradox. To counterbalance these defensive mechanisms, organizations must manage the tensions by exploring

ways to simultaneously comply to the apparently opposing forces (W. K. Smith & Lewis, 2011). This effort is referred to as managerial actions that can effectively manage the tensions thus allowing long term performance (Lewis, 2000).

In addition to the promotion of cultural tensions by a lean implementation, the suitability of the paradox theory lens in this context is reinforced by paradoxical nature of the lean thinking itself (Liker, 2004). Relevant paradoxes within lean implementation identified in the extant literature include the flexibility versus standardization paradox (Adler, Goldoftas, & Levine, 1999; Maalouf & Gammelgaard, 2016; Pereira, Ro, & Liker, 2014), and the contradiction of a faster product development supported by the delay in product definitions (Biazzo, 2009; Malak, Aughenbaugh, & Paredis, 2009; Ward, Liker, Cristiano, & Sobek II, 1995).

Despite the prevalence of those two paradoxes in the lean literature, the paradox theory proposes four main types of paradoxes, i.e., learning, organizing, belonging and performing. The paradox of learning emerges from an increase in the complexity in the environment, revealing the need to reframe past beliefs, understandings and practices in order to construct new and more complex references that are able to deal with the new context (Lewis, 2000). It concerns, therefore, the tensions between the past, internalized knowledge and the uncertainty of the future and the new challenges. The paradox of organizing results from the effort to balance opposing forces that encourage commitment, trust and creativity while maintaining efficiency, discipline and order (Lewis, 2000). Hence, it relates to opposing forces of empowerment and direction, collaboration and competition, flexibility and control (W. K. Smith & Lewis, 2011). The paradox of belonging relates to the tensions between the individual and the collective, and between competing roles, increased by the conflicts of belonging to multiples groups and subgroups. The challenges here concern respecting individuals at the same time as promoting integration and interconnections within groups (Lewis, 2000; W. K. Smith & Lewis, 2011). Lastly, the paradox of performing emerges from conflicting demands of different stakeholders that lead to competing measures for assessing managerial success (W. K. Smith & Lewis, 2011). In other words, in this type of paradox the organization and its members are required to achieve multiple goals (Cleland et al., 2018).

In this paper, we explore the four types of paradox. We expect to identify additional cultural paradoxes involved in a lean transformation, other than the ones already addressed by the literature. Furthermore, the unfolding of the paradoxes into defensive mechanisms and managerial actions, as proposed by (Lewis, 2000), can offer a better understanding of the dynamics embedded in the cultural tensions of a lean implementation, a subject still under-researched in OM/BA literature. On the one hand, we propose that the existing OC may support both defensive mechanisms and managerial actions during lean implementation. On the other hand, lean principles and practices may work as managerial actions that may support the cultural change that a successful lean implementation demands. Figure 11 demonstrates this theoretical framework.

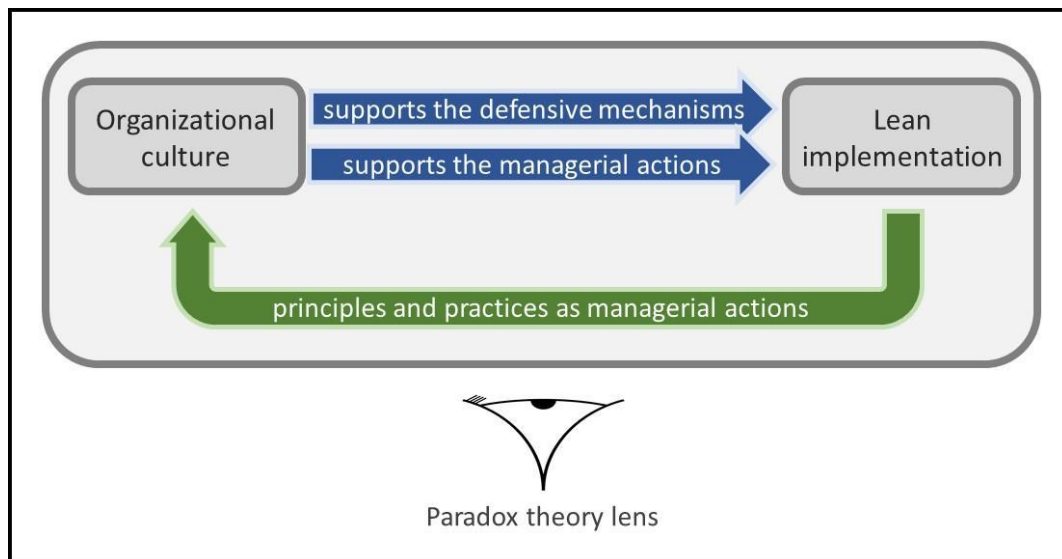


Figure 11 - Conceptual framework

4.3 RESEARCH METHODOLOGY

4.3.1 Research Design

Our research explores a theory-elaboration strategy as we start with a framework based on literature from both lean and paradox theory, and use a case study to allow the reconciliation of general theories (i.e. lean and paradox theory) with contextual idiosyncrasies (Ketokivi & Choi, 2014). We elaborate theory through an abductive logic. According to (Sinkovics & Alfoldi, 2012:11), the abductive approach:

“...involves using existing theoretical explanations to make inferences about data, and accommodating surprising or anomalous patterns by modifying the existing theory, with the ultimate aim of finding the most plausible way to explain what is happening.”

The constant confrontation between the data and the theory proposed by the abductive approach together with an in-depth single case study allow the acquisition of a substantial amount of data and a profound analysis. A case study suits soft themes such as culture, “*when the boundaries between phenomenon and context are not clearly evident*” (Yin, 2009:18). Similarly, as lean is a socio-technical intervention, inherently context-dependent, there are no clear boundaries between the intervention and its context (Andersen et al., 2014; Davidoff, 2011). Hence the choice of such research design.

The unit of analysis of the present study is the organization as our subject of analysis is the interplay between OC and the lean implementation. “Culture is a characteristic of the organization, not of individuals, but it is manifested in and measured from the verbal and/or nonverbal behavior of individuals – aggregated to the level of their organizational unit” (Hofstede, 1998:479). Denison, Nieminen, and Kotrba (2012) corroborate the above definition by identifying a shift from individuals to organizations as the primary unit of analysis in OC studies. Therefore, although the tensions and the defensive mechanisms manifest at multiple levels (Lewis, 2000), on the present study, we focus on ambiguous messages and contradictory systems at the organizational level.

4.3.2 Case Selection

This in-depth single case study was conducted at a private specialized hospital with two units in Brazil, here referred as LH. A recent systematic literature review on lean healthcare has identified only two studies conducted in Brazil, indicating a significant opportunity for future investigation in this emerging economy (Costa & Godinho Filho, 2016). The hospital selected was founded by two physicians in 1985, who still ran the hospital in 2018. The board of directors have accompanied the founders for decades, as well as most employees. LH has been the market leader in its region and sector, keeping the customer satisfaction rates of 95% in 2018. LH has been selected

because of its long-term effort to implement lean as well as by the positive results achieved.

LH started their lean program in 2013 focusing on the top management. The participants had classroom training on lean concepts followed by the development of a lean project with the support of the lean office. Other participants were added in subsequent years and, by 2018, the lean office had directly involved more than 150 employees of all organizational levels, departments and units. The program had not only contributed to lean dissemination and to a cultural transformation at LH, but it has also promoted positive operational and economic results. The 169 projects conducted in the first six years of the lean program have achieved savings of about U\$2 million. The program has also delivered less tangible results, such as improvements in patient and worker experience, the risk management and healthcare assistance performance.

4.3.3 Data Collection

Our research has been based on three data collection methods (Eisenhardt & Graebner, 2007): semi-structured interviews, participant observation of annual workshops and analysis of archival documents. Semi structured in-depth interviews were conducted with a range of LH workers, capturing the perspective of all organizational levels. This has allowed the understanding into the mindset and values of the organization as a whole and of its members, which is fundamental in research in both paradox theory (Yoon & Chae, 2012) and OC (Hofstede, 1998; Schein, 1984). In total, 15 interviews with managers and staff members from both administrative and assistance functions were conducted. Some interviewees were directly involved in lean implementation and others have been affected by the changes derived by the lean initiatives.

All the interviews had an average duration of 45 minutes and were transcribed (77,541 words in total). The interview guide has included questions regarding the interviewee experience at LH and with lean, the degree of adoption of lean principles and practices and the LH culture as its main characteristics, behaviors and values. The paradoxes have been addressed by questions regarding tensions and barriers faced as well as the initiatives adopted by the organization and individuals. The

interviewees have been working at LH for an average of 10 years (ranging from two to 32 years). Such diversity has enriched the case analysis. See Appendix F for the detailed list of interviews and workshops. The interview guide may be provided on request.

Additional to the semi-structured interviews, researchers have attended and have participated in annual organizational workshops. During these annual workshops, LH members present the lean projects they have conducted throughout that year. The board of directors and external lean healthcare professionals evaluate the projects. For two consecutive years (2017 & 2018), the main author was invited to join the jury members. The nine workshops throughout those years gave a wider perspective of the lean transformation process at LH, revealing their challenges and accomplishments. The closer contact with LH employees and leadership has contributed to data interpretation, as advocated by Van De Ven and Johnson (2006). Archival documents, such as internal reports and general publications about the organization and the healthcare sector has been used to enrich the understanding of LH and of healthcare context.

4.3.4 Data Analysis

The data was analyzed through qualitative coding conducted in two cycles, following a progressive approach (Sinkovics & Alfoldi, 2012). In the first cycle, we have classified the OC traits and the lean elements. The second coding cycle has consisted of grouping the elements into OC dimensions, lean principles/practices and barriers to lean implementation. The next step has been to highlight consensus and identify contradictions both intra and inter each construct, within and across interviews. The contradictions have indicated the existence of organizational tensions, which were further classified into the four categories of paradox - learning, organizing, belonging and performing. Each paradox was then unfolded into underlying tensions, defensive mechanisms and managerial actions. We have identified how the OC traits and lean elements impact each paradox and its elements.

4.3.5 Research Quality

Steps were taken to minimize potential sources of bias within this study, including a triangulation method for data collection that was employed to minimize the effect of the researcher's insider perspective, and to increase the validity of the findings (Edmondson & Mcmanus, 2007; Stake, 1995). Moreover, the researcher was able to validate the collected data in a number of different ways throughout the data collection process. Firstly, the use of different methods to collect the data was beneficial for assessing it, as findings were compared from different perspectives. Spending a lot of time with the study participants also allowed for the development of close relationships and a consequently greater ability on the part of the researcher to fully capture the meaning of practitioners' responses. The development of these relationships also meant that practitioners were sufficiently comfortable to share important information that may not otherwise have been communicated.

4.4 CASE ANALYSIS

4.4.1 OC Traits and Lean Elements

The case analysis reveals an interplay between OC and lean. We have grouped the OC traits in four OC dimensions (see

Table 7) and we have mapped lean principles and practices (see Table 8). In both tables we provide exemplary quotes and the total amount of quotes. The first OC dimension highlighted is the *strong tradition* found at LH. The founders of the organization are still present on a daily basis, directly reassuring the organization's values to all workers: "They come and talk to us, even here in the administrative building" (I10). Similarly, the board of directors and some other employees have been working at LH since its foundation (8 quotes). Throughout the years, they have been able to consolidate LH's expertise and a history of success, reflected in the market share leadership and in high levels of customer satisfaction (23 quotes). Consequently, LH members are not used to question the status quo: "We operate in the autopilot mode, we are not used to question our routines" (I12).

Table 7 - OC traits and exemplary quotes

OC traits	Total	Exemplary quotes
1. Strong Tradition		
Do not question the status quo	5 quotes	"It's that thing when people ask 'why are you doing this?', and the answer is 'it has been like this since I got here.'" (14); "We always think there is no other way of doing something we are used to do." (114)
Excellence in assistance and market leadership	23 quotes	"LH is the market leader, practically with no competitors at the same level, and very successful in what it does." (11); "We are a center of reference in our specialty, and this is a fact because we have the professionals and we have results that show this. It's not just saying, we have actual results." (19)
Intensive presence of founders on daily basis	6 quotes	"The hospital founders work directly in here. They are two physicians who are extremely involved with daily routines and with the results." (13); "Sometime the owner (of LH) calls me to say he is seeing that some printer is not working properly. I mean, he talks about the minimum details concerning everything that happens in here." (18)
Long-term employees, highly experienced	8 quotes	"Our history of success was built by those leaders who have been here since the beginning, the ones who haven't changed." (112); "We have many long-term employees and all the departments' leaders have been working here for twenty years." (12)
2. Parochial, unprofessional		
Horizontal segregation	8 quotes	"There was no union of all the departments to know that the necessity of an expensive medication must be previously informed so that we can receive it in time." (112); "Most of the departments have one manager for each unit and each one is focused on his/her own issues." (18)
Unstructured HR department	7 quotes	"People develop themselves more when they get involved with the lean department than from the HR initiatives." (17); "We used to have a personnel department instead of a strategic human resources department, which should aim in developing people through a career plan and everything." (14)
Internal promotion without prior knowhow	10 quotes	"The managers do not have the abilities to manage. The managers used to be the ones who perform well in their prior functions." (17). "A lot of promotions here happen without management knowhow because the leadership intend to have more people like that one being promoted in the sector." (115)
Lack of effective measurement systems	11 quotes	"All the information is in the system. Yet, the technicians make the same registration many times, and the physicians also register the monitor's information in the paper when their shift ends. This rework is unnecessary." (111); "We had a culture of registering the information, more related to the assistance of patients. But each one had their own information, there was no universal language for that." (113)
Poor managerial skills and processes	19 quotes	"Management is a challenge in Healthcare, everything is new to us, specially for our current leaders. They have an older and more traditional formation." (12); "They are not used to follow the schedule and everything." (15); "It's a lack of skills among those leaders who think they just need to lead the daily activities. But they also need to think how to do their work better in the future." (11)
Waste, re-work	12 quotes	"Each member of the team had his own file with the same information than the others but with different standards. So we used to hear 'get his file, his is a more complete file.'" (112); "The physiotherapists always complain that there was something missing when they were ready to settle the procedure." (114)
3. Hero-leader		
Humble, shy attitude among shop floor workers	7 quotes	"We used to ask 'why don't you show this to other people?', but they were afraid the other would think they are showing off." (15); "I'm apprehensive about presenting information to the other. For me the data may be clear, but what if the others do not think so." (111)
Immediacy, firefighting	8 quotes	"I think, humanly speaking, that it is much easier to directly think about a solution, which could not be the best one, than to work on the problem, unveil the issues involved and compromise with the others about the actions." (113); "We still put out fires a lot." (12); "I recognize sometimes I end up not thinking about the real problems because I'm always putting out fire." (19)
Physicians seen special entities	5 quotes	"Physician is God. Before God, the physician is the last door. After that, only God." (16); "I'm used to joking that physicians are special entities. But we need to understand them, because they live a more rough and competitive life." (14)
Problems seen as failures	9 quotes	"When we were in training and someone came up with the problem, everybody got desperate." (110); "It's hard to make a mistake. It used to raise insecurity, because they were looking for who to blame." (112)
Straight instructions, low empowerment	15 quotes	"We have a very centralized culture." (19); "People may use the name of the founders to get something done. Sometimes they are not even aware of it." (15); "They love and fear the owners at the same time." (16)
4. Employee orientation		
Caring, receiving, welcoming environment	9 quotes	"I have always had great leaders and I think everybody here is very humanized and caring with each other." (110); "People feel that somehow they are taken care in here" (12); "Once you enter LH, you feel welcomed and cared, and this is true in all the departments." (114)
Feeling of belonging, of family, of union	9 quotes	"Our staff here is like a family, the workers know each other, it is a joyful environment." (11); "Despite our growth, we didn't lose the idea of being a family. We have this idea of a warm family." (13)
Loyalty, Engagement, gratitude, love - both ways	31 quotes	"LH started as a dream of two (people) and today it's the dream of I don't even know how many. (...) I once told the directors, 'you are responsible for the smile in my child's face, for our food and our shelter' ". (17); "I notice people are proud to work here. (19); "The company is grateful to the employees, to the years they have dedicated to LH." (14)
Opportunities to grow internally	12 quotes	"I believe the company gives opportunities to workers. I've seen workers from a variety of sectors start as a technician or assistant and then grown in here. LH stimulates us to grow." (19); "Here someone is promoted because he/she has done a good job." (12)
Present and close relationship with leaders	12 quotes	"The founders try to keep that warm contact with the employees." (110); "The leaders are present and available on daily basis to talk to and hear the workers." (115).
Workers seek learning and development	5 quotes	"I have always wanted to be included in new challenges because I don't see it as more work, I see it as a learning opportunity." (17); "We are always searching for training, for new knowledge." (110)

Table 8 - Lean elements and exemplary quotes

Lean elements	Total	Exemplary quotes
Continuous improvement mindset	20 quotes	"We think somethings cannot be fixed. But with lean we learn to see them in different ways and to find opportunities to improve our daily activities. And this helps a lot." (I14); "We have been questioning some paradigms. For example, for certain procedure, we say we need 10 compresses. When was this measured? Does it make sense? Are we taking the highest quantity ever needed as our standard?" (I1)
Evidence based & KPI's	29 quotes	"We demand evidences in numbers when someone asks for anything now. They already know this is the only way to justify their need." (I7); "There are lean tools such as 'current reality tree', for example, that show us we really need to analyze the problem through measurements, identify the root causes and solve them."(I10)
Flexible and paradoxical approach	20 quotes	"We adapt the practices to our reality, off course. It does not have to be too restrained." (I5); "Sometimes we can do great and sometimes we can only do good. We keep trying and we know we need to have flexibility and common sense." (I4)
Focusing on value creation aligned with the organizational strategy	10 quotes	"I have to tell you. I was worried the lean initiatives would find some serious barriers. But lean implementation was so strong as our new strategy that people felt they didn't have much of a choice. They understood this was a new vision of the company and people need to follow it."(I8); "The lean projects have saved us time to do what really matters." (I11)
Horizontal integration & holistic view	35 quotes	"Today we can see LH as a wrapped-up process." (I7); "We have achieved an integration with the quality department, IT, marketing, HR... I mean, we were able to take lean thinking as a systemic work, more and more integrated." (I4); "The lean teams are a mix of hierarchical levels and functions, so that it allows the understanding of daily routines and problems of the others." (I9).
Patients' involvement and closeness	3 quotes	"We have involved the patients in the safety process, for example. (...) For the next year, we'll have patients' committees so that we can co-create processes and redesign them with the direct contribution of the patients."(I1); "We have improved our understanding about the patients' needs with a project called the patient's experience. We want to go deeper in their experience in each stage they go through here." (I2)
Leadership support	14 quotes	"In the first lean training, the owner spoke and shone. He gave the right message to promote the engagement." (I6); "The multifunctional projects work because of the leadership support. Our manager is present in the major decisions and she is always there to make things happen." (I13)
Open, clear and visual communication	11 quotes	"I used to be stressed out because my team was not able to give me the updated information on the waiting line, for instance. They didn't communicate with each other. Now we have a board the receptionists feed and it's all organized and visible to everyone." (I12); "We now have the visual management boards that we use to celebrate the good results, which used to be hidden, and also to identify the problems and involve the workers in the solutions." (I7)
Proactive planning and organizing	13 quotes	"With lean, we have organized and standardized somethings, and this improved a lot our work. Now we know what we have, what and when we need to purchase the materials... It helped a lot." (I14); "From the second year on of the lean implementation it was easier to work because we know we had to plan the initiatives, indentifying the problems first, then following the further steps." (I11).
Lean department as internal consultants and change agents	23 quotes	"It's only three in the lean department to deal with more than sixteen hundred employees. Such a huge challenge. I see them as fundamental in here, their department must exist forever." (I8); "I'm not saying that the lean team came as life saver, but to me they did." (I12)
Promoting commitment	55 quotes	"We work as a team, so people give their opinions, agree, disagree, interact, build on each other's comments... we build the projects together." (I3); "We have changed our implementation strategy in two ways related to promoting commitment. The first was to receive internal demands for projects, instead of only having them established by the leadership. The other was to train our workers so that they could lead the lean projects as well." (I1)
Recognition & rewards	16 quotes	"The residency program, that we copied from Medicine, consists of a dedication of 40% of their time to lean. This program motivated and raised the self-steam of the lean residents, who had high capabilities but were not seen or recognized." (I4); "We started working with rewards. (...) We always give something to the ones who stand out. (I11); "We are always reinforcing in our department that if we win a prize with the project, we will share it with everybody involved."(I14)
Waste reduction, simplification	18 quotes	"I see in my work that we can strongly minimize the waste of time. Sometimes we get around to reach a goal and we could do it in a much smaller period of time, as we find out using the VSM (value stream mapping), for example." (I10); "We didn't have this way of thinking about simplifying everything. Make things simpler and more consistent as possible." (I11)

The second OC dimension is the *parochial/unprofessional style*. LH has shown poor managerial skills and processes, as the leaders' background related to assistance rather than management skills (19 quotes). Aligned with that, the measurement systems are related to assistance indicators, "often redundant and inefficient" (11 quotes). We have also found a segregation among departments and units, lacking efficient communication and standardized procedures common to different departments or between the two units. One unit was created decades after the other. As so, "the infrastructure was designed according to recent demands and most of the workers were more recently hired" (15). Each unit has its own leadership and structure. Looking at a lower level, there are significant differences among departments, mainly but not exclusively, between assistance and administrative functions. The HR has not been structured (7 quotes), and the leaders have managed the organization without any formal written procedures, but 'by heart', doing what they believe is the best for the organization and its members. There is no structured plan for people's development and internal promotions are conducted without the necessary knowhow for the new function. We have also identified recurrent examples of re-work and waste throughout the organization (12 quotes), with information, control and materials whether redundant or missing.

The third OC dimension is the *hero-leader style*. LH culture is historically based on command and control, with straight instructions and low empowerment (15 quotes). Shop floor workers, such as technicians and administrative assistances, are usually humble and shy, avoiding to share problems and achievements: "They will think I'm showing off" (15). Leaders are expected to give immediate solutions (8 quotes) and problems represent failures rather than opportunities (9 quotes). Physicians are seen as "special entities" (14), playing a crucial role for the core activity of the hospital. A busy schedule and their role as clients instead of employees aggravate the perception of their differentiation from the others.

The fourth and last OC dimension is the *employee orientation*. All the interviewees have highlighted the caring and welcoming environment of the organization, the feeling of belonging and union: "this union LH has with its workers, this umbilical cord, is well worked." (14) Particularly, some employees have used the metaphor of LH being a "mom" to the employees. Loyalty is a two-way road (31 quotes). As LH

has long promoted a good working environment and long-term and closer relationships, in turn, members have been engaged, grateful and satisfied for being part of LH: “People like working in here, they are proud and grateful” (13). Moreover, LH has offered opportunities to workers’ development and growth (12 quotes) and workers have shown willingness to learn and grow as well (5 quotes).

Regarding the lean elements, we have identified principles and practices adopted by LH throughout their lean journey (see Table 8). They were applied by the lean program and its projects as well as by ad-hoc initiatives conducted by LH members on their routine tasks. Promoting commitment is by far the most cited lean element (55 quotes), followed by the implementation of an evidence-based approach using key performance indicator (KPI’s). A nurse manager note that people are engaged and empowered through the evidence-based approach as “if they understand what the actual problem is, we can work on the proper solutions together.” (17). Another key lean initiative is having lean department as internal consultant and change agents (23 quotes). The promotion of the continuous improvement mindset and the flexible approach when implementing the changes complement the set of the most cited lean elements. The main ideas are that “we are always re-evaluating what has been done and changing whatever is needed to improve more” (15), “always respecting what is feasible and considering patients as a priority” (18). The exemplary quotes in Table 8 describes the other eight lean initiatives implemented. In the following subsections, we detail the role of the OC traits and of the lean elements, as we discuss the cultural paradoxes that emerged from the clashes between LH culture and lean thinking. Table 9 summarized those findings.

Table 9 - OC traits and lean elements in four types of paradox

OC dimensions	Paradoxes				Lean elements
	LEARNING	ORGANIZING	BELONGING	PERFORMING	
1. Strong Tradition					
Do not question the status quo*	DM	DM	DM	DM	Continuous improvement mindset** Leadership support
Excellence in assistance and market leadership	DM			DM&MA	Focus on value creation aligned with the organizational strategy
Intensive presence of founders on daily basis	DM			DM	Evidence based & KPI's**
Long-term employees, highly experienced	DM		DM	DM	Flexible and paradoxical approach**
2. Parochial, unprofessional					
Horizontal segregation		DM	DM	DM	Horizontal integration & holistic view Leadership support
Unstructured HR department*	DM	DM	DM	DM	Focus on value creation aligned with the organizational strategy Recognition & rewards**
Internal promotion without prior knowhow					
Lack of effective measurement systems	DM	DM		DM	Evidence based & KPI's** Open, clear and visual communication
Poor managerial skills and processes*	DM	DM	DM	DM	Proactive planning and organizing
Waste, re-work			DM	DM	Waste reduction, simplification Patients' involvement and closeness
3. Hero-leader					
Humble, shy attitude among shop floor workers		DM	DM		Recognition & rewards** Open, clear and visual communication
Immediacy, firefighting*	DM	DM	DM	DM	Proactive planning and organizing Leadership support
Physicians seen special entities	DM		DM	DM	Promotion of commitment** Flexible and paradoxical approach**
Problems seen as failures	DM	DM		DM	Continuous improvement mindset** Open, clear and visual communication
Straight instructions, low empowerment		DM		MA	Evidence based & KPI's** Promotion of commitment**
4. Employee orientation					
Caring, receiving, welcoming environment			MA		
Feeling of belonging, of family, of union		DM&MA	MA		Evidence based & KPI's**
Loyalty, Engagement, gratitude, love - both ways	MA	MA	MA	DM&MA	
Opportunities to grow internally	MA	MA			
Present and close relationship with leaders	MA	MA	MA	MA	
Workers seek learning and development	MA	MA	MA	MA	

*Defensive mechanisms present in the four types of paradox

**Managerial actions present in the four types of

DM = defensive mechanisms; MA = managerial actions

4.4.2 Paradox of Learning

The paradox of learning concerns the conflict between old and new knowledge (Lewis, 2000). With a long history of excellence in assistance and long-term employees, LH now faces the challenges of improving managerial and problem-solving skills to cope with a lean implementation in a context of an economic crisis: “We have some leaders who had built our history of excellence, who resist to change because they say ‘what do I need to do better if I already do the best’.” (I4). We have identified how OC traits and the lean elements support the defensive mechanisms and the managerial actions adopted in response to the new context, as following detailed.

One example of defensive mechanism is resistance to change as “people are reactive and they reject some initiatives proposed without even testing them.” (I4). Such resistance is stronger among long-term members, as they “master the job and do not believe someone else knows a better way to do it” (I12). Another defensive mechanism is viewing lean initiatives as additional work. The supply manager mentions that some people used to think “here comes the lean again. I’ll have to spend 4h in training while I have so much work to do” (I8). This resistance to the acquisition of new knowledge is supported by some LH cultural traits. All the elements of a *strong tradition* clearly support the defensive mechanisms aforementioned, inhibiting the efforts to build a new and more complex reference to deal with the new scenario. Along with that, the *hero-leader* dimension also influences the defensive mechanisms, with its cultural traits of firefighting, where physicians and leaders assume they have all the solutions to the problems, and every problem is seen as a failure: “The physician is at the bedside, and all he wants is to take care of his patient and to have his successful results.” (I12); “Here we make a lot of fast decisions because we are dealing with lives and there is not much time to think.” (I8). The parochial/unprofessional dimension plays additional role in the support of the defensive mechanisms. The absence of a strategic HR and of managerial skills among leaders make it harder to institutionalize the need for the new knowledge acquisition: “I was invited to join the first training. It was strange for me, everything was new, all the tools... I really did not know how to apply what I was

learning.” (I11). The lack of efficient measurements to depict processes and results disguises the necessity for change and improvement: “Sometime people do not recognize or see the problem, they don’t see it. Because we are at a hospital, we don’t have a strong culture of measurement. There is no indicator to serve a reference of what is under or above the expectations.” (I5).

The adoption of lean principles and practices counterbalance the defensive mechanisms aforementioned. The continuous improvement mindset promotes the idea that it is always possible to achieve better results (I1; I7, I10). The principle of actions based on evidence through the KPI’s outweighs the lack of measurement culture: “our effort is to demand that people demonstrate that something cannot be done in a better way in order for them to keep the current way. So we need measurements and follow up.” (I4). LH is intensively promoting engagement, recognition and rewards and the outcomes are positive: “We decided to train our employees so that they could lead the lean projects. When we did that, the lean expanded tremendously within LH.” (I1); “At the annual lean workshop this year, they gave each of us (the lean residents) a belt, with our names in gold, so nice... such a recognition that no money pays it off.” (I8). The leadership support also acts as a managerial action to deal with the paradox of learning: “All the leaders support and participate in the lean initiatives. Today our unit’s director was here picking up some boxes for a lean project she sponsors. She has more than 20 years here, this is very interesting to see.” (I10). In addition, having a process department working as internal lean consultants and adopting a flexible and paradoxical approach were key to successfully managing this paradox: “The best part is that the lean team is always available to any kind of demand we might have. (...) They help make our departments better and by doing this, they disseminate the lean thinking” (I7).

Additionally, we found that the OC dimension of *employee orientation* supports the managerial actions adopted to counterbalance the defensive mechanisms. The loyalty, love and gratitude from the employees to the organizations and vice-versa promotes a safe and favorable environment for engagement to new learning: “I’m very grateful for having worked here for the past 10 years, for being part of the lean projects. All my professional knowledge I’ve learnt in here.” (I10). The internal

opportunities to grow and the workers seeking development corroborate: “It’s nice because the physicians like to acquire new knowledge.” (I5); “I see in all the nursing team a movement towards qualification, always attending conferences and specializations.” (I9).

4.4.3 Paradox of Organizing

The paradox of organizing results from the effort to balance opposing forces that encourage commitment, trust and creativity while maintaining efficiency, discipline and order (Lewis, 2000). Hence, it relates to the conflicts of empowerment and direction, collaboration and competition, flexibility and control (W. K. Smith & Lewis, 2011). We have identified underlying tensions related to this type of paradox. LH leaders are admired and used to give straight instructions, which are followed by loyal, grateful, and humble workers. Additionally, redundancies are part of the processes, as pointed by the lean specialist: “We get so used to some redundancies that we don’t even question them”. (I1). Lean implementation creates a tension in that it stimulates LH members to questioning the status quo, eliminating waste and continuously improving processes and results. A director recognizes that “the company needs to mature in the sense of delegation and empowerment” (I4) in order to manage this tension.

We found that LH members avoid exposure and are scared of punishment to some degree (I1, I12, I14): “I’m on my comfort zone and I will not expose myself.” (I7). Therefore, they tend to do whatever they are told to (I1, I2, I7). The cultural traits of the *hero-leader* dimension, i.e., humble attitude among shop floor workers, the straight instructions and low empowerment, and problems seen as failures reinforce this behaviour. Moreover, the feeling of family, present in the *employee orientation* dimension, raises the perspective of leaders seen as fathers/mothers, who are expected to “know better” and to have all the answers (I1). Recognizing re-work as value is another defensive mechanism that hinder the questioning of the status quo, also reinforced by the OC dimension of *strong tradition*. From the neonatal nurse to the lean specialist, LH members points out the importance of having redundancies as a safety margin, specially in the healthcare sector (I1, I2, I3). The fact that they are dealing with unique patients and unique physicians is an additional barrier to settle

standard procedures and processes (I12), which may be supported by the immediacy and firefighting cultural trait typical of the *hero-leader* dimension. The external consultant corroborates when stating that “physicians are afraid of losing autonomy and flexibility” (I6).

Similarly to the paradox of learning, some lean initiatives function as managerial actions that counterbalance the defensive mechanisms aforementioned. For example, the adoption of the continuous improvement mindset, and the evidence-based actions coupled with having the support of the process department as internal consultants using a flexible approach to implement the changes are also found effective to the paradox of organizing. As the billing manager explains “you have to put out the fire but also work so that it does not flame again” (I9), that is to say that LH may need to search for immediate solutions to some problems, but they must identify the root causes of the problems in order to prevent them to reoccur. The promotion of engagement through the lean projects (I7, I13, I14), with spaces to discuss problems (I3, I7, I11), and simple solutions to root causes (I9, I12), coupled with the recognition and rewards (I4, I13) also play a crucial role in the management of this paradox. Furthermore, the alignment with the organizational strategy supports the changes among leaders (I1, I4, I8) and focuses the efforts into what generates value (I10). Open, clear and visual communication and the proactive planning efforts present in lean implementation helped dealing with the fear of exposure and helped differentiate value from waste (I10). Visual management charts are available and used to discuss processes and results (I1, I7) and the discussions seek solutions rather than guilty parties (I12, I13).

Despite the feeling of belonging supporting some defensive mechanisms, the emotional and actual job security support the managerial actions as well. Similarly to the paradox of learning, the other aspects of the *employee orientation* dimension corroborate with the managerial actions. For example, grateful and engaged members who recognize the love and loyalty of LH to them are more likely to question the current situation at LH, to suggest improvements and to follow the procedures established (I2, I8). Despite the centralized decision making, the present and closer relationships with the leaders (I2, I3, I8, I9) support the participation of LH

members in the construction of the solutions and in the acceptance of the managerial actions adopted (I15).

4.4.4 Paradox of Belonging

The paradox of belonging relates to the tensions between the individual and the collective and between competing roles and memberships, which are increased by the conflicts of belonging to multiples groups and subgroups (Lewis, 2000; W. K. Smith & Lewis, 2011). The challenges concern respecting and stimulating individuality at the same time as promoting integration and interconnections among individuals and groups. In the lean implementation context at LH, we have identified conflicts between functional role and team role, outlining this type of paradox. The engagement to lean projects fosters horizontal integration and collaboration among different units, departments and functions although it demands extra effort and time as it raises conflicts when dealing with the diversity and complexity involved.

The actual differences among a variety of subgroups within LH is one of the main barriers to managing the paradox of belonging. At unit level, the newer hospital has a higher level of accreditation and is seen as more professional and less traditional (I2, I5, I8). At departmental level, the major differences are between the assistance and administrative departments as the nature of attributions and backgrounds differ significantly (I15). LH members tend to use those differences to justify the segregation among units and departments, which is supported by the OC dimension of parochial/unprofessional style. All in all, the poor integration is highlighted by most interviewees. For instance, one pharmacist states the difficulty in participating and collaborating with professionals in multifunctional lean teams as she is used to work with mostly only pharmacists and technicians: “any discussion within this group is easier to understand because everybody is from the same department and knows what is going on, what are the problems” (I13). This defensive mechanism is supported by two elements of the *strong tradition* OC: not questioning the status quo and the long-term employees highly experienced in their specialization. Poor managerial skills, not structured HR and the culture of waste and re-work reinforce the segregation, as they support the belief that each one is supposed to take care of their own tasks, no matter the impact on and of the others. The hero-leader style also

contributes to the segregation, hence the opposite perspective of physicians (“special entities”) and shop-floor workers (“humble and shy”). Another barrier to deal within this paradox of belonging is that participating in the lean teams demands extra work, not always related to their own regular functions, and sometimes with long-term results (I5, I9, I11, I13). As a result, some members have rejected or abandoned the lean projects as a defensive mechanism (I7, I10, I14), supported by the immediacy culture found in the *hero-leader* OC dimension.

LH has used the lean initiatives to manage the paradox of belonging by counterbalancing the defensive mechanisms. One major principle in this context is the horizontal integration and the holistic view. LH proposed multifunctional teams for the lean projects, integrating workers and leaders from different department and units (I1, I5), which promoted the viability of the interrelations among them and a sense of entity throughout the LH (I8, I9, I13). On the one hand, the lean specialist highlights that the administrative workers found a purpose in their function as they come closer to the core functions of the hospital. On the other hand, “assistance workers, who used to be in the shadow of their leaders, now have the opportunity to step up and show their contribution to LH” (I15). Besides the involvement and recognition of workers directly involved in the lean projects, the process department stimulate and support LH members to conduct ad-hoc initiatives in order to disseminate lean principles to the organization as a whole (I7, I9, I14). The leadership sponsors the lean projects (I4, I7, I10) and constant communication reinforces the unified approach within LH (I1, I7). Another example of lean principle as a managerial action is the evidence-based approach, which uses the KPI’s and the root-cause analysis to have solid arguments towards the necessary changes (I7, I9, I10, I13). One nurse describes how “a deeper investigation of the root causes of a problem leads to the collaboration of all the departments and professionals involved in each process” (I11). The inventory supervisor adds: “the major change here is that now people are willing to listen and detail whatever is being discussed.” (I13). We have identified that the continuous improvement mindset and the flexible approach supports the management of this paradoxes, as they support the paradoxes of learning and organizing. The waste reduction, simplification of processes and controls, focus on

value creation and organizational strategy integrate the set of managerial actions adopted to counterbalances the defensive mechanisms.

Similarly to the previous paradoxes, the employee orientation is a cultural dimension supportive to the adopted managerial actions. Grateful and engaged members who recognize the love and loyalty of LH to them are more likely to feel safe and willing to compromise with different professionals. The caring and welcoming environment along with the present and close leadership help LH workers to feel comfortable in belonging to multiple groups. Finally, the fact that workers seek learning and professional development and improvement corroborates with the *employee orientation* support. Dealing with workers of different backgrounds and analysing problems from department other than their own may enrich their knowledge and increase their opportunities to develop.

4.4.5 Paradox of Performing

The paradox of performing emerges from conflicting demands among different stakeholders, relating to competing measures for managerial success (W. K. Smith & Lewis, 2011). Therefore, the organization and its individuals are required to achieve multiple goals (Cleland et al., 2018). At LH, similar to other hospitals, the core activities are related to assistance of the patients. Its long history of excellence in assistance and the market leadership coupled with the caring and loving environment present in LH's OC may conflict with the new demands for operational and economic improvements caused by the lean implementation. The lean specialist and other LH members recognize the urgency to manage both sides: "Although the health of the patient is a value to us, we are a private hospital, so we need to generate profit to the shareholders. Our challenge is to make them converge, because not always this seems possible." (I1).

Although some members recognize the relevance of focusing and improving the operational performance, assistance workers and leaders have resisted to engage in activities with this focus. According to one director, "physicians believe their role is to save lives and do their best on it, and let the others do the rest." (I4). Assistance workers were concerned about solving the patients' necessities instead of with how much it will cost, if the insurance will cover, if the patient will pay (I12). This defensive

mechanism is supported by the OC dimensions of *strong tradition* (professionals do not question the status quo, excellence in assistance, intensive presence of founders and long-term highly experienced employees) and the *hero-leader style* (immediacy, physicians seen as special entities, problems seen as failures, straight instructions and low empowerment). The parochial/unprofessional style also contributes to this defensive mechanism. The horizontal segregation hinders a holistic perspective with unified goals, as the concern is on the immediate care. An unstructured HR is incapable of linking the functions to the strategy, promoting effective training of the missing managerial skills and providing a career plan that encompasses assistance and operational demands. The culture of waste and re-work, justified as safety procedures, added to the lack of effective measurement systems prevent LH members from seeing the organizational results as a whole. The cultural trait of loyalty, engagement, gratitude and love between LH and its members also supports the resistance to improving performance because “when it’s time to evaluate low performance, relationships make it harder” (I4)

We have identified that all the lean elements adopted by LH contribute to manage the paradox of performing, some of which are common to the four types of paradoxes. Regardless of the perspective, lean elements such as a continuous improvement mindset, evidence-based and flexible approaches, promoting engagement, reward and recognition through internal consultants are key managerial actions to successfully manage cultural tensions derived from a lean implementation. One example is how an effective monitoring, with no redundancies, releases the assistance professionals to dedicate more time to actually supporting the patient (I11). Other lean initiatives are common to one or two types of the paradoxes previously discussed. Focusing on value creation aligned with the organizational strategy; horizontal integration and holistic view; leadership support; open, clear and visual communication; proactive planning; and waste reduction acts as managerial actions. The patients’ involvement and closeness is a lean practice successfully adopted as a managerial action to identify customers’ value and to integrate them into LH care processes. Among the few initiatives in this direction undertaken so far, one example is to inform the patients about the safety procedures and to have them helping control the accomplishment of the tasks. (I1). Overall, the managerial actions

have contributed to the idea that the goal is “to make the client have the perception of being well-assisted while, internally, we have to make sure this happens at the best cost-benefit possible.” (I8).

Although the dimensions of *strong tradition* and the *hero-leader style* support the defensive mechanisms, we found some controversial cultural traits within them. The first controversy is the excellence in assistance and the market leadership. On the one hand, LH maintains the assistance as a top priority in detriment to the operational results. On the other hand, LH has invested on innovation, research and infrastructure focused on the assistance in order to keep the market leadership (I3, I4). This could be broadened from the assistance to the management as well, balancing both sides of the paradox. The second controversy relates to the straight instructions and low empowerment. As LH members are used to do whatever its founders require, they tend to embrace the changes supported by the founders, such as incorporating lean practices towards achieving operational improvements (I5). Another controversial OC dimension is the *employee orientation*. The cultural trait of loyalty and gratitude was found not only supportive to defensive mechanisms, but to the managerial actions as well, as LH member are grateful and consequently willing to give it back to the hospital. Along with that, two cultural traits of the *employee orientation* dimension give additional support to properly manage the paradox of performing, i.e., the present and close leadership, showing they are aware of the small details and that the final results matter (I8, I10), and the workers’ willingness to learn new skills.

4.5 CONCLUSIONS

4.5.1 Theoretical Contributions

This case study investigates the interplay of OC and lean implementation through a paradox theory lens. To the best of our knowledge, previous studies have explored lean implementation using the paradox theory without specifically addressing OC, or they have investigated the interplay of lean and OC with a different theoretical lens. By answering the RQ “*How are cultural paradoxes managed in a healthcare*

organization going through a lean implementation?”, we offer an in-depth analysis of four OC dimensions that act as both defensive mechanisms; that is negative forces to lean implementation, and managerial actions; which help overcoming the emerging tensions. We also show how each of 13 lean principles and practices interact with the OC dimensions and the four paradoxes.

The paradox theory has shown to be a valuable lens to investigate the nuances of OC in a lean implementation context. The organizational tensions we have analysed are underexplored by the literature, specially the paradox of learning. Previous studies were not able to identify this type of paradox in lean implementations (Maalouf & Gammelgaard, 2016) or in other contexts of organizational change (Jarzabkowski, Lê, & Van de Ven, 2013).

In the studied case of an organization with a family business origin, we have identified four main dimensions of OC traits: *strong tradition, parochial/unprofessional style, hero-leader style* and *employee orientation*. The first three dimensions result in predominantly defensive mechanisms. Combined, these three dimensions represent a major negative force for family businesses implementing lean in healthcare. Conversely to the first three OC dimensions, the fourth dimension, that is *employee orientation*, is predominantly positive to lean implementation (i.e. managerial action in paradox theory terms). This corroborates with prior literature review on the role of OC in lean implementation (Erthal & Marques, 2018) as well as with family business literature. Studies emphasize the leadership closeness (Seah, Hsieh, & Huang, 2014), founder centrality (Tipu, 2018), feeling of belonging (Ainsworth & Cox, 2003) and employees' commitment (Ainsworth & Cox, 2003; Tipu, 2018) as common traits of family businesses cultures. These cultural traits are highly related to those identified in our study.

4.5.2 Managerial Contributions

The interplay of OC and lean has revealed that existing OC traits can serve as either negative defensive mechanisms or positive managerial actions. Hence, a previous assessment of the OC may better prepare managers before starting a lean implementation. In addition, we show how specific OC traits and lean principles may counterbalance the defensive mechanisms. Therefore, we offer a guide to manager

dealing on how to overcome resistance when implementing the cultural transformation necessary for a successful lean implementation in a healthcare organization.

The granular discussion of the conflicting tensions according to the typology of four inter-related paradoxes provide evidence that some OC traits and lean principles/practices are capable of supporting the management of tensions across all four types. We suggest that managers could start lean implementation through these traits to accelerate resistance mitigation and implementation.

Ultimately, our study offers a framework for the analysis of cultural tensions that may benefit organizations implementing lean in other sectors as well as organizations going through cultural clashes provoked by the implementation of a management systems other than lean.

4.5.3 Limitations and Future Research

The empirical setting of a healthcare organization implementing lean has offered an invaluable opportunity to investigate the interplay between OC and lean implementation, but the single-case approach carries its limitations (Eisenhardt & Graebner, 2007; Yin, 2009). Although this research has employed formal protocols for data collection (triangulation, coding, etc.), , inter-personal influences, such as educational background, between the researchers and the participants can never be fully eliminated. As much as it has allowed an in-depth discussion of paradoxes, future research should expand the empirical base in order to map contextual conditions in varying organizational and cultural contexts.

The complexity of culture relies on the fact that a culture of a group is not an average of the individual reactions. Rather it is the most common reaction in the same group of people (Hofstede, Hofstede, & Minkov, 2010). We have tried to overcome this limitation by interviewing multi-level and multi-function workers, gathering and comparing the different perceptions. Furthermore, we recognize the complexity of investigating culture considering its multi-layered nature. Future studies could take a step further towards investigating the impact of culture not only at the organizational level, but also at a national level, thus exploring a multilayer perspective to cultural tensions.

Future research could delve deeper into the defensive mechanisms of family businesses in other healthcare organizations as well as other sectors. The fact that we have identified all four paradoxes proposed by paradox theory within a lean implementation suggests a good fit between theory and context. As exploring paradoxes is an ongoing and cyclical journey (Lewis, 2000), we claim for future exploration of cultural paradoxes present in lean implementation as well as their interconnections.

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Appendix F - List of interviews and workshops

Data collection	Unit	Id #	Years at LHC	Date	Duration	Words
Lean specialist	U1&2	I1	5 yrs	Ago 21st 2017	67'	6660
Neonatal nurse and lean resident	U1	I2	8 yrs	Sep 1st 2017	50'	6162
Quality specialist	U1	I3	6 yrs	Sep 1st 2017	45'	6097
Lean director	U1&2	I4	6 yrs	Sep 1st 2017	32'	4468
Lean analyst	U1&2	I5	2 yrs	Sep 1st 2017	45'	2919
Lean consultant	-	I6	(external)	Oct 9th 2017	46'	5551
Workshop - lean projects presentation	U2		-	Oct 10th & 11th	8h	-
Workshop - lean projects presentation	U1		-	Oct 16th & 20th	8h	-
Workshop - lean projects presentation	U2		-	Dec 13th 2017	4h	-
Workshop - lean projects presentation	U1		-	Dec 14th 2017	4h	-
Workshop - lean projects presentation	U1&2		-	Dec 21th 2017	3h	-
Nurse manager	U1	I7	14 yrs	Oct 11th 2018	56'	6671
Supply manager	U1&2	I8	9 yrs	Oct 11th 2018	60'	6849
Billing manager	U1&2	I9	32 yrs	Oct 11th 2018	32'	3312
Financial analyst	U1&2	I10	10 yrs	Oct 11th 2018	38'	5435
Nurse	U2	I11	8 yrs	Oct 30th 2018	52'	6327
Reception manager	U2	I12	20 yrs	Oct 30th 2018	58'	7611
Pharmacist & Inventory supervisor	U2	I13	6 yrs	Oct 31th 2018	42'	4918
Nurse Technician	U2	I14	5 yrs	Oct 31th 2018	30'	2367
Workshop - lean projects presentation	U2		-	Dec 5th 2018	4h	-
Workshop - lean projects presentation	U1		-	Dec 6th 2018	4h	-
Workshop - lean projects presentation	U1&2		-	Dec 13th 2018	3h	-
Lean specialist	U1&2	I15	5 yrs	Dec 13th 2018	21'	2194
Total			Average	Period	Total	Total
Number of interviews		15	10 yrs	From Jul 6th 2017 to Dec 13th 2018	11h	77541
Number of workshops		10			38h	-

5 CONCLUSIONS

The extant literature has recognized the crucial role that culture plays in lean implementation efforts (Boscari, Danese, & Romano, 2016; Gambi, Boer, Gerolamo, Jørgensen, & Carpinetti, 2015; Hasle, Bojesen, Langaa Jensen, & Bramming, 2012; Kull et al., 2014). However, on the one hand, because of the soft and abstract aspects of culture, the lean literature has mostly addressed culture as one variable among others rather than as the main subject. When culture has been the main subject, researchers have applied a wide variety of models and dimensions, often presenting divergent results (Erthal & Marques, 2018). On the other hand, practitioners have also recognized the relevance of culture to the success of lean implementation, although they seem unable to explain how to manage cultural elements and benefit from the positive ones. Therefore, this study has investigated the interplay of culture and lean in three sequential stages, as presented in section 1 of this doctoral thesis (see Table 1).

The first stage has consisted of a systematic literature review (Section 2 – First Paper), which has identified controversial views regarding the role of NC and OC dimensions in lean implementations. This broad map of the literature has revealed a necessity for further investigation on those controversies as well as on the cultural tensions provoked by lean implementation. The following empirical research (Section 3 – Second Paper) has fulfilled the necessity of understanding the cultural tensions as paradoxes and dilemmas. Additionally, the research has investigated to what extent cultural traits and lean elements function as either resistance to lean (defensive mechanisms) or actions towards the management of the tensions (managerial actions). As this study was conducted in a multinational organization from the construction sector, it was possible to investigate the role of culture at both national and organization level in a service organization, fulfilling another gap in the literature. Complementing this research, the study on the healthcare organization (Section 4 – Third Paper) has allowed a deeper investigation on the cultural paradoxes found in lean implementation. The granular discussion of the conflicting tensions according to the typology of four inter-related paradoxes has provided a refined guide to managers facing cultural resistance to a successful lean

implementation. The findings, contributions and future research suggestions of each paper are summarized in Table 10.

Table 10 – Contribution of the three papers

	Paper 1	Paper 2	Paper 3
Title	"National culture and organizational culture in lean organizations: a systematic review"	"Managing cultural paradoxes and dilemmas in lean construction"	"The interplay of lean healthcare and organizational culture: A paradox theory lens"
Outlet	Production Planning & Control - PP&C (published)	International Journal of Operations & Production Management - IJOPM (under review)	Annual Meeting of the Academy of Management - AOM (submitted)
Research question (RQ)	RQ1: How has the literature addressing the role of culture in lean organizations evolved over time, and what are the identifiable trends? RQ2: How do specific dimensions of NC and OC influence lean organizations?	RQ: How are cultural paradoxes and dilemmas managed in a service organisation going through a lean implementation?	RQ: How are cultural paradoxes managed in a healthcare organization going through a lean implementation?
Method	Systematic literature review	In-depth single case study in the construction sector	In-depth single case study in the healthcare sector
Framework of analysis	Streams of lean studies (abductive), NC dimensions (Hofstede, 1980; 1983), OC dimensions (Hofstede)	Lean service (Malmbrandt and Åhlström, 2013), NC dimensions (Hofstede, 1980; 1983), OC dimensions (abductive), Paradox theory (Lewis, 2000)	Lean elements (abductive), OC dimensions (abductive), Paradox theory (Lewis, 2000) and types of paradoxes (Smith & Lewis, 2011)
Findings & Contributions	This review supports lean transferability and identifies the countries with best fit for lean. However, findings are controversial on the role of specific NC and OC dimensions. Few studies consider the controversies as paradoxes rather than dilemmas.	The study shows that lean implementation may turn a paradox into a dilemma and vice-versa, reshaping the OC. The authors identify the defensive mechanisms supported by NC & OC and which lean practices counterbalance each cultural trait.	This paper offers an in-depth analysis of the OC dimensions that support both defensive mechanisms and managerial actions when facing the paradoxes due to lean. We also show how each lean element interact with the OC dimensions in the four types of paradoxes.
Future research	This review underlines a number of paradoxes regarding the relationship of culture and lean, which deserve further investigation. An investigation of the interactions between NC and OC in lean implementations could clarify how the latter can actually overcome the former.	Future research should expand the empirical base in order to build a broad picture of the paradoxes and dilemmas present in lean implementations in varying organisational and cultural contexts.	Future research should expand the empirical base in order to map contextual conditions in varying organizational and cultural contexts and future studies could delve deeper into the defensive mechanisms of family businesses in other healthcare organizations as well as other sectors.

5.1 THEORETICAL AND MANAGERIAL CONTRIBUTIONS

The present doctoral thesis has contributed to the knowledge advancement on the influence of the established culture (NC & OC) on lean as well as on the impact of lean implementation over the OC. The systematic review of the literature (Paper 1) has synthesized over two decades of publications on lean and culture at both national and organizational levels, therefore presenting a contribution in itself. Not only this review addresses gaps and trends in the intersection of lean and culture, but it offers a map of how this literature has evolved and which cultural dimensions foster or hinder lean implementation. This systematic review adds to previous reviews focused on leanness assessment (Narayanamurthy & Gurumurthy, 2016), specific industries (Andersen et al., 2014) and other human-related factors (Hasle et al., 2012), which together synthesize the body of knowledge regarding lean implementations.

The joint contribution of papers 2 and 3 emphasize the benefits of exploring the paradox theory (Lewis, 2000; Luscher & Lewis, 2008; W. K. Smith & Lewis, 2011) as a theoretical lens to investigate the role of culture in lean implementations. In one paper, the discussion surrounds the distinction and dynamics between paradoxes and dilemmas in a longitudinal perspective, a relevant yet under explored subject of the paradox theory (Jarzabkowski et al., 2013; Yoon & Chae, 2012) and of lean studies (Holden, 2011; Jarzabkowski et al., 2013; Yoon & Chae, 2012; Zimmermann & Bollbach, 2015). In the other paper, the investigation concerns the four different types of inter-related paradoxes proposed by the paradox theory. To the best of our knowledge, no other study has identified all the four types in a lean implementation context. Previous studies were not able to identify the paradox of learning in lean implementations (Maalouf & Gammelgaard, 2016) or in other contexts of organizational change (Jarzabkowski et al., 2013). In both papers, the paradoxes were unfolded into defensive mechanisms and managerial actions to offer a guide to managers on the importance of (i) mapping emerging tensions, (ii) understanding which ones should be resolved as dilemmas and which should be managed as

paradoxes, and (iii) engaging in counter-balancing managerial actions to successfully implement lean.

By conducting the research in service organizations, we bring to light key aspects of NC influence on lean implementation that have been overlooked by researchers and managers so far (Boscari et al., 2016; Wiengarten, Gimenez, Fynes, & Ferdows, 2015). We propose that OC traits are influenced by the NC although OC traits and lean elements may counterbalance NC traits negative to lean implementation. Specifically, the Brazilian cultural traits of collectivism, short term orientation, uncertainty avoidance, femininity and high power distance have supported OC traits that hinder lean implementation. As our case study has showed, the adoption of lean principles such as worker involvement and open communication, for instance, helped counterbalancing those cultural traits. Moreover, we provide a better understanding about how lean elements interact with the OC to overcome the resistance to lean implementation in the service context. Additionally, the two case studies were conducted in the family businesses founded in Brazil. The similarities on their cultural traits and on the tensions identified in both organizations suggest other family businesses going through lean implementation may benefit as well from the findings of this research. Among the cultural traits common to both cases are *strong tradition*, *hero-culture*, *employee orientation* and *unprofessional style*, which have been also identified as common traits of family businesses cultures (Ainsworth & Cox, 2003; Seah et al., 2014; Tipu, 2018).

5.2 LIMITATIONS AND FUTURE RESEARCH

The limitations of each stage of the research are addressed in their referring papers and well as the indication for future researches resulting from their findings. Regarding the thesis as a research program, the choice of two single-cases in two different service sectors has limited the replicability of the findings, although it has also allowed an in-depth investigation of each case (Bortolotti et al., 2015; Eisenhardt & Graebner, 2007; Stake, 1995; Yin, 2009). Future studies should expand the empirical base in order to build a broad picture of the cultural paradoxes present in lean implementations in in other organizations from the construction and healthcare

sectors as well as from other sectors. A comparison between the cultural paradoxes in the service and manufacturing industries could bring to light the necessary adaptations from the later to the former (Holden, 2011; Jaca, Santos, Errasti, & Viles, 2012; Tezel et al., 2017). Similarly, as both cases are family businesses originally founded in Brazil, future studies could also delve deeper into the defensive mechanisms and managerial actions of family businesses implementing lean in other cultural contexts. We found no study delving into the reality of family businesses implementing lean and the paradox theory may serve as a potential lens for this endeavor.

We recognize the complexity of investigating culture, given its multi-layered and subjective nature. We have addressed culture at national and organizational level, although future studies could take a step further towards investigating multiple cultural levels such as regional cultural traits and subcultures within the organization (Fullerton, Kennedy, & Widener, 2014; Zimmermann & Bollbach, 2015). This could unveil paradoxes and dilemmas emerging from clashes between the levels as well as the differences in the defensive mechanisms and managerial actions adopted by the groups within each level. A study contrasting the OC level with the individual level could also unveil tensions emerging from the mismatch between an individual's background and the OC (Jarzabkowski et al., 2013; Touboullic, Matthews, & Marques, 2018).

In addition, as this research is framed within the boundaries of lean implementation, future investigation on cultural paradoxes derived from similar organizational initiatives that involve major cultural changes, such as mergers and acquisitions, could contribute to the paradox literature and practitioners dealing with organizational tensions.

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