

Department of Management

**LEAN THINKING IN HEALTHCARE SERVICES-
- LEARNING FROM CASE STUDIES**

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Abstract

Healthcare organisations, especially in public sector, have been adopting Lean management practices with increasing outcomes' evidences in several parts of the world, since the beginning of this century.

However, Lean deployment in Healthcare services has been addressed in the literature in a surgical way by an array of case reports addressing the “hard” side of Lean deployment, sometimes with no result's consistency or even follow-up analysis.

This thesis seek to add to the operational side of Lean deployment in Healthcare, a complementary understanding of Lean deployment approaches, addressing both “hard” and “soft” sides, identifying the real constraints of Lean in Healthcare sector and the sustainability factors. Supported by two main literature reviews and a multi-case approach, a deep research on the eligible Portuguese cases was conducted answering the questions: (i) What are the different outcomes from Lean deployment in Healthcare?; (ii) What are the barriers to Lean implementation in Healthcare?; (iii) What enables Lean implementation in Healthcare?; (iv) What are the risks of Lean in Healthcare?; (v) How to measure Lean achievements in Healthcare services?; and (vi) How to develop a sustainable Lean culture?

This contribution to the academic debate on Lean deployment in Healthcare creates clarity on what can be called Lean practices in Healthcare settings under the light of the concept's founders; what pattern of a Lean deployment journey was followed by Healthcare organisations; and how different cultural (organisational and national) contexts can influence the pace in pursuing that pattern.

Keywords: Lean Thinking, Healthcare Organisations, Operating Strategy, Cultural Change

Classifications of JEL Classification System:

D22 - Firm Behaviour: Empirical Analysis

I12 - Health Production

Resumo

As organizações de saúde, nomeadamente públicas, têm vindo a adoptar práticas de gestão Lean com crescente evidência de resultados em várias partes do mundo, desde o início deste século.

Contudo, a aplicação do Lean em serviços de saúde tem tido um tratamento cirúrgico na literatura, recaindo apenas nos aspectos “hard” e sem grande consistência ou seguimento de resultados .

Esta tese pretende acrescentar aos aspectos “hard” do Lean, um entendimento complementar juntando os aspectos “hard” e “soft”, identificando as restrições e factores de sustentabilidade da aplicação do Lean no sector da saúde. Tendo por base duas revisões bibliográficas primordiais e uma abordagem empírica multi-caso a partir de casos portugueses elegíveis, esta tese fornece respostas às questões: (i) Quais os diferentes resultados da aplicação do Lean na Saúde?; (ii) Quais as barreiras à aplicação do Lean na Saúde?; (iii) Quais os facilitadores da implementação do Lean na Saúde?; (iv) Quais os riscos do Lean na Saúde?; (v) Como medir a implementação do Lean na Saúde; e (vi) como desenvolver uma cultura Lean sustentável?

Este contributo para o debate académico sobre a aplicação do Lean na Saúde introduz clareza sobre o que pode ou não ser chamado de práticas Lean na Saúde tendo como referência os conceitos dos fundadores; que padrão de implementação é seguido pelas organizações; e de que forma diferentes contextos culturais (nacionais e organizacionais) influenciam o ritmo desse padrão de implementação.

Palavras-chave: Pensamento *Lean*, Organizações de Saúde, Estratégia Operacional, Mudança Cultural

Classificações no Sistema de Classificação JEL:

D22 - Firm Behaviour: Empirical Analysis

I12 - Health Production

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List of Abbreviations

AT-Agency Theory

AUL-Australia

BICS-Bolton Improving Care Systems

BPO- Business Process Outsourcing

BRA- Brazil

CAN- Canada

CAT-Computerized Axial Tomography

CEO- Chief Executive Officer

CIRCA- Continuous Improvement Research for Competitive Advantage

COL-Collectivism

COO- Chief Operating Officer

CPFR-Collaborative Planning, Forecasting and Replenishment

CSCMP-Council of Supply Chain Management Professionals

DMAIC- Define, Measure, Analyze, Improve, Control

DNA- Deoxyribonucleic Acid or Genetic Code

DNM- Denmark

DRGs-Diagnosis-Related Groups

DSD-Direct Store Delivery

ECR-Efficient Consumer Response

EDI-Electronic Data Interchange
EFQM-European Quality Award-
FIN-Finland
FRA- France
FTE-Full Time Equivalent
GBR/UK- United Kingdom
GER- Germany
GLSAT-Government Lean Enterprise Self-Assessment Tool
GPOs-Group Purchasing Organisations
HIPPA-Health Insurance Portability and Accountability Act
HLA-Healthcare Lean Assessment
HLS-Hospital Logistic System
HR-Human Resources
IND-Individualism
IRA-Iran
ISO-International Organization for Standardization
ITA-Italy
JCAHO-Joint Commission on Accreditation of Healthcare Organisations
JPN-Japan
KBV-Knowledge- Based View
LML-Lean Maturity Levels
LTC-Long Term Care
LESAT -Lean Enterprise Self-Assessment Tool
LOS-Length of Stay
MAS-Masculinity
ML-Manufacturing-Like
MS-Managerial and Support
MT-Methodological
NET- Netherlands
NHS-National Health Service
NUMMI-New United Motor Manufacturing Inc.
PAR-Product Activity Records
PBBL- Personnel Behaviour Based Lean Model

PD-Power Distance
PDA-Personal Digital Assistant
PDCA-Plan-Do-Check-Act
PDSA- Plan-Do-Study-Act
PF-Patient Flow
PO-Process-Oriented
POR-Portugal
POU-Point-of-use
PPPs- Public-private Partnerships
O-Organisational
OD-Outsourcing Drivers
OM-Operations Management
OPL- One Point Lessons
OR-Operating Room
RBV-Resource-Based View
RFP- Requests For Proposals
RIEs-Rapid Improvement Events
ROA-Return on Assets
RPIW-Rapid Process Improvements Workshops
RQ-Research Questions
S-Speculative
SCM-Supply Chain Management
SL/IND- Sri Lanka/India
SME-Small and Medium Enterprises
SMED- Single Minute Exchange of Die
SMI-Supplier Managed Inventory
SP-Shingo Prize
SPA-Spain
SWE- Sweden
TCA-Transaction-cost Analysis
TIS-Theda Care Improvement System
TP-Theoretical Proposition
TPS-Toyota production system

TQM-Total Quality Management

UA-Uncertainty Avoidance

UA-Unit of Analysis

USA- United States of America

VE-Virtual Enterprise

VMI-Vendor Managed Inventory

VMPS-Victoria Mason Production System

VSM-Value Stream Mapping

WIP-Work in Progress

1. Introduction

1.1. Lean thinking – concept evolution

Lean, considered with a cross-functional nature, not exclusive from Operations Management (OM) literature, is present in literature on strategy, management and organisational theory (Atkinson, 2010; Bhasin and Burcher, 2006; Shook, 2010) broadening of the scope. However, the predominance of OM publications leads to an unbalanced exchange of knowledge that this research aims to invert.

The evolution of the term "Lean" from a production system (TPS) to a philosophy, a "Lean thinking" (Womack and Jones, 1996, 2003), suggests that Lean should be seen with other lens than only OM ones, namely under operations strategy, change management and organisational Behaviour.

Thinking Lean, in a broader sense, is pursuing five principles (Womack and Jones, 1996:15-90) five Lean principles:

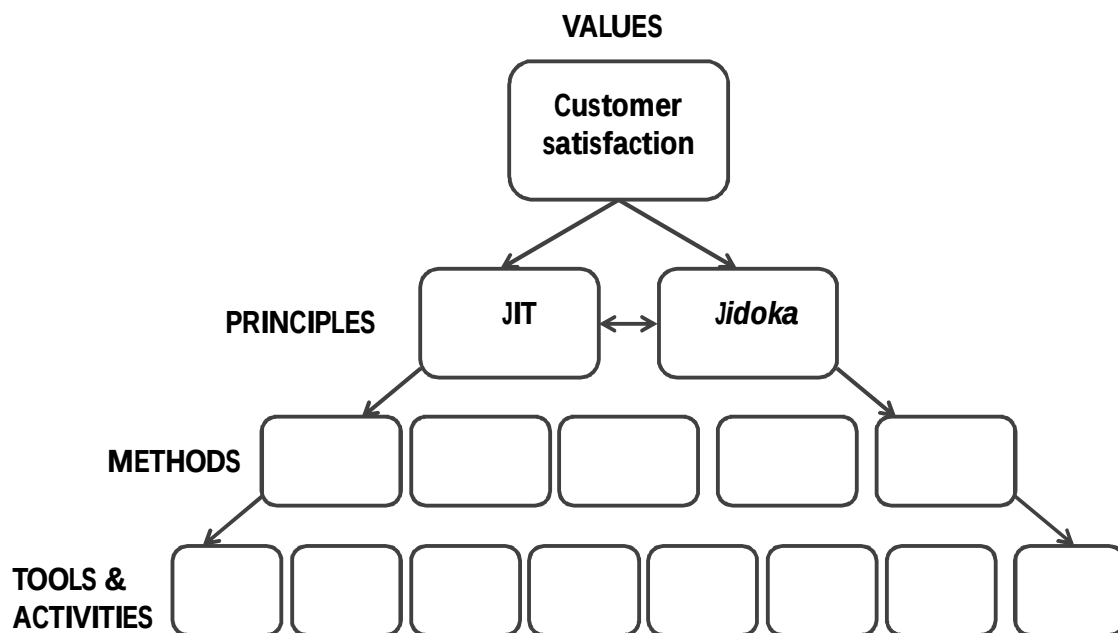
- (1) Specify the value desired by the customer;
- (2) Identify the value stream for each product/ service providing that value and, challenge all of the wasted steps;
- (3) Make the product flow continuously. Standardise processes around best practice allowing them to run more smoothly, freeing up time for creativity and innovation;
- (4) Introduce 'pull' between all steps where continuous flow is impossible. Focus upon the demand from the customer and trigger events backwards through the value chain;
- (5) Manage towards perfection so that non-value adding activity will be removed from the value chain and that the number of steps, amount of time and information needed to serve the customer continually falls.

Despite some controversial critics on Womack and Jones "guru-hype" publishing's (Green, 1999b), most of the scientific literature relied on the "Lean" coinage and evolved ever since on several applications beyond manufacturing settings, broadening its scope.

This research contributes to the academic debate on the extent to which the Japanese model of Lean production is applicable in Western services context. Following Ohno's (1988: 119) wish to provide an understanding of the Toyota production system, a critical analysis is pursued on: (i) what can be called Lean practices in Healthcare settings under the light of the concept's founders; (ii) what pattern of a Lean deployment journey was followed by Healthcare organisations; and (iii) how different cultural (organisational and national) contexts can influence the pace in pursuing that pattern.

The simplicity of Lean concept is presented in Figure 1.1 in a tree analogy where satisfaction of customers needs is prioritized above all else as a value to guide everyone in the organization.

Figure 1.1 - The Lean tree



Source: Based on Modig and Ahlström (2012)

To ensure the tree grows healthy towards the value that is the core of the Lean culture and every day principles are developed regarding the way decisions are made. Those principles (Just-in-time (JIT) and *Jidoka*) show how and what is prioritized in a business. Those two principles, which are two sides of the same coin, represent the two central concepts of Lean: JIT is about creating flow and *Jidoka* is about creating a

visible and clear picture so anything that hinders or disturbs the flow can be immediately identified. In the next level are the patterns of how to make decisions on Lean, the methods, where standardization is just one of methods' examples for flow creation as visual planning is an example for *Jidoka*. At the tree basis, supporting this four abstraction level pyramid are the tools and activities that are needed to follow a specific method.

Hence, Lean is far from the collection of tools and techniques myopic view, nor is to pursue principles or methods, considering only the upper side of this pyramided. Is a system construction were values, principles, methods, tools and techniques are means for realizing a Lean operations strategy. The higher the abstraction level, the less context dependent the means; the lower the abstraction level, the more context dependent are the means.

1.2. Lean thinking in Healthcare services

“Waste” has lately become a jargon word in Portuguese Healthcare system but the doubt on whether the emerging cases were really on a Lean journey subsisted by the apparent snapshots of department successes in implementing Lean projects. Therefore, the main question to be answered was: - **are Lean practices truly embedded in Healthcare services, or they are only this sector's latest fad?**

In order to provide a complete answer, this research pursued the main goals of:

- Identifying key domains that represent Lean practices in Healthcare sector;
- Studying how many lessons in seventy years of Lean manufacturing, with its wide range of tools and scopes, were learned by service industry, particularly Healthcare services;
- Understanding how deep were those lessons deployed and why deployment fails in Healthcare settings;
- Creating a “Lean implementation framework” for Healthcare organisations based on the study of failures and successes of “Lean” deployment in Healthcare services.

Healthcare organizations and systems are designed around specialities and departments rather than around the needs of patients which leads to inefficiencies on patient flow. The growing complexity of treatment and a willingness to see the care process from the patient's perspective should be, *per se*, good reasons for rethinking Healthcare services in a value added perspective not only to introduce some rationality in Healthcare providers' operations, but to introduce another paradigm to revert the collision course the sector is traveling in.

Lean deployment in Healthcare is a crescent phenomenon in a global scale that deserves academic discussion on the suitability of Lean translations from manufacturing to services, and in particular to Healthcare services. Some bad translations of management practices might have unintended consequences for Healthcare service redirecting the attention from patient care towards more administrative issues. That does not occur with Lean management practices.

There is a body of literature that leads to misconceptions on Lean deployment in Healthcare for exclusive focus on cost reduction. That narrow scope is properly addressed by authors like Kaplan and Porter (2011), out of the Lean Healthcare literature, as an answer to a cost crisis in Healthcare. Other approaches that consider quality and delivery issues as in Parnaby and Towill (2008) complete the extent of focus in Lean Healthcare. However, very few articles present a holistic view of Lean deployment in Healthcare context that properly present the barriers, enablers, risks and sustainability of a triad of Lean outcomes in Healthcare. In this research, we seek to explore all those elements, convinced that the crisis in Portuguese Healthcare system won't be solved only by cost cuttings.

1.3. Thesis motivation

Lean deployment bandwagoning in Healthcare services has been addressed in the literature in a surgical way by an array of case reports addressing the "hard" side of Lean deployment, sometimes with no result consistency or even follow-up analysis. With a restrictive lens of OM, Lean deployment literature, first in manufacturing and lately in services settings, lacks contingency explanations and strategic

contextualization. Only through a deeper study on the real embeddedness of Lean in Healthcare services, can be possible to find answers to less successful Lean “translations” and effectively contribute to both theory and practice. In fact, much of the groundbreaking work in OM is atheoretical at the outset, namely on public sector services (Rich and Piercy, 2012).

This thesis seek to add to the operational side of Lean deployment in Healthcare, a complementary understanding of Lean deployment approaches, addressing both “hard” and “soft” sides, identifying the real constraints of Lean in Healthcare sector and the sustainability factors. Lean working practices debate goes beyond Lean production and even the boundaries of an organisation. The Lean extended enterprise concept, fully understood in manufacturing context, seems to find some difficulties in its materialization in Healthcare services settings. New insights are needed as a result of failures and successes analysis to help Healthcare organisations to keep on track in a Lean journey without a panacea blindness that easily would be so enhanced in an economic/political crisis environment.

One can easily fall into lucubration on Lean, as a way of thinking and living, could work as antidote for the crisis. But that is not the intent of this research. Rather, it seeks to provide, not only a roadmap for Lean deployment in Healthcare after learning from Lean Healthcare cases, but also encouragement to see Lean not as a program but a new way of (re)define a whole Healthcare system.

1.4. Thesis overview

This thesis aims to provide answers for the following main research questions (RQ):

- RQ1 - What are the different outcomes from Lean deployment in Healthcare?
- RQ2 - What are the barriers to Lean implementation in Healthcare?
- RQ3 - What enables Lean implementation in Healthcare?
- RQ4 - What are the risks of Lean in Healthcare?

- RQ5 - How to measure Lean achievements in Healthcare services?

(RQ 5.1) Why assess Lean deployment in Healthcare?

(RQ5.2) What Lean deployment dimensions have to be evaluated in Healthcare?

- RQ6 - How to develop a sustainable Lean culture?

Due to the need of these questions disaggregation for better analysis of intrinsic issues, a set of sub-questions were developed and answered in a stream process.

Thus, this thesis unfolds itself in two moments. In a first moment the Lean deployment theoretical and field analysis in Healthcare services settings is made as presented in Table 1.1 that displays all papers submitted, each one representing a chapter.

Table 1.1- Research questions, methods and original contribution

Chapter	Research Sub-Questions	Research Methods	Original Contribution
3	-Does national cultural resemblance to Japan means a deeper deployment of Lean practices by Healthcare organisations?	Literature Review	The updated state-of-the-art of Lean deployment in Healthcare, including national cultural factors.
4	-How embedded is outsourcing in Healthcare sector?	Literature Review	Structured cross-cultural comparison on outsourcing in Healthcare
5	-Is “outsourcing” a Lean practice?	Literature reviews merger	Outsourcing as a strategic Lean tool: - when and why in Healthcare. Outsourcing and Lean evolving pathway.
6	-How to find the best value equation combining internal and external resources offering innovative and highly customized services?	Case study	Leagility concept appliance on Healthcare Start-ups: Lean and Agile concepts combined in an outsourcing strategy.
7	-How to find the best value equation combining internal and external resources offering innovative and highly customized services?	Case study	Process modularization linkage to Leagility in Healthcare settings.
8	-How VMI benefits serve Lean purposes in Healthcare and why its outcomes can be difficult to achieve?	Case study	Thinking Lean in Healthcare Supply Chain Management, not only in internal processes. Vendor Managed Inventory (an outsourcing example) as Lean practice.
9	-What are the barriers to Lean implementation in Healthcare? -What enables Lean implementation in Healthcare? -How to develop a sustainable Lean culture?	Case study	Enablers and barriers in Lean replication process in the same Healthcare organisation; Lean sustainability key factors in Healthcare settings.
10	-How does Healthcare organisational culture change in Lean deployments? -Why Lean programs fail?	Cross-case analysis	Lean culture change process framework in Healthcare settings and critical success factors. Lean maturity model for Healthcare
11	-Why assess Lean deployment in Healthcare? -What Lean deployment dimensions have to be evaluated in Healthcare? - How to assess Lean transformations in Healthcare?	Critical review	“Healthcare Lean Assessment” framework.
12	- How to develop a sustainable Lean culture? - What are the enablers, barriers and risks of Lean in Healthcare?	Cross-case analysis	Lean Healthcare Sustainability Pre-conditions and Direct Factors

In a second moment, a deeper discussion on the research path followed and findings is pursued (chapter 13). A sustainability proposal providing insights for Lean sustainability achievement in Healthcare and overall conclusion are presented opening new streams for further research, in chapter 14.

2. Methodology

2.1. Introduction

This research' starting point was the awareness of a lack of empirical studies on the sustainability of Lean practices in Healthcare settings. A sort of phenomenon dissemination (DiMaggio and Powell, 1983), which some call "fad", seemed to focus exclusively on case success reports with misleading conclusions either on the nature of the concepts involved as on the contributions to theory and practice. The Lean thinking translation to services introduced the need of understanding at what extension new management practices adoption should be analyzed under the umbrella of Lean thinking. This problem led us to try to develop knowledge fostering objectivity in a less studied setting, Healthcare services, not only to achieve a better understanding of the problem, but to provide theoretical improvement and practical usefulness.

This chapter presents the research design for the empirical study of Lean practices in Healthcare services settings, framed by a specific philosophy of science that justifies the scientific approach adopted.

After recalling the research questions that aroused from some gaps identified in literature review, defining the unit of analysis and introducing the study procedures, the selection of cases is explained. Data collection and analysis procedures are presented and the end of the chapter with considerations regarding research design quality.

2.2. The philosophy of science behind this research

The scientific approach adoption and the choice of methods are intrinsically dependent of the researcher epistemological assumptions and the ontology of this study's problem and goals.

Being the researcher's view of reality the corner stone to all other assumptions, what is assumed here predicates the researcher's other assumptions. We see reality of new management practices adoption as dependent on the individual/object history and thus,

it cannot be studied from the outside. Moreover, the common characteristics of the phenomenon – Lean practices - are present in two streams of the literature, one presenting its roots and main principles in Operations Management (OM) field in manufacturing settings, and another present their translation to Healthcare services settings. Therefore, under that array of assumptions, the transferability of knowledge is acceptable. As such, ontologically, we are placed in the “nominalism” side of a continuum that opposes nominalism and interpretivism to realism (Burrell and Morgan, 1979). Placed in an interpretive paradigm, the researched conducted undertook an in-depth, long-term exploration of how Lean practices were adopted in Healthcare organisation’ improvement programs.

Epistemologically, this study seeks the viewpoint of the individuals involved in Lean deployment as a management philosophy change, interacting with the individuals through interviews and observing processes and their contexts. Therefore, we follow a relativist or non-positivist paradigm (Bryman, 2004). Hence, if ontologically, we see reality as a contextual field of information, epistemologically we seek to understand patterns of symbolic discourse, to map contexts and to study systems, change processes, seeing individuals as actor or symbol users (Morgan and Smircich, 1980).

According to Burrell and Morgan (1979: 24), "To be located in a particular paradigm is to view the world in a particular way". Moreover, as Khun, (1970: 113) posits: "something like a paradigm is a prerequisite to perception itself". Among the most prominent philosophies of science reflected in management studies: positivism (Donaldson, 1996; Wicks and Freeman, 1998), constructivism (Mir and Watson, 2000), pragmatism (Powell, 2002, 2003; Wicks and Freeman, 1998), critical realism (Fleetwood, 2005; Tsang and Kwan, 1999), and interpretivism (Lee, 1991) the last is the foundation of this research’s philosophy of science.

The late 1980’s change from paradigm-driven to problem-driven in organisation theory research was concomitant with the growing importance of qualitative methodologies (Davis and Marquis, 2005). Some authors contributed to rethink the Burrell and Morgan 1979 paradigm grid (functionalist, radical structuralist, radical humanist and interpretive paradigm) (Deetz, 1996; Willmott, 1993, among others). The focus of research topics changed from the problems of the theory to the events of the world. Selecting Lean

Thinking in Healthcare, a new field in the operations and health management literature (Brandao de Souza, 2009), this research main problem – **are Lean practices truly embedded in Healthcare services, or they are only this sector’s latest fad** - calls for a chain of elements to be study that are presented in the following sections.

As the main purpose of this study is understanding how embedded are Lean practices in Healthcare sector, an array of dimensions as Lean outcomes, measures, risks, implementation barriers, implementation enablers and sustainability factors were considered for a context deeper exploration comparing with the extant literature . These dimensions were explored with the specific purposes of:

- Identifying key domains that represent Lean practices in Healthcare sector;
- Studying how many lessons in seventy years of Lean manufacturing, with its wide range of tools and scopes, were learned by service industry, particularly Healthcare services;
- Understanding how deep were those lessons deployed and why deployment fails in Healthcare settings;
- Creating a “Lean implementation framework” for Healthcare organisations based on the study of failures and successes of “Lean” deployment in Healthcare services.

As this research seeks explanation rather than prediction, the emphasis in contextual issues seemed paramount in explaining the success or failure of Lean implementations. For trying to understand events in their specific context, qualitative approaches (also known as hermeneutic, reconstructive or interpretative) seemed suitable for this research (Flick, 2002). Therefore, the multi-case study approach, allowing in-depth analysis and comparative case-study, was chosen for being rooted in contextualism (Pettigrew, 1990, 1997).

2.3. Research design

2.3.1. Research questions

This research intends to understand how embedded are Lean practices in Healthcare organisations by deeply exploring the following dimensions:

a) Lean Outcomes

The adoption of Lean practices in Healthcare has been studied and reported as success stories of strategic changes in Healthcare organisations, as the Bolton Improving Care System – BICS (Fillingham, 2007) and the legendary Virginia Mason Medical Centre Cases (Black and Miller, 2008:149-189). In 2003 revision, Womack and Jones (1996, 2003:289) introduced the application of Lean thinking in the medical system.

Some authors (Fillingham, 2007; Kollberg *et al.*, 2007, Manos *et al.*, 2006) advocate Lean practices in Healthcare settings to eliminate delays, reduce length of stay, repeated encounters, errors and inappropriate procedures. In fact, according to Green and May (2005), the legitimacy of Lean discourse is rooted in a 30-year trend of corporate restructuring, de-layering and outsourcing.

It is our assumption that outsourcing can be a Lean solution in the sense of giving to third parties less value-added activities and focus only in value added activities, “doing more with less”. According to the literature there are non value-added activities that can be eliminated and others that are necessary to the process and cannot be eliminated, but can be outsourced, but that analysis is absent from Lean Healthcare literature. The literature presents some differences in terms of Lean deployment outcomes in Healthcare settings that make pertinent the question: **RQ1 - What are the different outcomes from Lean deployment in Healthcare?**

b) Implementation barriers

Radnor and Walley (2008), among others, found some barriers in Lean principles and tools implementation in public services (including Healthcare services): lack of clear customer focus, too many procedures, people working in silos, too many targets, lack of awareness of strategic direction, general belief that staff are overworked and underpaid, and finally, lack of understanding of the effect of variation, systems thinking and

process flow. Silva *et al.* (2010) used survey to explore Lean production implementation barriers as well as the drivers and achievements of implementation. Browning and Heath (2009) explore Lean implementation complexity and difficulties through a case study in aircraft manufacturing.

However, the Lean implementation barriers are less explored in services settings. Nevertheless, the literature suggests that the lack of process orientation along with cultural aspects (organisational and national) linked to change resistance can provide research contexts for trying to give answers to: **RQ2 - What are the barriers to Lean implementation in Healthcare?**

c) Implementation enablers

A lot of successful cases on Lean deployment in Healthcare settings have been reported. However, the ones with a longer follow-up showed that Lean journey has an entropic curse that tends to lead to the “comfort zone” and, even so, they were able to achieve a “Lean culture”. What were their enablers in the Lean journey? Can the prescribe success recipes? This led us to the question:

RQ3 - What enables Lean implementation in Healthcare?

Some possible clues can be found in the literature. In small and medium enterprises (SME) context, Achanga *et al.* (2006) outlined the importance of leadership, management, finance organisational culture and skills, as well as expertise, among other factors, as critical success factors for implementing Lean. In Chakrabarty and Tan's (2007) literature review, the critical success factors refer to the applicability of another improvement philosophy (six sigma) in services (mostly in Healthcare and banks). Nevertheless, it lacks a review on Lean implementation critical factors in Healthcare.

d) Risks

Radnor and Boaden (2004) explain the risk of an organisation becoming anorexic (long or short-term) while pursuing Leanness, having, however, the possibility of “cure” before permanent damage is done. This anorexia can have multiple dimensions, less explored in the literature that the following research intends to explore.

On the other end of this weight problem lays the frequent need to put some weight before every Lean intervention start, as internal and external (consultants) resources are gathered to this mission, bringing additional risks also not reported by published literature leaving unanswered the question: **RQ4 - What are the risks of Lean in Healthcare?**

e) Measures:

As in any change process, Lean deployment monitoring is important not only to mark out the route but to help managing the process adjusting efforts to outcomes. Hence, a natural question not properly covered in the literature is:

RQ5 - How to measure Lean achievements in Healthcare services? This question is subdivided into two prior ones:

(RQ5.1) Why assess Lean deployment in Healthcare?

(RQ5.2) What Lean deployment dimensions have to be evaluated in Healthcare?

The reviewed literature has not presented a consistent answer to this question. Even when achieving satisfactory outcomes, measuring improvements in Healthcare services still presents a challenge (Young and McCLean, 2009). Monitoring performance in highly accountable services is a main issue that requires empirical research in Healthcare settings, namely regarding Lean deployment.

Holm and Ahlström, (2010a) propose an instrument for Lean Service assessment – but for measuring Lean in repair and maintenance services for industrial products- what about other kinds of services, as Healthcare, where upstream can coexist with downstream? Shah and Ward (2007) define Lean measures in manufacturing context. Based also in their insights, Overboom *et al.* (2010) develop a measurement tool to assess the degree of Leanness in a logistics service setting but don't present a holistic answer to assess Lean changes.

A lot of “Lean Assessment” maps have been presented by consultants¹, mostly developed for manufacturing settings. It seems that the translation to Healthcare services is not strait. On the other hand, should such an instrument be custom made, serving self assessment purposes, or a benchmark framework instrument? This research aims to provide suitable answers to the three above questions exploring the accuracy of the measures used in Lean deployment in Healthcare and its sustainability.

And last, but certainly not least,

f) Sustainability factors

As Radnor and Boaden (2008) stress, three key issues in Lean deployment in Healthcare that require further examinations are: process, people and sustainability. Process and people are addressed already in above research questions. Sustainability is our last explored dimension. This dimension appears as a consequence of all the others, specially the last one (Lean enablers), and so, this research has been conducted to answer the question: **RQ6 - How to develop a sustainable Lean culture?**

Hines and Rich (1997) present Lean tools applied to services. Some Lean initiatives seem to present a prescriptive tone by testing some of those tools in pilot projects (Grunden, 2009), combined tools (Buesa, 2009), seeking for rapid improvement (Wennecke, 2008, Caldwell, 2006). Is “Lean” a goal or a journey? According to Goodman *et al.* (2007) the Lean project termination is just the beginning. The difficulty is sustain Lean practices and turn to previous comfort zone (Lucey *et al.* 2005). The importance of a Lean sustainable culture enhances long-term benefits focusing. The focus has changes from “how to go Lean” to “how to stay Lean” (Hines, 2010).

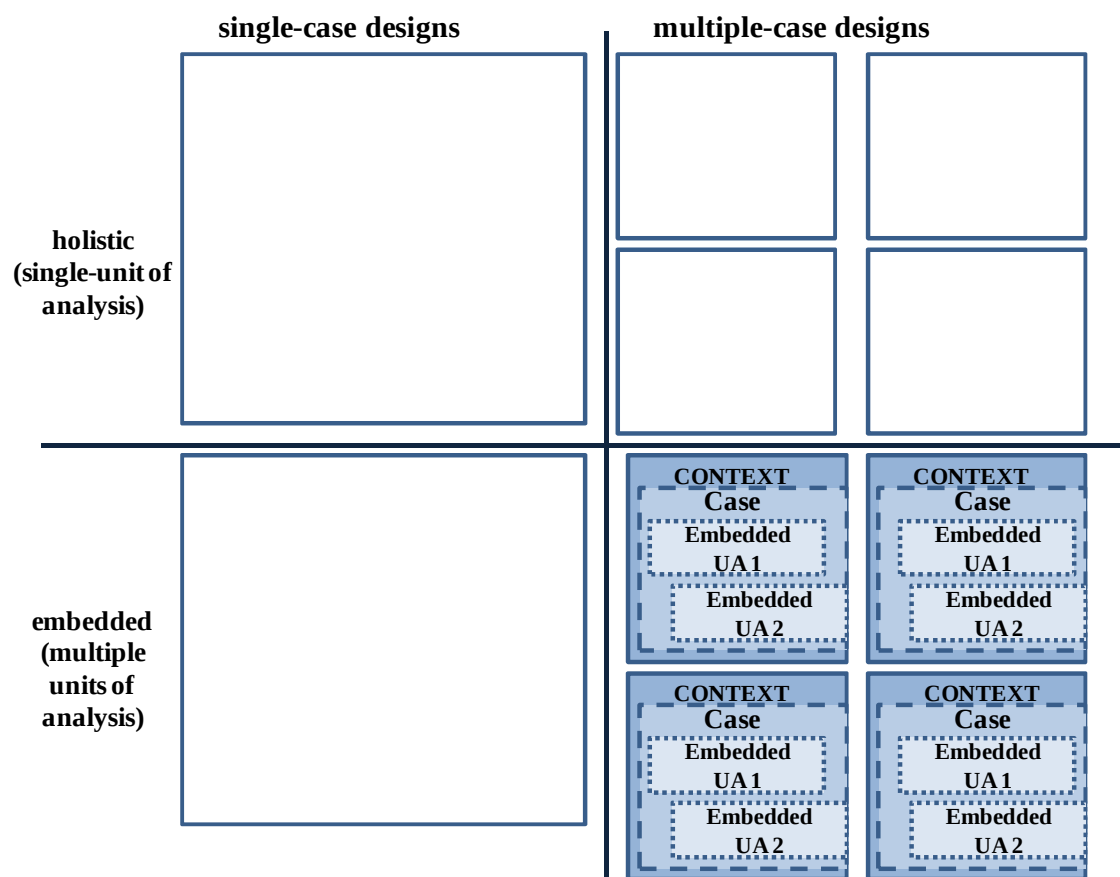
From all research question exposed and according to Yin (2009), case study method is appropriate to “How” and “Why” questions and to investigate a contemporary phenomenon in its real-life context when the boundaries between phenomenon and context are not evident. Moreover, and according to Yin (2009: 8) case study method is also appropriated before a nonexistent control of the researcher over actual behavioural events and a higher degree of focus on contemporary over opposed to historical events, as in this study.

¹ The word “consultant” is in this entire thesis document used for a member of an external team of a business/Lean consultant company, not as the British significance of clinical consultant.

2.3.2. Unit of analysis

As the research main objective is to understand how embedded are Lean practices in Healthcare settings i.e. the extension of Lean deployment in Healthcare, we set out to analyze as many different Lean practices/projects conducted in the same organisation. Therefore, and according to the embedded type of case study designs (Yin, 2009: 46), we considered each Lean project as the embedded unit of analysis (UA) as showed in Figure 2.1.

Figure 2.1 - Embedded multiple-case design



Source: Based on Yin (2009: 46).

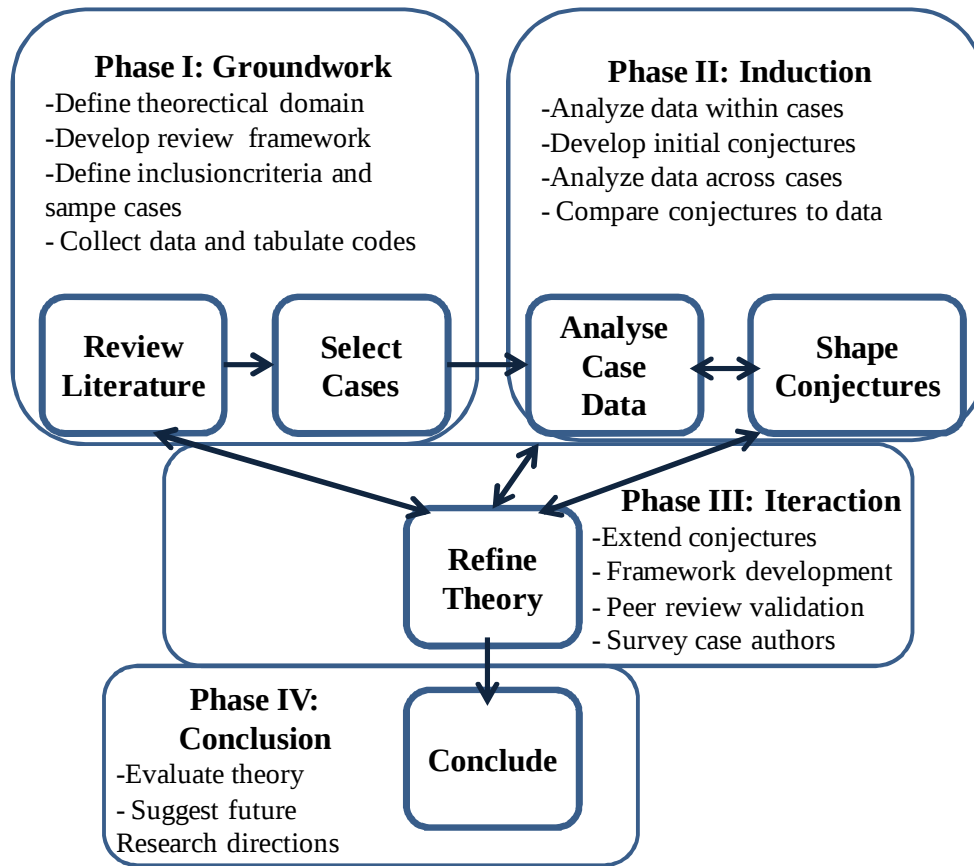
2.3.3. Study procedures

Being aware that case studies make it harder to generalize findings (Yin, 2009; Meredith, 1998), a multi-case approach was adopted not aiming to find the “law” of white swans (Taleb, 2007) survival but to understand the circumstances of black and white swans’ coexistence. At the same time, despite the growing academic interest of the topic, little was known, in Healthcare settings, regarding the differences in Lean deployment, the sustainability factors and constraints. Therefore, it seemed crucial to obtain descriptions on the conditions, patterns and on inconsistencies.

Also, a single case design would only be justified “when the case represents (i) a critical test of existing theory, (ii) a rare or unique circumstance, or (iii) a representative or typical case or when the case serves a (iv) revelatory or (v) longitudinal purpose” (Yin, 2009:47-52), which was not suitable to our purposes. It seemed, though appropriate to follow the techniques and procedure for developing grounded theory (Charmaz, 2006; Glaser and Strauss, 1967; Strauss and Corbin, 1998). The multi case approach enabled searching for cross-case patterns and the possibility of theory building (Eisenhardt, 1989). Although there is no ideal number of cases, Eisenhardt (1989) recommends multiple cases analysis based in four to ten cases as less than four, it would be difficult to generate theory with much complexity and empirical evidence is not convincing. On the other hand, with more than ten cases, it would become difficult to cope with the high volume of information and data.

There was an iterative process of interviewing, coding and data analysis from data collection until case writing was almost completed (Glaser and Strauss, 1967: 43). It was possible to explore data through “iterative triangulation” by systematic iterations between literature review, case evidence, and intuition (Lewis, 1998) in order to draw theory from data. Across cases it was followed a replication logic, comparing conjectures, clarifying constructs, relationships and the emerging theoretical framework (Eisenhardt, 1989; Mc-Cutcheon and Meredith, 1993). The Figure 2.2 illustrates the methodological process followed in this research:

Figure 2.2 - Research methodological process



Source: Based on Lewis (1998).

2.4. Case selection

Based on the Lean definition in Healthcare literature: "...a management practice based on the philosophy of continuously improving processes by either increasing customer value or reducing non-value adding activities (*Muda*), process variation (*Mura*), and poor work conditions (*Muri*)" (Radnor *et al.*, 2012), a set of inclusion criteria was defined in cascade:

- to be an Healthcare organisation (public or private) running process improvement projects and/or practices that clearly served customer (internal or final) value increase;

- the goals of the improvement projects/practices had to clearly state the reduction of non-value adding activities, redundancies rather than staff or FTE (Full Time Equivalent) reduction;
- the improvement projects/practices' goals (as process variation reduction and/or poor work conditions elimination) had to be subsequent to non-value adding activities reduction goal.

Yin (2009) notes that when considering multiple case research design, an understanding of the following two concepts is required:

- (i) the counter intuitive nature of case studies' replication compared with traditional empirical research: there are different logics that need to be applied,

and

- (ii) the understanding of and importance of contemplating research design and ensuring appropriate choices are made, so that the cases selected provide insights to confirm or contrast the predicted results.

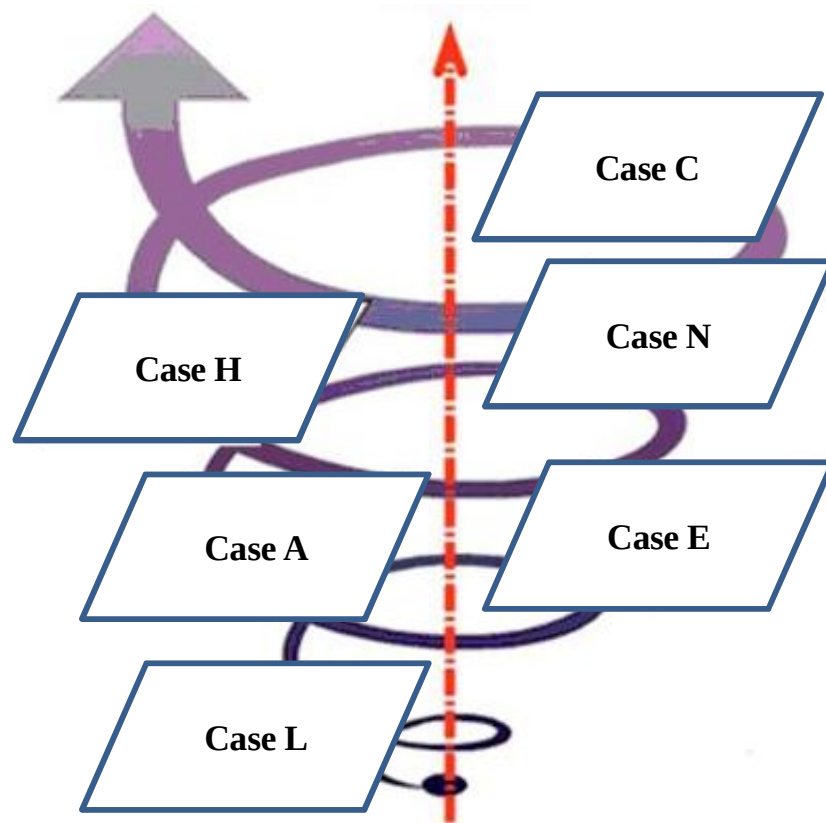
Hence, each case/organisation was followed by a study protocol to analyze each improvement process (unit of analysis) repeatedly following the same structure, collection (interviewing script) and analysis procedures.

The choice of the units of analysis was driven by the choice of Healthcare organisations (or cases) and was leveraged by the growing interest of some media and community forums in learning from those cases.

The public presentations that derived from that interest, despite of its importance to documentary analysis did not influence the research path in striving for case evidence on primary sources. Some of the cases ended up as a study of several Lean projects while others presented only one project that matched the inclusion criteria. It was though the unit of investigation that counted, for providing objects of reasoning, relevant criteria and circumstances (matching the inclusion criteria described above) and not the way how they were identified, as we did not seek for quantitative representativeness (Diefenbach, 2009).

However, it is important to stress that the case choosing process followed a crescent spiral (Figure 2.3) where each case's elements influenced the subsequent selection until no novelty or elements' sufficiency were found in potential new cases.

Figure 2.3 - Case selection process



Source: the author

2.5. Data collection

Data collection had the purpose of building an evidence chain (Yin, 2009: 122) that could provide answers the most complete as possible to the research questions. Serving this purpose, in data collection and analysis, a study protocol Yin (2009: 79) was followed as well as multiple sources for data triangulation (Yin (2009: 116)). As part of the case study protocol, a pre-structured case study outline allowed to better deal with the risk of data overload collection and also made it easier to locate the data related to a specific issue across all cases in analysis process (Ellram, 1996). Data was collected through semi-structured interviews, direct non participant observation and the use of secondary data recurring to organisations' documents analysis (Saunders *et al.*, 2007).

2.5.1. Interviews

The main source of data was semi-structured interviews as it permits an in-depth exploration of the topics and experiences of Lean deployment (Charmaz, 2006). The need of flexibility in an exploratory study does not necessarily mean the absence of direction and clear paths (Saunders *et al.*, 2007:134). Thus, this study protocol included an interview guide promoting the focus on the interview scope and enabling concrete answers to the posed research questions without jeopardizing genuine statements' collection. Hence, the semi-structured interviews were composed by adjustable questions before interviewee characteristics and issues to be covered. Some supplementary questions (Appendix A) were posed to go deeper than the initial answer or used as anchorage to avoid question deviations and misleading information.

A two-step interview process was completed when data saturation was reached (Chiovitti and Piran, 2003), between July 2010 and January 2012, following the semi-structured interview guide covering the Lean success factors selected from literature review and treated as main codes: communication, resources, involvement, training, monitoring, pace, achievement, and leadership (Appendix A).

The interviews were cross checked between interviewees (Meredith *et al.*, 1989) and with documentation and notes from direct non participant observation (i.e. “within-method” triangulation (Jick, 1979)).

Were interviewed significant participants (senior manager, programme leaders, program team members, staff members who were affected by the change, consultants, relevant middle managers and service professionals) on the Lean project implementation that was the study's unit of analysis (Baker *et al.*, 1992). A total of 53 interviewees distributed by the six cases are presented in Table 2.1.

Some participants were interviewed more than once in order to affirm, modify, add and clarify what was said in the first interview. The interviews had an average duration of 90 minutes. Taped transcripts were used to assist in data collection. Data gathered from different informants and sources was reduced to precise categories in common tables and then systematically interrogated (Yin, 2009) comparing and noting patterns (Miles and Huberman, 1994).

Table 2.1- Respondents' roles by case

Role	Cases					
	L	E	A	N	H	C
Senior (top) manager	2	2	3	4	2	1
Middle manager	1	4	4	3	2	3
Service staff	2	3	3	3	1	1
Lean programme leader	1	1	1	1	-	-
External Consultants	1	1		1	1	1
Total Respondents	7	11	11	12	6	6

Source: the author.

Considering the trade-off between efficiency and richness of data, we seek to enhance the reliability of data by repeating the same questions to as many possible respondents and also look for much valuable data by going beyond formal interviews, what revealed itself highly time consuming and obliged to a careful selection of the respondents (Voss *et al.*, 2002).

2.5.2. Direct non participant observation

As a complement to interviews, and considering the opportunity to conduct the study in its natural setting (Yin, 2009:109), the alleged improved processes were observed without compromising the normal course of Healthcare services in operating theaters (during Healthcare procedures and during stand-by times), in ancillary services following process paths in materials management and logistics.

Direct non participant observation allowed non-systematic data collection and tacit information confirmation regarding the process improvements, not possible to obtain only recurring to interviews and documental analysis. Notes were jot down in a sort of “logbook” in order to join the coding material.

2.5.3. Document analysis

Another evidence source, one of the six enumerated by Yin (2009:101) was documentation. All documents allowed following the evidence chain as well as comparing information, detecting possible contradictions, finding similarities between interviews and cases and complete case information. However, some caution was taken

when analyzing public presentations, as they deliberately present strengths and hide some weaknesses. Another difficulty was the access to some internal reports as they are sometimes withheld.

2.6. Data analysis

Raw data is not *per se* relevant. Construct relevance depends not only on the liability and skills in collection but also on accuracy in data analysis. Hence, triangulation of different sources of data was necessary to find convergence of evidence (Yin, 2009: 117). A database for each case study was created recurring to coding. Coding procedures were followed in order to (i) build rather than test theory; (ii) provide analytic tools for handling masses of raw data; (iii) help to consider alternative meanings of phenomena; (iv) be systematic and creative at same time; and (v) identify, develop and relate concepts, the building blocks of theory (Strauss and Corbin, 1998).

The interviews answers, the document content and observations memos were object of a three step categorization: (i) data was grouped by categories by concept identified according to specific characteristics and dimensions (sentences, ideas and events coded and grouped in subcategories); (ii) data was re-sorted in order to connect categories; (iii) selective coding of nuclear categories and the ones related with the former (Voss *et al.*, 2002). It was followed the grounded theory systematic process by a standard format in three levels: open coding (selecting categories of information), axial coding (interconnecting the categories); and selective coding (building a story that connects the categories) (Strauss and Corbin, 1998). The codes' list² was build based in the concepts of the literature revision that were addressed in previous chapters.

After coding relevant data, were followed three concurrent stages: data reduction (to limit the number of categories), data display and conclusion drawing/verification (Miles and Huberman, 1994).

During data analysis, the results were being compared with an ongoing review of the literature providing a secondary source of data and supplementary validity (Strauss and Corbin, 1998). Since data collection and interpretation is continuous in grounded

² Provided upon request.

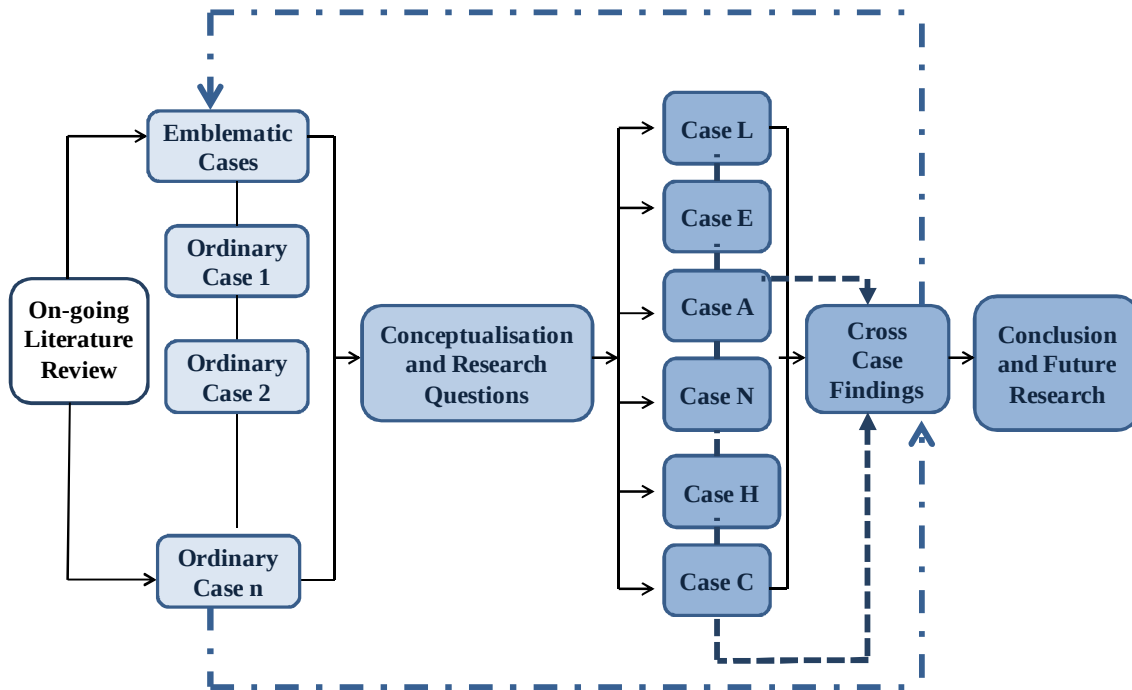
theory, data verification occurred throughout the research process. This procedure had the advantage of avoiding data verification discrepancies occurring too late in the research follow-up making difficult that resolution (Strauss and Corbin, 1998). Therefore, there was an iterative process of interviewing, coding and analysis from data collection (Charmaz, 2006; Glaser and Strauss, 1967).

The cross-case analysis (Bourgeois and Eisenhardt, 1988) was conducted in two different moments: a preliminary analysis focused on data from each single case, then, data grouped by hospital were codified and reduced in a systematic approach. The idea was to become intimately familiar with each case as a stand-alone entity, and allow unique patterns of each case to emerge before moving to cross analysis. The results were used in a second moment to perform cross-case analysis (Eisenhardt, 1989).

The analysis process was iterative examining the cases and then comparing findings with the literature cases and indicators that were determined at this research's conceptualization. In the iterative process was followed one of the Miles and Huberman (1994: 153) analysis suggestions: the causal network. The causal network, a "display of the most important independent and dependent variables in a field study and of the relationships among them" are associated with analytic texts (working blocks) describing the meaning of the connections among factors.

As more knowledge became available during field work, patterns of interaction between variables emerged, both within and across cases. Some variables looked connected while others seemed random or unconnected. This process lead to four individual networks allowing cross analysis. The iterative process is represented by the dash lines in Figure 2.4. The intensity of ground color illustrates the three stages in knowledge contribution progress.

Figure 2.4 - Iterative cross case analysis



Source: the author

2.7. Quality of research design

Our awareness of the possibility of multi-case approach might reduce the depth of study despite augmenting external validity and preventing observer bias (Voss *et al.*, 2002) led to concentrate on four quality issues: construct validity, internal and external validity and reliability. According to Yin (2009: 40), construct validity is the establishment of correct measures for the concepts in study, internal validity for exploratory studies is provided by the processes utilized to ascertain the quality of phenomena, external validity is the ability to generalize the findings and reliability is the demonstration that following the same procedures the same study can be repeated with the same results.

2.7.1. Construct validity

According to Voss *et al.* (2002), construct validity was tested by: (i) observing whether predictions regarding relationships to other variables were confirmed; (ii) using multiple sources of evidence; (iii) looking for “discriminant validity” of constructs (if the

construct as measured can be differentiated from the other constructs); and (iv) seeking triangulation to strengthen construct validity. Also, Yin (2009:41)'s recommendations were followed testing construct validity in the following research phases: in data collection and composition. Moreover, was considered the possibility of multiple evidence sources supply multiple measures for the same phenomenon. Those recommendations were followed for all constructs.

2.7.2. Internal and external validity

There are threats to internal and external validity at the three major stages of the research process: research design/data collection, data analysis, and data interpretation. However, contrary to quantitative research, in interpretive research, these three stages are iterative (Onwuegbuzie and Leech, 2007). Seeking internal validity, in this study, was pursuing sustainability of the relations between constructs and establishing causal relationships whereby certain conditions are shown to lead to other conditions (Eisenhardt, 1989).

In this study it occurred from research design for seeking internal replication of procedures. In data collection, special attention to aspect as observational and researcher bias was taken (Onwuegbuzie and Leech, 2007). Miles and Huberman (1994) identified two sources of researcher bias: (i) the effects of the researcher on the participant(s) (i.e., bias A); and (ii) the effects of the participant(s) on the researcher (i.e., bias B). Bias A occurs when the researcher disrupts or poses a threat to the existing social or institutional relationships. It can lead to informants implicitly or explicitly boycotting the researcher, who is viewed as a spy, voyeur, or adversary. Further, bias A can inhibit informants. On the other hand, bias B can lead to the researcher going native.

In order to avoid bias A, some Miles and Huberman (1994)'s recommendations were followed such as: (i) prolonged engagement, (ii) persistent observation, (iii) making the intentions clear, (iv) conducting some of the interviewing in a neutral site, and (v) being careful not to exacerbate any potential problems. Also Bias B was minimized by (i) avoiding elite bias by selecting a heterogeneous sample, (ii) avoiding going native by spending time away from the site, (iii) maintaining a conceptual framework, (iv) utilizing informants to provide background and historical information, (v) triangulating

data, (vi) examining potential informant bias, and (vii) continually keeping research questions firmly in mind.

Also, these authors' recommendations were followed avoiding the "causal error" or providing causal explanations and attributions for observed Behaviours and attitudes without attempting to verify such interpretations. This could lead to error in the data.

During data analysis, internal validity was pursued through pattern matching, explanation building and also addressing concurrent and rival explanations (Yin, 2009: 41). During data interpretation, the data triangulation of multiple sources (i.e., semi-structured interviews, direct observation, analysis of internal documents and other secondary data) assured internal validity (Tharenou, *et al.*, 2007). That was leveraged by performing the multi-case study on a replication basis, which concurred to internal validity as it enabled cross information, confirm, infirm and reformulate propositions (Voss *et al.*, 2002). Furthermore, cross-case analysis was conducted, allowing comparison and contrasting emerging constructs and theory settings refining conceptual definitions and strengthening internal validity of findings (Lewis, 1998).

It was thus avoided the validity threat of "voluptuous legitimation" or embodied validity, assuring that extent to which the researcher's level of interpretation do not exceeds her/his knowledge base stemming from the data (Onwuegbuzie and Leech, 2007).

Aware that case studies make it harder to generalize findings (Yin, 2009; Meredith, 1998), a multi-case approach presented defensible replication logic to enhance external validity (Tharenou *et al.*, 2007; Yin, 2009). Analytic generalization is the main difference of the replicability of case studies as distinct from other empirical research methods (Smaling, 2003; Yin, 2009). Therefore, the choice of extreme cases within a theoretical sampling enhanced external validity (Eisenhardt, 1989). The choice of unit of analysis and cases in a replication logic and filling the inclusion criteria increased external validity, only constrained by considering a single service setting, Healthcare services.

External validity was pursued also by avoiding some threats as “communicative validity” (Onwuegbuzie and Leech, 2007) that involves testing the validity of knowledge claims in a discourse, i.e. validity is agreed upon by a collection of researchers. That was accomplished by the continuous production and submission of articles that followed all the revision process. Reviewers often request additional data analyses and the iterative nature of research continued during the submission, the review and revision stages of research. This also allowed obtaining “interpretive validity” or the extent to which a researcher’s interpretation of an account represents an understanding of the perspective of the group under study and the meanings attached to their words and actions. Peer reviewers played an important role in determining which sources of invalidity might have prevailed.

Another external validity awareness was the “Population generalizability/Ecological generalizability/Temporal generalizability” (Onwuegbuzie and Leech, 2007). According to these authors, a common error among qualitative researchers, made at the interpretation stage, is the tendency to generalize findings rather than to utilize the qualitative data to obtain insights into particular underlying processes and practices that prevail within a specific location. In fact, only when relatively large representative samples are utilized should qualitative researchers attempt to generalize findings across different populations (i.e., population generalizability), locations (i.e., ecological generalizability), settings, contexts, and/or times (i.e., temporal generalizability).

2.7.3. Reliability

In this research there was a constant concern with researcher bias (opinions and perspectives) not only in interviewing (Tharenou *et al.*, 2007; Yin, 2009) but also in data analysis.

During interviewing the script support prevented “order bias”. Order bias occurs-when the order of the questions posed in an interview schedule or the order in which observations are made makes a difference to the dependability and confirm ability of the findings (Onwuegbuzie and Leech, 2007).

Thus, reliability concern was present at the study design, at the definition of the study protocol and at data analysis through coding by creating templates or frameworks

(Tharenou *et al.*, 2007; Yin, 2009). Reliability was assured by the codification or standardization of the method and processes for the conduct of case research. Also was followed Yin (2008: 45) suggestion that the documentation of procedures would assist future researchers repeat the work improving the likelihood of reliability.

2.8. Chapter conclusion

This chapter describes the methodology, or a “way of thinking about and studying a specific reality” or problem (Strauss and Corbin, 1998). This research pathway included the selected and justified methods – multi-case study – as the set of procedures and techniques for gathering and analyzing data and also the analytic process - coding - through which data was fractured, conceptualized and integrated.

Shaped by this study problem- the embeddedness of Lean practices in Healthcare sector-the research methodology adopted has an inductive (Smaling, 2003) nature promoting understanding through exploratory and descriptive studies based in qualitative data (Maxwell, 2008). The interpretative paradigm conducted this exploratory research for a better understanding of a growing phenomenon’s evidence in a still less studied context: Healthcare services.

Being more idiosyncratic than a generalizing method, the multi-case approach was chosen by its descriptive and exploratory character, not to produce causality statements but to achieve a logical sequence of connection between empirical data, problem/research questions and findings/conclusions. The multi case approach enabled searching for cross-case patterns and the possibility of theory building or refining (Eisenhardt, 1989; McCutcheon and Meredith, 1993).

In summary, this chapter began with our epistemological assumptions. The ontology of the problem and the research questions that emerged from the literature gaps influenced the methodology followed in this study. The option of an exploratory empirical study based on description and interpretation of qualitative data was made with full awareness of quality requirements and suitable procedures.

3. Lean Healthcare across Cultures: State-of-the-art³

3.1. Abstract

Lean thinking “translation” from manufacturing to services settings is a topic of growing interest among academics and practitioners. Healthcare organisations have been one of the latest services settings adopting Lean principles, tools and techniques feeding a crescent stream of literature. However, despite of the important contribution of some review articles, the Lean embeddedness in different national Healthcare systems lack cultural appraisal and updating.

Through a systematic literature review, this paper presents the state-of-the-art of Lean deployment in Healthcare settings recurring to cultural lenses, classifies the existent literature, enhances cultural (national and organisational) marks and disclosures Lean deployment patterns while answer the question: - Does national cultural resemblance to Japan means a deeper deployment of Lean practices by Healthcare organisations?

3.2. Introduction

Applying Lean in Healthcare services has been the most visible recent trend in services industry (Holm and Ahlström, 2010, Jones, 2006). In spite of Brandao de Souza’ s (2009) contribution in updating the evolution of Lean principles application in Healthcare context, providing a taxonomy for classification of existent studies, a more critical perspective including contextual variables has to be considered (Dal Pont, 2010; Hines *et al.*, 2008). When analysing the phenomenon dissemination to Healthcare services, some questions arise: - is “Lean” in Healthcare just a buzzword or a sustainable enterprise process improvement system? What context variables, such as national and organisational culture, contribute to the adoption and sustainability of a “production system” also called as a “way” of thinking?

³ This chapter is based on the article “*Lean Healthcare across cultures: state-of-the art*” published in the American International Journal of Contemporary Research, Vol.2, Nr 6, pp.187-206, 2012.

Scarce but important review articles (Young and McClean, 2008; Winch and Henderson, 2009; Brandao de Souza, 2009; Poksinska, 2010; Mazzocato *et al.*, 2010b, Sobek and Lang, 2010) present the deployment extension of Lean thinking in Healthcare. However, all these reviews seem to be surgical in scope presenting only success cases under a tool and technique view (also called the “hard” side) and narrow in extension, not trying to cover different national cultures context (the “soft” side). Cultural issues are less explored in studies regarding Lean deployment, even when is accepted that change is not a technical-rational process, but a behavioural process, thus, Lean implementation requires a “cultural redesign” (Atkinson, 2010). Whilst some western skeptical authors (Green, 1999) consider Lean deployment subjugated to the principles of contingency theory, in this paper, we explore Lean deployment under the only contingency, the cultural one.

Presented as an antidote to *muda* (waste) (Ohno, 1988), converting *muda* into value, “Lean thinking”, a five principle improvement philosophy coined in Japan has been adopted all over the world having the first follower, the USA. Two different countries, Japan and USA, with different positions in the cultural values dimensions assessment: Power Distance (PD), Uncertainty Avoidance (UA) and Individualism (IND) (resembling only in Masculinity) (Hofstede, 1985), contributed differently for the same management philosophy. But, “...before understanding how the Japanese do business, one must understanding the underlying culture” (Ford and Honeycutt, 1992). Despite some dramatic critics to the adaptation of Japanese model to new world economic context (McCormick, 2004), Japanese Way is still inspiring more economic sectors ever proving that there is a lot to learn (Strach and Everett, 2004). However, research has been strongly concentrated in Lean manufacturing and only recently the discussion on Lean production included the concept’s relation to Six Sigma and Total Quality Management (TQM) (Liker, 2004). Hines *et al.* (2004) present the evolution of Lean concept highlighting the shifting of focus from quality in early 1990s to customer value with the appliance to services sector, from 2000s onwards (Hines *et al.*, 2008).

The purpose of this paper is to understand the state-of-the-art of Lean deployment in Healthcare settings recurring to cultural lenses, to classify the existent literature, to seek for cultural (national and organisational) marks and also to disclosure Lean deployment patterns while answering the question: - do national cultural resemblance to Japan

means a deeper deployment of Lean practices by Healthcare organisations? Or in a narrow way: - who embedded are Lean practices in Healthcare services?

Being aware of the different corpuses of literature produced by industrial and academic methods (scientific and grey), this literature review aims to bring together insights from operational management, Lean management, and cross-cultural management literature and provide new agenda for future research considering the cultural context.

This paper is structured as follows: in the second section, we present the methodology followed in this review, the third section explores national cultural dimensions and the cultural construction along the main different cultural levels (national, organisational and individual) highlighting the national culture influence on organisations' culture as the backdrop of this paper. The fourth section enhances the culture ground of Lean deployment serving as the linkage to subsequent section that presents all available literature on Lean deployment in Healthcare sector that will support this review's classification regarding the extension of Lean practices, showing the cultural differences of each cluster in one of the latest sectors pursuing Lean adoption. Conclusions and future research paths are, finally, presented.

3.3. Methodology

A systematic search in electronic databases (ABI/Inform, B-On, PubMed) was conducted with the purpose of gather information and examples from both scientific and grey literature (Farace, 1998) that could show a full picture of Lean Healthcare practices emphasizing the cultural (national and organisational) aspects. We have excluded articles concerning hybrid approaches (as "Lean Six Sigma") and included all articles that reported successful or not successful Lean deployments in Healthcare organisations, in peer-review and grey publications using key words: "Lean thinking"; "Lean Healthcare"; "Toyota Production System" and "Lean Services". Books were also excluded for presenting a broader case analysis extension when our goal was categorization of the main scope, which is more clearly in articles.

A cross-reference search encompassing the eligible first selection was carried out. Data was collected in two Excel spreadsheet, one following a categorization according the

publications taxonomy of Brandao de Souza (2009), and the other covering the main findings categories (outcomes, measures, risks, implementation barriers and enablers, and sustainability factors) of Lean applications in Healthcare.

3.4. Cultural grounds of work practices

Culture, “the collective programming of the mind which distinguishes the members of one human group from another” (Hofstede, 1980, p.25), manifests itself in many ways as symbols, heroes, rituals (also labeled as “practices”) and values (Hofstede, 1998b) and can be defined at four main levels: society, organisational, small group and professional (Hofstede, 2000). In Geert Hofstede IBM study, four variables/dimensions to classify national culture were defined: (i) Power Distance (PD) (the degree of equality, or inequality, between people in the country's society); (ii) Individualism (IND) (the degree the society reinforces individual or collective achievement and interpersonal relationships or the degree to which individuals are integrated into groups); (iii) Masculinity (MAS) (the degree the society reinforces, or does not reinforce, the traditional masculine work role model of male achievement, control, and power); and (iv) Uncertainty Avoidance (UA) (the level of tolerance for uncertainty and ambiguity within the society - i.e. unstructured situations) (Hofstede, Hofstede and Minkov., 2010).

Several country level studies were conducted following Hofstede’s country scores, based mostly in these four dimensions, with some interesting findings (Kirkman, Lowe and Gibson, 2006). To cite only some, Newman and Nollen’ (1996) study posits that when managers adapt their practices to a country’s values, the result is higher return on assets (ROA) and sales, comparing to those with less fit. The authors defend that management practices should be adapted to the local culture and the differences between cultures limit the transferability of management practices. The same idea is broadly developed by Hofstede (2004) identifying different hierarchies of business (perceived) goals between leaders from different country clusters suggesting that the leaders’ goal mindset might influence performance. Also according to Hofstede (2009), executive’s goals are not only economic, but personal, cultural and difficult to assess. These findings are aligned with previous work on organisational culture conclusion that

employee's values were found to differ more on demographic variables (such as nationality, age, and education) than on organisation membership and therefore, the core of an organisation's culture appeared to lie more in shared daily practices, "the way we do things around here", learned in work place, than in shared values (Hofstede, Neuijen, Ohavy and Sanders, 1990).

Schuler and Rogovsky (1998) (cited by Kirkman *et al.*, 2006) found that IND was positively related to the use of pay-for-performance with focus on individual performance, PD was negatively related to social benefits and employee stock ownership plans, UA was positively related with seniority and skill-based pay plans and negatively to the focus on individual performance, MAS was positively related to individual bonuses and negatively related to flexible benefits. In the same review, UA is related to the preference for organisational norms, rules and procedures, while PD shows the preference for gaining the support of superiors before acting. The author cite also the Shane (1995) study, where collectivism (COL) is related with preference to seek cross-functional support for innovation, UA is associated with preferences for innovation roles and that the greater legitimacy of these roles suggests that uncertainty acceptance may be linked to more innovative societies. In another study, COL was positively associated with team-oriented leadership, contributing to collective efficacy, group performance and cooperative behaviour, and PD and UA were negatively associated with participative leadership (Kirkman *et al.*, 2006). All these findings corroborate Hofstede's (1980) idea that cultural values are related to the aggregate management practices and nations' beliefs.

Hofstede (1998a) addresses the convergence or divergence of national cultures theme admitting, only in individualism dimension, a certain degree of convergence (countries that increase wealth move towards greater individualism) but never losing main differences between countries' individualism. Leung, Bhagat, Buchan, Erez and Gibson (2005) also address cultural convergence/divergence issue underlining that the shift in values is not from western society to others but in the change of cultural western values with the increasing concern with quality and teamwork, representing a partial result of the influence of Japanese management.

Hofstede and Minkov (2010) added a fifth cultural dimension: Long versus short term orientation (society's time perspective and an attitude of persevering, i.e. overcoming obstacles with time, if not with will and strength) and ranked 23 countries based in the “Chinese Values Survey” and 44 countries based in “World Values Survey”. Japan occupies the 4th position in the first rank and the 3rd in the rank composed by the 44 countries showing a strong long-term orientation, opposed to countries as USA that occupies a place in the last third of the list. A second expansion of Hofstede’s dimensional model came with Minkov’s exploration of the “World Values Survey”, adding three dimensions labelled: “Exclusionism versus Universalism” (strongly correlated with Collectivism versus Individualism), “Monumentalism versus Flexhumility” (strongly correlated with short-versus long-term orientation) and “Indulgence versus Restraint” (IVR), the entirely new sixth dimension (Hofstede *et al.*, 2010:45).

While national cultures differ mostly at the level of values, organisational cultures differ at the level of practices: symbols, heroes and rituals (Hofstede, 1998b; Hofstede *et al.*, 2010: 347), which apparently contradicts some management literature presenting organisational culture as a matter of values (Peters and Waterman, 1987). Hofstede’s (1998b) position is that within an organisation, members’ values depend primarily on broader levels of culture as gender, nationality, class, education and through the socialization process they learn the organisational practices. According to the author, the organisational structure is primarily influenced by PD (affecting concentration of authority) and UA (affecting activities’ structuring), as IND and MAS affect primarily the functioning of people within the organisations.

Also, PD combined with UA affects employees’ motivation. Hofstede *et al.* (2010: 314) present a merger between UA and PD national assessment and the five types of Mintzberg’s (1979) organisational structure matching the “typical” country with each stricter configuration as follows: (i) USA organisation, with medium levels of both UA and PD, present a divisionalized configuration form, having standardization of outputs as coordinating mechanism and the middle line as key part of the organisation; (ii) Great Britain organisations, with low PD and UA, are adhocracies coordinated by mutual adjustment and having the support staff as key part; (iii) German organisations, with low PD and high UA, are professional bureaucracies (as in Healthcare

organisations, according to Mintzberg (1979)) with standardization of skills as coordination mechanism, and the operating core as key part; (iv) Chinese organisations, with high PD and low UA, are simple structures with direct supervision as activity coordination and the strategic apex as key part; and, at last (v) French organisations, with high PD and UA, being full bureaucracies, coordinated by standardization of work processes and having the techno structure as the key part.

Based on Mintzberg's models and being aware of the difficulty of finding organisational structure's patterns in such idiosyncratic sector as Healthcare, Blaise and Kegels (2004) compare European Healthcare organisations with African ones. Showing the importance of context (national and organisational) in quality management approaches, the authors posit that in professional configuration organisations, as Europeans face a shift of paradigm towards a "machine" type configuration, as Africans ones, that have the standardization of procedures as coordinating mechanism, a more favourable context for quality management movement. Other studies (Schneider and De Mayer, 1991) confirm the influence of national culture in the perception of the same strategic issue (environmental event that may have an important impact on organisational performance) leading to different responses. National culture plays an important role in corporate culture construction (Adler, Doktor and Redding 1986; Doktor, 1990; Hofstede, 1994) and the inconsistency of national culture increases the difference of the organisational cultures (Oudenhoven, 2001) and hinders the transfer of managerial philosophies or production systems (Wong, 2010).

More recently, Hofstede's cultural dimensions have been grounded investigation on differences in doctors (general practitioners) communicative behaviour and patients enhancing the role of communication training in medical curricula from a cultural viewpoint (Meeuwesen, van den Brink-Muinen and Hofstede, 2009). Consequences at the Work Place of National Culture differences are summarized in Table 3.1.

One critic made to cultural studies is that they address "culture" as cause, not as consequence (Steel and Taras, 2010). In this paper we seek the culture grounds of new work practices adoption, as Lean, with the main purpose of mapping differences of achievements in Lean deployment that can be related to differences in national and organisational culture.

Table 3.1 - National Culture consequences in Work Place

Small POWER DISTANCE	Large POWER DISTANCE
Hierarchy as inequality of roles, established for convenience	Hierarchy means existential inequality
Subordinates expect to be consulted	Subordinates expect to be told what to do
Ideal boss is resourceful democrat	Ideal boss is benevolent autocrat
Acceptance of responsibility	Discipline
COLLECTIVISM	INDIVIDUALISM
Value standards differ for in-and out-groups: particularism	Universal application of same value standards: universalism
Other people seen as members of their group	Other people seen as potential resources
Moral model of employer-employee relationship	Calculative model of employer-employee relationship
Employee commitment	Management mobility
FEMININITY	MASCULINITY
Assertiveness ridiculed	Assertiveness appreciated
Undersell yourself	Oversell yourself
Stress on life quality	Stress on careers
Intuition	Decisiveness
Personal service	Mass production
Custom-made products	Efficiency
Weak UNCERTAINTY AVOIDANCE	Strong UNCERTAINTY AVOIDANCE
Dislike of (written or unwritten) rules	Emotional need for (written or unwritten) rules
Less formalization and standardization	More formalization and standardization
Tolerance of deviant persons and ideas	Intolerance of deviant persons and ideas
Basic innovations	Precision
SHORT-TERM ORIENTATION	LONG-TERM ORIENTATION
Fast adaptation	Developing new markets
Main work values include freedom, rights, achievement, and thinking for oneself.	Main work values include learning, honesty, adaptativeness, accountability, and self discipline
Personal loyalties vary with business needs	Investment in lifelong personal networks, <i>guanxi</i>
Focus on the “bottom line”	Focus on market position
Importance of this year’s profits	Importance of profits ten years from now
Analytical thinking	Synthetic thinking

*Findings based on Chinese Value Survey (CVS) data.
Source: Hofstede, 1998b; Hofstede *et al.*, 2010.

3.5. Cultural grounds of Lean deployment

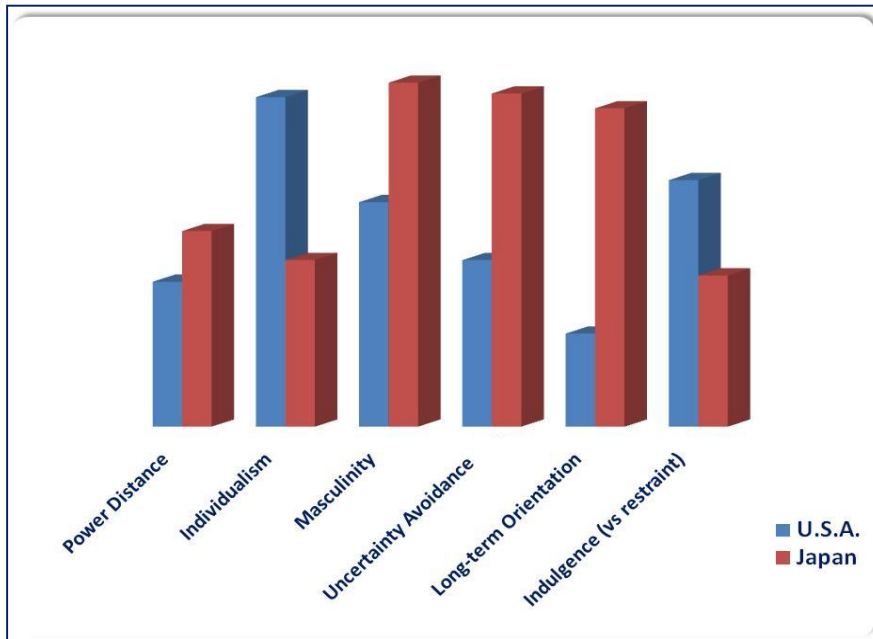
“Lean thinking”, a term coined by Womack and Jones (1996), studying the Toyota Production System. A system influenced by Sakichi Toyoda’ son, Kiichiro and his successor Eiji, who travelled to the United States to study Henry Ford’s system in operation, learned from Ford’s mistakes and replaced, with his chief process engineer Ohno and his consultant Shingo, maximum for minimum lot sizes and minimum set ups for “just-in-time” production (Liker, 2004). The “Toyota Way” was not an Ohno’s invention or a production concept dated by 1948, but a result of a learning cycle of sixty years that combined experiences from other industries (e.g. textiles) as from other countries (Holweg, 2007). Japanese organisations have changed shop floor relationships, partially based on the European and American Taylorist concept of “separation of conception and execution (Tamura, 2006).

Although Japanese management has been topic of study for decades, it was firstly broadly study considering the embeddedness of national culture in business (Drucker, 1971; Fox, 1977; Thanopoulos, 1996, among others) to evolve through a stage of practice learning resulting from Japanese companies’ transplant to the West and all subsequent cultural comparisons (Schonberger, 1982a,___1982b; Linowes, 1993; Beechler and Yang, 1994; Damanpour, 1998; Spear and Bowen, 1999) to the understanding of the “Lean” journey as a production system, opponent to the Mass System (Lin and Hui, 1999; Emiliani, 2006) and lately as a philosophy enhancing transformations not only in processes and tools but in people and organisational culture (Bhasin and Burcher, 2006; Liker and Morgan, 2011; Badurdeen, Wijekoon and Marksberry, 2011; Angelis, Conti, Cooper and Gill, 2011).

As stated, “before understanding how the Japanese do business, one must understanding the underlying culture” (Ford and Honeycutt, 1992). Thus, Lean practices need to be seen under the powerful umbrella of their cultural origin. The Japanese cultural success factors have been studied by several authors (Drucker, 1971, 1987; Horvath and McMillan, 1980; Marengo, 1979; Ouchi, 1981; Vogel, 1978; Weiss, 1984). Some underlined the group solidarity while others (Ouchi and Johnson, 1974) enhanced the paternalistic system and the population homogeneity as the cultural success factors. Analysing the differences between Japanese and American management, Fox (1977)

concludes that American organisations failed in the understanding of the *Ringi* system and in applying Japanese management, mostly due to the individualism characteristic. Following Hofstede's cultural dimensions study, the differences are substantial as showed in Figure 3.1.

Figure 3.1 - Japan versus U.S.A. according to Hofstede's cultural dimensions



Source: Based in www.geert-hofstede.com

Cultural factors are the main constraint in adoption of Japanese management style. In fact, the main three characteristics of Japanese management thinking: harmony and group loyalty, consensus decision making, and life-time employment, cannot be used as recipes for success for being too idiosyncratic (Thanopoulos and Leonard, 1996). Differences in values and behaviour patterns seem to explain the difficulties found by Japanese managers in America (Linowes, 1993). Studying the transfer of Japanese management overseas, in American service and manufacturing settings, Beechler and Yang (1994) stress the importance of human resource practices defending the large job concept over functional specialization and found that there was no single model of Japanese human resource management abroad.

Despite of national, local and organisational characteristics constraints, it is consistent in the literature on Japanese Management the importance and respect for the human

resources. Emiliani (2006), through a historical view of Lean Management adoption in USA since 1979, describes how the Japanese Lean principle “respect for people” was not understood by organisations only focused in “continuous improvement”. Therefore, Leanness would be achieved not through the elimination of non added value activities, but as described by Emiliani (1998), the elimination of “fat behaviours”. Comparing Lean with mass organisation systems in terms of complexity, formalization, centralization and problem solving attitude, Lin and Hui (1999) enhance structural and cultural coordination mechanisms effects on the effectiveness and efficiency of the two systems.

However, the lessons learned from Japanese management style were mainly on the “hard” aspects, neglecting the “soft” ones. In fact, the excessive focus on “tools and techniques” leads to the reductionist identification of only one model instead of the existent several (McCormick, 2004). With the economic and political Japanese evolution and globalization growth, adaptations in some characteristics as lifetime employment introducing new practices as mid-career and women recruitment (Damanpour, 1998) prove that management styles are not static even when faithful to a distinctive national culture. Likewise, distinctive business practices can coexist in the same national culture carrying themselves, some more than others, strong national cultural elements that leads to the illusion of taking the whole from its parts.

Thus, the “Toyota way” (Liker, 2004) is representative of the Japanese way, but not the other way around. Toyota’s DNA (Spear and Bowen, 1999) is marked by impossible goals, local customization and a great deal of experimentation as the main forces of expansion. At the same time its organisational culture is coined by integration forces such as values from the founders, retention of talents with a strong commitment to respect for people and an open communication. Toyota’s executives are willing to listen and learn, constantly drive for improvements, comfortable with working in teams with ability to quickly act and solve a problem. And above all, these executives are *senseis*, coaching other employees without losing modesty.

Some authors (Radnor and Walley 2008; Hines and Lethbridge 2008; McQuade 2008; Scorsone 2008) point that different corporate cultures can inhibit Lean implementation. Lean is not just a technological system but also a management philosophy (Sanjay and

Burcher, 2006) that serves the whole company, which requires consensus on corporate culture. Thus, the shared assumptions, beliefs and values that define each organisational culture (Schein, 1992) can make the difference between a company success or failure (Goffee and Jones, 2003). Taking the Toyota and General Motors' joint venture, NUMMI (New United Motor Manufacturing Inc.), as an example of corporate culture change, Shook (2010) is consonant with Schein, positing that the culture change starts not at the bottom of the pyramid but on the top. According to Shook (2010), "It's easier to act your way to a new way of thinking than to think your way to a new way of acting", i.e. by changing behaviour and actions, the culture change as a result. The success of Japanese transplants lie on the culture of seeking for problems and finding solutions as they occur, without blaming anyone.

The long- versus short-term orientation and the way respect for people is seen in every country might lead to different consistencies in Lean deployment. Hines (2010), Hines *et al.* (2008) among others, posits that the pure and simple tool deployment to achieve quick-wins lead to a short term Lean results and often returns to "the comfort zone" whilst systematic Lean approaches of culture changes shows long-term results. These authors suggest that what make "Lean stick" are strategy and alignment, leadership, behaviour and engagement. Dal Pont (2010), analysing Lean adoption techniques in services, defines "enablers" of Lean deployment variables as: (i) process or/and service divisibility, serenity, (ii) loyalty and leadership and (iii) information technology (IT) skills. Conversely, define as inhibitors: (i) knowledge, (ii) customer contact, (iii) corporate culture, (iv) complexity and (v) autonomy. Each of these variables' findings requires in-depth studying and testing, namely in Healthcare setting.

Can the "Toyota Way" adoption by several other countries, with different implicit models of organisations, be understood as an acculturation process? Can we see all Lean deployments as cultural transformation? From all previous cited articles some relations between cultural dimensions and Lean practices can be proposed: - First, when looking at Lean ingredients as flow production, stress on quality, standardization and use of only reliable and thoroughly tested technology, they manifest the cultural characteristic of collectivism and strong uncertainty avoidance (Wong, 2010); Second, continuous improvement and willingness to change expresses the cultural characteristic of masculinity, while empowerment and discipline shows the obvious power distance in

the organisation; Third, the elimination of the uncertainty on site and solving problems in time through visual control, “pull” mechanisms, use only reliable and thoroughly tested technology, and level out the workload (*Heilinka*) shows that the cultural characteristic is highly uncertainty avoidance.

The Japanese way of dealing with uncertainty is quite different from western cultures. Japanese manage uncertainty by matching it, understanding it, rather than trying to eliminate it or minimizing its importance. This is the basis, according to Schneider and De Meyer (1991), of dealing with crisis and History testifies Japanese way. The sense of urgency, crucial for effective change, is different in Latin cultures, for instance, comparing to Japan. The Lean strong uncertainty avoidance is also express by the “no problem is a problem” (Shook, 2009) attitude.

Also, the characteristics contained in Lean production, such as determined will, shame, and thrift, go for future long-term vision with tradition and being obedient to achieve final goals, are basic value points and attitudes in supporting Lean production. Despite of some critics to Toyota’s difficulties in staying Lean (Schonberger, 2010), cultural marks as the long term orientation and strongly embeddedness of a unitary organisational culture nurtured by Lean daily behaviours appear to be the basis of Lean sustainability (Angelis *et al.*, 2011; Badurdeen *et al.*, 2011; Hines, 2010).

3.6. Mapping Lean deployment in Healthcare

Healthcare services waited sixty years for manufacturing lessons and rush in to implement these improvement principles and tools. These attempts have been scope of several review articles bringing a narrower or broader view to the comprehension of the phenomenon of Lean implementation in Healthcare settings. Young and McClean’ s (2008) review, stressing the difficulty of “value” definition in Healthcare, challenges future research proposals to consider three critical dimensions of value: clinical, operational and experiential in the assessment of Lean gains. Winch and Henderson (2009) question the theoretical basis from which the Lean deployment in Healthcare is derived stressing the need of evidence for long-term benefits related to patient outcomes, in a critical tone but not providing a systematic review. Brandao de Souza (2009)’s systematic and critical review updates the concept evolution regarding the

Lean principles application to Healthcare and suggests a taxonomy for classifying the literature giving a first glance of geographic evidence and bringing the issue of sustainability of Lean findings linked to the need of deeper studies regarding cross-organisational (strategic and operational) Lean deployment.

The Poksinska (2010)'s review disclosures the Lean scope intervention main areas in Healthcare confined only to the first three (from the five) Lean Thinking principles, the most usual roadmap implementation, barriers and enablers in Healthcare setting and presents two main areas outcomes: in the performance of the health care system and in the development of human resources and work environment.

A realist review is presented by Mazzocato *et al.* (2010b) of successful appliance of Lean thinking in Healthcare that influence patient care. Changes are presented through a logic in which common contextual aspects interact with Lean intervention different components and trigger four different change mechanisms. Although only success cases are studied, which can indicate a bias, the sustainability issue was absent in this review, lacking a long term view of changes. The authors explain this constraint due to an immaturity of the field for conducting a realist review.

Success and factors inhibitors are the main focus of Sobek and Lang (2010) review, presenting the range of manufacturing translated tools applied and the idiosyncrasies of Healthcare organisational culture that ask for a better adaptation to Healthcare language. There are contextual variables of Lean adoptions in services (Dal Pont, 2010) and context specificities in Healthcare services. One of the specificities regards the socio-technical aspects when implementing Lean thinking (Joosten, Bongers and Janssen, 2009), apart from specific operational aspects from Healthcare organisations. While the former lack deep research, the latter have been subject of more thorough concern by academics and practitioners. Towill and Christopher (2005) framed the analysis of Healthcare pipelines in Lean and agile paradigms showing that the principles of supply chain design used in industrial and commercial contexts provide a suitable "architecture" within a Healthcare delivery context and present taxonomy to redesign Healthcare delivery systems based on multiple pipelines. Another taxonomy is presented by Burgess, Radnor and Davies (2009) proposing six different intensities of Lean adoption going from "tentative" to "systemic" in 152 Hospitals Trusts in UK

linking to performance criteria, opening a case study path for deeper research addressing Lean cultural issues.

3.7. Results

From the electronic search resulted 115 records, 19 of which not eligible. To the 96 retrieved, 11 articles were added resulting from the reference lists. In total 83 eligible articles concerning Lean deployment in Healthcare in a specific country context and another two articles in cross-countries context were consider. After full text assessment we arrived to the distribution presented in Table 3.2.

Table 3.2 - Lean Healthcare literature classification and main findings

Paper Nr	Cases	Date	Country	Paper type	Main Findings Scope						Reference
					Outcomes	Measures	Risks	Barriers	Enablers	Sustainability	
1	N.A.		USA	MT	X				x		Endsley et al.(2006)
2	Avera McKennan	2004	USA	O	x			X	x		Stolle and Parrott (2007)
3	Virtua Health	2006	USA	ML	X						Towne (2006)
4	Virginia-Mason Medical Center	2005	USA	PF	X				x	x	Weber (2006)
5	Meadows Regional Medical Center	2007	USA	MS	X						Kent (2008)
6	Progressive Healthcare	2002	USA	ML	X						Bushell et al. (2002)
7	one community hospital	2008	USA	MS	x		X				Mazur and Chen (2009)
8	N.A.		USA	S					X		Bliss (2009)
9	Avera McKennan	2001	USA	ML	X						Serrano and Slunicka (2006)
10	N.A.		USA	S	x	X			x	x	Grunden (2009)
11	Mayo Clinic	2006	USA	O	x			X	x		Taninecz (2007)
12	Virginia-Mason Medical Center	2005	USA	O	X	x			x		Womack et al. (2005)
13	Seattle Children's Hospital	2010	USA	ML	x	X		x			Rutledge et al. (2010)
14	ThedaCare	2009	USA	O					x	X	Tonkin and Bremer (2009)
15	Brigham and Women's Hospital	2008	USA	PF	X	x					Melanson et al. (2009)
16	N.A.		USA	S				X		x	Toussaint (2009)
17	South Florida Quest Histology Laboratory	2002	USA	ML	x	x	X				Buesa (2009)
18	N.A.		USA	MT	x			x			Kim et al. (2006)
19	Rex Hospital	2009	USA	ML	X				x	x	Poole and Mazur (2010)
20	N.A.		USA	MT	x	X					Varkey et al. (2007)
21	Riverside Medical Center	2006	USA	ML		x		X		x	Grabau (2007)
22	Radiation Oncology Dep. At University of Michigan Health System	2005	USA	ML	X					x	Kim et al.(2007)
23	Histology Lab at OU Medical Center	2008	USA	ML	x	X					Hassel et al. (2010)
24	Emergency Dep.-Iowa Univers. Hospitals	2005	USA	PF	X					x	Dickson et al. (2009)
25	Emergency Dep. In 4 Hospitals	2007	USA	PF		x			x	X	Dickson et al. (2009)
26	Surgical Pathology Lab at Henry Ford Hosp.	2008	USA	ML	X	x					Zarbo et al. (2009)
27	Surgical Pathology Lab at Henry Ford Hosp.	2006	USA	ML	X	x					D'Angelo and Zarbo (2007)
28	Molecular Diagnostic Lab - Henry Ford Hosp.	2008	USA	ML	X	x					Cankovic et al. (2009)
29	St. Luke Hospital	2006	USA	PF		x			X		Pate and Puffe (2007)
30	12 Physician Clinic	2006	USA	O	X						Lummus et al. (2006)

Table 3.2 Cont. - Lean Healthcare literature classification and main findings

Paper Nr	Cases	Date	Country	Paper type	Main Findings Scope						Reference
					Outcomes	Measures	Risks	Barriers	Enablers	Sustainability	
31	Virginia-Mason Medical Center	2004	USA	PF		x	X				Furman (2005)
32	Bozeman Deaconess Hospital	2007	USA	O	x		X				Mazur and Chen (2008)
33	Pathology Dep. of a Hospital	2005	USA	ML		x	X				Raab et al. (2006)
34	Emergency Deps in 5 facilities	2005	CAN	PF	X	x					Willoughby et al.(2010)
35	3 Iowa healthcare providers	2004	CAN	ML	X						Panchek (2005)
36	Hô tel-Dieu Grace Hospital	2007	CAN	O	X				x		Tanineez (2005)
37	N.A.		GBR	MT	X	x					Castro et al. (2008)
38	N.A.		GBR	MT	X					x	Burgess et al. (2009)
39	NHSCO Hospital	2010	GBR	O	x				X		Papadopoulos et al. (2011)
40	3 NHS acute Trusts	2008	GBR	O		x		X			Brandão de Souza and Pidd (2011)
41	NHSCO Hospital	2007	GBR	O					x	X	Papadopoulos and Merali (2008)
42	Pennine Acute Hospitals	2006	GBR	O	X				x		Lodge and Bamford (2008)
43	An ambulance Trust	2004	GBR	MS	X	x		x			Heath and Radcliffe (2010)
44	N.A.		GBR	S	X						Hoskins (2010)
45	3 Hospitals-multi-site	2005	GBR	O	X	x	x		x	x	Esain et al. (2005)
46	3 Trusts	2009	GBR	O				x		x	Radnor et al. (2011)
47	BICS	2005	GBR	PF	X				x		Fillingham (2007)
48	Emergency departments	2007	GBR	PF	X				x		Decker and Stead (2008)
49	56 projects in one trust	2005	GBR	O					x	X	Esain et al. (2008)
50	N.A.		GBR	MT		X		x			Young and McClean (2009)
51	3 Trusts	2009	GBR	O	x				x	X	Radnor and Holweg (2010)
52	Two NHS Hospitals	2008	GBR	O				X			Waring and Bishop (2010)
53	2 Hospital Trusts	2010	GBR	O	x			X			Burgess and Radnor (2010)
54	A Primary Care Trust	2008	GBR	PF	x	X					Grove et al. (2010)
55	N.A.		GBR	MT	x			X	x		Parnaby and Towill (2008)
56	N.A.		GBR	MT	x			x	X		Cooper and Mohabeersingh (2008)
57	2 Emergency services of 2 regions	2001	GBR	MS	X						Walley (2003)
58	Health agency	2007	GBR	O	X					x	Radnor and Walley (2008)
59	Cambridge Univ. Hosp' Cochlear Implant	2007	GBR	PF	x	X					Kullar et al. (2009)
60	2 Primary care services	2008	GBR	PF	X		x				Herring (2009)
61	Pennine Acute Hospitals	2006	GBR	O	X	x					Lodge and Bamford (2007)

Table 3.2 Cont. - Lean Healthcare literature classification and main findings

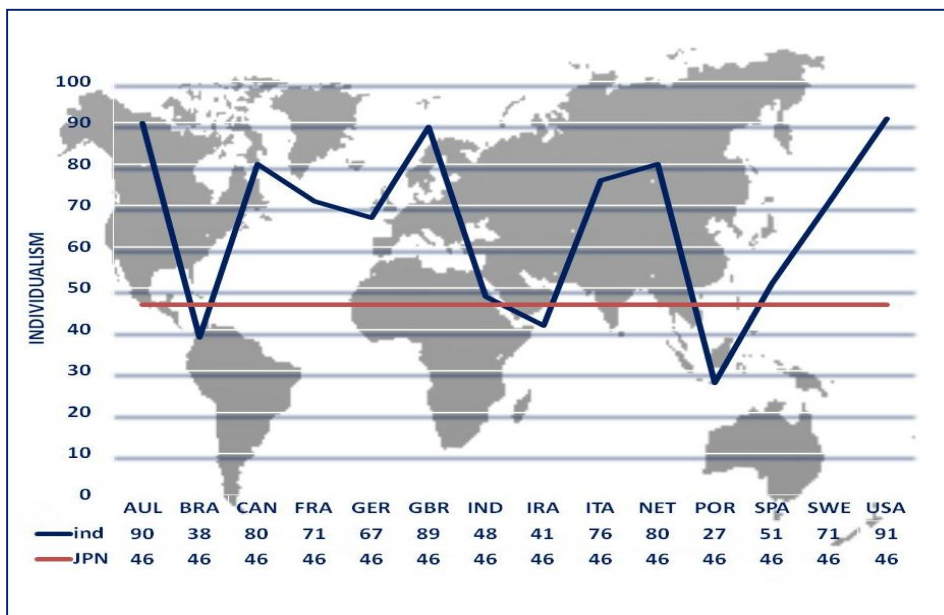
Paper Nr	Cases	Date	Country	Paper type	Main Findings Scope						Reference
					Outcomes	Measures	Risks	Barriers	Enablers	Sustainability	
62	Rotterdam Eye Hospital	2007	NET	PF	X	x				x	van Vliet et al. (2010)
63	N.A.		SWE	MT	X	x					Kollberg and Dahlgaard (2007)
64	A University Hospital	2009	SWE	PF				X			Jacobsson and Ahlström (2010)
65	A Pediatric Accident & Emergency Dep	2009	SWE	PF	x					X	Mazzocato et al. (2010)
66	Lund University Research Hospital	2007	SWE	O	X				x		Lindskog and Nilsson (2010)
66	Capio S:t Göran Hospital	2007	SWE	PF	X				x		Lindskog and Nilsson (2010)
66	Landskrona Hospital (smallest in SWE)	2007	SWE	MS	X				x		Lindskog and Nilsson (2010)
66	Uppsala University Hospital	2009	SWE	O	X				x		Lindskog and Nilsson (2010)
67	Sahlgrenska Hospital	2009	SWE	PF	X	x					Setijono et al. (2010)
68	Primary Care and a Hospital-Chain	2003	SWE	PF	X				x		Trägardh and Lindberg (2004)
69	6 Hospitals	2002	GER	MS	X	x					Sharma et al. (2007)
70	Hospital Nord 92	2005	FRA	ML	X		x				Ballé and Régnier (2007)
71	Hospital Sant Rafael	2012	SPA	ML	X				x		Aguilar and Gil (2012)
72	Na Italian Hospital	2006	ITA	ML	X				x		Portoli-Staudacher (2008)
73	4 site cases of "Lean Without Stress"	2008	DNM	PF				X			Nielsen and Edwards (2010)
74	Skejby Sygehus Hospital	2004	DNM	PF	x			X			Laursen et al. (2003)
75	Flinders Medical Centre	2006	AUL	PF	X	x					Ben-Tovim et al. (2008)
76	Flinders Medical Centre	2006	AUL	PF	X			x			Ben-Tovim et al. (2007)
77	Flinders Medical Centre	2004	AUL	PF	X	x					King et al. (2006)
78	Clinical Services redesign - 60 Hospitals	2007	AUL	PF					X		Ben-Tovim et al. (2008)
79	N.A.		AUL	MT					x	X	McGrath et al. (2008)
80	A public Hospital	2004	SL/IND	ML	X	x			x		Withanachchi et al. (2007)
81	A public Hospital	2008	IRA	ML	X			x			Rahimnia and Moghadasian (2010)
82	Pólo do Pé Diabético	2006	BRA	MS	X						Araujo et al. (2008)
82	Pró-Cardíaco Hospital	2006	BRA	MS	X						Araujo et al. (2008)
82	Hospital Dr. Badim	2006	BRA	MS	X						Araujo et al. (2008)
82	Hospital Copa D'Or	2006	BRA	ML	X						Araujo et al. (2008)
82	Diagnóstico da America	2006	BRA	ML	X						Araujo et al. (2008)
83	N.A.		POR	MT			x	X			Sousa et al. (2009)
84	15 Emergency Departments	2006-2010	USA/AUL/CAN	PF	x	x				X	Holden (2010)
85	5 Hospitals	2008-2010	FIN/SWD/AUL	PF	X	x					Meredith et al. (2010)

Table's 3.2 Legend

USA - United States of America	
CAN - Canada	
GBR - United Kingdom	
NET - Netherlands	
SWE - Sweden	
GER - Germany	
FRA - France	
SPA - Spain	
ITA - Italy	
DNM - Denmark	
AUL - Australia	
SL/IND - Sri Lanka	
IRA - Iran	
BRA - Brazil	
POR - Portugal	
USA/AUL/CAN - United States of America /Australia/Canada	
FIN/SWD/AUL - Finland/Sweden/Australia	
	MT- Methodological
	S - Speculative
	MS - Managerial and Support
	ML - Manufacturing-Like
	PF - Patient Flow
	O - Organizational
	X - Major findings' scope
	X - Minor findings' scope

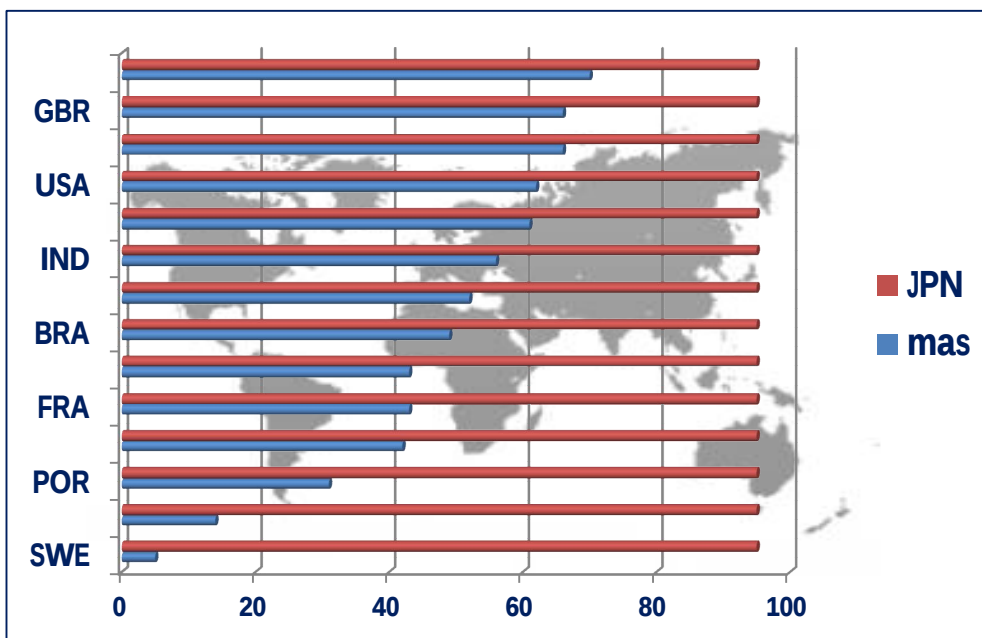
Looking thorough the data of the results of Hofstede and Hofstede's (2008) study, we present the culture dimensions' scores of the countries with reported cases of Lean in Healthcare having as benchmark Japan's scores (Large PD, Collectivist, Masculine, Strong UA and Long-term oriented).. These cases were classified according to the four case-type in Brandao de Souza (2009) taxonomy. Each Figure (from 3.2 to 3.6) is named after the also exposed possible relations between national cultural dimensions and some of the Lean practices.

Figure 3.2 - Collectivism and flow concept



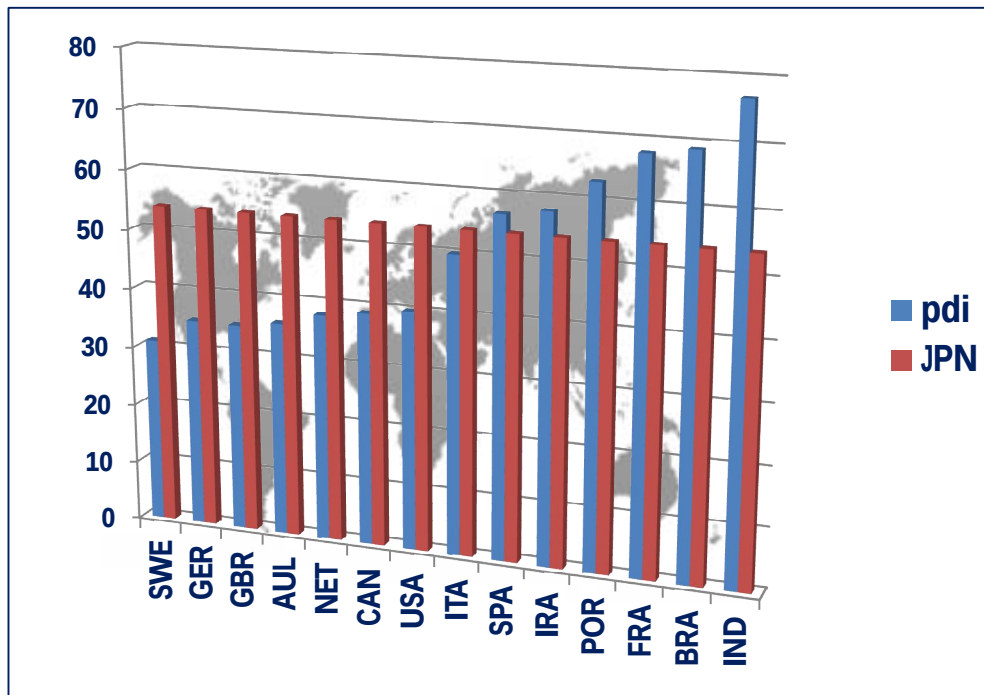
Source: Based in www.geert-hofstede.com

Figure 3.3 - Masculinity and continuous improvement and willingness to change



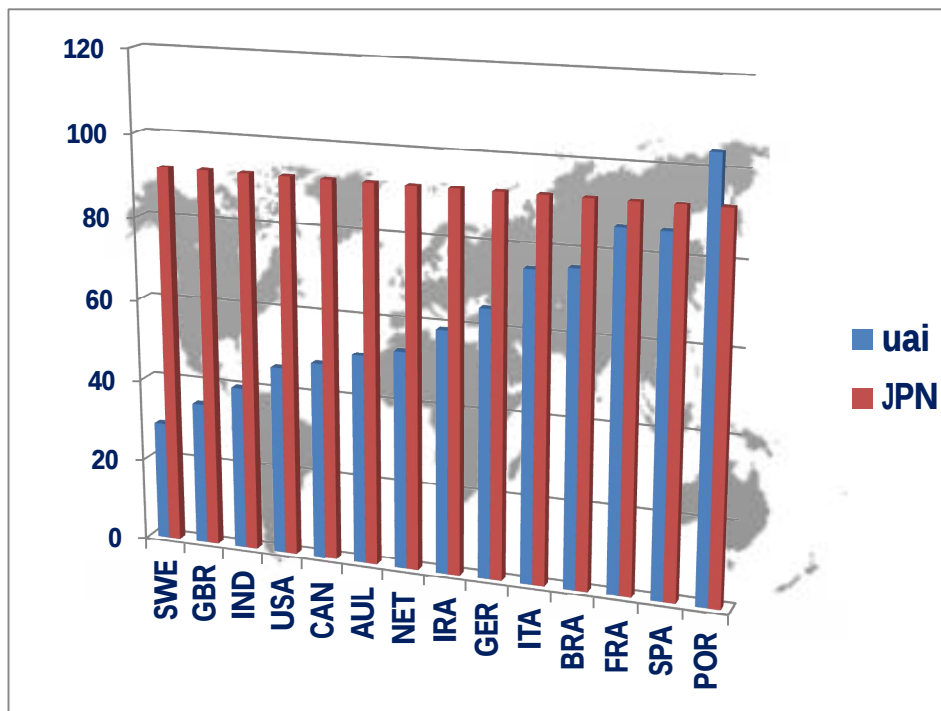
Source: Based in www.geert-hofstede.com

Figure 3.4 - Power distance and empowerment



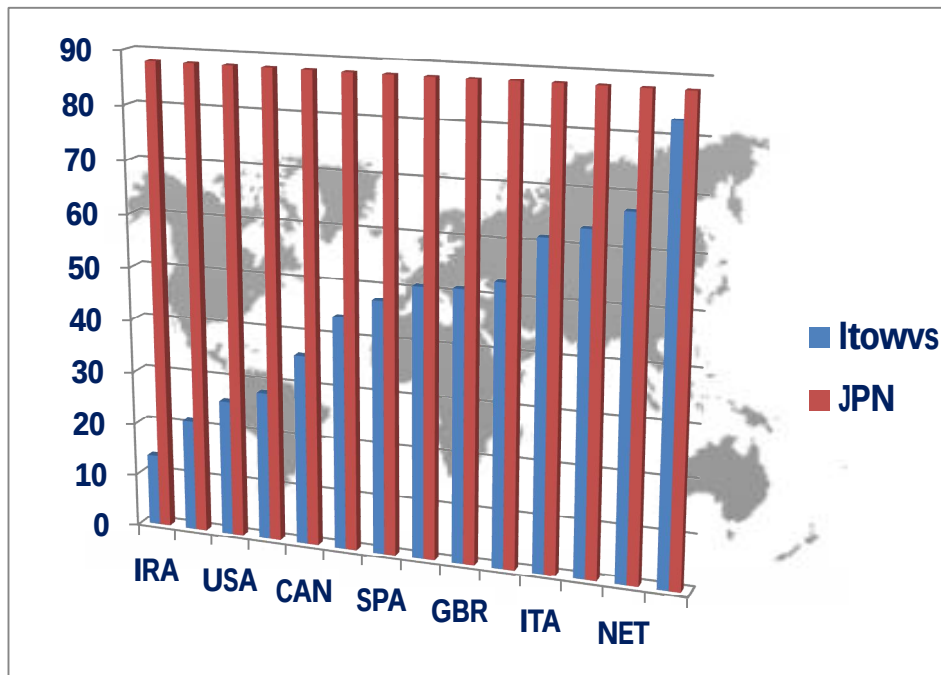
Source: Based in www.geert-hofstede.com

Figure 3.5 - Uncertainty Avoidance- Problem solving, visual control



Source: Based in www.geert-hofstede.com

Figure 3.6 - Long-term orientation and sustainability

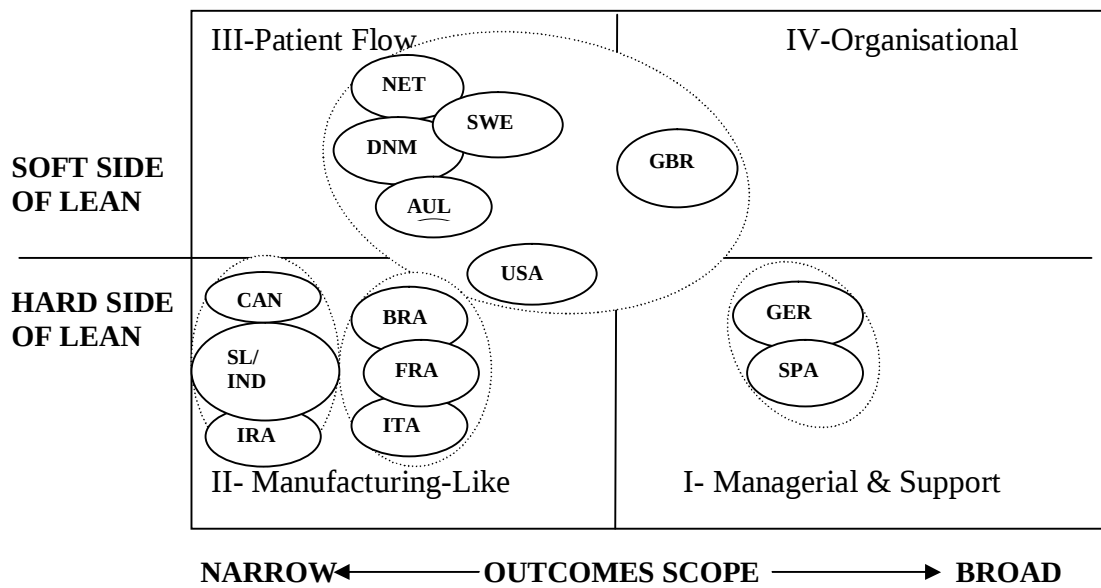


Source: Based in www.geert-hofstede.com

These assumptions present a challenge for future research to find empirical confirmation for national culture relations with particular work practices as lean practices.

Nevertheless, an attempt of understanding the lean deployment stage, through the analysis of the classified articles in terms of outcomes scope and “hard” versus “soft” deployment (Badurdeen *et al.*, 2011), is presented in Figure 3.7.

Figure 3.7 - Cultural clusters of Lean deployment in Healthcare



Source: the author.

It is possible to identify four cultural clusters of countries in the light of the two Hofstede's *et al.* (2010: 303) cultural dimensions combined (Power Distance and uncertainty Avoidance), the only combination of dimensions that matched the Lean stages countries' position:

- (i) The cluster **GER+SPA**, with **Small PD + Strong UA**, are in the first stage of lean deployment in Healthcare settings, the "Managerial and Support", where Lean deployment cases are in the support areas (logistics, warehouse improvement, etc);
- (ii) The clusters: **BRA+ FRA+ ITA** with **Large PD + Strong UA** and
- (iii) **CAN+ SL/IND+ IRA** with **Large PD + Week UA**, are in the second stage of lean deployment in Healthcare settings, the "Manufacturing Like" where lean deployment evolved to the improvement of "production" processes, but without visibility of effects on patient flow;
- (iv) The cluster **NET+SWE+DNM+AUL+GBR+USA**, with **Small PD + Week UA**, are mostly in the third stage of lean deployment in Healthcare settings, the "Patient Flow", where cases report real changes on the clinical path with benefits perception by the patient (apart from USA that presents in a previous stage, and GBR, in the last maturity stage, the "Organisational",

where all previous stages marks can be seen, but lean deployment holistic achievements in the whole value chain lead to a “Lean organisation”.

3.8. Conclusions

In spite of the globalization, each national culture still owns its uniqueness of its particular core values. Taking one of the most recent sectors embracing the “Lean Journey”, Healthcare, this study’s challenge was to update findings regarding cultural (national and organisational) aspects of Lean deployment in an embryonic but growing stage of this sector.

In spite of the scarcity of cultural aspects in the Lean Healthcare literature, some patterns concerning the kind of publication and findings can be found. Clusters formed by countries with the same position in PD and UA dimensions can be identified in a particular stage of the Lean journey. However, two particular countries seem to defy that perfect match, USA and GBR. It could be due to the fact of most of the literature cases found happen to belong to those countries and, as result, the variability of kinds is therefore bigger, showing a majority of USA cases a “manufacturing-like” scope. Nevertheless, if we add case dates to this analysis, we can see a generalized shifting of scope that goes from “manufacturing-like”, to “patient flow” and finally to “organisational” cases, placing USA in the same position as GBR. The cluster placed in the “Patient Flow” level of Lean deployment, might benefit of the low level of UA as it enhances higher opportunity for deeper improvements and innovation, on one hand, and by the small PD which benefits decision making, pace of deployment and empowerment, on the other. Also, by being individualist countries, creativity and universal understanding of same rules are correspondent cultural marks that are favourable to problem solving and standardization required in Lean deployment. However, the Lean deployment maturity level of this cluster cannot be directly related with MAS, as three countries are feminine (NET, DNM and SWE) and the other three masculine (AUL, USA and GBR).

Future refinement work would be necessary to go through deeper understanding of cultural issues behind success and failures in Lean deployment. Nevertheless, some dimensions as Long-versus short Term orientation are visible in most of the articles with the purpose of finding sustainability in lean deployment, confirming the previous theoretical considerations. Also, recent publications bring the organisational and national cultural issues related to barriers, enablers and sustainability factors of Lean. Finding what is due to national culture constraints might be useful in Lean deployment across countries, as finding what is due to organisational

culture, without disregard the national background, can be useful for managing organisational culture change process.

Surprisingly, no publications were found on Lean deployment in Japanese Healthcare organisations. Could it be due to a lack of Japanese case publishing tradition or the lean cultural embeddedness is so naturally Japanese that only manufacturing emblematic cases were reported at the pace of their organisations' growth, leaving other sector's cases out of research? These questions remain also for future research.

Despite Womack, Jones and Roos (1990: 9)' statement regarding the universal applicability of the fundamental ideas of Lean "anywhere by anyone"; cultural context can explain differences in maturity levels of Lean deployment in Healthcare settings. As the culture building process described by Schein (1992, 2009) and Shook (2010), Lean culture construction, in Healthcare settings, appears to have its starting point in the "hard" deployment, using tools and techniques in a less core activities and evolve to the core ones, to the patient path, until the daily practices take over the whole organisation.

4. Outsourcing in Healthcare Sector: state-of-the art⁴

4.1. Abstract

Outsourcing has become one of the Healthcare sector's buzzwords. In the supply chain management of Healthcare organisations, outsourcing decisions have specific distinctiveness. This article reviews the state-of-the-art literature on outsourcing in the Healthcare sector and provides a structured frame of outsourcing in different countries with different Healthcare systems. This appears to be the first time evidence on outsourcing practices in the Healthcare sector have been systematically collected and structured in order to understand the reality beyond the outsourcing processes and trends.

4.2. Introduction

In the supply chain management (SCM⁵) of Healthcare organisations, outsourcing decisions have specific distinctiveness, namely, in the reasons and constraints of the decision, in the selection criteria of the activities left to third-party operators, in the type of possible agreements, and even in the impact of the outsourcing decision on the organisation. After the outsourcing trend in the manufacturing industry (Roberts, 2001), the Healthcare sector is considered one of top three sectors (along with the finance and legal industries) with a significant outsourcing growth (Brown and Wilson, 2005).

Our goal in this study was to understand how embedded the outsourcing practices in the Healthcare sector are. Thus, the literature review approach involved (1) reviewing scientific articles and grey literature (Farace, 1998) on the subject, (2) reviewing publications that focus narrowly on outsourcing in private and public Healthcare organisations, (3) reviewing publications regarding clinical and nonclinical outsourced

⁴ This chapter is based on the article: “*Outsourcing in Health Care Sector – A State of the Art Review*”, published in the Supply Chain Forum- An International Journal, Vol.12, No.2, pp.140-148, 2011.

⁵ The Vitasek (2005) definition, consensual among the Council of Supply Chain Management professionals, can be found at <http://www.cscmp.org/Website/AboutCSCMP/Definitions/Definitions.asp>

activities, and (4) categorizing literature into thematic areas and items regarding motives, risks, advantages, and trends in this researched field.

This article enhances the evolution of SCM in Healthcare, particularly in identifying (1) outsourcing decisions rationale, (2) the main drivers and their differences from other sectors, (3) specific risks and benefits of this decision related to outsourced clinical and non-clinical activities, and (4) the wide spectrum of private-public supplier relationships.

Healthcare organisations have a commitment to reliability (Weick and Sutcliffe, 2001), which implies not treating SCM decisions about outsourcing as a panacea.

4.3. Methodology

In this study we synthesized evidence of outsourcing in the Healthcare sector. We developed a key word search in electronic databases to find articles representing the inclusion criteria of being related only to outsourcing in the Healthcare sector and the exclusion criteria of being related to contracting out or subcontracting in the Healthcare sector. In the literature, *outsourcing* has different connotations from the common use of the concept. In fact, outsourcing also refers to activities not previously performed in-house (e.g., procurement) and it differs from subcontracting and contracting out by the premises of long-term relationships and the obligation of not only providing the means but also results (Kakabadse and Kakabadse, 2003). We identified 76 eligible articles in the peer-reviewed literature, 16 in the grey literature, and 10 books concerning (1) outsourcing Healthcare in private and public organisations in different types of health systems, (2) distinction between outsourcing clinical and nonclinical activities, (3) motives, risks, advantages, and trends in this researched field.

4.4. Outsourcing rationale in Healthcare settings

Outsourcing, or transferring internal activities to third parties (Greaver, 1999), can assume several forms in a wide spectrum of relationships (Ballou, 2003; Franceschini and Galetto, 2003; Sanders *et al.*, 2007). A theoretical evolution from transaction cost analysis (TCA) (Coase, 1988; Williamson, 1979) and agency theory (Eisenhardt,

1989b) to a resource-based view (RBV), which supports outsourcing noncore activities, keeping core activities internal (Bettis *et al.*, 1992; Kelley, 1995; Lacity *et al.*, 1995; Mullin, 1996; Peisch, 1995; Prahalad and Hamel, 1990; Quinn and Hilmer, 1994), and, more recently, to the transformational view (Linder, 2004), places outsourcing as an SCM strategic tool able to redesign the organisation value chain and sometimes also its mission (Schneller and Smeltzer, 2006).

Outsourcing decisions frequently result in organisational change. Even low-volatility sectors such as Healthcare (Goepfert, 2002) have riotous periods resulting from regulations alterations, more informed and demanding patients. In this entrepreneurship environment, Healthcare organisations adopt outsourcing solutions for the same reasons as in other sectors (Quinn and Hilmer, 1994): looking for efficiency, quality, and profitability gains. However, in Healthcare units, outsourcing is part of volume flexible strategies to adapt capacity (namely in bigger organisations such as academic medical centres) trying to respond to demand flotation's, care that is increasingly complex, and to the linkage between clinical performance and number of medical acts (Jack and Powers, 2006). In fact, according to some authors (Atun, 2006; Campos, 2004), in some European countries that are more politically reluctant to privatizations (e.g., the United Kingdom, Sweden, Spain, and Portugal), outsourcing of clinical services was a response to waiting lists. Through contracting agreements with public and private providers (including public-private partnerships (PPPs)), Healthcare systems looked for access, quality, equity, and efficiency advantages (Abramson, 2001; Liu *et al.*, 2004). However, according to Bossert (2004), although there's evidence in primary care outsourcing agreements (Walshe and Smith, 2006) of access improvement (in provision, coverage, and use) gains, there is not clear evidence of equity, quality, and efficiency effects. Evidence regarding efficiency gains has revealed some inconsistency (Atun, 2006; England, 2000, 2004; Liu *et al.*, 2004, 2007).

Although the extension of outsourcing decisions from nonclinical to clinical activities occurred in the Healthcare sector later than in other sectors, the phenomenon took a global scale with many reported cases, from medical transcription to the latest trend of "medical tourism" with people travelling abroad for Healthcare services seizing the best relaxing environment for recovering (Bies and Zacharia, 2007; McCallum and Jacoby, 2007).

4.5. Outsourcing in Healthcare main drivers

From reviewing the literature, the most pointed drivers for outsourcing in Healthcare units are (1) cost reduction, (2) risk mitigation, (3) adapting to quick changes without jeopardize internal resources, and (4) value stream redefining (Alper, 2004; Bhattacharya *et al.*, 2003; Chen and Perry, 2003; Hazelwood *et al.*, 2005; Lorence and Spink, 2004; Roberts, 2001; Wholey *et al.*, 2001; Yang and Huang, 2002). Wigglesworth and Zelcer (1998) defend the outsourcing of Healthcare units' supply chain global management to specialized providers identifying three reasons: (1) the possibility of externalizing noncore activities but critical to process-oriented organisations; (2) the transference of information technology to support SCM investment, which allows the leverage of its nuclear capacities; and (3) the possibility for critical mass to build up and achieve economies of scale.

Yang and Huang (2002) identify four imperatives for outsourcing growth in the Healthcare sector: (1) organisational, (2) strategic, (3) regulatory, and (4) technological. Still, outsourcing decisions in Healthcare units depend on (1) the kind of activity (modular versus integral; more or less contractible); (2) the type of contract (classical versus relational); (3) contract duration (depending on contract type and supplier selection process); (4) specification of performance requirements (process and outcomes indicators); and finally (5) payment mechanisms (Liu *et al.*, 2007).

4.6. Clinical and non clinical risks and benefits

We found a consensual typology in the literature that identifies as “clinical” all the activities (direct or indirect patient care deliveries), processes, or sub processes that are carried out by health professionals, whereas “nonclinical” actions differ from Healthcare delivery for being delivered by other areas' professionals. We also identified a pattern of distinguishing outsourced clinical services with less the proximity to patient (not directly delivered to the patient) and the separation of nonclinical actions from support activities and business process outsourcing (Alper, 2004; Cezarotti and Di Silvio, 2006; Guy and Hill, 2007; Hazelwood *et al.*, 2005; Shinkman, 2000; Shohet and Lavy, 2004; Stockamp, 2006; Worrell, 2003).

In general, outsourcings in Healthcare risks were identified as follows: (1) losing control of suppliers (discontinuity of service quality levels (MacCutcheon and Griffin, 2002), accountability issues, loss of competences (Hazelwood *et al.*, 2005), and information confidentiality problems; and (2) excessive supplier dependency and consequent loss of flexibility (Renner and Palmer, 1999).

Referring to nonclinical services several authors stressed the importance of performance monitoring to avoid quality problems (infection risks, patient dissatisfaction) and hidden costs of support activities such as (1) cleaning (Andersen and Rash, 2000; Barrs and Fahey, 2000; Dancer, 1999; Giarraputo, 1990; Goggins, 2007; Griffith *et al.*, 2000; Liyanage and Egbu, 2006; Murphy, 2002) and (2) meal services (Bossert, 1994; Crogan and Evans, 2006; Hwang *et al.*, 2003; Kwon and Yoon, 2003; Lau and Gregoire, 1998). Other nonclinical activities outsourced and identified as the main drivers of cost reduction are procurement and purchasing to group purchasing organisations (GPOs) (Nollet and Beaulieu, 2005; Rivard-Royer *et al.*, 2002; Schneller and Smeltzer, 2006). Although evidence of GPOs shows cost reduction advantages (10% to 15% in acquisition cost, 40% in transaction-related costs), some authors highlighted the risk of oligopoly development and function duplications due to strategic misalignment.

The most reported risks of outsourcing clinical activities refer to integration difficulties in activities such as radiology and other laboratory functions (Chasin *et al.*, 2007; Peisch, 1995). On the benefits side, gains in expertise, capacity, and resource release are underlined by Renner and Palmer (1999) and Greeno (2001).

4.7. Visiting different Healthcare systems

One common conclusion derived from reviewing the several cross-national health system studies (Elling, 1980; McPake and Mills, 2000, among others) is that context differences are crucial to understanding the advantages and risks of outsourcing in each Healthcare system framework. Based on the source of funding, three main models can be identified: the Beveridge model, with predominantly public funding based on taxation (in the United Kingdom, Spain, Portugal, Greece, Italy, Sweden, Denmark, Canada, Australia, and New Zealand); the Bismarck model, with private-public providers and premium funding (Germany, France, Austria, Switzerland, Belgium,

Holland, and Japan); and the private insurance model, as shown in the United States with predominantly private providers coexisting with Medicare and Medicaid social care (Simões, 2004). From all reviewed literature, we focused on Germany, United Kingdom, Australia, New Zealand, the United States and Greece, not only because of the higher number of articles founded regarding outsourcing practices, but also for being illustrative of the three different Healthcare systems. The main findings are summarized in Table 4.1.

Table 4.1 - Outsourcing in Healthcare sector across countries

Constructs	Countries				
	Germany	U.K.	Australia and New Zealand	E.U.A	Greece
Outsourcing Activities	a) Nonclinical services - Information technology services - Procurement, purchasing and delivery - Payment collection - Facility management (cleaning, laundry) - Patient transport - Snack-bar b) Clinical services: (medical and technical): - Laboratory (pathology, microbiology) - Pharmacy - Radiology - Nuclear medicine	a) Nonclinical services - Facility management (cleaning, meals and maintenance) - Sterilization - Non emergency patient transport b) Clinical services: - Physiotherapy, occupational therapy, speech and language therapy - Home delivered high-tech healthcare (total parenteral nutrition, intravenous chemotherapy, continuous ambulatory peritoneal dialysis) - "Medical tourism"	a) Nonclinical services - Car parking - Laundry - Cleaning - Meals - Information system - Security - Distribution to wards - Maintenance and gardening b) Clinical services: - Mental health services - Radiology - Pathology - Pharmacy - Dentistry	a) Nonclinical services - Meals - Cleaning - Laundry - Legal advising - Pest control - Waste management - Car parking - Information systems - Patient transport - Sterilization b) Clinical services: - Emergency medicine - Magnetic resonance - Imaging - Physiotherapy and rehabilitation - Pharmacy - Dialysis - Pathology - Anaesthesiology - Inpatient care management - "Medical tourism"	a) Nonclinical services: - Snack-bar - Meals - Legal advising - Equipment maintenance - Laundry - Laboratory NB: - No published research was found regarding clinical services (apart from Laboratory) outsourcing in Greek healthcare sector
Drivers	- Reduce investment in devices and stocks - Human resources cost reduction - Investments expenses (easier to support by bigger hospitals)	- Cost and health service quality standardization - Partnership policy - Cost reduction in ancillary activities - Business process redesign and IT updating - Access to expertise - Flexibility - Focus on critical activities and lean thinking deployment to achieve strategic advantages	- Cost Reduction - End Public- Private interests conflict - Flexibility to deal with low and vulnerable demand services (e.g. Dental care) - Focus on core competences - Staff reduction (22% reduction in some cases) - Government privatization program - Efficiency - Risk mitigation	- In clinical activities: access to expertise - In nonclinical activities: cost reduction - Process agility (outsourcing IT to front-end activities as patient admission) - Liability in data transferring and warehousing - Health financing systems changes	- Cost reduction - Patient satisfaction - Flexibility - Scarcity of human resources - Focus on core business
Benefits	- Outsourcing service quality higher than internal (namely in IT) - Cost reduction	- Service standardization (to follow <i>National Standards of Cleanliness for the NHS Report</i>)	- Equipment improvement - Increase in number of patients - Staff reduction (160 to 35 in a 1,200 bed unit) - Cost reduction (from \$Aus 200,000 to 3,000)	- Access to best practices and top class technology	- Service quality improvement
Risks	- Adapting problems - High hidden costs of IT outsourcing - Patient claims regarding service quality	- Results monitoring difficulty and consequent need for process monitoring	- Supplier non compliance and quality decreasing - Contract clauses non compliance - Monitoring costs not previously considered - Cultural discrepancies leading to internalization (e.g. meals, cleaning)	- Dissatisfaction with outsourcing outcomes (service quality, cost reduction and processes agility)	- Very low impact on costs - Integration and coordination difficulties - Vendor difficulty to understand internal processes. - Difficulty in negotiating changes in quality levels
Conclusions and Future Perspective	- Outsourcing level (clinical and nonclinical) decreases as hospital size grows. - Regional differences in outsourcing (IT) willingness - Dominant pattern is: patient direct care delivery services are internalized - Outsourcing "second wave" in cleaning, meal, laundry and laboratory services; - Outsourcing growth in sterilization, building maintenance, accounting and HR management services	- NHS Trusts outsourcing contracts evolution: - from cost savings in ancillary services to filling expertise gaps through "knowledge intensive business service (KIBS)" - Growing trend of clinical services offshoring	- "Mix-outsourcing" solutions - Cleaning and meals outsourcing for downsizing purposes (staff transfer) - Cost reductions and quality gains only by reviewing contracts - Clinical services remain internal for having difficult monitoring and outcome measuring comparing with nonclinical	- Contract management fails due to: lack of negotiation skills, bids bad evaluation, bad choice of payment form and absence of measuring culture - The possibility to revert outsourcing process and internalize activities refers only to clinical services - Clinical services outsourcing in agenda - Communication services offshore outsourcing trend	- 95.3%, of respondents outsource one or more activities - Outsourcing didn't lead to full-time personnel reduction (only in 16.3% of respondents occurred a staff replacement of 11% to 20%) - 81.4%, of respondents predict a moderate to substantial outsourcing growth in near future while less than 20% predict a reduction

Sources: Aggarwal, 2004; Amaratunga *et al.*, 2002; Augurzky and Scheuer, 2007; Bies and Zacharia, 2007; Chasin *et al.*, 2007; Chess, 2006; Giarraputo, 1990; Grande and Roberts, 2001; Greeno, 2001; Guven, 2003; Heavisides and Price, 2001; Hensley, 1997; Hoppszallern, 2002; Katzman, 1999; Kirchheimer, 2005, 2006; Lorence and Spink, 2004; Mark, 1994; May and Smith, 2003; McCallum and Jacoby, 2007; McPake and Mills, 2000; Moschuris and Kondylis, 2006; Okohoh *et al.*, 2002; Pilling and Walley, 1996; Prager, 1997; Renner and Palmer, 1999; Shinkman, 2000; Smith and Waymack, 2000; Sunseri, 1998; Young, 2005, 2007, 2007a.

4.7.1. Outsourcing in the German Healthcare Sector

A description of the Bismarck model evolution, adopted by the German Healthcare sector in 1883, is presented by Kakabadse and Kakabadse (2005) and stresses the demographic changes, the social security financial resources scarcity (mostly due to unemployment), and the decrease of physicians as main constraints for deep reforms in the hospital sector. One of the measures deployed was a new remuneration system based on diagnosis-related groups (DRGs), following the Australian system, starting in 2004 to be completely implemented in 2009 (Augurzy and Scheuer, 2007). This new system, along with quality implications of the “integrated care” (or “integrated delivery systems” (Burns *et al.*, 2001)), forced a second wave of outsourcing trying to achieve better cost-efficient outcomes than found in the first wave during the 1990s.

4.7.2. Outsourcing in the UK, Australian and New Zealand’s Healthcare systems

In the United Kingdom, the National Health Service (NHS) system, created from Beveridge’s 1942 report (Simões, 2004) offered universal access and comprehensive coverage of services for all citizens but has undergone considerable changes throughout the past decades. These changes have often been portrayed as a move toward an internal market in the UK system. Under a conservative government and against the strong opposition of physicians and nursing personnel, provisions to reform NHS (the National Health Services and Community Care Act) were intended to open the field to the private sector on a wider scale. Private hospitals were allowed to compete with regional and municipal hospitals for NHS patients, publicly owned hospitals could be acquired by private entities, and, most visibly, services were to be managed under prospective global budgets (Perrot, 2004; Simões, 2004). The trusts and “internal market” creation, in the beginning of 1990s and later in 1997 the Blair’s government reforms, led to the encouragement of private sector entrance and spreading of outsourcing practices that had begun in the 1980s (McPake and Mills, 2000).

Likewise, Australia and New Zealand’s Healthcare systems, which are based on the same Beveridge concept, were driven by efficiency, flexibility, innovation, waiting-time reduction, and service range diversity gains to take measures such as the “national

competition policy,” which created outsourcing opportunities (Ashton *et al.*, 2004; Prager, 1997; Young, 2005, 2007, 2007a).

4.7.3. Outsourcing in the U.S.A. Healthcare sector

Funded through a complex mix of private and governmental insurance, the US Healthcare system shows a great reliance on the mechanisms of the market, including contracting and competition that forces providers to do “more with less money” (Goolsby, 2001). Outsourcing practices evidence is, however, much later identified comparing to other sectors. Hazelwood *et al.* (2005) justify that fact because of the ownership of most Healthcare organisations being mostly not-for-profit (80%), government financed, and managed by committees, and not by an administration with a strategic plan and cost-driven decision-making processes. However, a growing outsourcing trend (Smith and Waymack, 2000) has emerged, helped by quality constraints of JCAHO (Joint Commission on Accreditation of Healthcare Organisations) and outlined by HIPPA (Health Insurance Portability and Accountability Act) (Goolsby, 2001; Hazelwood *et al.*, 2005). According to Stockamp (2006), around 75% of US hospitals have at least one outsourced function, not just in support services, as in early years, but also in the patient path of inbound to outbound functions (Chess, 2006; Neil, 2005; Rhea, 2007; Casale, 2007; Schneller and Smeltzer, 2006). The growth trend is also posited in studies using surveys of hospitals, long-term-care units, and clinics (Hensley, 1997; Katzman, 1999; Kirchheimer, 2005, 2006; Shinkman, 2000). Another growing trend is group purchasing organisations (GPOs), which serve 97% of USA hospitals that outsource procurement (Neil, 2005). The latest trend is medical outsourcing (Bies and Zacharia, 2007) provided by partnerships such as in one of the Parkway Hospitals in Singapore; the Johns Hopkins Hospital in Baltimore, Maryland; one of hospitals in Health Care City in Dubai; and the Mayo Clinic in Rochester, New York (McCallum and Jacoby, 2007).

4.7.4. Outsourcing in the Greek Healthcare sector

The Greek Healthcare sector, also inspired by the Beveridge model, illustrates the importance of the public health sector as the main provider in an economically difficult environment. Despite the lack of empirical and published research on outsourcing in the Healthcare sector, the Moschuris and Kondylis (2006) study gives a full description of

the Greek Healthcare system constraints to outsourcing practices in public hospitals, leaving private Healthcare providers outside the empirical setting. This study focuses on the decision-making process, the extension of outsourcing, effects on public Healthcare, and future trends; stresses the difficulty of decision making in public Healthcare organisations; and explores the reasons of (dis)satisfaction with outsourcing decisions.

4.8. Conclusion

This article reviews the state-of-the art literature on outsourcing in the Healthcare sector with an aggregated view. Summing up all the available information regarding the activities typology commonly found, the pointed risks and pitfalls, and also the advantages and opportunities that turned outsourcing in this sector into a strategic tool; this article provides a structured frame of outsourcing in different countries with different health systems.

A systematic review was conducted with the purpose of gathering information and examples from scientific and grey literature that could show a full picture of the main drivers, risks, advantages, and trends found when outsourcing different activities in different countries. In order to describe and compare all the relevant findings of the literature review, data from different Healthcare systems in Germany, the United Kingdom, Australia, New Zealand, the United States, and Greece are presented and illustrate the updated reality of outsourcing in Healthcare.

Despite the literature scarcity found in this field, all gathered information was synthesized, organised, and structured into main issues (activity typology, outsourcing drivers, benefits and risks, lessons learned and future trends) offering a new research agenda to follow the phenomenon evolution in the Healthcare sector, namely, to compare the shifting of outsourcing paradigm stages of each country and to evaluate the implications to Healthcare supply chain managers. The existing literature is frugal in empirical research on performance models and measures in outsourcing cases (Heavisides and Price, 2001). There is also a lack of published research on how Healthcare organisations deal with outsourcing risks before and after the decision and in different contexts from organisational change processes, such as start-up organisations'

outsourcing decisions. Rigorous scientific research is also missing in order to gain a generalization of findings.

Lessons from other sectors' practices should be studied instead of thinking of outsourcing as a panacea to mitigate risks or simply reduce costs.

5. Strategic outsourcing: a Lean tool of Healthcare SCM⁶

5.1. Abstract

Considering Lean thinking inside and beyond the organisation's boundaries, in the extended supply chain, this paper aims to fill a literature gap clearly stating some outsourcing practices as Lean practices and establishing a deployment evolution parallel between both practices. A literature review was carried out collecting cases of Lean deployment in Healthcare, from both scientific and grey literature. Cases were classified according to Lean deployment taxonomy in Healthcare settings, showing some differences in Lean journey stages in fifteen countries. There is an alignment between SCM thinking in Healthcare and Lean thinking that places a SCM decision as outsourcing as a Lean practice serving not only strategic intent but solving operational efficiency. There is a match between different outsourcing drivers (Transactional, Strategic and Transformational) and Lean maturity levels. The main constraint to deployment of both Lean and outsourcing practices are cultural differences. Understanding Lean and outsourcing different deployment maturity levels under the national cultural umbrella can open new perspectives to study Lean sustainability factors and better outsourcing relationships in Healthcare organisations. This paper presents a merger between the state-of-the art of both Lean and outsourcing practices in Healthcare settings and suggests an outsourcing and Lean evolving pathway.

5.2. Introduction

A key strategic issue of both outsourcing and Lean adoption is whether an organisation can achieve a sustainable competitive advantage in ongoing basis (McIvor, 2000; O'Shannassy, 2008) which implies continuously deliver value to customer (Jorgensen *et al.*, 2007).

Lean implementation scope is not restricted to the boundaries of the company, but to the entire value chain, thus to the extended supply chain (Cudney and Elrod, 2011;

⁶ This chapter is based in the article: "*Strategic Outsourcing: a Lean Tool of Supply Chain Management*", published in *Strategic Outsourcing-An International Journal*, Vol. 6 No. 2, 2013.

Womack *et al.*, 1990). However, several misconceptions surround Lean deployment such as considering it a downsizing method completed or not by outsourcing decisions. Some studies (Cudney and Elrod, 2011) reveal the necessity of outsourcing adopters (including Healthcare services) extend their Lean practices to their suppliers in a culture alignment attempt. But was their outsourcing decision a Lean practice, in the first place? Apart from eliminating redundant work or finding knowledge specialization, outsourcing presents several more benefits and continues to drive organisations from vertical to virtual integration (Bowersox *et al.*, 2000). Some claim that through outsourcing at a strategic level, a company can do “more with less” (Insinga and Werle, 2000). Others posit that by outsourcing activities and processes, organisations’ supply chains become more flexible, Lean and agile, and deliver better value to the customer (Mohammed *et al.*, 2008).

However, the linkage between outsourcing and Lean literature has not been clearly made. This paper aims to fill that gap clearly stating some outsourcing practices as Lean practices and establishing a deployment evolution parallel between both practices.

Some Lean thinking literature misjudges supply chain many constraints, in terms of value appropriation, resulting of the different power structures which are visible when mapping the value chain (Cox, 1999). By misperceiving the causal factors of successful appropriation of value that lie on the hierarchical distribution of power in a supply chain, panacea decisions can reveal themselves disastrous. It is, though, crucial to understand if each decision serves only operational efficiency or a real strategy, even knowing that all strategies will collapse, over time, into operational efficiency (Porter, 1996; Prasad, 2010). Considered by some a mega-trend in supply chain management (SCM) decisions (Bowersox *et al.*, 2000), outsourcing evidence in Healthcare sector show some differences and similarities among different countries with different Healthcare systems (Guimarães and Carvalho, 2011). Those differences are grounded, as we posit in this paper, on cultural aspects.

This paper presents a merger between outsourcing practices in Healthcare sector (Guimarães and Carvalho, 2011) and Lean deployment in Healthcare sector. Moreover, it sets out to argue the following key points: (i) Only some outsourcing drivers fit into Lean concept and therefore, only some outsourcing kinds can be a Lean tool; (ii)

Outsourcing and Lean, in Healthcare settings, have both “hard” and “soft” sides related to short or to long-term orientation and deepness of scope; (iii) Lean journey is a state of mind construction that starts with practices and so is the outsourcing journey in relationship evolution; (iv) Lean and outsourcing common drivers are related to cultural dimensions that distinguish different maturity deployment stages of different national cultures.

The common elements of Lean deployment and outsourcing practices are enhanced considering both phenomena usual context - organisational change. This paper is aligned with the view that short-term wins encourages change process, but what make change “stick”, in the long-term, is to pursue in daily basis the new shared values, rooting behaviour to a culture building (Kotter and Cohen, 2002). Therefore, the culture construction is explained throughout Lean and outsourcing common cultural elements and illustrated by the state-of-the art of both practices in Healthcare settings.

5.3. Outsourcing as a strategic Lean tool

5.3.1. A strategic decision in SCM

Supply chain management (SCM) definitions in the literature appear mostly with a strategic frame, as the one in Mentzer *et al.* (2001): “...the systemic, strategic coordination of the traditional business functions within a particular company and across businesses within the supply chain, for the purposes of improvement the long-term performance of the individual companies and the supply chain as a whole.”

In fact, and as postulated by Christopher (1997), the competition is not between companies but between supply chains. Thus, organisations core capabilities lie in their ability to design and manage their supply chains in order to have maximum advantage in a continuous changing market (Marcus, 2010). This ability, or supply chain management thinking, implies to consider the supply chain design and management as key strategic issues for obtaining competitive advantages.

As strategy emerges from a decision process (Eisenhardt, 1999), the result of the strategic evaluation of “make or buy” (Ohmae, 1982) is often to transfer activities

(along with related resources' management decisions) to third parties, i.e. outsourcing (Greaver, 1999). Outsourcing refers also to activities not previously performed in-house and it differs from subcontracting and contracting-out by having the premises of long-term relationships and obligation of not only means but also results (Kakabadse and Kakabadse, 2003). The starting point for analysis is the disaggregation of the value chain into pieces subject to allocation geographically (off shoring) and organisationally (outsourcing) (Contractor *et al.*, 2010). This exercise requires a Process Oriented view (Davenport and Beers, 1995, Hammer, 2007, Kohlbacher, 2010).

Outsourcing became a multifaceted phenomenon with a broader set of issues (motivation, scope, performance, decision making, contract, and more recently, partnership) that map the evolution of outsourcing research (Lee *et al.*, 2000), setting a wide spectrum of relationships (Ballou, 2003: 716; Franceschini and Galetto, 2003; Sanders *et al.*, 2007). From reviewing the literature on its conceptual background and on outsourcing practices, we identified a paradigm shift (a completely different mental framework for interpreting facts (Kuhn, 1970)) from the classical outsourcing paradigm to a new outsourcing paradigm. Kakabadse and Kakabadse (2000) claim this shifting is due to the “Westernisation of the Japanese *kieretsu* model” that emphasises flexibility of “Lean and mean” structures focused on “core competencies” leading to “do more with less”. Each of the three different paradigms is supported by a theoretical support from Transaction-cost Analysis (TCA) (Williamson, 1979) and Agency Theory (AT) (Eisenhardt, (1989b), to Resource-Based View (RBV) (Prahalad and Hamel, 1990). The RBV is in fact a Knowledge- Based View (KBV), especially when related to services outsourcing. More recently, the Transformational View (Linder, 2004; ___ 2004a; ___ 2004b) places outsourcing as a SCM strategic tool allowing the redesign of the organisation value creation process and, sometimes, its mission (Schneller and Smeltzer, 2006). This change of mindset regarding outsourcing theory and practices is shown in Table 5.1.

Despite of each of these three paradigms relation to the specific decade of first visible practices, all three are coexistent nowadays disclosing the type of mindset of each outsourcing organisation.

Table 5.1 – Outsourcing: Paradigm shifting

Issues	<i>Transactional Outsourcing</i> (70's and 80's)	<i>Strategic Outsourcing</i> (since the 90's)	<i>Transformational Outsourcing</i> (21 st century)
Theoretical Background	-TCA -AT	-RBV - KBV	-Relational View -Network Theory
Decision Drivers	-Cost (production and transaction) reduction strategies -Functional specialization -Competitive needs	-Differentiation strategies -Market adaptation/flexibility -Competitive advantages -Improve time to market	-Mixed strategies (extended supply chain) -Reinvent the business
Kind of Activities	-Non core activities -"Problematic" functions -Single function	-Core and non core activities -Set of activities -Multi-function	-Complete process (BPO- Business process outsourcing)
Kind of Agreements	-Cost/Efficiency evaluation -Decision based on price and ,margin bargain -Short term (up to 3 years) -Agent-principal relationship -Individual outsourcer	-Value complementary evaluation -Decision centered in tangible, no tangible and profit share -Long term (3 to 7 years) -Synchronized relationships -Multiple vendors	-Value creation evaluation -Alliances and partnerships -Cooperative relationship (10 y0 15 years) -Virtual outsourcer (net or service's clusters)

Based in: Bettis *et al.* (1992); Brown and Wilson (2005); Bustinza *et al.* (2010); Coase (1988); Conner and Prahalad (1996); Eisenhardt (1989); Ford (1990); Franceschini and Galetto (2003); Grandori (1997); Kakabadse and Kakabadse (2000; 2003; 2005); Kelley (1995); Kulkarni and Heriot (1999); Lacity *et al.* (1995); Lee *et al.*, (2000); Linder (2004; 2004a; 2004b); Liu (2007); Lonsdale and Cox (1997; 2000); Madhok (2002); Mowery *et al.* (1998); Mullin (1996); Peisch (1995); Prahalad and Hamel (1990); Quinn (2000); Quinn and Hilmer (1994); Sanders *et al.* (2007) and Williamson (1979).

Outsourcing decisions, if only taken at the operational level can lead to dependencies that create strategic vulnerabilities (Insinga and Werle, 2000). On the other hand, at a strategic level, outsourcing can present a solution for doing more with less, focusing in the essential activities, there's the danger of losing strategic intent when at operational level are not assured: (i) the alignment with business strategy, (ii) the clarification of core capabilities and competences; (iii) the identification of strategic gaps and (iv) the recognition of the significant dependencies and vulnerabilities. This strategic intent means more than the fit between resources and current opportunities; it seeks the misfit

between resources and long term ambitions (Hamel and Prahalad, 1989). Likewise, the outsourcing decision, when serving strategic intents, brings broader results at the organisational performance level, instead of only pursuing tactical and punctual purposes of cost reduction (DiRomualdo and Gurbaxani, 1989).

There are yet other reasons for outsourcing that cannot be called strategic but can be called “isomorphism” within an economic sector (DiMaggio and Powel, 1983). According to these authors, this isomorphism can assume three different aspects: (i) a *coercive isomorphism*, when is driven by government stipulations as it can be a privatization program, for instance; (ii) a *mimetic isomorphism*, where a set of change environmental factor provoke a standard response; and (iii) a *normative isomorphism*, when members or a sector look at outsourcing as the strategy to pursue.

This isomorphism can serve institutional legitimacy purposes (Martin and Bourgeois, 2007) in a sort of bandwagon attitude. However, and according to Hannan and Freeman (1984), following the leader without any efficiency concerns in ongoing outsourcing practices shows organisational inertia.

Hence, not all outsourcing arrangements can be called strategic relationships. In Sanders’ *et al.* (2007) study in manufacturing and services settings, outsourcing relationships can be classified according to activities’ scope (from out-tasking to full outsourcing) and criticality (from tactical to strategic) spectrums. Thus, *non-strategic transactions* encompasses low criticality tasks with limited scope, usually commodities with higher levels of standardization; *contractual relationships* regard not to tasks but activities and processes and reflect the need of greater supplier control and dependency even for low criticality activities; *partnerships* include now critical tasks in a narrow scope but involving a great deal of trust; and, finally, *alliances*, the most comprehensive outsourcing relationship occurring in high levels of criticality and scope involving high commitment, trust, risk and investment in resources and relationship management. Throughout a two year study, Johnston and Staughton (2009) defined strategic relationships as long-term commitments of mutual cooperation, shared risks and benefits with much greater parity and power sharing between the parties as opposed to transactional relationships.

Analysing the different outsourcing drivers, the kind of activities and outsourcing agreements, one can find the evolution in paradigm shifting that led to better satisfaction with the outcomes when the strategic intent matches the adopted practice. It is accepted that successful business strategies result mainly from a shared understanding of a particular state of mind (Ohmae, 1982).

However, strategy's outcomes are influenced by several constraints that are typical of a sector or even a nation. In a thorough literature review of outsourcing practices in Healthcare sector in different countries, Guimarães and Carvalho (2011) present a full perspective considering the dimensions: (i) the decision rationale constraints and drivers; (ii) the risk / benefit assessment for clinical and non-clinical activities; and (iii) the particular national health system context. In this cross-national outsourcing assessment it became clear that Healthcare organisations outsource for the same reasons as in other sectors (Quinn and Hilmer, 1994), mostly in organisational change context.

Healthcare has been considered a low volatility sector (Goepfert, 2002) but also with riotous periods as a result from regulations' alterations, more informed and demanding patients and broader networking for a bigger care offer range. In this Healthcare outsourcing reviewed literature, the most cited outsourcing drivers were: cost reduction, risk mitigation, rapid changing without compromising internal resources (value mapping and value chain reconstruction) (Roberts, 2001). Cost reduction expectations may not be achieved due to insufficient evaluation of indirect costs (procurement, transition, bad contracts and monitoring) and social costs (low "moral", low productivity and high turnover) (Kremic *et al.*, 2006). Outsourcing appears also as part of a volume flexibility strategies (namely in bigger organisations as academic medical hospitals) trying to respond to demand flotation's, care increasing complexity, and to the linkage between clinical performance and act volume (Jack and Powers, 2006).

In fact, according to some authors (Atun, 2006; Campos, 2004), in some European countries more politically reluctant to privatizations (United Kingdom, Sweden, Spain and Portugal) outsourcing of clinical services was a response to waiting lists. Through contracting agreements with public and private providers (including public-private partnerships (PPPs)), Healthcare systems looked for access, quality, equity and efficiency advantages (Abramson, 2001; Liu *et al.*, 2004).

Apart from financial, technological, strategic and political drivers, organisation and national culture were identified as influencing factors. Hence, even a well designed strategy has to consider organisational and national culture context as deployment constraints.

5.3.2. Outsourcing and Lean drivers in Healthcare settings

There is an alignment between SCM thinking “...a way of thinking that is devoted to discovering tools and techniques that provide for increased operational effectiveness and efficiency throughout the delivery channels that must be created internally and externally to support and supply existing corporate product and service offerings to customer” and Lean thinking illustrated by Toyota’s way of managing relationships with customers and suppliers (Cox, 1999). The author underlines the literature stream on strategic SCM through collaborative and co-opetitive relationships cohesiveness with eight defining characteristics of the Lean paradigm understood not only in terms of operational Lean production and supply efficiency, but also as a different way of thinking about business strategy. In fact, it is clear in the literature that one Toyota’s key strategic decision, the “make or buy” decision is a SCM one (Ohmae, 1982; Cox, 1999; Womack *et al.*, 1990, Liker, 2004).

Thus, when taking a broader view, “leanness” can be conceptualized in terms of a quest for structural flexibility involving restructuring and outsourcing (Womack and Jones, 1996, 2003; Green and May, 2005). If, on one perspective, outsourcing serves Lean purposes of doing more with less, meaning less fixed costs and less owned resources, on the other hand, through outsourcing is possible to obtain the flexibility a Lean organisation requires (Milgate, 2001). The author lists six major building blocks of a Lean organisation: (i) core competences; (ii) strategic outsourcing; (iii) strategic alliances and partnerships (sorts of outsourcing according to Sanders *et al.*, 2007); (iv) new management disciplines; (v) partnership culture and (vi) technological enablers.

Similarly, other authors (Emiliani, 2004; Maleyeff, 2006, among others), discussing Lean practices in services setting, identified outsourcing, technology initiatives and cross-function collaboration with perfect flow of information, as key methods to reduce

cost and improve efficiency. Illustrating how to pursue Lean public administration in Healthcare sector, Milgate (2001) presents an Australian case of a regional hospital outsourcing project. It is suggested, in this reported case, that having as initial driver accomplishing the 1994 government privatization encouragement program, the outsourcing solution assured real added value to the customer (internal and external).

The objectives of seamless integration of services, deliver of high quality health services, cost reduction, risks mitigation and positive externalities by encourage health education and training were achieved and patients could choose between public or private service. In terms of added value to final customer, the first sceptic reactions were softened by this project success. Nevertheless, the author stresses that this success took five years of operation.

In a similar context of lack of public fund, static revenues, accumulated debt and need of weight reduction of public providers in the economy, different Healthcare systems, having more or less public weight, looked for Lean solutions, sometimes through outsourcing. However, from some cross-national health system studies (Elling, 1980; McPake and Mills, 2000, Guimarães and Carvalho, 2011, among others) one common conclusion is that context differences are crucial to understand advantages and risks of outsourcing in each Healthcare system framework.

There is, in did, a growing pressure on public health services to increase their efficiency by adopting concepts and methodologies more commonly associated with private enterprise, whether it can be called by some as “reengineering” (Champy and Greenspun, 2010) or “Lean management” by others (Radnor *et al.*, 2012).

In the 2003’s revision, Womack and Jones (2003: 289) introduced the application of Lean thinking in the medical services establishing the difference between putting the patient in the foreground and flowing him through the system by contrast of leaving him in the background facing a “forest too full of trees”. Some authors advocate Lean practices in Healthcare services to eliminate delays, reduce length of stay, repeated encounters, errors and inappropriate procedures (Fillingham 2007; Kollberg *et al.*, 2007, Manos *et al.*, 2006). Presented as an antidote to *muda* (waste), converting *muda* into value, “Lean thinking” coined by Womack *et al.* (1990) stands as a five principle improvement philosophy: (i) specify value, (ii) identify the value stream, (iii) make the

value-creating steps for specific products flow continuously, (iv) let the customers pull value from the enterprise, and (v) pursue perfection. Waste is defined as any element of a process that adds time, effort or cost but no value and, in Healthcare settings it can assume different forms: overproduction of diagnosis tests (a so called “defensive medicine”), transportation (patients, equipment, etc), inventory (clinical and non-clinical supplies) and work in progress (tests waiting distribution), processing (excessive documentation), waiting (patients being patient), correction/defects (prescription errors, incorrect information, incorrect diagnosis) and motion (looking for missing patient information, sharing medical equipment/tools). The attempt to reduce these wastes is described in the literature with several examples.

In his literature review, Brandao de Souza (2009) presents taxonomy to classify the existent published work on Lean in Healthcare settings. The following classification given by the author to the empirical cases reported presents an evolution in Lean deployment scope:

- (i) *Managerial and support*, address to cases describing Lean approaches in support services as administrative departments, usually with a single tool (5S) as department or rooms tidying programs;
- (ii) *Manufacturing-like*, classify those cases where the use of manufacturing techniques (single tool of set as 5S, Value Stream Mapping-VSM, *poka-yoke* devices and visual control) on material management and material logistics, thus cannot be called a complete Lean application for not including the patient pathway management, the core activities;
- (iii) *Patient Flow*, are those cases of elimination of unnecessary steps by streamlining patient pathway leaving, usually, to time outcomes as reducing length of stay (LOS) and waiting lists as well a quality results for the real presence of flow and pull concepts; Tools like 5S are in these cases used in Healthcare practices standardization; An iconic case is the patient safety alert system (*jidoka*) in Virginia Mason Medical Centre (USA) (Furman, 2005); and finally
- (iv) *Organisational*, classifies cases as Theda Care Improvement System (TIS) (American) (Miller, 2005) and Victoria Mason Production System (VMPS) and Flinders Medical Centre (Australian) (Weber, 2006; Kaplan and

Patterson, 2008; Ben-Tovim *et al.*, 2007) reported as having an organisational Lean approach; also Bolton Improving Care Systems (BICS) in UK (Fillingham, 2007) shows a broader perspective with Lean extension to the sector and describes the Lean journey started with managerial and support case, passing to the manufacturing –like and then, patient flow, to become organisational for reporting Lean deployment as a result of strategic plan, thus, covering the whole organisation. On the other hand, the Pittsburgh Health System (Grunden, 2008) good results are, according to Brandao de Souza's (2009) classification, misleading to classify the case as full Lean deployment.

If one emblematic case can serve as reference to Lean deployment in the same Healthcare national system, apparently is not enough to define a trend or a predominant Lean scope. It seems important to accurate the application world wide of some authors statements that “Healthcare organisations are at a stage equivalent to the late 1980s and early 1990s in automotive manufacturing” (Radnor *et al.*, 2012). The pathway described by Hines *et al.*, (2004) clearly suggests an evolution from shop-floor based-tools, to a process view, and finally a holistic understanding of inter-organisation pathways.

Hence, a systematic search in electronic databases (ABI/Inform, B-On, PubMed) was conducted with the purpose of gather information and examples from both scientific and grey literature (Farace, 1998) that could show a full picture of Lean practices in Healthcare. We have excluded articles concerning hybrid approaches (as “Lean Six Sigma”) and included all articles that reported successful or not successful Lean deployments in Healthcare organisations, in peer-review and grey publications using key words: “Lean thinking”; “Lean Healthcare”; “Toyota Production System” and “Lean Services”. A cross-reference search encompassing the eligible first selection was carried out. Cases were classified according to Brandao de Sousa's (2009) taxonomy showing some differences in Lean journey stages in fifteen countries, as presented in Table 3.2 of this thesis' section 3.

Relating this Lean maturity levels (LML) with outsourcing drivers (OD) described on section 5.3.1., it is possible to establish a relation with the main drivers of transactional,

strategic and transformational outsourcing and above cases Lean outcomes regarding each Lean maturity stage (Figure 5.1).

Fig. 5.1 - Outsourcing drivers (OD) versus Lean maturity levels (LML), in Healthcare

LML \ OD	MANAGERIAL and SUPPORT	MANUFACTURING -LIKE	PATIENT FLOW	ORGANISATIONAL
-Cost reduction	●	●	◐	◐
-Functional specialization	●	●	◐	○
-Competitive needs	◐	●	◐	◐
-Differentiation	○	◐	◐	◐
-Market adaptation /flexibility	○	●	◐	●
-Competitive advantages	○	●	●	●
-Improve time to market	○	●	●	●
-Mixed strategies (extended supply chain)	○	○	◐	●
-Reinvent the business	○	◐	●	●

○ Weak Relation

◐ Relation

● Strong Relation

The diagonal darker shade suggests that transactional OD seem to be more related to earlier stages of Lean deployment, strategic OD with the three last stages, and transformational OD with a full Lean deployment or the last stages. In fact when analysing Lean cases outcomes in Healthcare settings, these relations are notorious. Also the criticality of each kind of activity outsourced, from ancillary ones (non-clinical) to the ones closer to the patient (clinical), can be matched with the Lean scope of each “intensity” level.

Nevertheless, one possible exercise is to consider an organisation at the beginning of the Lean journey, recurring to outsourcing as a result of a VSM evaluation and have for each activity a different outsourcing arrangement (transactional, strategic or

transformational) in scope and criticality and conduct Lean auditing to internal and outsourced activities. If Lean deployment stays at a tool and techniques level, the hard level, it might be improving time or costs, for instance, but it can be still far from presenting a better value proposition. Likewise, if outsourcing presents itself as a shopping practice, as a “must do” for lacking resources, it won’t bring real long-term benefits in terms of the value proposition.

5.4. Outsourcing and Lean hard and soft⁷ sides in Healthcare settings

As reflected in (not so many) reported non-success cases, the starting point of depth evaluation of organisation’s value chain, common to Lean deployment and outsourcing decision making (Contractor *et al.*, 2010), is not *per se* the main success factor, although it is the one that both academics and practitioners have given more attention. Some Lean applications to services are claimed to be “Lean service” but are just applications of Lean production to material processing tasks in service companies. Moreover, pursuing Lean principles as standardization might seem paradoxical in services settings due to variability introduced in operations by customers (Kosuge *et al.*, 2010). As reported in the literature, Healthcare organisations started the “Lean journey” by the application of a set of specific tools and techniques with prominence to VSM; and “kaizen blitz” or “rapid improvement events” (RIEs) (Radnor *et al.*, 2012). In Virginia Mason’s case (Spear, 2005), RIEs results are described as “dramatic improvements in quality, customer satisfaction, staff satisfaction and profitability”.

On the other hand, Radnor and Walley (2008) advert to the difficulty in sustaining RIE’s quick wins that are not integrated in the overall strategic objectives of the organisation. When they are part of the strategy improvement program, RIEs themselves can be a powerful mean to both engage and motivate the workforce and allow a number of small changes to occur producing a sort of a butterfly effect.

⁷ The dichotomy of “hard” (utilitarian instrumentalism) and “soft” (developmental humanism) extracted of the Human Resources Management literature (Legge, 1995) has similarities what concerns the integration of the human factor in with Strategic Management literature (Peters and Waterman, 1987) that attributes to “hard” a quantitative sense– appraisal systems, pay scales, formal training, etc. – and to the soft, qualitative sense of morale, attitudes, motivation and behaviours. Similarly, in Lean thinking literature the hard side refers to the tool and technique pure and simple deployment, and the soft implies Lean culture edification.

Organisations often run a series of RIEs and call them “Lean” or “process improvement” whereas in reality it is just *Kaizen* (continuous improvement). According to Barraza *et al.* (2009) in continuous improvement (*kaizen*) events the length of implementation varies according to the extension of activities. In Healthcare settings, Proudlove *et al.* (2008), suggest that medium/long term achievements in Lean implementations are due to: standardization training, measuring employers engagement with the company and with the customer, monitoring results, management commitment and ownership to maintain and improve gains and also learn from external support how to develop internal mechanisms for sustain improvement.

Having longer (based on traditional Japanese Quality Management system) or shorter dimension, the continuous improvement events are part of a journey to a Lean enterprise as Lean-*kaizen* events (Manos, 2007). Hines (2010), among others, posits that the pure and simple tool deployment to achieve quick-wins lead to a short term Lean results and often returns to “the comfort zone” whilst systematic Lean approaches of culture changes shows long-term results. Using the iceberg metaphor the author shows that sustainability doesn’t come from working only the visible part of the iceberg (technology, tools and techniques and process management) but mostly work below waterline with much bigger and real sustainability keys as: (i) strategy and alignment; (ii) leadership; and (iii) behaviour and engagement.

The Lean literature focus shifting from “how to go Lean” to “how to stay Lean” (Hines 2010; Lucey *et al.*, 2005) suggests that once solved the technical part of Lean deployment it was necessary to understand Lean sustainability factors. The main reason pointed in the literature, for Lean programs failure is the absence of work on the soft side, the relational aspects of Lean deployment as communication, leadership, essential for building a Lean culture (Brandao de Souza and Pidd, 2011; Hines *et al.*, 2008). Working the soft side is achieving people’s involvement through mutual respect and team work (Badurdeen *et al.*, 2011).

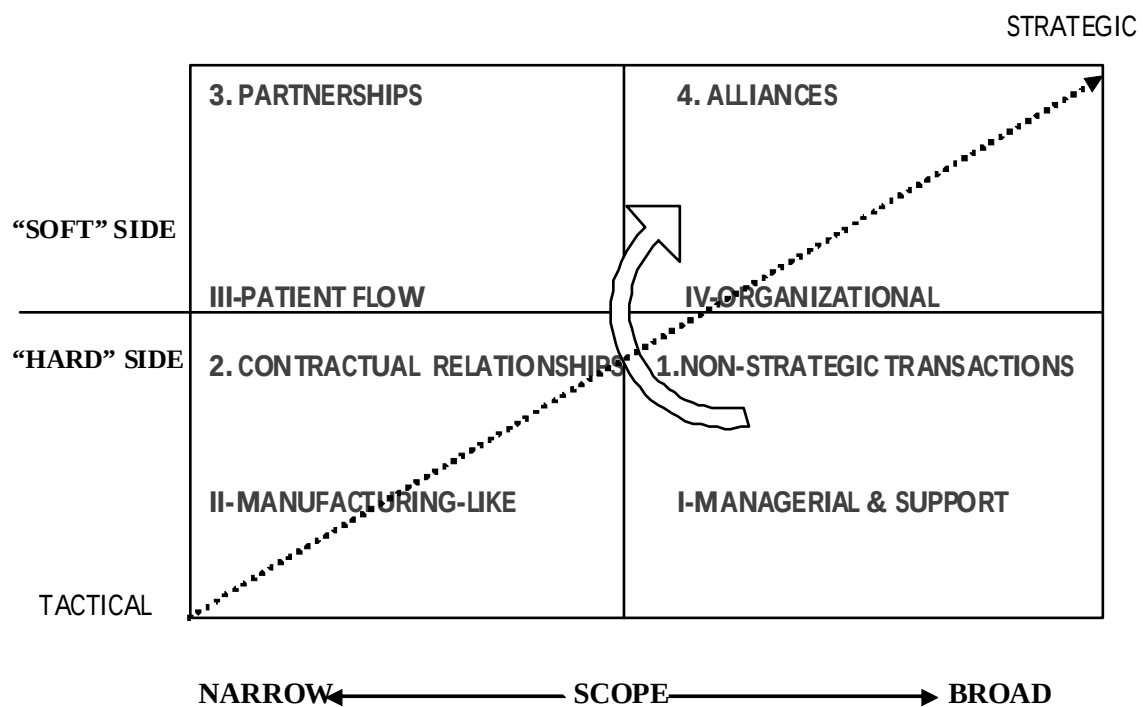
Others address the Lean maturity and sustainability issue through the edification of a proactive Lean culture expanded outside the organisation’s boundaries in a real Lean inter-organisational network building (Jorgensen *et al.*, 2007). Forrester (1995) links the sustainability of Lean deployment to the human elements and advises to consider

elements as: (i) *organisational style and structure* (a people centred process, with involved, motivated and accountable teams and leader empowerment, flat structure focused on processes not hierarchies); (ii) *staff selection* (based on management and leadership skills, give clear and individual performance targets); (iii) *training* (solving problems and other individual continuous development programs). Also Womack and Jones (1996b) point out the importance of the Lean principles when “all interact with one another in a virtuous circle” as the goal is not playing individual notes but a tune.

This view is consistent with the relational sustainability factors of a strategic outsourcing relationship (Dyer and Sing, 1998; Luvison, 2010). Luvison (2010) posits that outsourcing requires collaborative styles necessary to develop trust and commitment and replacement of operational behaviours by boundary spanning behaviours. In a simplified statement, outsourcing management has two sides, the hard side referring to the contract, and the soft side referring to trust and a partnership philosophy (Barthélemy, 2003; Shepherd, 1999). Addressing the objective/hard and subjective/soft factors in transactions, Butter and Linse (2008) distinguish between internal soft factors (effects of decisions on existing jobs, reputation, and corporate culture and risk aversion) and external soft factors (cultural differences, political and economical differences and environment).

In Healthcare settings, where people are the key to every process, the change issue takes a special relevance. From analysing both literature on outsourcing and Lean in Healthcare settings, the existence of a pathway of change is clear in outsourcing as in Lean deployment, first through a tool and technique experiments in several Healthcare systems, with a sort of trial and error execution and evolving, in time, to a mindset creation where real benefits of change are more visible. Recurring to Brandao de Souza (2009) Lean Healthcare cases taxonomy, and Sanders' *et al.* (2007) outsourcing relationships classification, an *Outsourcing and Lean pathway evolution* is possible to define considering the phenomena scope and the hard and soft factors described in this section (Figure 5.2). Following the arrow, the Lean journey is very similar to outsourcing relationship evolution, starting at the hard side in a broad scope (several suppliers and ancillary services transactions), and going through a paradigm shifting of crescent importance of the soft side.

Figure 5.2 - Outsourcing and Lean evolving pathway



5.5. The Lean culture construction

As stated by Atkinson (2010), “«Lean» is a Cultural Issue”. The Lean philosophy implies transformations not only in processes and tools but in people and organisational culture (Bhasin and Burcher, 2006). However, most of the literature on Lean services does not properly cover “people aspects” and behaviour issues in organisations, even though they are crucial to Lean implementation success. As Spear (2005) concludes “in health care, no organisation has fully institutionalised to Toyota’s level the ability to design work as experiments, improve work through experiments, share the resulting knowledge through collaborative experimentation, and develop people as experimentalists”. In spite of this disappointing conclusion on Lean deployment in Healthcare, it is possible to identify in several countries a deeper extension of Lean deployment in Healthcare organisations and evidence of a Lean organisational culture.

Lean deployment cases in the UK, USA and, with less expression, in Australia, prove that Lean journey in these countries achieved the higher lever, the edification of a Lean

culture. In fact, cultural context can explain differences in maturity levels of Lean deployment in Healthcare settings.

Necessary to understand the Lean cultural process, some background concepts need to be visited. Culture, “the collective programming of the mind which distinguishes the members of one human group from another” (Hofstede, 1980: 25), manifests itself in many ways as symbols, heroes, rituals (also labelled as “practices”) and values (Hofstede, 1998) and can be defined at four main levels: society, organisational, small group and professional (Hofstede, 2000).

While national cultures differ mostly at the level of values, organisational cultures differ at the level of practices: symbols, heroes and rituals (Hofstede, 1998; Hofstede *et al.*, 2010: 347). This statement apparently contradicts some management literature that presents organisational culture as a matter of values (Peters and Waterman, 1987). Hofstede’s (1998) position is that within an organisation, members’ values depend primarily on broader levels of culture as gender, nationality, class, education and through the socialization process they learn the organisational practices.

Within the organisational level, culture change issue can be seen in two opposite ways, one that defends that change should start at the less visible and tacit part, at the assumptions, then values, until be visibly manifested in artefacts and practices, and the other way around, changing first the most visible part and through new practice and behaviour repetition, gradually change culture. This last view is defended by practitioners, in Lean literature, and also by academics like Schein (2009). Schein himself describes culture as “...the pattern of basic assumptions that a given group has invented, discovered or developed in learning to cope with its problems of external adaptation and internal integration and that have worked well enough to be considered valid, and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems”.

Examining the culture building process as described by Schein (1992, 2009) and Shook (2010), Lean culture construction, in Healthcare settings, appears to have its starting point in the “hard” deployment, using tools and techniques in a less core activities and evolve to the core ones, to the patient path, until the daily practices take over the whole organisation. Contrary to this view of culture as consequence, the culture construction

in the “system view” defends a dynamic top-down-bottom-up process across all levels of culture (Global, National, organisational, Group, and Individual) placing culture as a cause (Leung *et al.*, 2005). In Hofstede’s *et al.* (2010) work, several national cultural dimensions were studied as causes of organisational practices. The author claims that although culture is a soft characteristic, changing it requires hard measures (Hofstede’s *et al.*, 2010: 375). Hence, considering culture as both a cause and consequence, if in one perspective, outsourcing practices contribute to the edification of a Lean enterprise, on the other hand, only working on the soft aspects will be possible to create a real Lean culture in a sustainable way.

Through a thorough assessment of Lean literature in Healthcare settings it is possible to identify those national cultural characteristics linkages to the maturity stage of Lean deployment. Therefore, (i) “collectivism”⁸ can be related with flow concept, (ii) “masculinity” with willingness to change, (iii) “power distance” with empowerment, (iv) “uncertainty avoidance” with problem solving and, finally, (v) “long-term orientation” with sustainability. These Lean concepts, that are above all Lean success factors, as explained in preceding sections, are in fact common to outsourcing success factors. Hence, it is possible to admit national cultural constraints in outsourcing cases in Healthcare settings of different countries (Guimarães and Carvalho, 2011). That will be addressed in the following section.

5.6. Merging national mindsets

In line with Hofstede’s (2010) view that culture changes very slowly, culture has been treated in the literature as a relatively stable characteristic, reflecting a shared knowledge structure, values, behavioural norms and patterns. Hence, it seems suitable to address cultural elements to identify some deployment patterns along a big date range in Healthcare Lean and outsourcing deployment.

⁸ Power Distance (PD) (the degree of equality, or inequality, between people in the country’s society); Individualism (IND) (the degree the society reinforces individual or collective achievement and interpersonal relationships or the degree to which individuals are integrated into groups); Masculinity (MAS) (the degree the society reinforces, or does not reinforce, the traditional masculine work role model of male achievement, control, and power); and Uncertainty Avoidance (UA) (the level of tolerance for uncertainty and ambiguity within the society, - i.e. unstructured situations; quite different from risk avoidance) (Hofstede *et al.*, 2010).

A common mindset can be identified in successful Lean and outsourcing practices in Healthcare sector (Guimarães and Carvalho, 2011) and that is long-term orientation. The Lean management fourteen principles outlined by Liker (2004) underline basing management decision on long-term philosophy. Hines *et al.* (2008) suggest that generally Lean systems take between three to five years to develop and between five to seven years to implement.

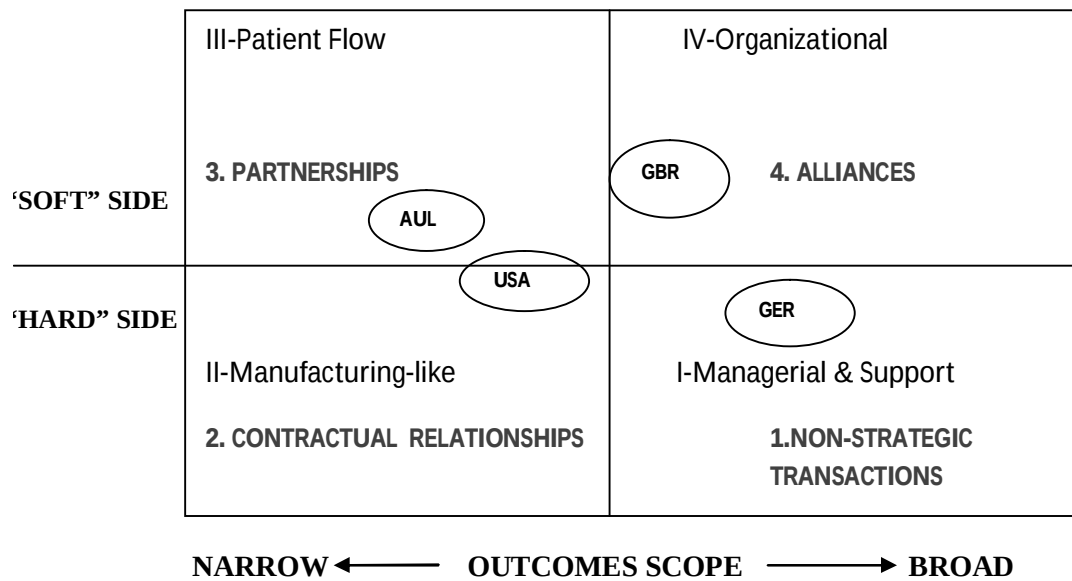
The importance of Long-term view is not only claimed for strategic planning as for implementation. As outlined in outsourcing literature, evolving from tactical to strategic level means to think and build relationships in a long-term basis as only a long history of interacting allows higher levels of trust to emerge (Dyer and Chu, 2000). The significance of “trust” in relationships is either claimed inside as outside organisations boundaries. Taking the Japanese management style, trust is in the basis of supplier-purchaser partnership whether the supplier is an affiliated company-*kankei-gaisha* (belonging to keiretsu) or an independent company- *dokuritsu-gaisha* – enabled by a long-term perspective (Dyer and Ouchi, 1993). Dyer and Chu’s (2000) study on the determinants of trust in supplier automaker relationships in USA, Japan and Korea, found that the social embeddedness perspective is only important in Japan, while the process-based perspective has importance in the three studied countries. Thus, the sociological determinant of trust appears as a Japanese cultural mark.

In terms of the cultural dimension “long-term orientation”, persistency in hard aspects and strong relationships seem, according to the literature, to lead to successful approaches.

Analysing the results of Guimarães and Carvalho (2011) review, and comparing to this review’s results, is possible to find some distinctive Lean marks in outsourcing practices in Healthcare sector in Germany (GER), Australia and New Zealand (AUL), USA, and United Kingdom (GBR) (leaving Greek results out of this merger for lack of Lean cases). Taking these four countries, common to both Lean and outsourcing reviews, some results can be summarized. For instance, in German cases cost drivers are more clearly stated while in other countries the same driver appears as a given. Lean purposes are more clearly stated in British cases with frequent use of terms such as “standardization”, “flexibility” and “Lean thinking”. Australian and New Zealand cases

are following a British path, although the much less number of cases show an earlier stage. Conversely, in USA the countless cases either of outsourcing and Lean show an emphasis in outsourcing contract management and Manufacturing-Like predominance in Lean cases, in spite of some iconic cases of Lean organisational full deployment. It was possible to match outsourcing cases with Len cases and place its nationality in the classification chart as presented in Figure 5.3.

Figure 5.3 - Outsourcing and Lean state-of-the art merger



5.7. Conclusions

This paper presents a merger between outsourcing practices and Lean deployment in Healthcare sector. All relevant literature on both topics was thoroughly analysed with special emphasis on the dimensions of outsourcing and Lean drivers, outcomes scope, and the soft and hard deployment aspects. The growing pressure on Healthcare sector has been forcing to new process improvement methodologies adoption and change in supply chain management' decisions paradigm. One of the major decisions is the "make-or-buy" which, when looked at a strategic level, has its starting point in the value chain analysis, just as in Lean thinking. In a summarized statement, outsourcing serves Lean thinking, while a strategic decision to improve performance in the value chain by

focusing on what the organisation does best and leaves redundant or less expertise activities to experts. Hence, through outsourcing, an organisation gains flexibility and ability to be more nimble and competitively adaptive, thus leaner. It became clear from the Healthcare reported cases that some outsourcing benefits as flexibility, access to world class expertise, cost reduction, focus on core activities, serve Lean organisations in terms of reducing waste (*muda*), by reducing non-value adding activities, variability (*mura*) and poor work conditions (*muri*).

However, outsourcing not always can be classified as a Lean option, as sometimes is more a downsize one, a transaction one or even a mimetic practice in a sort of a sector bandwagon. When looking at each outsourcing paradigm drivers, not all outsourcing drivers seem to fit perfectly Lean thinking. In this paper, we found a spectrum of crescent strategic intent and relationship intensity when moving from a transactional outsourcing paradigm to strategic and transformational paradigms with correspondence of drivers and benefits of a crescent Lean deployment maturity. In fact, Healthcare organisations in an early stage of Lean have the same quick win purposes with a bigger visibility in cost decreasing as in transactional outsourcing. It was also possible to identify national patterns were the matching of outsourcing drivers with Lean maturity levels is almost perfect. By reviewing the reported cases in Healthcare settings, an evolution pattern in outsourcing and Lean deployment from narrow to a broader scope, a short to a long-term benefits, is visible in a trial and error learning process. In this “losing weight” program the risk of becoming anorectic is the same of losing critical competences when outsourcing in a large scale.

Another important remark is the importance of hard and soft domains when pursuing both Lean and outsourcing organisational change processes. Both outsourcing and Lean success are associated not only to a thoroughly planned and implemented strategy but mostly to the people who planned and implemented. Hard aspects are completed to soft aspects of the strategy implementation. In fact, real Lean is made up of two key principles: continuous improvement, reflecting the hard side of tool and techniques deployment, and “respect for people”, reflecting the soft side that enables Lean sustainability. When exploring the soft side it becomes evident that outsourcing and Lean outcomes are a result of cultural factors that influence people’s decisions and deployment. In Healthcare organisations the human factor plays the most important role

as determinant not only of performance but also of change processes. If Lean deployment stays at a tool and techniques level, the hard level, it can be still far from presenting a better value proposition. Likewise, if outsourcing presents itself as a shopping practice, it won't bring real long-term benefits in terms of the value proposition.

This paper is aligned with the view that short-term wins encourages change process, but what make change "stick", in the long-term, is to pursue in daily basis the new shared values, rooting behaviour to a culture building where soft aspect cannot be neglected. However, the change process behind a Lean deployment in Healthcare, as in an outsourcing relationship building, should be object of deeper research, considering the idiosyncrasies of this sector "culture", not possible to properly address in this paper.

The focus was national culture, as its relation to organisational and individual behaviour. Considering culture as both a cause and consequence, in one perspective, outsourcing practices contribute to the edification of a Lean enterprise; while on the other hand, only working on the soft aspects will be possible to create a real Lean culture. Lean thinking is, from its national origin, viewed by academics and practitioners as a philosophy. The original Japanese Lean concept only superficially presents cost reduction as its main purpose putting the accent on sharing costs and risks with much more than arms-length suppliers. In this mind set, trust plays a main role and not all organisations, for cultural reasons are able to play it quite in "the Toyota Way".

Building strong relationships are not only a matter of cultural willingness but a matter of time. In Lean journey first steps are usually made at a tool deployment level and as most of learning by doing change paths, time will help to turn those practices into culture. Similarly, Healthcare organisations with longer experience in outsourcing, take more benefits of it not only for expanding the kind of activities to the core and clinical ones, but to experience a more cooperative environment with their suppliers. Even the name supplier loses its first meaning when facing new forms of externalizing activities and processes as strategic alliances and joint-ventures, called partnerships.

Long-term orientation plays an important role in thriving on the Lean journey where practices as outsourcing, as other Lean tools, are only just the beginning.

Finally, and as main conclusions, one can clearly state that:

- Only some outsourcing drivers fit into Lean concept and therefore, only some outsourcing kinds, the ones that seek for long-term relationships and true competitive advantages, can be a Lean tool by allowing focus in value-adding activities;
- Outsourcing and Lean, in Healthcare settings, have both “hard” and “soft” sides related to short or to long-term orientation and deepness of scope, but what makes a strategic change “stick” is the soft side, especially in Healthcare were human factor, as in most services, is “the” key factor;
- Lean journey is a state of mind construction that starts with practices and so is the outsourcing journey in relationship evolution. This journey implies a change process as deep as the maturity stage achieved;
- Lean and outsourcing common drivers are related to cultural dimensions that distinguish different maturity deployment stages of different national cultures, that differs in “collectivism”, “masculinity”, “power distance”, “uncertainty avoidance” and “long-term orientation”.

In sectors as Healthcare, where the strong public character inhibits its managerialisation, good SCM practices allied to a Lean organisation culture construction result on strategic advantages. Those practices, as outsourcing, will be, as this paper suggests, much stronger Lean weapons and aligned with wider strategy, as the national and organisational culture allow them to be.

It will be, though, interesting to understand the linkage between the national and organisational culture to explore the change process of Lean deployment in Healthcare sector.

Another area that will require further scrutiny is the Lean culture construction in Healthcare settings assessing the influence of hard aspects in that construction as well as the soft ones.

6. Leagility in Healthcare – A start-up case study⁹

6.1. Abstract

When taking a broader view, ‘leanness’ can be conceptualized in terms of a quest for structural flexibility involving restructuring, downsizing and outsourcing. Looking for efficiency, quality and profitability gains, Healthcare organisations adopt outsourcing solutions in the attempt of “doing more with less” seeking for benefits such as cost reduction, risk mitigation, adapting to quick changes without compromising internal resources (value mapping and value chain reconstruction) but also taking big risks as loss of control and flexibility. In order to understand how Healthcare organisations find the best value equation combining internal and external resources, a case study on a start-up Long-term Care unit with innovative format, great levels of customization and following an outsourcing strategy, was carried out. The main conclusion, among others, is that in ambitious start-ups, when the speed of entrance is a conditioning factor, trade-offs between cost and quality gains (leanness) and between cost and time gains (agility) can be combined through outsourcing strategies in a so called “leagile” paradigm. This study contributes for a wider understanding of the “leagile” concept associated to an outsourcing strategy as a way of coping with market and services volatility, uncertainty and complexity, hyper competition and market share/sped of entrance goals.

6.2. Introduction

According to some authors (Womack and Jones 1996, 2003, Green and May 2005), when taking a broader view, “leanness” can be conceptualized as a quest for structural flexibility involving restructuring, downsizing and outsourcing. The extension (scope), motives (drivers), decision process, contracts, risks and benefits can vary according to each one of the three outsourcing paradigms – transactional, strategic and transformational. In fact this paradigm shift is, according to Kakabadse and Kakabadse

⁹ This chapter is based on the article: “*Leagility in Healthcare: a start-up case study*” published in Joldbauer, H. Olhager, J. and Schonberger, R.J. (Eds), *Modelling Value*, Physica-Verlag, A Springer Company, pp. 275-291, 2012.

(2000) mostly due to the “Westernisation of the Japanese *keiretsu* model” that emphasises flexibility of “lean and mean” structures focused on “core competencies” leading to “do more with less”. Do all outsourcing relationships serve lean principles, agile ones, or both?

A decade after Naylor *et al.* (1999) working paper coining the term “leagility”, deeper empirical research in different settings from the usual manufacturing as services, namely in Healthcare sector, is still required (Naim and Gosling 2010). Naim and Gosling (2010) literature review shows that the extent to which one paradigm fits into another is in discussion. The scope of each (lean or agile) paradigm and the extent to which leanness is a prerequisite for agility and vice-versa are still contested. Delivering the best value equation to end-customer implies a suitable combination of efficiency, effectiveness and relevancy to face market challenges. In the attempt of eliminate redundant work or find knowledge specialization, outsourcing presents several benefits and continues to drive organisations from vertical to virtual integration (Bowersox *et al.* 2000).

The main question this research intends to give an answer is: - How to find the best value equation combining internal and external resources in order to quickly turn into, not only a “market qualifier” but also a “market winner” (Christopher and Towill 2000; 2002) offering innovative and highly customized services?

As postulated by Christopher (1997) the competition is not between companies but between supply chains. Thus, organisations core capabilities lie in their ability to design and manage their supply chains in order to have maximum advantage in a continuous changing market (Marcus 2010). In the supply chain management (SCM¹⁰), of Healthcare organisations, outsourcing decisions have been globally increased. In spite of the differences between Healthcare systems, they all are converging into a network governance model where loosely coupled (Orton and Weick 1990) organisations with ever-changing partners are linked by all sorts of outsourcing contracts, not by ownership, in a cooperation atmosphere (Guimarães and Carvalho 2011).

¹⁰ Vitasek (2005) definition, consensual among Council of Supply Chain Management Professionals, can be consulted at <http://www.cscmp.org/Website/AboutCSCMP/Definitions/Definitions.asp>

In order to contribute for a wider understanding of the “leagile” concept associated to an outsourcing strategy a case study on a Long Term Care (LTC) unit was carried out. The choice of a LTC was due to the possibility of a longer evaluation by the end customer of the value equation offered. High innovation and customization levels were also including criteria in order to find evidence of the agile paradigm.

6.3. Lean, Agile and Leagile paradigms in Healthcare

In a summarized statement, “leanness means developing a value stream to eliminate all waste, including time, and to ensure a level schedule”, whilst “agility means using market knowledge and a virtual corporation to exploit profitable opportunities in a volatile market place” (Naylor *et al.*, 1999).

Lean is about doing more with less (Christopher 2011). Presented as an antidote to *muda* (waste), converting *muda* into value, “Lean thinking” was coined by Womack *et al.* (1990) as a five principle improvement philosophy: (i) specify value, (ii) identify the value stream, (iii) make the value-creating steps for specific products flow continuously, (iv) let the customers pull value from the enterprise, and (v) pursue perfection. Womack *et al.* (1990) reformulated and streamlined the core Lean concepts based in Taiichi Ohno’s Toyota Production System (TPS), describing Lean production in five elements: (i) Lean manufacturing, (ii) Lean product development, (iii) supply chain coordination, (iv) customer distribution, and (v) Lean enterprise management. Research has been strongly concentrated in Lean manufacturing and only recently the discussion on Lean production included the concept’s relation to Six Sigma and Total Quality Management (TQM) (Liker, 2004).

Hines *et al.* (2004) present the evolution of Lean concept highlighting the shifting of focus from quality in early 1990s to customer value with the appliance to services sector, from 2000s onwards. The shifting from manufacturing to services setting is presented by Allway and Corbett (2002). Emiliani (2004), discussed lean practices in higher education and identified outsourcing, technology initiatives and collaboration as the three key methods to reduce cost and improve efficiency in this sector. Also, Piercy and Rich (2009a) propose the suitability of basic Lean methodologies like value understanding in service context. In 2003 revision, Womack and Jones (1996, 2003:

289) introduced the application of Lean thinking in the medical services. Some authors advocate Lean practices in Healthcare services to eliminate delays, reduce length of stay, repeated encounters, errors and inappropriate procedures (Fillingham, 2007; Kollberg *et al.*, 2007, Manos *et al.*, 2006). Brandao de Souza (2009) updates the Lean principles application evolution to Healthcare.

The original concept of agility was brought by academics (Lehigh University) and practitioners in 1991 referring to a new manufacturing paradigm (high quality and highly customized products, high information and value added products/services, mobilization of core competences, responsiveness, response to change and uncertainty and intra/inter-enterprise integration). Based on the first research context – manufacturing – several definitions of Agile Manufacturing were translated into agility for business (Gunasekaran, 1998; Gunasekaran, 1999; Backhouse and Burns, 1999; Christopher and Towill, 2000; among others) enhancing the organisations' adaptive capability in re-organising and even in reconfiguring themselves responding to a market opportunity. Gunasekaran (1998) present the key enablers of agile manufacturing to respond to 21st century challenges: (i) rapidly changing markets; (ii) globalization; (iii) decreasing new product time-to-market; (iv) increasing inter-enterprise co-operation; (v) interactive value-chain relationships; and (vi) increasing value of information/service. One example of the scarce empirical literature on agility is presented by Davies and Drake (2007) contending that to achieve significant improvement in quality, home care service providers must increase agility.

According to Yusuf *et al.*, (1999) definition: “Agility is the successful exploration of competitive bases (speed, flexibility, innovation proactivity, quality and profitability) through the integration of reconfigurable resources and best practices in a knowledge-rich environment to provide customer-driven products and services in a fast changing market environment”. This definition suggests three levels of agility: individual, enterprise and inter-enterprise, supported by four pillars of agile competition: core competence management, virtual enterprise formation, re-configuration capability and knowledge-driven enterprise.

It is useful to underline here that the definition of flexibility as the “ability of companies to respond to a variety of customer requirements which exist within defined constraints” cannot be confounded with agility (Backhouse and Burns, 1999).

One of the ways of show re-configuration capability and flexibility is through modularity (“the use of interchangeable units to create product variants” (Ulrich and Tung, 1991)), necessary to mass customization, defined as provision of individually customized products (or services) through the use of flexible and highly responsive systems (Hart, 1995; Pine 1993; Piller, 2003; Stump and Badurdeen, 2009). Sherehiy *et al.*, 2007 review presents: flexibility, responsiveness, speed, culture of change, integration and low complexity, high quality and customized products and mobilization of core competences, as characteristics of agility. In the same tune, Jain *et al.*, 2008 indicate four elements required to an agile supply chain: (i) responsiveness (the ability to identify changes and respond to them quickly, reactively or proactively, and also to recover from them); (ii) competency (the ability to efficiently and effectively realize enterprise objectives); (iii) flexibility/adaptability (the ability to implement different processes and apply different facilities to achieve the same goals) and (iv) quickness/speed (the ability to complete an activity as quickly as possible).

It is unanimous in literature that agile and Lean are not synonymous. However, for some, agility is mutual compatible with leanness (Jones *et al.*, 1999; Katayama and Bennett 1999; Naylor *et al.*, 1999; Yusuf *et al.*, 1999; Mason-Jones *et al.*, 2000; Hormozi, 2001), as Lean is needed to build agility (Marcus, 2010). Containing “little fat”, leanness may be an element of agility, but by itself does not warrantee satisfying the customer more rapidly as is expected from a “nimble” organisation (Christopher, 2011). Naylor *et al.* (1999) posit that both Lean and agile systems emphasize supply integration, waste reduction, and lead time compression, but they differ mostly in their emphasis on flexibility for market responsiveness. For Krishnamurthy and Yauch (2007) Lean is more related with production focused while agile is with customer focused strategies. Gunasekaran and Yusuf (2002) stated that when the primary goal is to be Lean, responsiveness is compromised over cost-efficiencies whilst agility places cost and responsiveness as equally important.

For Narasimhan *et al.* (2006) Lean does not imply agile, but agile does imply that many of the principles and techniques of Lean are in place. The Total Cycle Time Compression Paradigm (Towill 1996) is, though, sufficient to achieve Lean, but represents only one necessary condition, not sufficient, to achieve agile (Christopher, 2002). Therefore, agile is a post-Lean paradigm leaving to Lean a "foundational" role.

Some authors (Cox and Chicksand 2005; Herer *et al.*, 2002) find the agile paradigm suitable to innovative products, in low volume, highly volatile supply chains, where customer requirements are often unpredictable and supplier capabilities and innovations are difficult to control as in Healthcare services. Others (Mason-Jones *et al.*, 2000) compare both paradigms distinguishing attributes, but in the end of the day, the essence of the difference lies, in terms of value to the customer, in the fact that in agility, the market winner is service level, whilst cost is the Lean critical factor (Christopher and Towill, 2000).

"Leagility" (Naylor *et al.*, 1999; Mason-Jones *et al.*, 2000; van Hoek, 2000) is the combination of both paradigms (lean and agile) within a total supply chain strategy marked by a decoupling point downstream of which an agile strategy responds to a volatile, unpredictable demand, and upstream providing level scheduling and eliminating waste, non added-value activities and bottlenecks pursuing a Lean strategy. This strategic point separates the supply chain part that is pulled directly by the end customer and where variability asks for agility and effectiveness, from the upstream supply chain part lead by efficiency purposes and forecast driven. Leagility is, thus, also called hybrid strategy (Christopher, 2011). Both paradigms can coexist separated: (i) by space (matching agile supply chain with innovative products and functional products); (ii) within a whole and its parts (by settling a decoupling point); (iii) in time (having short lead times for "fashion" or "emergency" and longer ones for "basics" or "elective"); and (iv) upon condition (using order winner criteria in market segmentation or in product design modularization) (Stratton and Warburton, 2003). According to Towill and Christopher (2005) "having the best of both worlds" is also possible in Healthcare setting through a "pipeline differentiation", coexisting lean and agile pipelines, or by using three approaches: (i) the Pareto curve approach; (ii) the decoupling point; and (iii) the "base and surge" demands.

It is also possible for a corporation to simultaneously pursue both lean and agile strategies by adopting a leagile infrastructure (Krishnamurthy and Yauch, 2007). Naim and Gosling (2010) review stresses that Lean, agile and leagile systems may be implemented according to product type and phase of its life cycle. Standard/functional products or commodities (Fisher, 1997) call for Lean systems and hybrid products call for leagile systems, no matter the cycle life phase they're in. Conversely, innovative products first two cycle life phases (infancy and growth) ask for agile systems, while in maturity and decline phases they can have either lean or leagile systems.

Also, leagility enables “mass customization” strategies by stabilizing variety and flow responsiveness (van Hoek, 2000). The shifting from craft industry to a process industry in Healthcare sector (Bliss, 2009), where guidelines don't jeopardize individual different care, introduces a mass customization paradox that lead to combine Lean with agile paradigm (Krishnamurthy and Yauch, 2007).

6.4. Leagile outsourcing

Outsourcing or transferring internal activities to third parties (Greaver, 1999) can assume several forms in a wide spectrum of relationships (Ballou, 2003: 716; Franceschini and Galetto, 2003; Sanders *et al.*, 2007). A theoretical evolution from Transaction-cost Analysis (TCA) and Agency theory (AT), to Resource-Based View (RBV), and, more recently, to the Transformational View placing outsourcing as a SCM strategic tool able to redesign the organisation value chain and, sometimes, its mission (Schneller and Smeltzer, 2006), was already addressed in section 5.3.1 of this thesis.

Healthcare organisations adopt outsourcing solutions for the same reasons as in other sectors (Quinn and Hilmer, 1994), looking for efficiency, quality and profitability gains. However, in Healthcare units, outsourcing is sometimes part of volume flexible strategies trying to respond to non predictable demand fluctuations, care increasing complexity, and to the linkage between clinical performance and act volume (Jack and Powers, 2006). In fact, according to some authors (Atun, 2006; Campos, 2004), outsourcing of clinical services was a response to waiting lists. From reviewing the literature, the most pointed drivers to outsource in Healthcare units are: (i) cost reduction; (ii) risk mitigation; (iii) adapting to quick changes without jeopardize internal

resources; and (iv) value stream redefining (Alper, 2004; Bhattacharya *et al.*, 2003; Chen and Perry, 2003; Hazelwood *et al.*, 2005; Lorence and Spin. 2004; Roberts, 2001; Wholey *et al.*, 2001; Yang and Huang, 2000). Outsourcing decisions in Healthcare units also depend on: (i) the kind of activity (modular versus integral more or less contractible); (ii) the type of contract (classical versus relational); (iii) contract duration (depending on contract type and supplier selection process); (iv) specification of performance requirements (process and outcomes indicators) and, finally (v) payment mechanisms (Liu *et al.*, 2004).

However, not every outsourcing strategy leads to cost reduction. Apart from non successful outsourcing experiences, where hidden costs (monitoring, contract management, low productivity and high turnover (Kremic *et al.*, 2006)) erase the initial cost advantage, in successful *transformational outsourcing*, according to Linder (2004b), when comparing internal with external costs, in the four phases of organisations life cycle, only in the last two phases outsourcing leads to cost reduction. In start-up phase, external costs are, according to this author, higher than internal and in the “Pathway to Grow” phase, the costs of outsourced services are equal to internal costs, not showing advantages of cost reduction.

Still, “make or buy” decisions are taken according to a core competencies evaluation. Core competencies can be pooled to reduce time to market (Gunasekaran, 1998). The meaning of core in health care organisations is defined in Young (2007; 2007a) as “direct contact with patient”.

The Virtual Enterprise (VE) or the integration of core competences distributed among a number of real and carefully selected organisations, can be used as loose coupling mechanism of integration promoting agility. In this “sub-strategy”, temporary alliances and partnerships based on core competencies are formed to improve flexibility and responsiveness (Gunasekaran, 1999). Based on this view in which success lies on focusing in the activities with a differential advantage over competitors (Resource Based View- RBV), outsourcing the remaining activities leads to creation of “network organisation”, confederations of firms linked through shared information and aligned processes (Christopher, 2011). This author stresses the need of a responsive organisation facing the continuous and rapid changes, a “new organisational paradigm”

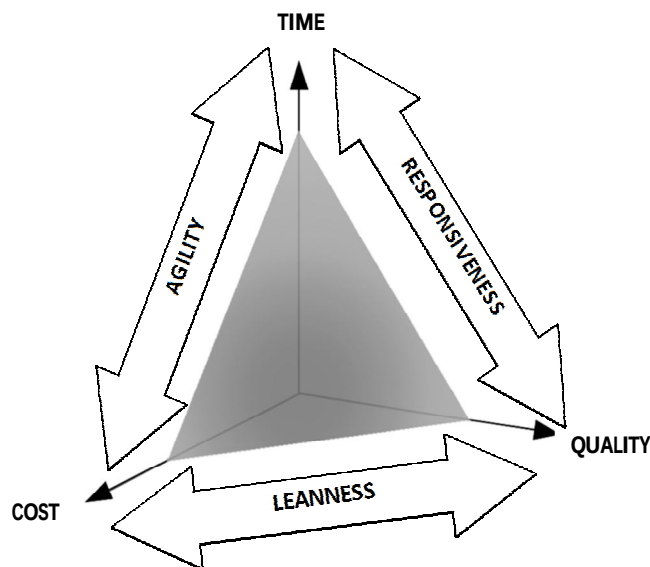
that combines innovation and flexibility with co-operation in competition (co-opetition). This virtual integration requires, as stated by Bowersox *et al.*, (2000), monitoring supplier performance skills, common vision of value creation among all supply chain partners in a risk/reward sharing atmosphere, and also extending Lean management views beyond suppliers achieving up-stream alignment.

According to Green and May (2005), the legitimacy of Lean discourse is rooted in 30-year trends of corporate restructuring, de-layering and outsourcing. In the attempt of “doing more with less”, outsourcing presents several benefits such as cost reduction, risk mitigation, adapting to quick changes without compromising internal resources (value mapping and value chain reconstruction) (Roberts, 2001; Hazelwood *et al.*, 2005), but also big risks as loss of control and flexibility (Lonsdale and Cox, 1997; Chasin *et al.*, 2007).

So, outsourcing seems to follow not only Lean paradigm, with a strong focus on reducing waste (sometimes mainly costs) but also agile, pursuing flexibility and quick response – but when can we call it a leagile outsourcing?

Taking the logistics management three dimensions as decisional tool (Figure 6.1) and the dominant thinking in the literature, one can posit that Lean focus mostly on cost and quality.

Figure 6.1 - Logistical Triad



Source: Adapted from Carvalho and Ramos, 2009.

However, Lean supply chain impacts flexibility and time-based technology leadership objectives rather than cost and quality. Conversely, the agile supply chain influenced cost rather than flexibility and time-based technology leadership (Yusuf *et al.*, 2004).

In terms of performance outcomes, according to Cagliano *et al.* (2004), there is no clear evidence (in manufacturing setting) of the dominance of one supply model on the other. Combining both paradigms leads to focus on time and quality pursuing responsiveness goals. That is the focus of a start-up outsourcing strategy.

6.5. Methodology

According to Yin (2009), case study method is appropriate to “How” and “Why” questions and to investigate a contemporary phenomenon in its real-life context when the boundaries between phenomenon and context are not evident recurring to several data collection techniques and different evidence sources. This qualitative method, allowing a deeper understanding of phenomena (Flyvbjerg, 2006), has been frequently used in management studies, namely in operational management (Voss *et al.*, 2002) and logistics (Ellram, 1996; Renner and Palmer, 1999). Being more a idiosyncratic than a generalizing method, was chosen by its descriptive and exploratory character, not to produce causality statements but to achieve a logical sequence of connection between empirical data, problem/research questions and findings/conclusions. Though, the unit of analysis chosen was a start-up geriatric Long-term Care unit with recognizable innovative format (great customization levels and distinctive service offer compared to other players).

As recommended by Yin (2009) in data collection and analysis, a study protocol was followed as well as multiple sources data triangulation. For data collection (from April to October 2008) we've recurred to semi-structured interviews (to the CEO, COO, Marketing Director, one external consultant and three department managers), document analysis (company profile, interim regulation, outsourcing proposals, contracts, sector regulations, internal memos, structural charts, press releases) and direct, non participant observation (procedures of outsourced activities) (Saunders *et al.*, 2007). Data analysis followed Miles and Huberman (1994) recommendations on data codification, reduction

and categorization techniques. Data gathered from different informants and sources was reduced to precise categories in common tables (Miles and Huberman, 1994), and then systematically interrogated (Yin, 2009) comparing and noting patterns (Miles and Huberman, 1994).

The results were compared with an ongoing review of the concepts' attributes of each paradigm and their linkage to the option of outsourcing in a start-up phase.

6.6. Case L: a Long-Term Care start-up

“L” is the first unit (two other are in project phase) of an organisation that aims to be a national reference in providing high quality and differentiated Long-Term care for the elderly. Having a market share penetration ambitious goal of 15% to 20% in 7 – 9 years, “L” aims to be the first, the better and the bigger player among others on The Long-Term care scene. In a moment marked by the announced entrance of several players in this fast growing sub-sector, this unit is the only one presenting a floor building segmentation by independency levels. An interdisciplinary care plan for each client and a specific place in the residence is given as result from a complete geriatric assessment, by a multi-professional team, at check- in time and during follow-up to match the particular needs of each person. Therapies, equipment, medication, leisure actions and even meals are customized in a four star hotel environment. Though, in client's value equation four major issues are addressed: (i) clients expectations (cleanness, safety, comfort and health solutions); (ii) modular solutions (rehabilitation, maintenance, prevention); (iii) service delivery (specialized, customized); and (iv) service segmentation (price, range).

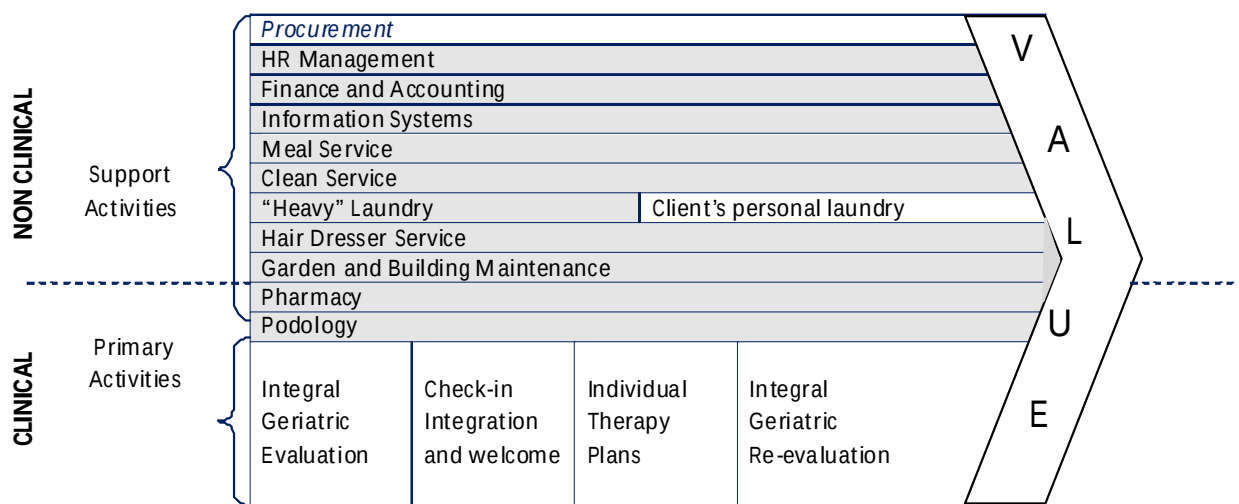
According to the interviewees, outsourcing was consider, first of all, due to strategic need for flexibility, time scarcity, speed to enter in the market and focus in core business. To outsource expertise, specific know-how to deal with complexity of some non core activities were the main purposes, leaving financial worries to a second plan.

As restrains of outsourcing decision we found: (i) an adversity to take risks from the top management that takes outsourcing as a risk mitigation way; (ii) an ambition of market leadership; (iii) a best-in-class seeking position in the Long-Term care business; (iv) an

innovative combined health-hotel service; (v) all service components are modular “same ingredients are used for different recipes”; (v) the rule of service delivery to final client only by in-house staff; and (vi) incipient degree of knowledge formalization with no reporting culture and few written procedures.

Recurring to Porter’s value chain model, all activities in shade ground are outsourced (Figure 6.2).

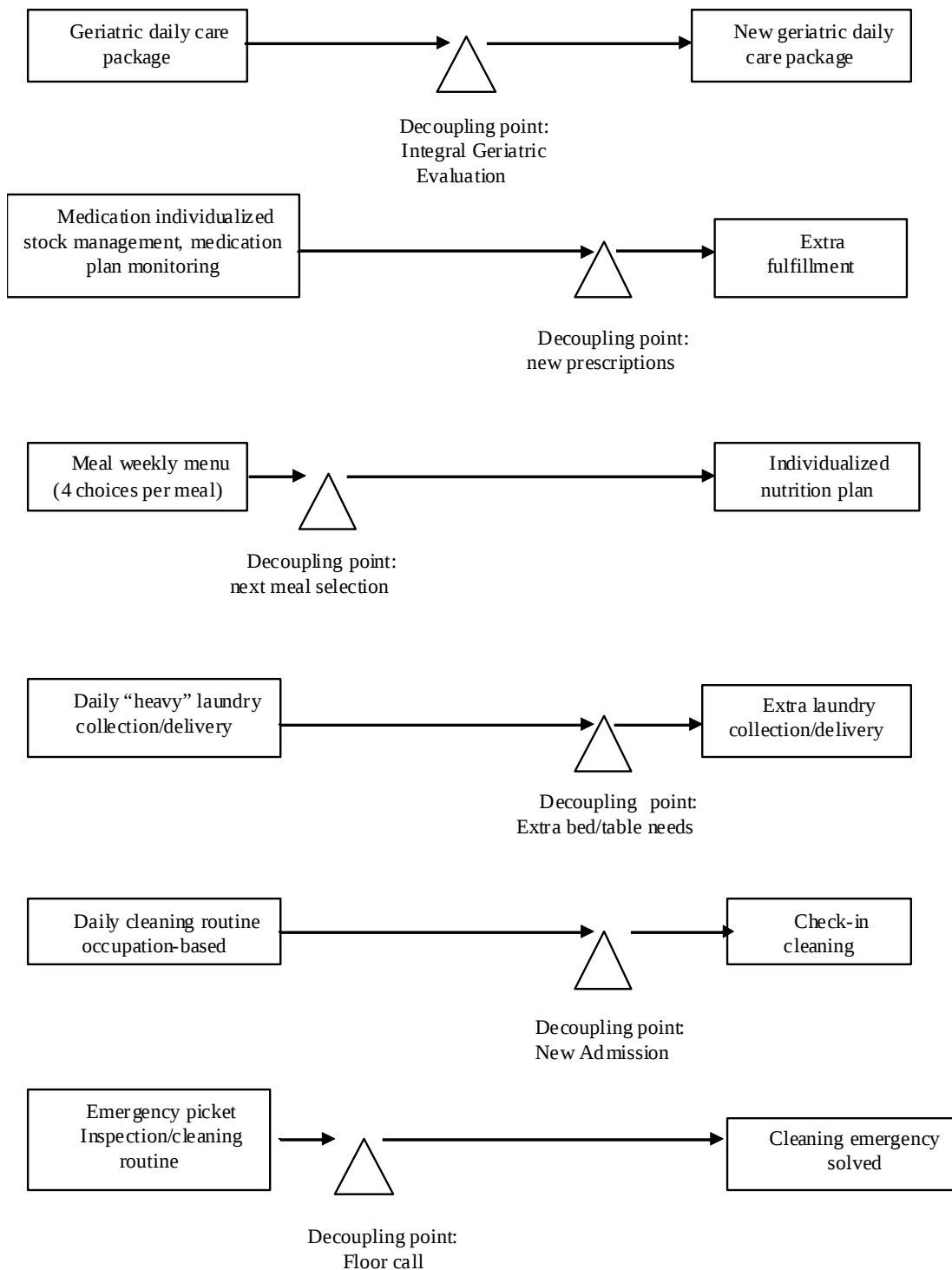
Figure 6.2 - Case “L” Value Chain



From all support activities, only procurement and client’s personal laundry (with high risk of loss or mix up) are kept internal. All primary activities, being a direct service to final client, are kept internal. Were chosen to outsource the activities: (i) less specific, having similar competitors in the market; (ii) less complex, simplifying the Requests For Proposals (RFP); (iii) with broader scopes and, though, with no punctual periodicity; (iv) with medium level of criticality as, even non core activities (meal and laundry services) are very “visible” or close to final client; but having always as rule to outsource activities (v) not direct delivered to final client. All contracts are for one year period, with a classical structure with no mention to contingency measures for failures or penalties and monitoring system.

The daily based outsourced activities (geriatric care, pharmacy service, meals service, laundry and cleaning services) were analysed following the tree paradigm (Lean, Agile and Leagile) theoretical perspective and found each decoupling point separating the “pull” system from the “push” as presented in Figure 6.3.

Figure 6.3 – Case “L” Activities’ decoupling points



Source: the author.

For having missed some steps on outsourcing process and lacking risk assessment before the final outsourcing agreement, “L” and vendors went on a spiral of continuous revisions and processes redesigning leading to service discontinuity and loss of quality. Also, the adjustment process resulted in higher costs (external consultancy, internal and external training programs), extra-time spent (designing and testing new processes, new contracts and negotiation), quality problems revealed in clients surveys, and lack of flexibility to follow occupation rates changes.

Nevertheless, based in the literature review, it was possible to find evidence of each paradigm’s attributes as presented in Table 6.1:

Table 6.1 - Lean, Agile and Leagile Paradigms distinguishing attributes

Attributes	L - Lean Paradigm	A - Agile Paradigm	LA - Leagile Paradigm	Case Findings
Quality	Market qualifier	Market qualifier	Market qualifier	LA
Cost	Market winner	Market qualifier	Market winner	LA
Lead-time	Market qualifier	Market qualifier	Market qualifier	LA
Service level	Market qualifier	Market winner	Market winner	LA
Customization	Low	High	Moderate	LA*
Market Demand	Predictable	Volatile	Volatile and unpredictable	LA
Service variety	Low	High	Medium	LA
Service life cycle	Long	Short	Short	L
Service type	Elective	Emergency	Both	LA
Customer drivers	Cost	Lead-time +Availability	Service Level	LA
Profit margin	Low	High	Moderate	LA
Dominant costs	Physical costs	Marketability costs	Both	LA
Lead time compression	Essential	Essential	Desirable	LA
Rapid reconfiguration	Desirable	Essential	Essential	LA**
Eliminate <i>muda</i>	Essential	Desirable	Arbitrary	A***
Robustness	Arbitrary	Essential	Desirable	LA

*Mass customization; ** Modularity *** Time wastes, mostly.

Source: Based in Agarwal *et al.* (2006)

6.7. Conclusions

In ambitious start-ups, when the speed of entrance is a conditioning factor and a main concern, trade-offs between cost and quality gains (leanness) and between cost and time gains (agility) can be combined through outsourcing strategies in a so called “leagile” paradigm. The reported case is an example of the Lean goals existence in the make or

buy rational – to externalize all non-core activities (what is not directed delivered to the customer) in order to deliver a quality service with less costs (non-core competences development and other investments). At the same time we can find agile purposes due to time pressure that led to some supplier choices based on the lowest bid and in the constant references to flexibility gains from interviewees.

Also, in spite of being the Lean philosophy that leads a start-up Healthcare organisation to outsource “non-value” added activities in order to gain speed to market and flexibility in entrance momentum, innovative products first two cycle life phases (infancy and growth) ask for agile systems. It is, therefore, suitable to combine both characteristics, agile and Lean, in order to be able to achieve the required degree of responsiveness that places the organisation as a “market winner” by offering an innovative service at a competitive price. The case presents the combination of both paradigms not only in the rationale of outsourcing decision but also in the architecture of each (internal or externalized) service. The modularization of services (and spaces) and the stream dual philosophies allowed the existence of decoupling points, boundaries between lean and agile systems.

The inclusion criteria of being an LTC unit, where the length of staying is bigger than in other Healthcare units, allowed to study a longer customer evaluation of the value equation. The focus on customer gives emphasis to the statement: “This year’s market winner is next year’s market qualifier (Christopher and Towill, 2000). An organisation can be fat and nimble...but not all the time. Sustainability issues were not taken into consideration in all outsourcing processes in “L” case.

This paper provides an example of “leagile” concept associated to an outsourcing strategy in Healthcare setting showing the decoupling points in primary and support activities. Therefore, this study contributes for a wider understanding of the “leagile” concept associated to an outsourcing strategy as a way of coping with market and services volatility, uncertainty and complexity, hyper competition and market share/speed of entrance goals.

In spite of being supported by a single case study, the paths followed in the structure of this study enables replication in other units of analysis with similar inclusion criteria.

7. Outsourcing in Healthcare through process modularization: - a Lean perspective¹¹

7.1. Abstract

Looking for efficiency, quality and profitability gains, Healthcare organisations are adopting outsourcing solutions in the attempt of “doing more with less”. Seeking for cost reduction, risk mitigation, adapting to quick changes without compromising internal resources, these organisations also take big risks in control and flexibility variables. In order to understand how Healthcare organisations find the best value equation combining internal and external resources in a modular service conception, a case study on a start-up Long-term Care unit with innovative format, great levels of customization and following an outsourcing strategy, was carried out.

The main conclusion, among others, is that in ambitious start-ups, having speed of entrance as the conditioning factor, a process orientation and management approach may offer a clear view of the gains related with trade-off decisions regarding time and cost (agility) and cost and quality (Leanness) i.e., decisions under the “leagile” paradigm.

This study contributes for a wider understanding of the “leagile” concept associated to an outsourcing operational strategy. Additionally, it also provides new insights to the concept of modularity in services settings in a complex service as Healthcare.

7.2. Introduction

Competition is not between companies but between supply chains (Christopher, 1997). Thus, organisations core capabilities lie in their ability to design and manage their supply chains in order to have maximum advantage in a continuous changing market (Marcus, 2010). In the supply chain management (SCM) of Healthcare organisations,

¹¹ This chapter is based in the article: “*Outsourcing in Healthcare through Process Modularization – a Lean perspective*”, published in International Journal of Engineering & Business Management, Vol.4, No.45, pp.1-12, 2012.

outsourcing decisions have been globally increased. In spite of the differences between Healthcare systems, they all are converging into a network governance model where loosely coupled (Orton and Weick, 1990) organisations with ever-changing partners are linked by all sorts of outsourcing contracts, not by ownership, in a cooperation atmosphere (Guimarães and Carvalho, 2011). In loosely coupled systems modular product/service designs allow a range of variations that can be carried out concurrently by multiple, loosely coupled modular organisation structures (Sanchez, 1995). In such structures, multiple governances of external and internal providers call for strong relational management skills. Being supplier relationship management one of the eight key SCM processes (Lambert *et al.*, 1998), the process-oriented (PO) approach frames outsourcing decisions in a value chain optimization scenario.

According to some authors (Womack and Jones, 1996; 2003; Green and May, 2005), when taking a broader view, “Leanness” can be conceptualized in terms of a quest for structural flexibility involving restructuring and outsourcing. The extension (scope), motives (drivers), decision process, contracts, risks and benefits can vary according to each one of the three outsourcing paradigms – transactional, strategic and transformational. In fact this paradigm shift is mostly due to the “Westernisation of the Japanese *keiretsu* model” that emphasises flexibility of “Lean and mean” structures focused on “core competencies” leading to “do more with less” (Kakabadse and Kakabadse, 2000). Do all outsourcing relationships serve Lean principles, agile ones, or both?

A decade after Naylor *et al.* (1999) working paper coining the term “leagility”, deeper empirical research in different settings from the usual manufacturing as services, namely in Healthcare sector, is still required (Naim and Gosling, 2010). Naim and Gosling (2010) literature review shows that the extent to which one paradigm fits into another is in discussion. The scope of each (Lean or agile) paradigm and the extent to which Leanness is a prerequisite for agility and vice-versa are still contested. Delivering the best value equation to end-customer implies a suitable combination of efficiency, effectiveness and relevancy to face market challenges. In the attempt of eliminate redundant work or find knowledge specialization, outsourcing presents several benefits and continues to drive organisations from vertical to virtual integration (Bowersox *et al.*, 2000).

The two main questions this research intends to give an answer are:

- How modularity contributes to find the best value equation combining internal and external resources in order to offer innovative and highly customized services?
- How PO enables standardization of activities and outputs in services settings, in order to achieve flexibility and “leagility”?

The vertical disaggregation of the firm through modularization of the structure is not new in Healthcare services (Kuntz and Vera, 2007). However the modularization concept goes beyond physical structure, addressing service configuration issues. In this paper we explore the full concept associated with the “make or buy” question in the period of an organisation life cycle when it should be firstly posed, the start-up.

In order to contribute for a wider understanding of the “leagile” concept associated to an outsourcing strategy a case study on a Long-term Care (LTC) unit was carried out. This paper is organised in the following way: section 7.3 outlines the process modularization concept; section 7.4 gives a theoretical background of Lean, agile and “leagile” paradigms and their identification in Healthcare setting presenting a theoretical explanation of outsourcing evolution and relation with the “leagile” concept. The following two sections are dedicated to the case method and case study and the last one presents the conclusions.

7.3. Process modularization

Processes are “structured sets of work activity that lead to specified outcomes for customers” (Davenport and Beers, 1995) consuming resources/ inputs and delivering outputs in stream alignment throughout the value chain.

A process-oriented (PO) organisation focuses on end-to-end business processes instead of placing emphasis on functional and hierarchical structures looking at the organisation as a group of silos. PO most cited direct effects are: (i) improvements in cost, quality, speed, profitability; (ii) internal and external customer satisfaction; (iii) added value increasing by sourcing out non-competitive activities and concentrate on core competences and (iv) improvement of operational effectiveness (Kohlbacher, 2010).

The author also considers other important benefits as the elimination of ownership ambiguity, the clarification of boundaries description and interfaces, the communication facilitation, the visibility of potential improvement areas and a proactive management through process performance measurement. PO can be classified into three applications: process view, process mapping and process management (Hellström and Eriksson, 2008).

According to the literature's theoretical perspective, modularity represents "the conceptual tool that allowed to capture the benefits and costs of interdependence, degrees of coupling, redesigning and imitation in the design of technological and organisational systems" (Campagnolo and Camuffo, 2010). Every system has a degree of modularity (subsystems and/or components) that will be higher in a modular structure comparing to an integral one. These authors' review addresses also the practical perspective in which modularity plays a important role in: (i) new product development processes, (ii) the design and management of vertical and horizontal inter-organisational relationships, (iii) the adoption of formal and informal standards; (iv) the design of flexible and scalable production systems based on cells, (v) sub-assembly and (vi) pre-testing . Modularity in services can be seen as an aims at packaging individual functionalities in a way that functionalities in one module would have as much in common as possible and that those modules would be as reusable as possible (Hyötyläinen and Möller, 2007).

In a modular system, each module communicates and interacts with the others via standardized interfaces that allow modules' decoupling. And through modularity, firms can redesign their internal organisational structure to gain strategic flexibility, and inter-organisational connectivity and Leanness to enter new markets or quickly exploit changing technologies (Baldwin and Clark, 1997; Sanchez and Mahoney, 1996; Wang *et al.*, 2008). Both theoretical and practical perspectives can be clustered into three kinds of modularity: product design modularity, production system modularity and organisational design modularity. The linkage of these three kinds is made by "process modularization". Lessons from automotive sector present modularisation through three main elements: product/service architecture, modular production and inter-firm systems, showing the importance of outsourcing as an enabler (Takaeishi and Fugimoto, 2001). The authors distinguish the western path to modularization that only considers two

aspects: modular production and inter-firm systems, from the Japanese path that also includes the product/service architecture enhancing the importance of innovation and product development in modularisation, and not only production and purchasing.

Some defend that product modularity have direct positive impacts in competitive performance by improving quality, flexibility, cost and supplier integration (Jacobs *et al.*, 2007). On the other hand, modularity (namely through outsourcing) may facilitate imitation with negative consequences for modular performance advantages (Pil and Cohen, 2006).

Others posit that, to some extent, modular products lead to modular organisations (Sanchez and Mahoney, 1996), but organisational modularity has multiple facets to explore, including outsourcing options (Hoetker, 2006). But what if the outsourcing decision is collateral to service design in start-up phase? A frequent question leads to different opinions concerning the relationship between product modularity and outsourcing strategies: - does product modularity determine outsourcing of modules' production? Or vice versa, does outsourcing affect product modularity? In fact, some authors (Campagnolo and Camuffo, 2010 ; Voss and Hsuan, 2009) defend that the effect of modularity in outsourcing is in fact a two-way effect, whatever the life cycle stage the organisation might be in. Moreover, with outsourcing, modularization can be used for strategic changes in organisational structure (Karim, 2006).

A recent stream of research, taking into consideration a life-cycle perspective and the peculiarities of the activities moved out of the firm boundaries, posits that the firm defines a modular product architecture before outsourcing one or more modules (in the phase of growth) (Campagnolo and Camuffo, 2010). On the other hand, a second path posits the firm starts to outsource some product components before moving towards a modular design. In the third path, the firm simultaneously implements product modularity and outsourcing. However, this authors' review leave unanswered the question: - "Does the adoption of a process perspective facilitates the definition of modules, interfaces and standards at organisational design level?" and stresses the need of deeper research on the drivers of modularization and architecture classification especially in services setting (Voss and Hsuan, 2009). Attempting to operate and measure the degree of service architecture modularity, the author "borrows" from

manufacturing settings five dimensions associated with the study of modularity: (i) interfaces; (ii) degree of coupling; (iii) components and systems; (iv) commonality sharing; and (v) platform (back office, among others). The interfaces (people, information, rules governing information flow) play the role of allowing mix and match of components enabling mass customization. The degree of coupling indicates how loose/tight the system constituents are. Commonality sharing refers to the possibility of using the same version of a component across multiple services/products, allowing economies of scale, economies of scope, rapid product development, shorter lead times and time to market. Outsourcing can only be realized when a system can be decomposed in a way that components' interfaces are well specified and standardized requiring a clear knowledge of both the process architecture (nodes and linkages) and the interfaces (Voss and Hsuan, 2009). Defending modularity, in both loosely and tightly coupled systems, as key driver of mass customization in services (as long as the interfaces between components were standardized) the authors conclude that, in services, customization can either be combinatorial (various service processes and products combined to create a unique service) or menu driven (personnel or the customers select from among existing services/products to meet customers' needs).

According to Mikkola (2006) there are four key elements for assessing the degree of modularity in physical product systems: (i) types of components (ranging from standard to unique), (ii) interfaces (whether they are well specified and standardized or not), (iii) degree of coupling (i.e. the tightness of coupling among components), and (iv) substitutability (i.e. the extent the unique components can be substituted across product families). Bask *et al.* (2010) state that the interfaces in modular service systems tend to be softer than in modular product systems, i.e., they more often include interfaces between human activities such as standards, contracts, definitions of division of labor and quality levels). This makes service modularity more complex than product modularity and increase risk management importance in outsourcing solutions (Guimarães and Carvalho, 2012).

In manufacturing several cases are reported, from the automotive industry (Chrysler Jeep (Mikkola, 2000, among others), providing insights that link the product architecture designs with strategic decisions in supply chain management as outsourcing. Less examples of modularity in services are known, despite of a recent

literature stream on modularity, but more in the context of product-related services (Bask *et al.*, 2010; Karim, 2006). However the literature presents contributions from cases in services multisite organisations (banking, retail), in third-party logistics (3PL) and also in Healthcare services as elderly care (De Blok *et al.*, 2010) and hospital patient care (Meyer *et al.*, 2007). In all those cases, modularization created dynamic capabilities (Eisenhardt and Martin, 2000) not only through modular product/service but also process architectures that integrates resources and competences in way that managers of different departments, or external partners mix and match their varied skills, functional backgrounds and expertise in order to deliver revenue producing products and services and satisfy individual customer requirements.

7.4. Leagility through modularity in Healthcare

As explained in section 6.3., “agility” implies that most of the Lean principles and techniques are in place, turning agility into a post-Lean paradigm, according to a stream of literature (Christopher, 2002; Narasimhan *et al.*, 2006). An integrated view came for another stream that presents both paradigms (Lean and Agile) combined (Naylor *et al.*, 1999; Mason-Jones *et al.*, 2000; van Hoek, 2000). Both paradigms can coexist in Healthcare settings by: (i) separating by location; (ii) settling decoupling points; (iii) adopting different lead times (short for emergencies and longer for elective Healthcare pathways); and (iv) condition segmentation (using modularization in processes and also in infrastructures) (Krishnamurthy and Yauch, 2007; Stratton and Warburton, 2003; Towill and Christopher, 2005). Thus, modularization of product/service level, process design level and organisational level can play a major role when pursuing “leagile” purposes.

Considering Yusuf *et al.* (1999)’s definition of agility as “the successful exploration of competitive bases (speed, flexibility, innovation proactively, quality and profitability) through the integration of reconfigurable resources and best practices in a knowledge-rich environment to provide customer-driven products and services in a fast changing market environment”, the focus on the reconfiguration capability introduces modularity as a possible solution. In fact, and according to Ulrich and Tung (1991), modularity is one of the ways of show re-configuration capability and flexibility (“the use of

interchangeable units to create product variants”), necessary to mass customization, the main and increasing “production” strategy in Healthcare. It is important, here, to distinguish between personalization and customization (Voss and Hsuan 2009) with the latter facilitated by an architecture enabling reconfiguration. Voss and Hsuan (2009) point exactly to how the use of the notion of architecture and modularity can be used in a service context and they seek to operationalize this by decomposing the service architecture and analyze it in light of its elements (nodes) and interfaces (linkages).

In mass customization, defined as “Customer co-design process of products and services, which meet the needs of each individual customer with regard to certain product features” (Piller, 2003), all operations are performed within a fixed solution space, characterized by stable but still flexible and responsive processes. Kumar (2004) posits that that modularity in product or service design is essential for mass customization for flexibility and responsiveness achievements. But what about the other two kinds of modularity (Campagnolo and Camuffo, 2010): production system modularity and organisational design modularity?

Outsourcing solutions, for instance, are not always the “natural” consequence of product design modularity, specially whether technology keeps changing fast and unpredictably, or service life-cycles are short (Campagnolo and Camuffo, 2010), but can be a consequence of process or organisational modularity.

In section 6.4 a leagile outsourcing concept is presented enhancing the importance of alliances and partnerships based on core competencies are formed to improve flexibility and responsiveness serving both Lean and agile purposes. In dynamic outsourcing framework the key component is organisational modularization where the value chain can be restructured and decomposed in a multiple-tier structure enabling better performance monitoring and achievements and assessment of what underperforming modules should be eliminated (Wu and Park, 2009). Therefore, outsourcing seems to follow not only Lean paradigm, with a strong focus on reducing waste (sometimes mainly costs) but also agile (with strong time reductions), pursuing flexibility and quick response.

Based on this view success lies on focusing in the value added activities with a differential advantage over competitors. Escaping to RBV limitations considering a

dynamic capability concept (the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing market (Wu and Park, 2009)), outsourcing the remaining activities leads to creation of "network organisation" (Christopher, 2011). This author stresses the need of a responsive organisation facing the continuous and rapid changes, a "new organisational paradigm" that combines innovation and flexibility with co-operation in competition (co-opetition). This virtual integration requires not only monitoring supplier performance skills, common vision of value creation among all supply chain partners in a risk/reward sharing atmosphere (Guimarães and Carvalho, 2012) but also extending Lean management views beyond suppliers achieving up-stream alignment.

Looking at modularity in these three levels of analysis another question emerges: "do modular products lead to modular organisations" (Koetker, 2006) or is the other way around?

If, on one hand, product modularity may lead to move activities from hierarchy to more loosely coupled organisations, as Healthcare organisations are good examples, as organisations becoming modular, a tightly integrated hierarchy is supplanted by a "loosely coupled" network of organisational actors. On the other hand, the organisational structure and life-cycle status, conditioned by resources availability, can predict product/ service configurations. The loosely coupled organisational forms allow organisational components to be flexibly recombined into a variety of configurations' (Orton and Weick, 1990). In Healthcare settings, case studies as in De Blok *et al.* (2010) in the context of elderly care in the Netherlands show that modular components function differently depending on the time of interaction and interestingly that the logic is different than in manufacturing as compared to the model of Duray *et al.* (2000). Another case now within the Danish Healthcare system is presented by Gobbi and Hsuan (2012) analyzing how modularity is deployed in the process of delivery cancer care. In this case cancer packages-modules are presented into detailed describing the process of defining the diagnosis and treatment service and customization is obtained by combining different components in the diagnosis phase and different treatment options in the treating phase showing modularity of service and processes as customization enablers. In both cases modularity seems to serve agility purposes in terms of time, flexibility and even perceived service quality gains through customization, but are not

addressed the service value pathway followed in Lean thinking when selecting types of components, interfaces, the degree of coupling and substitutability degree, the modularity elements.

In order to better understand how modularity can serve a leagile paradigm it is, thus, necessary to evaluate under leagile lenses (Agarwal *et al.*, 2006) the following service systems characteristics: (i) *disaggregation* denotes the extent a system, i.e. a product or service, can be decomposed into smaller elements; (ii) *recombination and reconfiguration* denote the extent the various elements in the system can be recombined or reconfigured to create product variety; (iii) *degree of coupling* characterizes whether the functional elements of the system has one-to-one relationship with each other or not; (iv) *standardization* denotes the extent the system is standardized, i.e. the extent it is comprised of standardized elements (as opposed to unique elements); (v) *interfaces* characterize the interface specifications linking the elements of the system (standard elements have standard interfaces, whereas unique components have specific interfaces); and (vi) *substitutability* denotes the extent the elements can be shared (or replicated) across other product (or service) families (Bask *et al.*, 2012).

In general, modular product-service systems are characterized with loose coupling, standard interfaces and high degrees of disaggregation, recombination and reconfiguration, standardization, and substitutability. On the other hand, integral product-service systems are characterized with tight coupling, specific interfaces and low degrees of disaggregation, recombination ability, standardization, and substitutability.

7.5. Methodology

The case study method is appropriate to “How” and “Why” questions and to investigate a contemporary phenomenon in its real-life context when the boundaries between phenomenon and context are not evident recurring to several data collection techniques and different evidence sources (Yin, 2009). This qualitative method, allowing a deeper understanding of phenomena (Flyvbjerg, 2006), has been frequently used in management studies, namely in operational management (Voss *et al.*, 2002) and

logistics (Ellram, 1996; Renner and Palmer, 1999). Being more a idiosyncratic than a generalizing method, was chosen by its descriptive and exploratory character, not to produce causality statements but to achieve a logical sequence of connection between empirical data, problem/research questions and findings/conclusions. Though, the unit of analysis chosen was a start-up geriatric Long-term Care unit with recognizable innovative format (great customization levels and distinctive service offer compared to other players). The choice of a LTC was due to the possibility of a longer evaluation by the end customer of the value equation offered. High innovation and customization levels were also including criteria in order to find evidence of the agile paradigm. The choice of an ambitious start-up aiming fast market share achievements had the purpose of taking conclusions regarding the conflict between cost-efficiency, time-to-market and flexibility.

In data collection and analysis, a study protocol was followed as well as multiple sources data triangulation (Yin, 2009). For data collection (from April to October 2008) we've recurred to semi-structured interviews (to the CEO, COO, Marketing Director, one external consultant and three department managers), document analysis (company profile, interim regulation, outsourcing proposals, contracts, sector regulations, internal memos, structural charts, press releases) and direct, non participant observation (procedures of outsourced activities) (Saunders *et al.*, 2007). Data analysis followed Miles and Huberman (1994) recommendations on data codification, reduction and categorization techniques. Data gathered from different informants and sources was reduced to precise categories in common tables (Miles and Huberman, 1994) and then systematically interrogated (Yin, 2009) comparing and noting patterns (Miles and Huberman, 1994)

The results were compared with an ongoing review of the concepts' attributes of each paradigm and their linkage to the option of outsourcing in a start-up phase.

In spite of being supported by a single case study, the paths followed in the structure of this study enables replication in other units of analysis with similar inclusion criteria.

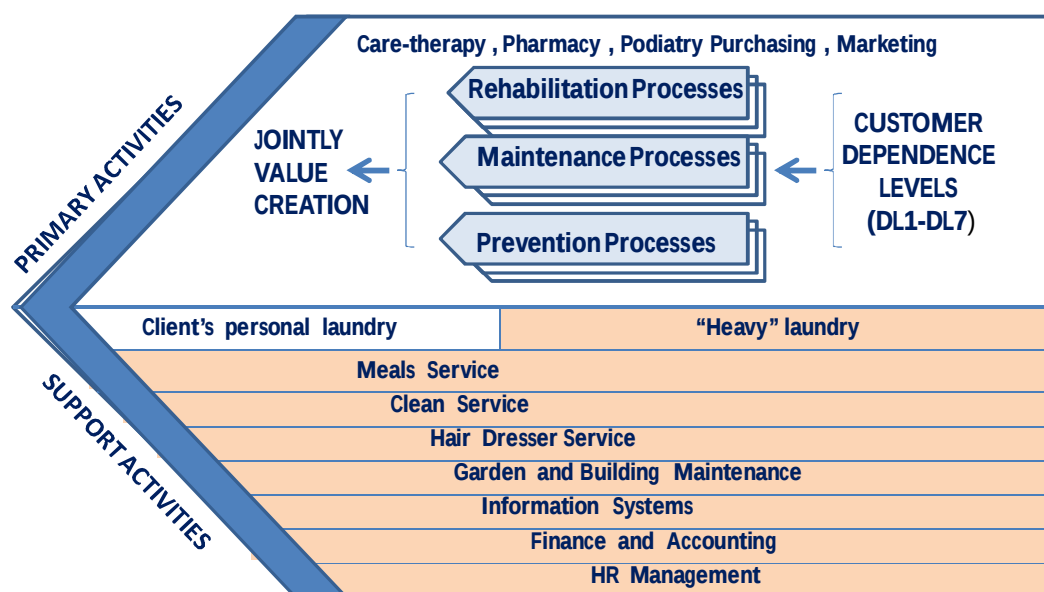
7.6. Case L: a modular start-up

“L” is the first unit (two other are in project phase) of an organisation that aims to be a national reference in providing high quality and differentiated Long-term care for the elderly. Having a market share penetration ambitious goal of 15% to 20% in 7 – 9 years, “L” aims to be the first, the better and the bigger player among others on The Long-term care scene. In a moment marked by the announced entrance of several players in this fast growing sub-sector, this unit is the only one presenting a floor building segmentation by independency levels. In the building conception, the modularization is present allowing different configurations of services and the mobility of care teams along the different dependency levels allocated in specific areas.

“L” presents as the first Long-term Care (LTC) unit to develop an individual and totally customized plan of care from the customer geriatric evaluation, instead of offering packages for the customers to fit in.

Recurring to Hines’s (1993) integrated value chain model to better illustrate the “pull” model according to which the customer triggers the activities’ chain (by contrast to “push” model of Porter’s value chain), all activities in pink shade ground are outsourced (Figure 7.1). The only support activity kept in house was the customers’ personal laundry for the great error risk probability associated.

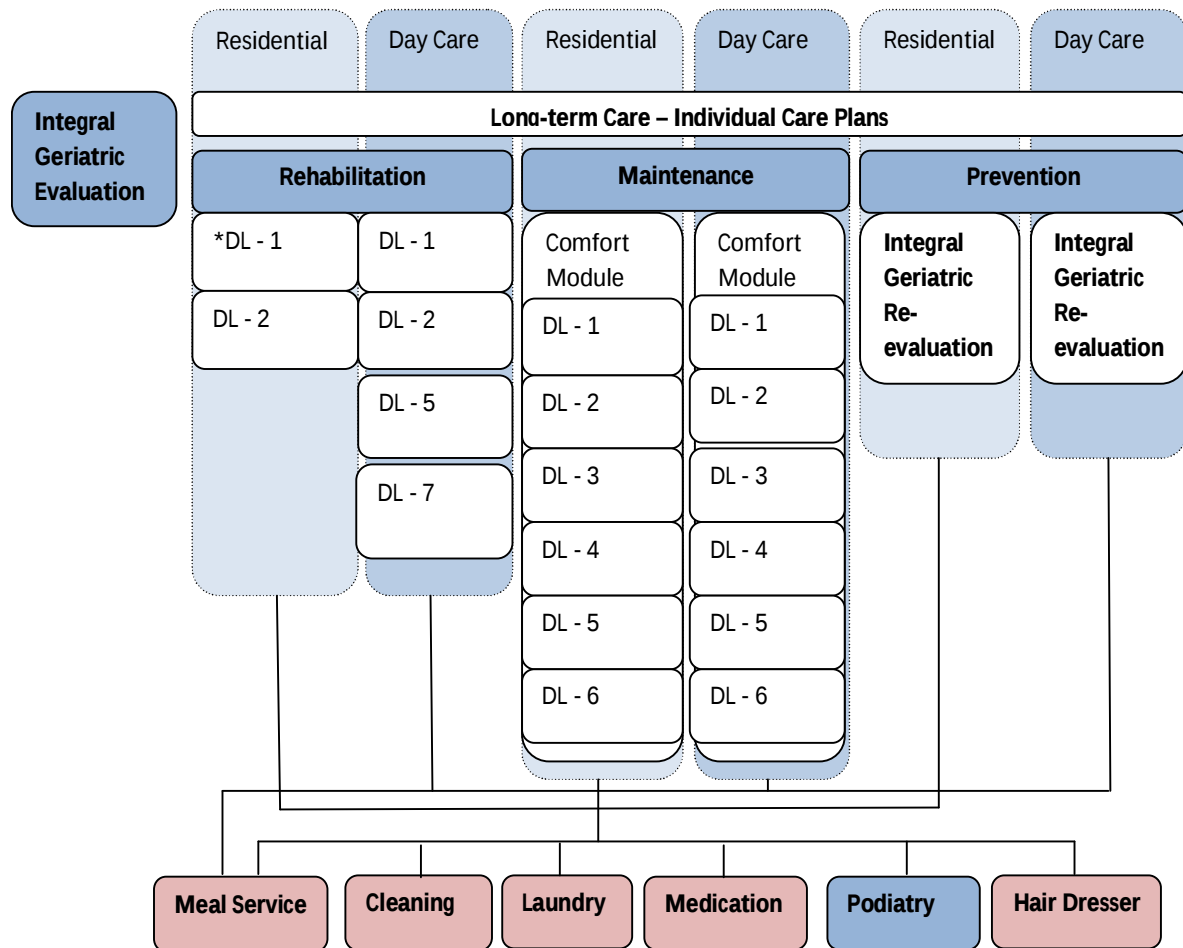
Figure 7.1 - Case “L” Integrated Value Chain



Source: the author based in Hines (1993).

An interdisciplinary care plan for each client and a specific place in the residence is given as result from a complete geriatric assessment, by a multi-professional team, at check-in time and during follow-up to match the particular needs of each person. Therapies, equipment, medication, leisure actions and even meals are customized in a four star hotel environment. Though, in client's value equation four major issues are addressed: (i) clients expectations (cleanness, safety, comfort and health solutions); (ii) modular solutions (rehabilitation, maintenance, prevention- Figure 7.2); (iii) service delivery (specialized, customized); and (iv) service segmentation (price, range).

Figure 7.2 - Case "L" Services Decomposition



*DL- Dependence Level

Source: the author

According to the interviewees, outsourcing was considered, first of all, due to strategic need for flexibility, time scarcity, speed to enter in the market and focus in core business. The main concern was to focus on LTC and use the distinctive competences of the founders, hospitality associated with Healthcare, leveraging the LTC concept to a care environment of a four star hotel. Therefore, all that was directly delivered to end customer should be internal and all the rest leave to third parties, with short length contracts, in an initial phase, and admitting other relationship developments with the growth of business. Looking for external expertise, specific know-how to deal with complexity of some non core activities was needed, leaving financial worries to a second plan.

However, we found some restraints of outsourcing decision: (i) an adversity to take risks from the top management that takes outsourcing as a risk mitigation way; (ii) an ambition of market leadership; (iii) a best-in-class seeking position in the Long-term care business; (iv) an innovative combined health-hotel service; (v) all service components are modular “same ingredients are used for different recipes”; (vi) the rule of service delivery to final client only by in-house staff; and (vii) incipient degree of knowledge formalization with no reporting culture and few written procedures.

All primary activities, being a direct service to final client, are kept internal. Were chosen to outsource activities considered: (i) less specific, having similar competitors in the market; (ii) less complex, simplifying the Requests For Proposals (RFP); (iii) with broader scopes and, though, with no punctual periodicity; and (iv) with medium level of criticality (even non core activities as meals and laundry services are very “visible” or close to final client). Thus, it was always followed the rule of outsourcing activities not directly delivered to final client. All contracts are for one year period, with a classical structure with no mention to contingency measures for failures or penalties and monitoring system.

The daily based outsourced activities (geriatric care, pharmacy service, meals service, laundry and cleaning services) were analysed following the tree paradigm (Lean, Agile and Leagile) theoretical perspective and found each decoupling point separating the “pull” system from the “push” as presented in Figure 6.6 (section 6 of this thesis).

Recurring to Bask *et al.* (2012) service systems characteristics (Table 7.1) each service modularity was analyzed and appraised according to leagile attributes of “moderated customization” and “essential rapid reconfiguration” (Agarwal *et al.*, 2006) resulting on Table 7.2 case “L” findings.

Table 7.1 - Service systems characteristics’ classification

	Modular System		Integral System
Disaggregation	High	←————→	Low
Recombinability/ Reconfigurability	High	←————→	Low
Coupling	Loose	←————→	Tight
Standardization	High	←————→	Low
Interfaces	Standard	←————→	Specific
Substitutability	High	←————→	Low

Source: Based on Bask *et al.* (2012).

Table 7.2 - Case “L” Leagile Services Systems Evaluation

SERVICES		Service Systems Characteristics					
		Disaggregation level	Recombination/ Reconfiguration degree	Coupling	Standardization	Interfaces	Substitutability
Meal Service		High	High	Loose	Medium	Standard	Medium
Cleaning		High	High	Loose	High	Standard	High
Laundry		High	High	Loose	High	Standard	High
Medication		High	High	Tight	High	Specific	Medium
Hair Dresser		Low	Low	Loose	Medium	Specific	High
Podiatry		Medium	Medium	Loose	High	Standard	High
Rehabilitation		High	High	Loose	Medium	Standard	Low
Maintenance		High	High	Loose	High	Standard	Medium
Prevention		High	High	Loose	High	Standard	High
Leagile Attributes in Modularity	Moderate Customization	✓	✓	✓	✓	✓	✓
	Essential Rapid Reconfiguration	✓	✓	✓	✓	✓	✓

Source: The author.

7.7. Conclusions

This paper illustrates how through a process approach, a service value chain can be disaggregated into pieces favoring the Lean principle of pulling value by the customer. Moreover, the PO approach allows standardization of activities and outputs enabling activity' mapping, costing and service design. Also brings visibility to bottle-necks, improvement opportunities and identifies outsourcing options. Outsourcing presents, though, as a Lean solution for all activities that, if performed inside, would not be value added. This paper does not focus on outsourcing in the usual context of change, but a less crossed path, i.e. at the beginning of all service conception by considering modularization, as a result of process view.

Taking Campagnolo and Camuffo's (2010) division of modularity in three different units of analysis: a) product design modularity, b) production system modularity and c) organisational design modularity, one can say that this case illustrates how product design modularity leads to the other two kinds of modularity. In fact, it is the product/service disaggregation, reconfiguration, standardization and substitutability levels along with the synergistic specificity of the care levels that lead to consider the production of the service as modular and even the building design allowing mix and matches of services. The service modularity levels are both cause and consequence of outsourcing. If one hand, transferring all activities with no direct contact with end customer to third parties was enabled by service modularity, showing some concern with substitutability and avoiding supplier dependency, on other hand, modularity levels and standard interfaces were enhanced by outsourcing contracts.

The case showed as the main driver of speed of market entrance led to look at the value chain through a PO lenses and design services in a modular structure, combining internal and external resources to serve each process and even adopt a building modular conception and service lay-out. Outsourcing in all non-direct delivery services (considered non-core), presented a solution to trade-offs between cost and quality gains (Leanness) and between cost and time gains (agility) can be combined through outsourcing strategies in a so called "leagile" paradigm. The "L" case is consonant with some authors (Cox and Chicksand, 2005; Herer *et al.*, 2002) that find the agile paradigm suitable to innovative products, as the innovation component calls for rapid

market entrance before losing momentum and the novelty of the service model. At the same time, other “steady” components, upstream, can benefit of Lean paradigm.

This case’s business model lies in the combination of the same ingredients- modules to multiple customer needs. In this cascade service architecture the separation of the supply chain part that is pulled directly by the end customer where variability asks for agility and effectiveness, from the upstream supply chain part lead by efficiency purposes, was not always easy to identify due to the concomitancy of customer need and service delivery.

In spite of being the Lean philosophy that leads a start-up Healthcare organisation to outsource “non-value” added activities in order to gain speed to market and flexibility in entrance momentum, innovative products first two cycle life phases (infancy and growth) ask for agile systems. It is, therefore, suitable to combine both characteristics, agile and Lean, in order to be able to achieve the required degree of responsiveness that places the organisation as one of major players in a strong competitive sector. The modularization of services (and spaces) and the stream dual philosophies allowed the existence of decoupling points, boundaries between Lean and agile systems. This paper provides an example of “leagile” concept associated to an outsourcing strategy in Healthcare setting showing the decoupling points in primary and support activities.

However, an organisation can be fat and nimble...but not all the time. Sustainability issues were not taken into consideration in all outsourcing processes in “L” case.

To this result might concur the inefficient process management that places this case only in a “process mapping” type, narrowing the PO possible applications (Hellström and Eriksson, 2008).

This case also stresses the difficulty to control outsourced processes and addresses the performance monitoring problem as a risk management issue.

Nevertheless, through this case evidence it was possible to conclude that PO approach allows activity stabilization and standardization of outcomes. It was though possible to evaluate activity costs, time allocation and service bottlenecks and base the outsourcing decisions. The customization complexity was softened by modularity.

Another conclusion is that at the early customer interaction there is a low degree of customization in which the primary service modules are configured. The detailed configuration of the care package however requires that the service personnel interact with the client leading to a re-evaluation of the customer requirements ending in a new module of services. Service modules and components (and thereby also the degree and type of standardization) thus, play different roles depending on the time of delivery and customer dependency status assessment.

This case point out that the interface between service modules can play different roles depending on whether the intent is to create variety or coherence and depending on whether the interface is between humans or objects in the service production. Also, it shows the extent outsourcing decisions can help or jeopardize the service, process and organisational modularity.

8. Vendor managed inventory: evidences of Lean in Healthcare¹²

8.1. Abstract

Understanding how VMI benefits serve Lean purposes in Healthcare and why its outcomes can be difficult to achieve in Healthcare settings is the main purpose of this study. An in depth case study of VMI is presented in the perspective of the downstream member, a public general multi-site hospital, operating as a small scale consolidated service centre in terms of material management, exploring dimensions as: VMI benefits, risks, barriers and enablers.

Despite some unawareness of VMI benefits in Healthcare, it can present a waste reduction solution not only in costs but in the quality of care for freeing clinical professionals to clinical tasks, among other savings. The multiple benefits are better explored, as in any relationship building, by investing in partnership creation and overcoming the idiosyncratic barriers of Healthcare sector. Although findings of a single case study are difficult to generalize, the protocol and methodology presented allow replication in other unit of analysis with same inclusion criteria.

This paper brings the Lean deployment discussion out of the organisation's boundaries, showing the interconnections and pointing the need for future work that would allow Healthcare managers to build a Lean supply chain. By consider VMI an outsourcing alternative, this paper identifies the Lean thinking intent behind such options and enhances the idiosyncratic difficulties in full deployment in Healthcare sector, a less studied setting.

8.2. Introduction

Supply Chain Management (SCM) has, in last two decades, suffered the influence of six major shifts in business thinking: (i) extension of cross-functional integration to cross-

¹² This chapter is based on the article: "*Vendor managed inventory (V.M.I.): evidences from Lean deployment in Healthcare*" published in Strategic Outsourcing - An International Journal, Vol.6, No.1, pp.8-24, 2013.

enterprise; (ii) from physical efficiency to market mediation; (iii) from supply focus to demand focus; (iv) from single-company product design to collaborative, concurrent product, process and supply chain design; (v) from cost reduction to breakthrough business models; and (vi) from mass-market supply to tailored offerings (Kopczack and Johnson, 2003). The collaboration trend in SCM took several forms from Efficient Consumer Response (ECR) to Vendor Managed Inventory (VMI) and Collaborative Planning, Forecasting and Replenishment (CPFR) (Christopher, 2011, p. 94), all having as support base the demand visibility (Holweg *et al.*, 2005).

Collaboration and information sharing is a combination well explored in the SCM literature showing as result the performance improvements in supply chain (Sari, 2007). SCM presents a challenge in Healthcare sector, not only for achieving around 40 per cent of a hospital costs (Haavik, 2000), but also for being a vast field of waste finding. However the topic has not been examined in a waste reduction end-to-end perspective, the Lean analysis. In this paper we try to fill that gap exploring the VMI practice as a Lean practice, showing the deliverables in terms of waste reduction and flow optimization in a less studied setting, Healthcare. VMI studies gain pertinence in sectors with high demand volatility, as Healthcare, being one solution of demand uncertainty mitigation (Waller *et al.*, 1999).

VMI, a popular topic in logistics literature (Williams and Tokar, 2008) was popularized in the 1980s in manufacturing settings as “direct replenishment” or “supplier managed inventory” distinct from continuous replenishment planning (CRP). In VMI partnership, the vendor makes the replenishment decisions (Yao and Dresner, 2008). When calling VMI arrangements partnerships, these authors (as others) stress that VMI relationship represents more than electronic data interchange and information system integration. Nevertheless, the information technology literature particularly views collaboration as real time data exchange through electronic data interchange (EDI) and vendor managed inventory (VMI) computer systems integration (Haavik, 2000).

It has been applied to various industries, from consumer goods retails such as Wal-Mart (Buzzell and Ortmeyer, 1995), automotive industry (Cooke, 1998), home delivery services such as e-grocery (Smaros and Holmstrom, 2000), electronic components (Dong *et al.*, 2010), agricultural services (Southard and Swenseth, 2008),

pharmaceutical industry (Danese, 2006) to Healthcare systems such as a multihospital integrated delivery system (Haavik, 2000). Among the most cited benefits is the possibility of better plan inventories and deliveries through VMI, but it remains at the upstream member side. The benefits overcome the risks for retailer and vendors in different ways.

For the downstream member, VMI is a way to outsource activities by shifting the traditional burden of inventory management upstream in the supply chain, and it presents more benefit when there is high outsourcing cost (Fry *et al.*, 2001). In this paper, a case of VMI is presented in the perspective of the downstream member, a public general multi-site hospital, operating as a small scale consolidated service centre (Parker and Delay, 2008) in terms of material management, exploring dimensions as: VMI benefits, risks, barriers and enablers. The next section presents a literature review on these dimensions followed by VMI in Healthcare literature framing that provides findings to be matched with Lean thinking literature in the fourth section. An in deep case study is presented to understand how VMI benefits serve Lean purposes in Healthcare and why its outcomes can be difficult to achieve in Healthcare settings.

8.3. Vendor Managed Inventory benefits and risk

According to the Council of Supply Chain Management Professionals (CSCMP), Vendor Managed Inventory (VMI) is defined as “The practice of retailers making suppliers responsible for determining order size and timing, usually based on receipt of retail point of sale (POS) inventory data. Its goal is to increase retail inventory turns and reduce stock outs. It may or may not involve consignment of inventory (supplier ownership of the inventory located at the customer)” (Vitasek, 2010). Pohlen and Goldsby (2003) distinguish supplier managed inventory (SMI) from vendor managed inventory (VMI) stating that the later involves the coordinated management of finished goods inventories outbound a manufacturer, distributor or reseller to a retailer, while the former involves the flow of raw materials and component parts inbound to a manufacturing process. In this paper, we address to the two entities involved in this research: the retailer and the vendor, although through the retailer perspective.

VMI arrangements can assume several forms. Fry *et al.* (2001) describe a type of agreement based on their analysis of VMI systems in a “newsvendor-type” relationship where the upper and lower limits of the contract are settled. In a “consignment-inventory VMI” system, the vendor retains inventory ownership at the retailer and payment is not made until the item is sold (Sui, 2010). Other (Bernstein *et al.*, 2006) refer to VMI⁻ when retailers continue to incur the inventory carrying costs and to VMI⁺ when all the carrying costs are transferred to the vendor. Holweg *et al.* (2005) present a theoretical classification of VMI systems based on the degree of planning collaboration and inventory collaboration. In certain VMI agreements, replenishment involves cross-docking or direct store delivery (DSD) eliminating the need for warehousing between vendor and retailer (Bowersox *et al.*, 2007, p. 161). Danese (2006) presents an extension of VMI to the whole supply network showing its potentialities above the usual dyadic level.

Zammori *et al.* (2009), propose a standard structure of a VMI agreement, in manufacturing setting, marking out the starting point of a relationship that leaves the replenishment decisions to the vendor. The authors stress the fact of VMI agreements are not regulated by any legal code of practice and defend that trust and partnership promotion start when both parties are aware and agree upon all the conditions so each one knows what to expect from the relationship. This paradox between the need of formalization and flexibility needed in a long-term relationship challenges the trust levels between parties in the relationship construction.

The implementation of VMI programs can lead to significant stock reduction (30% in pharmaceutical products, as described by Kim (2005)) and other benefits. Through VMI, the flow of information and, as result, the flow of materials become seamless, improving service levels, inventory and transportation costs, the coordination of supply process and transport optimization (Waller *et al.*, 1999).

The main goals of the VMI are to lower the inventory level and to improve the service level at the same time (Levy and Grewel, 2000). These two goals are compromised since both the retailer and the vendor hold a certain level of inventory in their own warehouses to secure product availability. Keeping safety stock is a traditional way to minimize the occurrence of stock outs. Inventory holding cost and customer service

level are usually negatively correlated. Thus, lowering the inventory level and increasing the service level were not possibly achieved at the same time through any traditional management techniques. VMI overcomes this limitation of traditional management. In the VMI system, the retailer eliminates inventory holding costs. The vendor also reduces his or her inventory holding cost and increases the service level by controlling the retailer's inventory according to his own best interest in scheduling production, delivery, warehousing, and replenishment in a win-win relationship.

Dong and Xu (2002) examine impacts of VMI on the performance of a supply channel, including buyer's and vendor's profits. As expected, the analytic models show that VMI improves the buyer's profit in any case but the vendor's benefits vary depending on the duration of VMI implementation. The short-term effect of VMI is harmful to the vendor's profit due to increased inventory costs under certain cost conditions. However, the vendor can achieve favourable outcomes from VMI due to increased buyer's demand levels in the long term. Therefore, this result implies that it is necessary to provide certain rewards, as raising the purchase price at the beginning of VMI implementation in order to compensate for the supplier's loss due to increased inventory cost.

Another VMI benefit to SCM disruptions, which result from lack of communication between channel members, is halving the bullwhip effect. Disney and Towill (2003a; 2003b) examine the impact of VMI on various sources of the bullwhip effect, the scenario where the orders to vendor have larger fluctuations than sales to the buyer, a distortion that propagates upstream increasingly. The bullwhip effect is classified into four categories depending on its sources (Lee *et al.*, 1997a, Lee *et al.*, 1997b): (i) the Forrester effects ("rogue seasonality" and "demand amplification) caused by nonzero lead-time and demand signal processing; (ii) the Burbidge effect caused by order batching; (iii) the Houlihan effect caused by rationing and gaming, and (iv) the Promotion effect caused by price variations. Disney and Towill (2003a) claim that VMI, as a practical exercise of echelon elimination, reduces the bullwhip effect by removing delays in information and material flow and by eliminating upstream flows. The VMI system defined in their research represents the supply chain, in which the supplier receives inventory information and point-of-sales data directly from his or her customers. Based on the actual sales and inventory information, the supplier

dynamically determines the reorder point by exponentially smoothing the sales signal and settling appropriate customer service levels at each distributor. The results also show that the bullwhip effect caused by price variations or the promotion can be significantly reduced by using VMI.

Disney and Towill (2003b) address the question of who should control inventories, the retailer who fears stock outs or the vendor that supplies the stock point and wants to feed it economically. The authors divide the responsibility between the retailer, for specifying the maximum and minimum stock levels, and the vendor for replenishing within those limits without overloading.

A summary of benefits and risks of VMI (for retailer and vendor) found in the literature review is presented in Table 8.1.

Table 8.1 - VMI benefits and risks

	VMI Benefits	VMI Risks
R E T A I L E R	-Reduce inventory and cost -Fewer stock outs -Increase service levels/product availability -Fill rates improvement -Increase inventory turns -Reduce transactional costs -Reduce ordering and planning costs	-Information visibility allows opportunistic behaviour -Dependency on vendor -Switching costs
V E N D O R	-Increase inventory flexibility - Reduce lead time variability -Consistent ordering pattern -Reduce transportation costs -Optimize physical distribution -Warehouse efficiency -Real time access to information -Competitive advantage relationship	-Order process is not abandoned by customer -Initial technology investment -Difficulties in technology integration

Based in: Dong *et al.* (2010); Kulp *et al.* (2004); Sari (2007); Sui (2010); Waller *et al.* (1999); Yao and Dresner (2008).

Some authors, through studies in a two stage supply chain with one vendor and one retailer, showed that retailers' benefits are much less than vendors' benefits and retailers have to be encouraged to participate in information sharing (Lee *et al.*, 2000; Yu *et al.*, 2002). By exploring the benefits for both parties, Le and Chu (2005)'s findings indicate that VMI is beneficial for both parties if the stock level desired by the vendor at the

retailer is higher than the one desired by the retailer, which apparently leaves the decision of entering in VMI to the vendor by determining the stock level at the retailer.

According to Dong and Xu (2002), the main benefit is on the retailer side, only if VMI condition is the short term. On the other hand, long-term VMI benefits the vendor as in the true VMI setting, the vendor would use past demand records to calculate the scheduling of delivery routes.

All above benefits can be better explored in certain conditions: (i) when there is high outsourcing cost; (ii) when demand variance increases, leading to greater savings (Fry *et al.*, 2001); (iii) when demands are correlated (Aviv and Federgruen, 1998); (iv) when demand information sharing occurs (can improve in 42% the fill rate) (Angulo *et al.*, 2004) and (v) for items with high variance when prioritizing items to be covered by VMI (Dong *et al.*, 2010).

From the two components of VMI (information sharing and decision-making) it is the information sharing component that produces the performance benefits (e.g., inventory reductions, stock out reductions), rather than the transfer of decision-making component (Dong *et al.*, 2010). Then, the distributor can receive these benefits by only adopting information sharing programs and technologies, while maintain control over its inventory management. Disney *et al.* (2004) posit that the simpler the information system used in VMI, the more effective it may be. Nevertheless, poor decision-making regarding the VMI risks prevent both parts from enjoying the benefits of VMI.

8.4. Vendor Managed Inventory in Healthcare settings

Healthcare systems have, traditionally, paid little attention to inventory management. In fact, this concern occurs, in this sector, as result of budget pressures or, in a more positive perspective, continuous improvement programs. It is common to find high levels of safety stocks in several points of Healthcare units due to poorly implemented inventory management practices and personal judgement in determining safety stock levels in silo-structured organisations.

Outsourcing inventory decisions is becoming a current practice in Healthcare (Nicholson *et al.*, 2004). The authors underline benefits of inventory costs and service

levels when shifting from an in-house three-echelon distribution to an outsourced two-echelon distribution network. However, these authors' research focus is in non-critical supplies, which are not the main inventory investment when compared with critical supplies, typically expensive, with a short shelf-life and expensive storage facilities on site (e.g. injectable medical supplies, pharmaceutical supplies and surgical supplies). One of the difficulties of managing inventory in Healthcare settings lies in the fact of these levels tend to reflect the desired inventory levels of the patient caregivers rather than the actual inventory levels needed in a department and in most cases, these product activity records (PAR) levels are experience-based and politically driven, rather than data-driven (Nicholson *et al.*, 2004). It is common to find reports of "secret inventory stashes" kept for fear of stock outs in closets for years of supply (Oliveira and Nightingale, 2007).

Healthcare sector seems to be rather idiosyncratic in implementation of SCM best practices. Some authors (McKone-Sweet *et al.*, 2005) point some barriers as the lack of executive support, misaligned or conflict of interest, need for data collection and performance measurement, limited education on supply chain and inconsistent relationships between group purchasing organisations and supply chain partners.

Despite the dynamic behaviour observed in Healthcare supply chains (Samuel *et al.*, 2010) barriers to best practices towards efficiency in supply chain still prevail such as: (i) conflicting goals; (ii) lack of SCM skills and knowledge; (iii) technology evolving; (iv) physician preferences; (v) lack of standardized codes; and (vi) limited information sharing (Callender and Grasman, 2010). These authors' study suggests that the high reluctance of Healthcare providers to VMI adoption is due to lack of training and information about the benefits.

Clearly assuming as a good practice in SCM, Haavik (2000) describes a VMI program recurring to VMI software able to forecast a hospital's demand for supplies. In this model, orders are generated in an economic order quantity calculation basis taking into account the safety stock, lead time, seasonality and exceptional demand. The information flows through electronic data interchange (EDI) reducing costs in data collection and communication. By transferring the purchase order creation activity to the distributor, purchase order costs and errors of creating it manually were eliminated.

Errors were frequent when matching purchase orders to invoices manually, such as out-of-date pricing in matching invoices, generating unnumbered purchase orders, allowing direct ordering from various departments instead of centralizing, and having different ordering methods in various departments.

Pan and Pokharel (2007) identified four methods for supplies distribution in Healthcare setting: “direct delivery to medical department for use; direct delivery to medical department’s storage for later use; direct delivery to central warehouses and then delivery to medical department for use; and direct delivery to central warehouse and then delivery to departments’ storages”. In these authors’ study, hospitals generally keep two weeks of stocks in their warehouses, lowering to one week only when suppliers understand specific needs, trust is established allowing alliances, VMI and other outsourcing practices. Their study showed that in medical supplies inventory management is through periodic reviews and weekly basis replenishments (only 2 in 8 hospitals use daily replenishment) while non-medical items are replenished after generating an order. The authors also describe the motivators and barriers to the use of information and communication technologies, underlining the integration difficulties with the legacy systems, the incompatibility with customer or suppliers, the long implementation time, the rapid obsolescence of technology and the great deal of industry standards to follow.

VMI seems to be easier to implement in pharmaceutical products, partly due to pharmaceutical suppliers’ knowledge on material management, familiarity with information technologies (IT) and SCM best practices (Petersen, 2003; Kim, 2005). In fact, pharmaceutical sector has been strategically adopting IT solutions in SCM from logistics processes as cross-docking to VMI, streamlining the replenishment process (Shih *et al.*, 2009). In the case presented by Oliveira and Nightingale (2007), a major vendor in America Healthcare industry executes VMI handling the replenishment beyond the hospital dock, delivering to the “point of care”.

8.5. Serving Lean intent through VMI

Applying “Lean” (Womack and Jones, 1996, 2003; Hines *et al.*, 2004) in Healthcare services has been the most visible and recent trend in services industry (Brandao de Souza, 2009; Holm and Ahlström 2010; Jones, 2006). “Lean thinking” was coined by Womack *et al.* (1990) as a five principle improvement philosophy: (i) specify value, (ii) identify the value stream, (iii) make the value creating steps for specific products flow continuously, (iv) let the customers pull value from the enterprise, and (v) pursue perfection. Some Lean applications to services are claimed to be “Lean service” but are just applications of Lean production to material processing tasks in service companies. However, Lean management is not a goal itself, but a journey. From analysing the literature on Lean in Healthcare, this journey beginning is frequently the material flow, not the patient flow. In fact, some translations of the seven Ohnos’ (1988) *muda* (overproduction, transportation, inventory, processing, waiting, motion, and defects) to Healthcare are based on material management as in Jimmerson (2010: 4) that presents: (i) confusion; motion/conveyance; (ii) waiting; (iii) over processing; (iv) inventory; (v) defects; and (vi) overproduction, as Healthcare seven wastes illustrated by material flow examples.

Lean management implies using less effort, investment, hours, inventory and space to achieving greater efficiency and fewer defects and errors (Womack *et al.*, 1990). Through Lean management the operational performance is improved also by removing complexity from processes (Womack *et al.*, 1990; Womack and Jones, 1996). Consonantly, the VMI cases in Healthcare cited in previous section are reported in a Lean tone enhancing value added creation and redundant activities elimination by introducing best practices and Lean practices, as VMI, in hospitals’ SCM. Some posit that there are imperatives as the need for Lean inventory systems and rapid-response supply systems that lead to consider the advantages of inventory practices as VMI as a SCM flow coordination mechanism (Fawcett *et al.*, 2010; Fugate *et al.*, 2006).

Lean management is more than just a method of delivering goods “just in time” (JIT). Rather, the true operational efficiency comes from understanding that the financial benefits of operating with smaller buffer stocks can only be achieved in a system that is simplified to prevent problems from infiltrating and is structured with feedback

mechanisms to allow rapid adjustment in response to disturbances (Spear, 2002). In fact, there is a literature stream that defends developing a strategic stock of inventory in a central location to mitigate supply chain disruptions (Lee and Wolfe, 2003; Chopra and Sodhi, 2004; Tang, 2006) and also in that sense, VMI presents a solution for reducing complexity and disruptions in supply chain.

However, some steps towards JIT are already taken in Healthcare. As showed by Heinbuch (1995), employing a JIT inventory management system in clinical areas of hospital materials management and adopting a win-win managerial philosophy is consonant with Lean higher achievements in other industries settings. Stockless initiatives in Canadian Healthcare sector are explored in Rivard-Royer *et al.* (2002) showing the need of continuous information flow to allow replenishment synchronization and demand and obtain on-hand inventory reductions of 70 per cent, in some cases. Introducing the “unit of use” delivery method instead of bulk, the stockless replenishment change the delivery frequency from once a week to daily, reduced the number of suppliers from over 35 to one or two, almost eliminated the need of clinical staff involvement in daily materials-related tasks, simplified receiving procedures, reduced hospital storeroom size from 6000 to 300 sq. ft, storeroom inventory from 6-8 weeks supply to 1-3 days’ supply and full time equivalents managing materials from 31 to 13. Similar experiences have taken place in European hospitals (Riley, 2001), illustrating integration of both internal and external Healthcare sector supply chain. Similarly, stockless inventory management in American hospitals seems a recent research topic (Oliveira and Nightingale, 2007). The reference to this studies seem useful to address VMI concept in its broader extension. In a perfect synchronized VMI system it is possible to match stockless purposes and reduce process complexity, as there is no benefit associated with adding or reducing inventory if the processes in a system remain complex.

Moreover, the literature on supply chain management integration (Power, 2005) is consonant with Lean management. Taking for instance, the purpose of supply chain management described by Kaufman (1997) of to “remove communication barriers and eliminate redundancies” through coordinating, monitoring and controlling processes. Also, the integration of supply chains has been described by Clancy (Clancy, cited in Power, 2005) as “...the attempting to elevate the linkages within each component of the

chain, (to facilitate) better decision making” and “get all the pieces of the chain to interact in a more efficient way” and thus create supply chain visibility and identify bottlenecks.

Also, the Lean idea of creating flow means to deliver products and services in the right amounts, and at the right quality levels at the right place. This implies that products and services are produced and delivered only when “pull” is exerted by the customer through a signal or order. The “pull” system in VMI programmes is assured in the sense that is the consumption in the point of use/patient care that triggers vendor’s deliveries in a perfect demand visibility basis.

From all sated above and showed in Table 1, reducing inventory levels is only one of the benefits of VMI having a significant cost impact because the amount of capital tied in inventory can be used in more efficient ways. Also, it frees up capacity of resources. Floor space and time can be better utilized for other value added activities and workers managing the inventory can be reallocated (Liker, 2004). Thus, looking at the benefits just described in this and previous sections, one can posit that VMI is a Lean practice.

8.6. Methodology

Understanding how VMI benefits serve Lean purposes in Healthcare and why its outcomes can be difficult to achieve in Healthcare settings are the main purposes of this study. Therefore the explored dimensions were: VMI benefits, risks, barriers and enablers.

According to Yin (2009), case study method is appropriate to “How” and “Why” questions and to investigate a contemporary phenomenon in its real-life context when the boundaries between phenomenon and context are not evident recurring to several data collection techniques and different evidence sources. This qualitative method, allowing a deeper understanding of phenomena (Flyvbjerg, 2006), has been frequently used in management studies, namely in operational management (Voss *et al.* 2002) and logistics (Ellram, 1996; Renner and Palmer, 1999). Holweg *et al.* (2005) used case studies to identify weaknesses in VMI implementations. Case studies are also used for building theory (Eisenhardt, 1989).

Being more idiosyncratic than a generalizing method, it was chosen by its descriptive and exploratory character, not to produce causality statements but to achieve a logical sequence of connection between empirical data, problem/research questions and findings/conclusions. Though, the unit of analysis was chosen according to the research objective, a public general multi-site hospital practicing VMI. Concurrent to the choice of this unit was the fact of this unit has been implementing new Lean practices in materials management and also because the Logistics Director had a strong back ground in logistics and SCM, first as a consultant and then as a Healthcare manager, which contradicts some literature.

As recommended by Yin (2009) in data collection and analysis, a study protocol was followed. Multiple sources data triangulation was given special attention during data collection (Eisenhardt, 1989). For data collection (from January 2011 to November 2011) we've conducted in-depth semi-structured interviews to the Logistics Director, operating staff, the hospital CEO, the COO, the Pharmacy Director, two services chief nurses (some interviewees were listened in more than one occasion). Also we recurred to document analysis (stock analysis, structural charts, and written procedures) (Saunders *et al.*, 2007). The open-ended questions covered the VMI implementation in a "before and after" perspective in order to collect evidence on benefits, risks, barriers and enablers. Interviews had an average duration of one hour and a half and were tape recorded and fully transcribed. Data analysis followed Miles and Huberman (1994) recommendations on data codification, reduction and categorization techniques. Data gathered from different informants and sources was reduced to precise categories in common tables (Miles and Huberman, 1994), and then systematically interrogated (Yin, 2009) comparing and noting patterns (Miles and Huberman, 1994).

8.7. The case study: VMI at Case A

"A" is a public general multi-site hospital (three units around 12 km distant from each other), operating as a small scale consolidated service centre in terms of material management, serving a population of approximately 300,000. With 580 bed capacity, an annual average discharges of 22,000 and annual outpatient average of 335,000, in a seven building structure in the central unit, this hospital also serves academic teaching

purposes. In February of 2007, along with the inclusion of the third Healthcare unit, were identified as priority areas for massive improvement the logistics and supply chain department. Among the main problems and clinical services claims were: distribution problems, delivering errors, stock outs, excess of bureaucracy, difficulties in distribution routes optimization, paper-based information exchange (internal requisitions and between units), lack of stock visibility (internal and external), high inventory levels and “secret” safety inventory in each clinical service.

A structured intervention plan was designed to implement a new logistics model having as main goal the visibility of the whole supply chain and elimination of redundancy. The objectives included the shifting and simplifying clinical staff tasks (from managing inventory management, placing orders to only consume register) freeing them to clinical tasks, create accountability in material usage and inventory levels, creation of conditions to patient cost imputation and stock management information system integration and centralization.

Thus, four new pillars were restructured:

- (i) Processes – all material management processes were mapped and redesigned in order to resource optimization and waste reduction;
- (ii) Organisational structure – process orientation actions involving all material management staff, adjusting skills and providing adequate training;
- (iii) Information Systems (IS) – a big effort to implement and adjust systems to the redesigned processes;
- (iv) Infrastructures – lay-out redesign towards flow optimization.

The new logistic model implications on material replenishment comprised the reinforcement of the already adopted practice of material consignment and vendor-management inventory implementation. VMI was claimed to be, according to the Logistics Director, also an alternative to outsource activities without assuming outsourcing costs, following new board strong cost constraints directives. This cost pressure increased every year achieving in 2011 drastic measures and unprecedented government budget cuts and VMI implementation cost were confined to information sharing technology adjustments.

One key issue of VMI implementation was the success of IS adjustments. Therefore, actions were deployed as data-base integration and standardization, wireless, PDA (personal digital assistant) and optical reader devices implementation in clinical departments and software development for integration of inventory management information system.

VMI was firstly implemented in pharmaceutical products supply chain due, according to the interviewees, to supplier willingness and awareness of the full process. Also, service-levels in pharmaceutical products were considerably higher and IS were more easily integrated comparing to clinical products' suppliers. The only clinical supplies vendor, a multinational organisation, took almost year to adapt IS and start VMI. Other multinational suppliers don't even considered the possibility to have a local structure for VMI, having only local key account without any material management knowledge. Another reason to have less VMI in clinical supplies is that this kind of material was already subject to consignment, which was the priority, with very satisfactory results as it involved the products with higher prices.

One of VMI conditions is the application to exclusive supplies – one product could not be supplied by two vendors for simplifying inventory visibility by product instead of by batch.

In transferring the inventory control of hospitals' central warehouse to the vendor, a major issue was setting product activity record (PAR) levels for various items as these levels tended to reflect the desired inventory levels of the patient caregivers rather than the actual inventory levels needed in a department over a certain period. In most cases these levels were, according to interviewees, experience-based and politically driven, rather than data-driven. The PAR levels were daily sent to the vendor (pharmaceutical and clinical supplier) and when the decision on replenishment was made, one advance delivery notice was sent to the logistics department. Deliveries management should follow the minimum and maximum inventory levels settled and occur without frequency constraints. It has been satisfactory not only in terms of inventory reduction as showed in Table 2, especially from 2009 onwards, but in terms of improving the partnership with the only clinical supply vendor. There is a declared intention of Logistics Department in extending VMI practices to other products as housekeeping

ones. The next section gives a more detailed description of this case's VMI outcomes. Table 8.2 shows the evolution in VMI in pharmaceutical and clinical supplies. It also presents the consignment values as, in a way, it worked as a VMI constraint.

Table 8.2 - VMI in numbers

	2007		2008		2009		2010		2011	
	Value	%	Value	%	Value	%	Value	%	Value	%
Clinical Supplies in Consignment	497.113 €	48%	697.307 €	55%	1.236.872 €	77%	2.572.653 €	84%	2.701.984 €	85%
Clinical Supplies in VMI	N		N		10.600 €	3%	14.000 €	3%	7.200 €	2%
Clinical Supplies in Central Warehouse	547.634 €		580.744 €		375.229 €		473.053 €		467.435 €	
Pharmaceutical products in VMI	N		217.256 €	10%	454.756 €	21%	566.225 €	31%	477.536 €	26%
Pharmaceutical products in Central Warehouse	1.818.855 €		2.120.179 €		2.123.879 €		1.828.697 €		1.850.000 €	
Number of consignment suppliers	10		17		20		32		41	
Number of VMI suppliers (pharmaceutical)	N		1		3		8		8	
Nº of pharmaceutical items in VMI	N		33		54		101		127	
Number of VMI suppliers (clinical sup.)	N		N		1		1		1	
Nº clinical supplies items in VMI	N		N		29		38		32	

Source: Data retrieved from internal reports of Logistic Department.

8.8. Case study discussion

The satisfaction with VMI implementation was present in all interviews, although in different perspectives. In fact, the real effect of VMI was from 2009 onwards, as the PAR levels of pharmaceutical supplies were increased before to solve stock out problems. With VMI application the workload of hospital pharmacists and nurses who are very busy in doing their specialized jobs, was relieved. Staff trained in the field of material handling and inventory management perform the job and clinical services gained more time for patient care. The results stressed by the logistics department interviewees were improvements of inventory management such as reduction of inventory costs, keeping proper inventory level, and decrease of emergency orders and no stock out episodes, so far.

On the other hand, information integration and optimized supply chain management has been achieved with the information sharing system based on a strong partnership. However a long work is still to be done in the use of electronic documents to improve speedy order processing and error minimization. Also, some information flow can still be improved as hospital access to information provided by the vendor such as item list

of contracted products, price history, information about new drugs and insurance codes when necessary.

Also, the consignment has been increasing significantly and the negotiation efforts are priority in that area. Nevertheless, pharmaceutical and clinical supplies VMI number increased, mostly by inclusion of high turn items.

The inventory level reduction has been also helped for the continuous level revisions and redefinitions of minimum and maximum stock levels by a Lean mindset department.

The most cited outcomes in the interviews were: better and quicker logistics response enabled by stock visibility and need anticipation; time optimization improved quality of care; accuracy in cost allocation; improved efficiency and service quality of replenishment; patient care quality improvement through better expiring date control and availability of drugs and materials.

Table 8.3 summarizes the evidence extracted from data codification and triangulation on the dimensions: VMI benefits, VMI risks, VMI enablers and VMI barriers.

Table 8.3 - Case “A” findings

R E T A I L E R: C A S E A	VMI Benefits	VMI Risks
	-Reduce inventory and cost -Fewer stock outs -Free clinical staff for clinical tasks - Free logistics staff for procurement and other added-value tasks -Fill rates improvement -Increase inventory turns -Reduce transactional costs -Reduce ordering and planning costs	-Information visibility allows opportunistic behaviour, but it didn't occurred so far -Dependency on vendor was delimited by public contract regulation and new calls to tender
	VMI Enablers	VMI Barriers
	-Products of difficult consignment (packs for unit consumption, low unitary cost) -Partnership relationship with vendor - Supplies reception bureaucracy in non VMI items -Purchase volume/critical dimension - Waste reduction orientation/holistic Lean projects going on	-Supplier SI integration constraints/dependency - Instability in partnership maintenance due to sector regulation and budget cuts -Generalization of the idea of complete range stock availability for all sorts of patient needs at all times – Healthcare complexity as an excuse - Lack of activity planning - Lack of flexibility in public sector contracting

Source: The author

The economic and financial instability affects partnership creation and maintenance and is obstructive to new VMI solutions. It has contradictory effects on inventory levels: if, on one hand the cost pressure forces to keep low inventory levels, on the other, the generalized instability and future uncertainty has led to keep “safety” inventory in higher levels than desirable.

To maximize and keep the major benefits described above, it seems necessary to evaluate and improve the developed system continuously. The most significant factor in the successful implementation of the integrated supply chain management system is collaboration between partners and information sharing in the supply chain.

8.9. Conclusions

The best way to look for enablers and barriers to any project implementation is to follow the root causes for benefits and risks. The reported case shows that some benefits of VMI are still hindered by Healthcare sector strong implementation barriers.

VMI has proved to be a Lean solution for material management in several ways: (i) by transferring an in-house activity to an existent supply chain partner resulting in less inventory costs, increased efficiency in replenishment and improving quality of care without having outsourcing costs; (ii) streamlining the material and information flow in a crescent seamless basis by introducing visibility to supply chain; and (iii) prevailing the pull trigger for replenishment leading by consumption.

However, when studying Lean practices in Healthcare, it is important to stress that Lean must be seen as a journey not always easy to course and the barriers to its implementation should be explored.

Despite some unawareness of VMI benefits in Healthcare (Callender and Grasman, 2010), it can present a waste reduction solution not only in costs but in the quality of care for freeing clinical professionals to clinical tasks, among other savings. The multiple benefits are better explored, as in any relationship building, by investing in partnership creation and overcoming the idiosyncratic barriers of Healthcare sector. Literature claims that VMI improves the buyer’s profit in any case but the vendor’s

benefits vary depending on the duration of VMI implementation. It would be worth to explore the vendors' advantages of this particular (as in other) case in future work and study the duration of VMI relations as a construct and its relation with Lean practices' sustainability.

This study also suggests that the continuous improvement in material management areas cannot happen apart from a holistic view of Lean deployment in the whole supply chain. Thus, issues as material standardization, waste reduction in consignment (also in vendor perspective), stakeholder collaboration to seamless material, information and patient flow are subjects to future research.

9. Lean, a tool set or a mindset? – A Healthcare case study¹³

9.1. Abstract

Applying “Lean” (Womack and Jones, 1996, 2003; Hines *et al.*, 2004) in Healthcare services has been the most visible and recent trend in services industry (Brandao de Souza, 2009; Holm and Ahlström, 2010; Jones, 2006). However, is “Lean” in Healthcare just a buzzword, a set of tools (Hines and Rich, 1997) for quick-wins or a sustainable enterprise process improvement system? Lean thinking has a sustainability issue that needs to be addressed.

In order to assess how embedded are Lean principles and tools in Healthcare and how organisations sustain the gains, a case study was conducted in a Healthcare organisation with 21 diagnosis units running *Kaizen* events. This study aims to bring some answers regarding the regression causes in Lean practices and Healthcare organisations priorities in matching customer needs to value streams provided. Conclusions about: (i) translation of Lean models and practices from other settings (manufacturing) to Healthcare (services), (ii) how elimination of waste in Healthcare is made by eliminating non value-added activities and how customers perceived the value creation, and (iii) how is (internal and external) communication of value, are presented, as well as some thoughts concerning the future of Lean in Healthcare. In spite of being supported by a single case study, the followed approach and the research design enables any other researcher to replicate it in other units of analysis with similar inclusion criteria.

9.2. Introduction

Healthcare services waited sixty years for manufacturing lessons and rush in to implement these improvement principles and tools. However, there are contextual variables of Lean adoptions in services, such as “value” and context specificities in Healthcare services (Dal Pont, 2010; Youg and McClean, 2008, 2009). In fact, pursuing

¹³ This chapter is based on the article: “*Lean, a Tool Set or a Mind Set? – A Healthcare Case Study*”, published in Joldbauer, H. Olhager, J. and Schonberger, R.J. (Eds), *Modelling Value*, Physica-Verlag, A Springer Company, pp. 313-328, 2012.

value creation is one of the challenges in assessing Lean application outcomes in Healthcare.

Radnor and Walley (2008) found the following barriers in Lean principles and tools implementation in public services (including Healthcare services): lack of clear customer focus, too many procedures, people working in silos, too many targets, lack of awareness of strategic direction, general belief that staff are overworked and underpaid, and finally, lack of understanding of the effect of variation, systems thinking and process flow. Silva *et al.* (2010) used survey to explore Lean production through non-Lean implementer's perceptions regarding the implementation barriers as well as the drivers and achievements of implementation. Browning and Heath (2009) explore Lean implementation complexity and difficulties through a case study in aircraft manufacturing. Other authors (Radnor and Walley, 2006; Hines and Lethbridge, 2008; Scorsone, 2008; McQuade, 2008, among others) show that different corporate cultures – particularly those in public sector – can inhibit the application of Lean techniques. Thus, we arrive to our first Research Question: - **RQ1 - What are the barriers to Lean implementation in Healthcare?**

On other hand, Achanga *et al.* (2006) outlined the importance of leadership, management, finance organisational culture and skills, as well as expertise, among other factors, as critical success factors for implementing Lean in manufacturing settings. But what are Lean implementation critical factors in Healthcare setting? That's our second question: - **RQ2 - What enables Lean implementation in Healthcare?**

Is “Lean” a goal or a journey? According to Goodman *et al.* (2007) the Lean project termination is just the beginning. Some Lean initiatives seem to present a prescriptive tone by testing some of those tools in pilot projects (Grunden, 2009), combined tools (Buesa, 2009), seeking for rapid improvement (Wennecke, 2008; Caldwell, 2006). The difficulty is to sustain Lean practices and prevent turning to previous comfort zone (Lucey *et al.*, 2005). As supported by several authors (Hines, 2010; Radnor and Walley, 2008; Radnor and Holweg, 2010; Womack, 2007; among others) Lean thinking sustainability is an issue that requires more empirical research. The importance of a Lean sustainable culture enhances long-term benefits focusing. The focus has changes

from “how to go Lean” to “how to stay Lean” (Hines, 2010) which leads to the last, but not least, question: - **RQ3- How to develop a sustainable Lean culture?**

In order to assess how embedded are Lean principles and tools in Healthcare and how organisations sustain the gains, a case study (Yin, 2009) was conducted in a Healthcare organisation with 21 diagnosis units running *Kaizen* events.

This study aims to bring some answers regarding the sustainability of Lean practices in Healthcare organisations. Conclusions about: (i) translation of Lean models and practices from other settings (manufacturing) to Healthcare (services), (ii) how elimination of waste in Healthcare is made by eliminating non value-added activities and how customers perceived the value creation, and (iii) how is (internal and external) communication of value, are presented, as well as some thoughts concerning the future of Lean in Healthcare.

Presenting a contribute to empirical studying of Lean deployment in services settings, this article first briefly reviews the literature on Lean services, enhancing the Lean “translation” and evolution from manufacturing to pure services settings, giving special relevance to Healthcare services. Also revision on tools and long *versus* short-term events is presented with strong emphasis to critical success factors and “people” issues as roots of sustainability of Lean. The retrospective case is reported as a search for evidence to answer the previously presented questions.

9.3. Lean services

9.3.1. From manufacturing to services

Presented as an antidote to *muda* (waste), converting *muda* into value, “Lean thinking” was coined by Womack *et al.* (1990) as a five principle improvement philosophy: (i) specify value, (ii) identify the value stream, (iii) make the value-creating steps for specific products flow continuously, (iv) let the customers pull value from the enterprise, and (v) pursue perfection. These same principles prevailed though the Lean concept scope evolution (Figure 9.1).

The roots of application of Lean manufacturing principles (personnel's limited discretionary action, division of labour, substitution of technology for people, standardization) to service settings can be found in the work of Levitt (1972; 1976). We've been assisting throughout the decades to successful attempts of "industrializing" services to solve mass-production approach limitations by adopting and adapting "Lean" principles (Hines and Rich, 1997; Bowen and Youngdahl, 1998, Allway and Corbett, 2002; Ahlström, 2004, Piercy and Rich, 2009, 2009a).

However, some Lean applications to services are claimed to be "Lean service" but are just applications of Lean production to material processing tasks in service companies. On the other hand, pursuing Lean principles as standardization might seem paradoxical in services settings due to variability introduced in operations by customers (Kosuge *et al.*, 2010). In a complete literature review, Holm and Ahlström (2010), through a categorization of current Lean service research, identify different levels of Lean deployment in services that goes from a simple tools/technique/method-focus, then to single principle and, broadly, to multiple principles focused studies. This review, using the Silvestro *et al.* (1992) classification of services (professional services, service shop and mass service), shows a main research incidence in "professional services", namely in Healthcare.

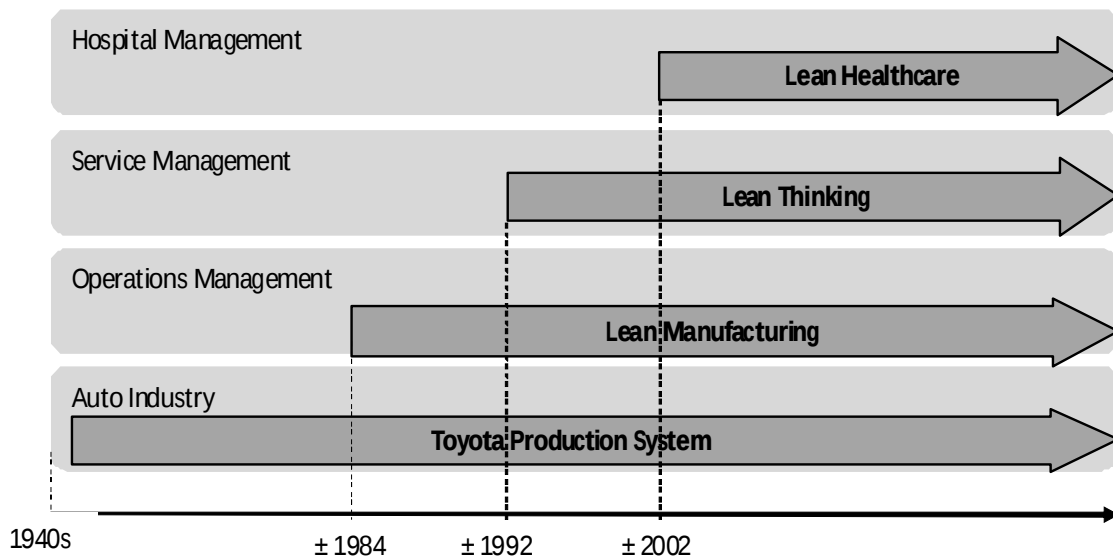
9.3.2. Lean in Healthcare services

The adoption of Lean practices in Healthcare has been studied and reported as success stories of strategic changes in Healthcare organisations, as the Bolton Improving Care System – BICS (Fillingham, 2007) and the legendary Virginia Mason Medical Centre Cases (Black and Miller, 2008:149-189). In 2003 revision, Womack and Jones (1996, 2003: 289) introduced the application of Lean thinking in the medical system. Some authors (Fillingham, 2007; Kollberg *et al.*, 2007, Lodge and Bamford, 2008; Manos *et al.*, 2006) advocate Lean practices to eliminate delays, waiting times, reduce length of stay, repeated encounters, errors and inappropriate procedures.

On the other hand, being the focus on "value" the critical point in Lean thinking, value creation in Healthcare, a world "full of values" (Young and McClean, 2009) depending

on the many different customer groups (patient, patient's family, society, medical students - internal customers), has to be seen beyond cost reduction. Young and McClean (2008) conclude that there is scope for methodological development by defining three themes associated with value-the operational, the clinical and the experiential. In fact, pursuing value creation is, along with evidence and metrics, one of the challenges in assessing Lean application outcomes in Healthcare.

Figure 9.1 - Lean concept scope evolution.



Source: Adapted from Brandao de Souza (2009).

According to Eaton and Phillips (2008) the success factors for edifying the Lean building are: (i) communications; (ii) resources; (iii) involvement; (iv) training; (v) implementation/measurement systems; (vi) compass; (vii) achievement; and (viii) leadership. The authors value also the reward spirit and the expertise of external support that is useful to “look outside the box”.

Also referring to success factors other authors (Achanga *et al.*, 2006; Hines *et al.*, 2008, among others) point the following Lean deployment enablers:

- Senior management commitment and engagement in improvement;
- Leadership at the top and at every level;
- Linking improvement to organisational direction;
- Time to allow impact to occur;

- Good customer understanding and response;
- Good understanding of the whole process;
- Training and development;
- Proper measurement of current performance;
- Engagement of all of staff.

The barriers can be seen as the opposite of success factors; however some barriers are common places of specific sectors. Studying cross-countries non-lean implementers, Silva *et al.* (2010) found as barriers to lean implementation: -existence of other substitute initiatives, lack of communication, inability to quantify the benefits, lack of understanding of Lean principles, lack of senior management commitment, attitude of shop floor staff and multiple business location.

In Healthcare sector we can find public sector barriers such as: (i) resistance from staff with a strong powerbase, (ii) the inability to define quality, (iii) political pressures and changes in policy and (iv) the perception that improvement techniques developed in manufacturing and are not appropriate in a service environment (Radnor and Walley 2008). In fact some authors (Radnor and Walley, 2008; Hines and Lethbridge, 2008; McQuade, 2008; Scorsone, 2008) point that different corporate cultures (particularly in public sector) can inhibit Lean implementation.

Dal Pont (2010), analysing Lean adoption techniques in services, defines “enablers” of Lean deployment variables as: (i) process or/and service divisibility, serenity, (ii) loyalty and leadership and (iii) information technology (IT) skills. Conversely, define as inhibitors: (i) knowledge, (ii) customer contact, (iii) corporate culture, (iv) complexity and (v) autonomy. Each of these variables’ findings requires in-depth studying and testing, namely in Healthcare setting.

9.4. Lean tools, quick-wins and long term Behaviour

The root of Lean is the Toyota Production System (TPS). However many Lean subscribers ignore the system aspect rushing into tools and techniques *tout court*. The Lean Healthcare reported cases are full of tool deployments. The Virginia Mason Medical Centre emblematic case describes Rapid Process Improvements Workshops

(RPIW) to run Rapid Improvement Events (RIEs), 5 S, Value-Stream Mapping (VSM) and *Kanban* (Weber, 2006). Reporting Virginia Mason's case Spear (2004) describes RIEs results as "dramatic improvements in quality, customer satisfaction, staff satisfaction and profitability". On the other hand, the issue of only focusing on RIEs in isolation is highlighted by Radnor and Walley (2008) adverting to the difficulty in sustaining RIE's quick wins that are not integrated in the overall strategic objectives of the organisation. However, when they are part of the strategy improvement programme, RIEs themselves can be a powerful mean to both engage and motivate the workforce and allow a number of small changes to occur producing a sort of a butterfly effect. Organisations often run a series of RIEs and see this as "Lean" or "process improvement" whereas in reality it is just *Kaizen* (continuous improvement). RIE is an important tool of Lean (Radnor and Walley, 2008). According to Barraza *et al.* (2009) in continuous improvement (*kaizen*) events the length of implementation varies according to the extension of activities. The *kaikaku* or *kairyo*, for instance, are short-term (one or two weeks) events in focused area that can work as *Kaizen* blitz, "bombing" workshops in the *gemba* (shop-floor). Having longer (based on traditional Japanese Quality Management system) or shorter dimension, the continuous improvement events are part of a journey to a Lean enterprise as Lean-*kaizen* events (Manos, 2007).

As Spear (2004) reports on Toyota "People don't typically go for big, dramatic cure-alls. Instead, they break big problems into smaller, tractable pieces and generate a steady rush of iterative changes that collectively deliver spectacular results." However, as Hines *et al.* (2008) report, one step at a time approach can be taken in order to deliver quick wins but "once the message has got across you need to progress to more ambitious, long term projects." The authors highlight the importance of tools as visual management and regular process auditing (Hines *et al.*, 2008).

In the case study analysis of 5S projects in Healthcare, Esain *et al.* (2008) noted both emergent and planned change approached. They also noted a paradox in that "change agents seem to unwittingly want to make the process neat by adopting the prevalent command-and-control organisational model of management which may restrain spontaneous change and learning. This could be resolved by ensuring that enthusiast converters and others judge the activity that they are proposing aligns with the vital few

objectives of the organisation, but this assumes a clear strategic organisational vision.” In fact, sustainability failures proved that the whole is not the sum of the parts, most of the time. Jackson (2009) describes the five pillars of 5Ss implementation in Healthcare “facilities” leaving the prescription of a good workplace as scenery of future continuous improvement actions.

Hines (2010), among others, posits that the pure and simple tool deployment to achieve quick-wins lead to a short term Lean results and often returns to “the comfort zone” whilst systematic Lean approaches of culture changes shows long-term results, even in the same corporation (ex. Whirlpool). Using the iceberg metaphor the author shows that sustainability doesn’t come from working only the visible part of the iceberg (technology, tools and techniques and process management) but mostly work below waterline with much bigger and real sustainability keys as: (i) strategy and alignment; (ii) leadership; and (iii) Behaviour and engagement.

Forrester (1995) links the sustainability of Lean deployment to the human elements and advises to consider elements as: (i) organisational style and structure (a people centred process, with involved, motivated and accountable teams and leader empowerment, flat structure focused on processes not hierarchies); (ii) staff selection (based on management and leadership skills, give clear and individual performance targets); (iii) training (solving problems and other individual continuous development programs). Also Womack and Jones (1996b) point out the importance of one of first four Lean principles “all interact with one another in a virtuous circle” as the goal is not playing individual notes but a tune.

Some authors (Lucey *et al.*, 2005, Manos, 2007; Proudlove *et al.*, 2008) suggest that medium/long term achievements in Lean and six sigma implementations are due to: standardization training, measuring employers engagement with the company and with the customer, monitoring results, management commitment and ownership to maintain and improve gains and also learn from external support how to develop internal mechanisms for sustain improvement.

Bateman and Rich (2003) refer to sustainability by relying on success factors or organisational readiness what can be reductionist if differences in public versus private organisations success factors were ignored. Time and readiness are issues that belong to

an organisation DNA. Toyota took twenty years to develop its system. Bale and Regnier (2007) report a Lean experience in Healthcare setting that took three years to achieve stability. Hines *et al.* (2008) suggest that generally Lean systems take between three to five years to develop and between five to seven years to implement. Distinguishing “performance improvement” from “continuous improvement”, Bateman (2005) states that performance improvements occur after a few months and have a supporting role to continuous improvement.

Hines *et al.* (2008) suggest that what makes “Lean stick” is leadership. Hines (2010) recent article explores Lean sustainability in multi-site organisations stressing Behaviour and engagement importance and defending “*Hoshin Kanri*” or policy deployment as a strategy alignment weapon, but not in a pure service setting.

Most of the literature on Lean services does not cover “people aspects” and Behaviour in organisations questions even though they are crucial to Lean implementation success. As Spear (2004) concludes “in health care no organisation has fully institutionalised to Toyota’s level the ability to design work as experiments, improve work through experiments, share the resulting knowledge through collaborative experimentation, and develop people as experimentalists.”

9.5. Methodology

According to Yin (2009), case study method is appropriate to “How” and “Why” questions and to investigate a contemporary phenomenon in its real-life context when the boundaries between phenomenon and context are not evident recurring to several data collection techniques and different evidence sources. This qualitative method, allowing a deeper understanding of phenomena (Flyvbjerg, 2006), has been frequently used in management studies, namely in operational management (Voss *et al.*, 2002) and logistics (Ellram, 1996; Renner and Palmer, 1999). Case studies are also used for building theory (Eisenhardt, 1989).

Being more a idiosyncratic than a generalizing method, was chosen by its descriptive and exploratory character, not to produce causality statements but to achieve a logical sequence of connection between empirical data, problem/research questions and

findings/conclusions. Though, the unit of analysis was chosen according to the research objective: to study sustainability factors in Lean deployment. Hence the attention was given to each single Lean implementation project, elected as the study's unit of analysis. Each project, by definition, has its own patterns and ways that allow contributions of different findings. The *kaizen* projects – units – were selected to allow replication (Yin, 2009) increasing the external validity of findings.

As recommended by Yin (2009) in data collection and analysis, a study protocol was followed. Multiple sources data triangulation was given special attention during data collection (Eisenhardt, 1989). Data collection occurred in two phases as there were two units of analysis (the first Lean project and the second Lean Project) For the first project (from July to October 2010) we've conducted ten in-depth semi-structured interviews to different functional areas actors in *kaizen* events (to the CEO, COO, the external consultant, the business area director, two department managers, three front-office elements and the quality manager). For the second Lean project the same interviewees (apart from the CEO that was replaced by the previous COO) were interviewed in July 2012) Also we recurred to document analysis (company profile, workshop presentations, internal memos, structural charts, written procedures, quality manuals) and direct, non participant observation (*gemba* "to be" state) (Saunders *et al.*, 2007). Interviews had an average duration of two hours and were tape recorded and fully transcribed. Data analysis followed Miles and Huberman (1994) recommendations on data codification, reduction and categorization techniques. Data gathered from different informants and sources was reduced to precise categories in common tables (Miles and Huberman, 1994), and then systematically interrogated (Yin, 2009) comparing and noting patterns (Miles and Huberman 1994).

The results were compared with an ongoing review of the literature to support findings or bring new directions to explore.

9.6. The case study “E” - a group of diagnosis clinics

9.6.1. Case E- Take One

“E” (organisation name initial for privacy reasons) is a group of twenty one clinics providing diagnosis exams and therapy in areas as radiology, cardiology, nuclear medicine, laboratory and physiotherapy in an extended geographic area covering all north part of the country.

A new administration board started functions in 2008, at that time with fifteen units, and followed a growing strategy by acquisition. A big effort has been made ever since, to achieve homogenization of procedures and create a corporate image. Some help from previously initiated quality certification was taken into a broader extension and most of the units now follow ISO quality norms. Radiology was the first area to be certificate by ISO 9001. Another contribution to homogenization came from constant training plans to all staff in different themes (reception, customer service, time management). The standardization of processes among so “many different ways of working” was a challenge to an organisation that was giving its first steps in Healthcare sector. Searching for efficiency gains and coping with geographic dispersion, practices as telemedicine (in radiology and cardiology) were encouraged.

Motivated by the known results of *kaizen* events in manufacturing, and in some services, the choice of contracting consulting services with *kaizen* events experience was seen by the interviewees as a the driving force with the ability of “looking outside the box” and presenting a “success guarantee”. The plan was to run a *kaizen* project in the biggest unit of radiology (out of nine units, half of total), to form multi-professional groups, including two members of the other nineteen units, creating a “spreading agent” to replicate the same improvement process in the rest of group units.

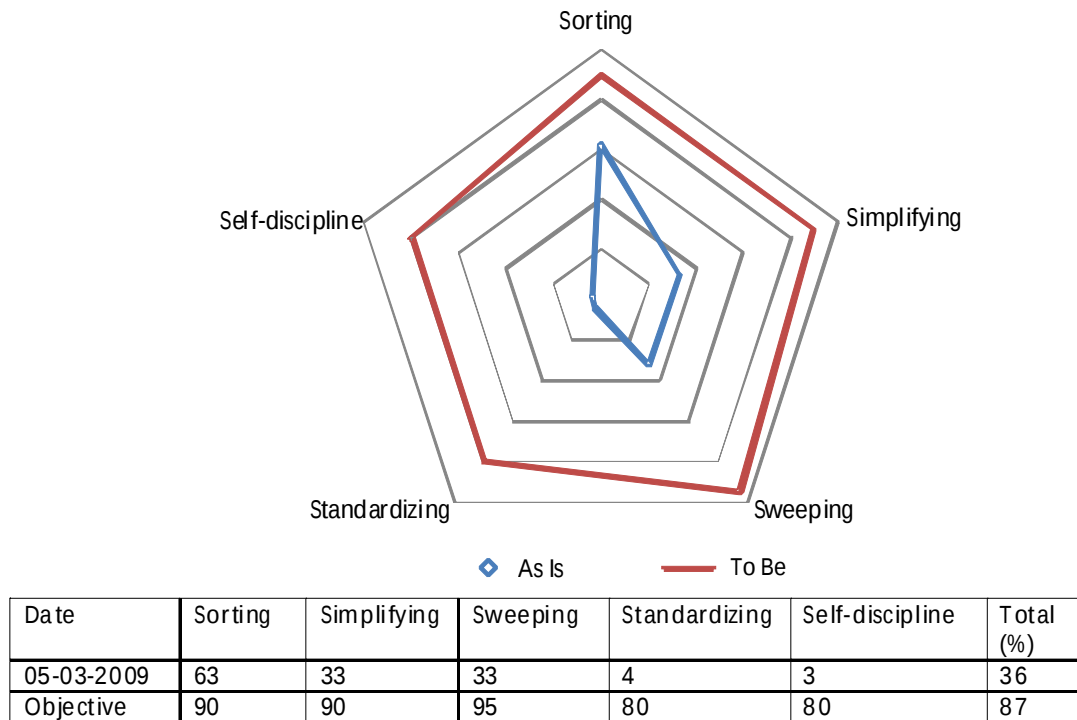
The intervention model proposed was to run workshops of 5S concerning back-office area, radiology rooms, front-office and warehouse.

The *kaizen* project was designed for ten month duration (assessment, training and implementation) starting in February of 2009.

Starting with Value Stream Mapping (VSM), the customer path designed and activities analysis showed a current state lead-time of 4-5 days and a future state stream was designed to achieve an average lead-time of 30 minutes. This goal would be possible to achieve through paper elimination and setting a new flow of information and customers.

In the assessment phase, after VSM a 5S current and future state was presented, scoring the existing levers of: sorting (*seiri*); simplifying (*seiton*); sweeping (*seiso*); standardizing (*seiketsu*) and self-discipline (*shitsuke*), showing the gap and size of journey to follow as the example of the report room assessment presented in Figure 9.2. The initial audit was carried out in file rooms, reception, report room, radiology rooms, waiting areas and warehouse.

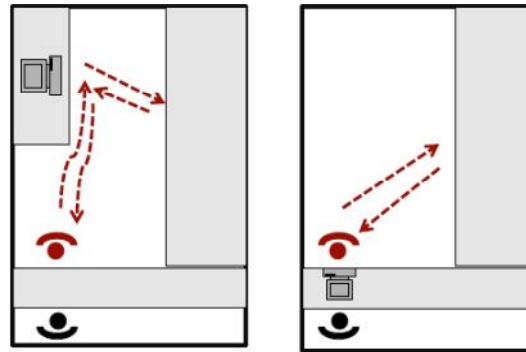
Figure 9.2- Case E: Goals of report room 5S deployment



Source: Lean project periodic report of March, 2009.

After some spaghetti diagrams new lay-outs were design in order to gain space and allowing 5S deployment, as in Figure 9.3 example.

Figure 9.3- Current and future File Room lay-out



Source: Lean Project periodic report of March, 2009.

The project implementation was carried out by steps (Table 9.1), each one with duration of a week and devoted to a specific workshop theme with correspondent *gemba*-homework tasks to be evaluated in the beginning in the following session. Rewards were encouraged.

Table 9.1 - Steps of Kaizen project

Step	Description
1. Presentation of the project	The top management introduces the issue of improvement. The consultant presents to a wide group of participants the purpose, focus and coordination of kaizen project.
2. Before initiating training	Presentation of the project plan and time table. Team selection
3. 5S Kaizen workshops in selected areas	Each workshop had one day duration (training in first session – audit and training in the followings)
4. Result presentation and guided visit	Meeting with all first meeting participants and <i>gemba</i> visiting

Source: the author through case data analysis and triangulation.

All interviewees enhanced the fact that there was a clear vision of the improvement results benefits and it would never have reducing staff as consequence. Redundant work was to be eliminated but not people. Staff reallocation was predicted and communicated in workshop sessions.

There was also a common feeling among the kaizen actors, that a lot more could be done, but the “a Healthcare unit can’t stop” and involving all personnel would take longer. One manager claims that workshops were designed without some valuable inputs of daily problems and that would make a difference in having a broader scope.

The *kaizen* project intervention areas improvements are presented in Table 9.2

Table 9.2 - Project improvements per process

Process	AS IS	TO BE
Reception	Unnecessary furniture Interruptions to find material Unorganised waiting area	Clean look Material individual kit, standardized forms New “U” lay-out of waiting areas; wider circulation area suitable for disable Centralized call system
Report writing	Confusion in queue selection	Visual management deployment
Filing	Difficulty of finding exams	Criteria and filing material standardized Elimination of post-dated “dead” file
Stock management	Different criteria of filing Maintenance of all dates “dead” file “empirical” stock management Validity dates not controlled Frequent stock-out Intra and inter-unit loans	<i>Kanban</i> system Daily fulfilment with standard routes Warehouse organised by fixed positions Reduced stock level
Radiology rooms scheduling	Difficulties of planning Inefficient professionals scheduling	Visual management deployment
Patient transport (Local hospital outsourcer)	Long waiting times Peaks of crowded areas	Shuttle transport system Previous day registration and form filling

Source: the author through case data analysis and triangulation.

When asked for future improvement actions, two unanimous ideas are in the interviewees minds: - the poor impact that this “beginning” had in customer perception of improvements and the difficulty of measuring results of this actions in the long-term for lacking of monitoring.

Consultants left at the end of the project and since February of 2010 the organisation has made few attempts to replicate the first unit kaizen project recurring to the “improvement agents” trained in *kaizen* workshops sessions, apparently with no results apart from “cleanness”.

Also, some diagnosis was started in the transcription room, which receives all doctors’ tape recorded exam reports, in the attempt to identify error patterns and improvement opportunities, but that was left to future projects.

The interview guide (attached after references section) covered not only the eight categories/elements of Lean implementation success (Eaton and Phillips 2008): - communications; resources; involvement; training; implementation; compass; achievement; and leadership but also, waste (*muda*) identification and implementation enablers and inhibitors. The main findings in each category are summarized in Table 9.3.

Table 9.3 - Summary of case evidence per category

Moment	Category	Case evidence
AS IS – before <i>Kaizen</i>	▪ <i>Muda</i> identification	Waiting times Excessive nr of customer visits per exam Space waste
	▪ Communication	“Freedom of speech” Coaching method
<i>Kaizen</i> project (5S <i>Gemba</i> - kaizen workshops)	▪ Resources	Small investment in materials
	▪ Involvement	All hierarchic levels Other units “improvement agents”
	▪ Training	Lean tools and techniques in a simplified way (5S, visual control, kinds of waste)
	▪ Implementation	Team work Weekly achievements
	▪ Compass	By the schedule Consultant’s responsibility
	▪ Enablers	Top management involvement “thirst” of novelty Multi-professional teams Involvement of all hierarchic levels
	▪ Inhibitors	Cost pressures Resistance to change Rotation of workers between units Lack of results monitoring
	▪ Achievements	Staff morale increased Time reduction (customer waiting times, full process length) New Kaizen daily vocabulary Poor customer perception of improvement Improvement opportunities discovered
	▪ Leadership	Expectations related to the consultant failed Strong role of operations management
TO BE– after <i>Kaizen</i>		

Source: the author through case data analysis and triangulation.

9.6.2. Case E- Take Two

A group of factors: group senior leadership changes, difficulties in the Lean dissemination roll out process to the other units and the need to deeper explore kaizen in core activities, lead to a second project with the same consultant.

The trained *senseis* did start a good 5S project in their units after the first Lean project but each one had “his way” and the results were very different. The group needed a homogeneous deployment as with employee’s rotation between the units, divisions could start.

The new forty week Lean project had two scopes: a) the dissemination of the first project (2010) to the other units, and b) productivity improvement in core activities (Radiology technicians’ activities, Radiologists’ activities, Typing/Transcribing and Reception’s activities).

The kick-off meeting was in the week 42 of 2011 and involved the senior management which showed its commitment to turn the two projects transversal to the whole organisation.

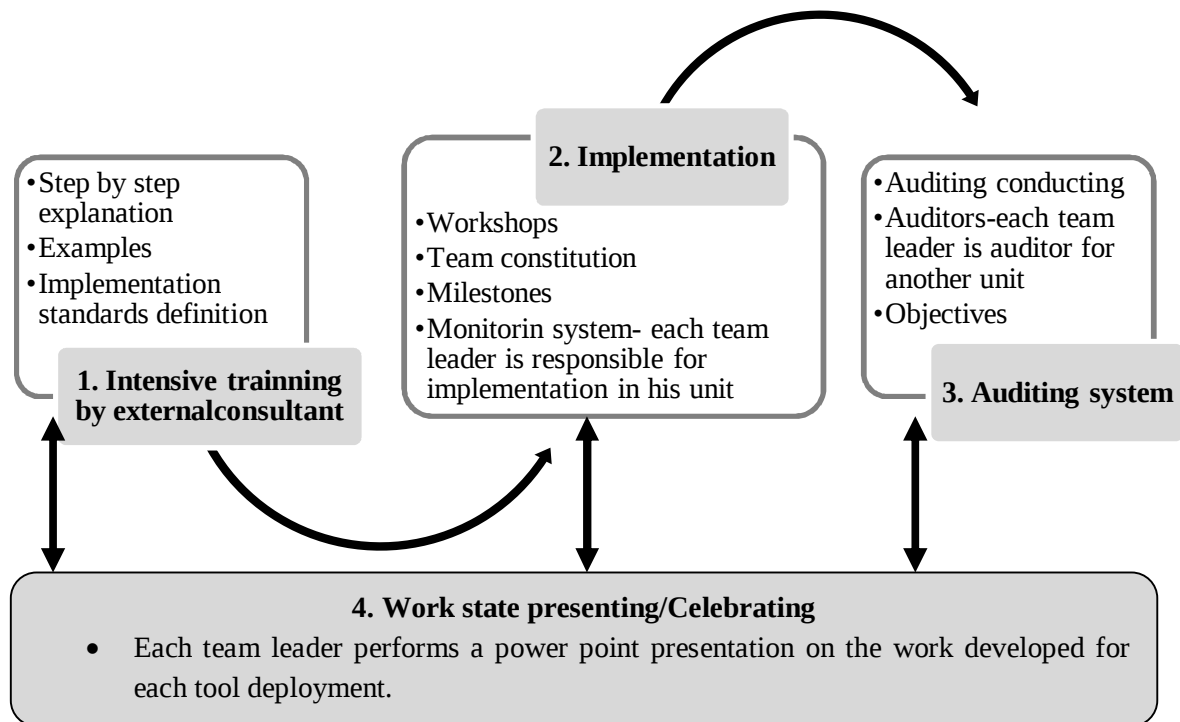
Lean Projects overview:

a) The dissemination of the first project to the other units

The *kaizen* tools were: 5S, material management, task planning, equipment “One Point Lessons” (OPL)¹⁴, Standardization of reception and exam reports delivery procedures, streamline and simplify exam reports sorting procedures.

¹⁴ OPL- One Point Lessons are visual manuals placed near equipment or devices with simple usage instructions.

Figure 9.4 - Case E: Lean deployment plan



Source: the author.

The key points of the dissemination strategy (Figure 9.4) were:

- Each improvement team leader (Clinic Manager) is responsible for dissemination on its clinic;
- In each dissemination step is implemented one different tool;
- At the end of each step is conducted an audit to assess implementation level;
- Audits are executed by each Clinical Manager in another clinic that not his own;
- The audits schedule is built by drawing in training sessions;
- Audit day should be the day before follow-up session;
- Audits should add new tools assessment points, increasing scope as implementation occurred;
- The goals for audits are settled in each tool training session;
- Each team leader should field a monitoring form every week to be given to the internal Lean leader that coordinates implementation;

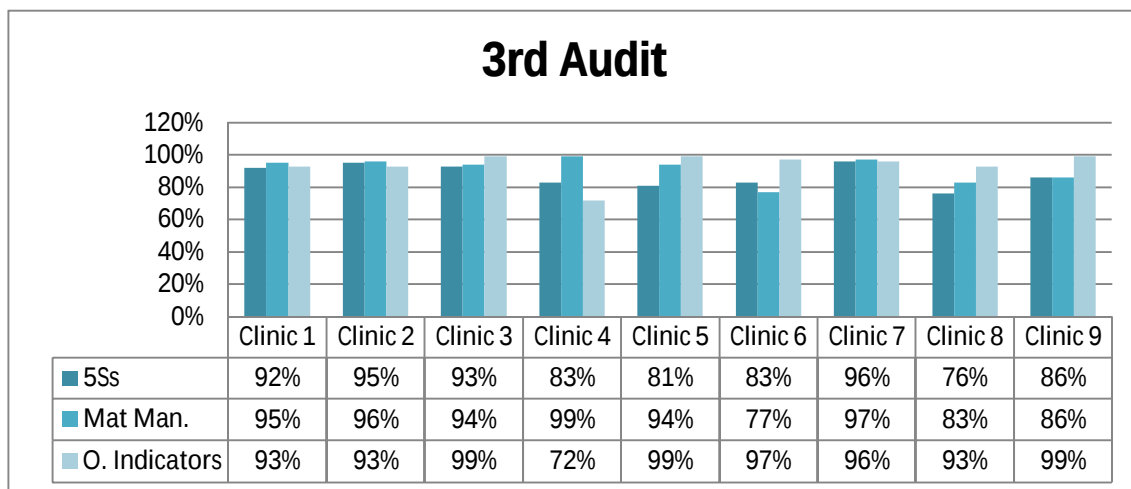
- If one clinic don't achieve the settled goal, the second audit will be conducted by the COO;
- Each clinic will receive a prize for goal achievement;
- For each tool, the best performing clinic will be awarded;
- At the end of the project a prize for overall Lean performance will be given to the best performing clinic.

The first two audits were in every two months, but after those four implementation months, monthly audits were conducted to correct deviations.

Also after each audit the incentives: Prize for the best original idea; Prize for best performance, were delivered.

This is one audit example in nine radiology clinics (the 3rd after 5 months of implementation):

Figure 9.5 – Case E: 5Ss Audit



Source: data retrieved from periodic Lean project status report, dated of November, 2012.

b) Productivity improvement in core activities:

b.1.) *kobetsu kaizen* in Typing/Transcribing activities:

- A set of problems were identified in brainstorming sessions, according to all interviewees, with incidence on: low productivity; lack of indicators; too many errors and rework (mainly for correcting reports' errors).

In the first month were identifying all the errors and quantify occurrences. By decreasing occurrence order, the main errors (that occurred more than twice in the same week) are listed in Table 9.4.

It was followed a ten-step error proofing method, as follows:

1. Identify the problem
2. List possible errors
3. Determine the most likely error
4. Propose multiple solutions
5. Evaluate effectiveness, cost, complexity of solutions
6. Determine the best solution (include data analysis)
7. Develop error elimination plan
8. Analyze preliminary benefits
9. Develop plan for long-term measure of benefits
10. Congratulate the team

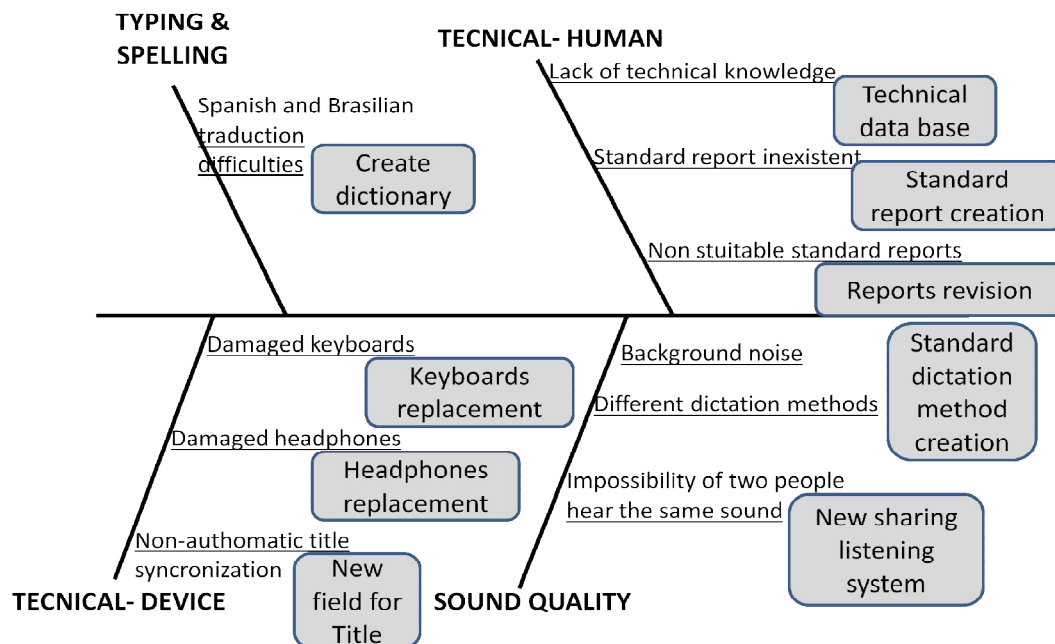
Table 9.4 - Typing frequent errors

Error	Week Frequency Average
Technical/device error	545
Spelling Error	390
Need of data confirmation	205
Orthography error	195
Sound imperceptible	150
Incomplete dictation	140
Need of sound adjustment	25
Discrepancy on exam head title and the text	10
Date error	5
Wrong Doctor	3
Difference in Patient name from exam to the report	2
2nd sound oblivion	2

Source: data retrieved from periodic Lean project status report, dated of November, 2012.

The root cause of some of the main groups of errors was analyzed and some solutions started to appear as the Figure 9.6 example:

Figure 9.6 – Root-cause diagram for Typing/Transcribing errors



Source: the author.

Apart from corrective actions, a set of indicators had to be created for assess the improvements impact of weekly performance as:

- Number of dictations transcribed/ hour
- Number of dictations transcribed/ hour/person
- Average of transcribers in a team
- Team productivity/hour
- Total errors of one team
- Total of week errors

In the first 24 weeks, the productivity (Nr of dictations transcribed/ hour) improved 12,7% and rise to 35% after two more weeks. The team errors decrease 20% in the first 24 weeks. The total week errors decreased 26% by week 37.

b.2.) *kobetsu kaizen* in Radiology technicians' activities:

- The “as is” situation was characterized by: discrepancies in the technical areas; standard work inexistence; lack of performance indicators; lack of capacity leveling; and too much work in progress (WIP) between shifts.

The same analysis of root-cause and problem solving was performed and a workshop on standard work ending in the following actions:

- Definition of standard work for each activity;
- 5Ss in technical areas;
- Equipment usage standards implementation;
- Staff working timetables alteration;
- Appointment timetables alteration;
- Layouts and work flows redesign.

A clear “to be” state was in all staff minds at the beginning of implementation. It included: work standards adoption in X-ray, mammogram and CAT (Computerized Axial Tomography); capacity leveling (technician versus exams) and WIP elimination. Production indicators of capacity and delays in patient entrance to the radiology room were developed. It was also developed a problem solving system for problems raised during implementation phase.

For work standards definition a complete process flow chart was analyzed and settled the cycle times for each kind of exam (X-ray, mammogram and CAT) in two variations, the regular exam and the exam when there is patient reduced mobility.

One of the results was the diminution of the number of technicians from 4,5/day to 3,5/day. All other project goals were achieved and the technicians’ involvement was complete and stated by consultant interviewed as the major success factor of the project¹⁵.

b.3.) *kobetsu kaizen* in Radiologists’ activities:

- A similar approach was made to the doctors’ activities, only defining a “as is” state without doctors’ participation. Despite that absence the initial situation was characterized by inexistence of standard work, inexistence of monitoring indicators and two many material and people movements.

Therefore, the solutions pointed were: listing improvement opportunities and best practices along with the creation and deployment of procedure standards. It would be

¹⁵ Further results details were kept in secret for confidential reasons.

accomplished through mapping all processes, layout and room organisation improvement and get the doctor to participate in best practices sharing and a simple thing as to wear identification badge.

After several trials to fix a date for workshops with the doctors, the excuses lead to drop the project for doctors' lack of adherence.

However, some good practices were implemented that, in the end of the day, help doctors' work such as: indication of "patient recovering from surgery"; patient always is accompanied by an assistant; normalized different areas for exams dictated or waiting dictation; join all exams to be done to the same patient; and attempts for doctor's dictation occur before next patient entrance.

b.4.) *kobetsu kaizen* in Reception's activities:

A value stream analysis to the fifteen reception sequential activities was performed lead to question the existence of four of them. The first of them- organising exam prescriptions- was problematic as took too much time, even if it was made in previous day of patient arrival for exam. Also a lot of waste was identified in printing labels. Other sub activities that were time consuming and leaved patients waiting were invoicing to insurances.

The solutions were visible in the VSM and lead to a complete process redesign and also to remodel the reception team. The team was, in the end, organised by patient flow.

Some indicators were introduced to start a performance monitoring system as:

- Number of patients served
- Number of patients served out of scheduled time
- Number of programmed exams (with appointment)
- Number of non programmed exams (without appointment)
- Number of non performed exams for unprepared patients (missing prescriptions, etc)
- Number of non performed exams for insufficient information in prescriptions
- Occupation (hours) of each room/day/week
- Number of exams by room

- Number of claims
- Admission duration (average)
- Exam collection duration (average)
- Exam duration/sort of exam (average)
- Total time of patient permanence in the clinic (average)

For the patient all these three *kobetsu kaizen* result on visible improvements as:

- With the standard report, if the patient is submitted only to one exam, he gets the report at the end (as the step of going to typing department was eliminated);
- Was created a patient card system that avoids the patient leaving the clinic without doing all the exams;
- Waiting times between exams were reduced as gathering all exams to perform by patient changed the focus to the patient instead of the exam kind.

After external consultants left, the worked initiated continued, according to all interviewees. The creation of cross-functional teams with the purpose of all other non-clinical processes analysis had the same Lean projects purpose of creating standard work. In all management and support processes, written standard works were implemented and audited in regular basis.

9.7. Conclusions

This Lean deployment case first driver was to start a journey to create a common way of working among twenty one different units with different management heritages. The plan was starting in the “biggest” and “oldest” unit with some external help and then replicate to the other units with trained *senseis*. That goal was not achieved with a first kaizen project and a second deeper project was needed.

Answering the first research question -**What are the barriers to Lean implementation in Healthcare?**- this case presents as barriers to Lean implementation not only the change resistance, mainly by doctors, and returns to comfort zone in non monitored activities, both well solved during *kaizen* sessions, but mainly the discontinuity of *kaizen* programs. This works as barrier as the organisation doesn't seem committed to

complete the *kaizen* goals, letting the first event look like a mere experiment. Financial reasons alleged also worked as a barrier, being the external help of the consultants the main force of engagement, compass and leadership of the process. It lacked the internal leadership and *sensei* training.

That interruption of work and mind set could be avoided by adopting a team-based approach: - why not have an inside permanent *kaizen* team to identify error patterns and improvement opportunities?

Another flaw in the first project was the failure on an on-going monitoring system implementation that worked as a barrier to Lean achievements. That was taken as major milestone in the second project.

The second research question -**What enables Lean implementation in Healthcare?** - was answered by the evidence of a well conducted and succeeded *kaizen* event. According to the literature, quick-wins are themselves the first enablers to achieve a lean mind set. However, all the enablers found in the first project (Table 9.3) were not leveraged by continuous deployment and a second project was needed. Whereas implementation was quite easy, the long term sustainability seems jeopardized by the inexistence of leadership at all hierarchic levels and audit and monitoring system. It would be helpful to implement A3 reports (see Appendix C.2) for each process improvement.

That led us to the third research question: -**How to develop a sustainable Lean culture?** The case evidence regarding the sustainability keys: (i) strategy and alignment; (ii) leadership; and (iii) Behaviour and engagement, was fable or nonexistent leading to the conclusion that apart from the engagement of this first team seduced by novelty, no real long-term strategy was defined and, as consequence (or because of that), no leadership skills were shown in all hierarchic levels in the first project. However, as people changed, the new leadership relied on lessons learned to motivate the teams. Teaching people the tools and techniques is one thing, getting them to apply them in their working areas takes a mind set of self continuous improvement that leads to cooperation in sustaining the first quick-win achievements, so all the organisation can play the same tune and not individual notes. It takes more than just training to have a real change process; otherwise it is just cosmetic or housekeeping. In this reported case

the cosmetic wasn't even clear to the end customer in the first approach. Only after the second project patient pathway was reviewed and patients could real benefit from improvements. Auditing was required (three or four annual sustaining audits per work area, according to the literature) to achieve the fifth "S" - sustain. But sustaining actions must be pursued in daily basis.

Dealing with people in changing environment is, therefore, dealing with the "eight waste", the human potential that was not completely taken into consideration. And it is also managing the emerged information in a continuous improvement mind set.

With the second round of *kobetsu kaizen* some lessons learned were revisited and, apart from the doctors, a Lean mindset was broader created. However, the approach was too much focused (*kobetsu*) in functional areas, not an end-to-end process approach that would include cross-functions and probably led to a bigger involvement of the doctors.

Another possible critic is that the diminution of the number of technicians apparently contradicts the Lean principle of respect for people as it gives the impression of using Lean to reduce staff. However, this group of clinics started the productivity project (the second Lean project) in same pilot clinic of the first project and spread to the others with the concern of relocating unfit staff.

In spite of being supported by a single case study, the followed approach and the research design enables replication it in other units of analysis with same inclusion criteria. It will be useful for the predicted future *kaizen* projects for this or other organisations.

10. Cultural change in Healthcare organisations through Lean practices¹⁶

10.1. Abstract

This paper main purpose is to understand the change of organisational culture by the adoption of new work practices resulting from Lean deployment. Therefore, a grounded theory approach from qualitative data from four Hospitals running Lean projects was adopted, exploring in cross-case analysis what were the enablers and failure motives.

A Lean culture construction path from practice repetition changing behaviour to change thinking is defended. The propositions formulated and hypotheses provide a research agenda for following studies. A Lean maturity model for Healthcare organisations is presented as a starting point for developing a Healthcare Lean Assessment (HLA) instrument.

This paper contributes to the recent research in cultural aspects of Lean, in a culturally rich service setting, Healthcare, bringing some new insights to the organisational culture change theory in context on Lean deployment and providing a framework for understanding Lean maturity stages.

This paper explores both the hard and the soft sides in Healthcare settings, absent from many of Lean transformation literature. Addressing the Healthcare organisational culture change under national culture awareness brings a new approach to Lean deployment assessment in Healthcare settings.

10.2. Introduction

The cultural aspect of Lean has been recently explored in the literature, although predominantly in a manufacturing setting, establishing a link between Lean success and cultural elements (Bhasin and Buercher, 2006; Hines, 2010; Wong and Cheah, 2011).

¹⁶ This chapter is based on the article: "Culture Change in Healthcare Organisations through Lean practices" submitted to European Journal of Cross-Cultural Competence and Management.

This paper contributes to the recent research in cultural aspects of Lean, in a culturally rich service setting, Healthcare, bringing some new insights to the organisational culture change theory in context on Lean deployment. Having as starting point the broad questions: -“how does Healthcare organisational culture change in Lean deployments”, and “why Lean programs fail”, an “embedded multiple case” research was conducted and results compared (Eisenhardt and Graebner, 2007; Yin, 2009).

The most pointed reason for improvement programs failure in Healthcare is their failure to address organisational culture (Boan and Funderburk, 2003; Kaissi *et al.*, 2004). Some authors place culture as the “infrastructure for change” in Healthcare (Atchison, 1999). Others present Healthcare culture as a consequence of structure and processes, stressing the need for an external “out of the box” change agent helping internal change actors (Anson, 2000; Eaton and Phillips, 2008; Towill, 2009). This paper main purpose is to understanding the change of organisational culture by the adoption of new work practices. Lean sustainability through an organisational Lean culture construction management is treated by a recent stream of literature in manufacturing setting cases (AME, 2009; Mann, 2009; 2010). This paper explores both the hard and the soft sides, absent from many of Lean transformation literature addressing the Healthcare organisational culture change under national culture awareness (Hofstede, *et al.*, 2010; Webster and White, 2010). The following section establishes the linkage between these two levels of culture, while the subsequent sections address the Healthcare culture and the Lean path of cultural change in Healthcare settings.

The literature revision on critical success factors of Lean deployment in Healthcare was complemented with some insights from the literature on Lean deployment in manufacturing settings addressing sustainability of Lean and, most of all, the Lean cultural aspects.

A cross-case analysis was carried out in order to understand how an organisational culture can change through Lean deployment in Healthcare settings, what are the enablers and failure motives. Discussion, emerged propositions and hypotheses precede these paper conclusions.

10.3. From national to organisational culture

The common underlying theme of culture definitions is based on an organisation's values, beliefs, and their shared philosophy (Barney, 1986; Deal and Kennedy, 1982; Ouchi, 1981; Pettigrew, 1979; Schein, 1990; 1996; Shockley-Zalabak and Morley, 1989). Despite has no academic consensual definition, “organisational culture” (Pettigrew, 1979), has been characterized by several authors as: holistic; historically determined; related to anthropological concepts; socially constructed; soft; and difficult to change (Hofstede *et al.*, 1990). The metaphor “culture as the software of minds” suggests that national values influence organisational ones, even when there is a very strong culture i.e. homogenised culture (Hofstede, 1980, 1985; Hofstede *et al.*, 2010). The analysis of organisational cultural patterns increases complexity when consider the several subcultures inside an organisation (Hofstede, 1998a).

On the other hand, Schwartz (2006) posits that corporate cultures are embedded into a national value system and that situational values map the influence of task on behaviour and values whilst personal values are trans-situational. The author places culture as a latent variable only measured through its manifestations. In consonance with this stream, similarities between corporate and national cultures were explored in Sagiv and Schwartz (2007) as in Webster and White (2010) in service firms.

Moving from national to organisational cultural setting, it is not consensual in the literature if cultural effects and context effects are complementary or iterative, especially when studying mergers and acquisitions or joint ventures in a multinational level (Shook, 2010).

However, while national cultures differ mostly at the level of values, organisational cultures differ at the level of practices: symbols, heroes and rituals (Hofstede, 1998b; Hofstede, Hofstede, and Minkov, 2010: 347). Hofstede's (1998b; Hofstede *et al.*, 2010: 314) position is that within an organisation, members' values depend primarily on broader levels of culture as gender, nationality, class, education and through the socialization process they learn the organisational practices in five types of structure configurations and coordination mechanisms (Mintzberg, 1979).

Schein (1985) classifies three levels of organisational culture: artefacts as level one at a pyramid's top, values, and beliefs as level two, and basic organisational assumptions as level three. Another classification of manifestations of culture in four categories: symbols, heroes, rituals and values, is given by Hofstede *et al.* (1990) separating the values (the less superficial and visible category) from the practices (that comprehend, from less to more visibility, rituals, heroes and symbols), placing the shared perceptions of daily practices in the core of organisational culture. Moreover, this study showed that in the culture construction, the way that founders and leaders values shape organisational culture is when they become member's practices suggesting the importance of the fit between management practices and national culture. One of Newman and Nollen's (1996) results posits that this fit was greater in collective national cultures than in individual national cultures.

The controversial issue of "culture management" in the academy and the increasingly practitioners' interest in culture management, resulted in a research stream on culture management in manufacturing and services settings (Ogbonna and Harris, 2002). Due to the association with "soft" aspects, organisational culture studies have traditionally adopted qualitative methods. However, several instruments for organisational culture assessment can be found in the literature, most in a preliminary stage of development, offering different insights (Jung, Scott and Davies, 2009). In Healthcare settings, nine culture assessment instruments were studied leaving remarks on the need of validity and utility (Scott *et al.*, 2003). Defining an organisational culture, through a balanced framework as the Competing values (Cameron and Freeman, 1991) where different models can and should coexist in the same organisation, disclosures the importance of values' congruence determinant to organisational change (Lamm *et al.*, 2010). Despite of its application in organisational culture assessment, namely in Healthcare settings (Blair *et al.*, 2002), doubts remain of the suitability of assessing organisational values by survey. The value congruence analysis (Argyris, 1964) increases complexity when looking at the culture construction in consonance with the "system view" defending a dynamic top-down-bottom-up process across all levels of culture.

In Schein's (2009) definition of culture, culture is presented as a consequence, not as a cause as in Hofstede's (Steel and Taras, 2010). Therefore, the culture changing analysis (in section 10.4) can provide valuable insights to better understand these two

opposite views of culture. This analysis is pertinent at national level to understand, for instance, if rapid economic and societal changes accompanied by visible changes in cultural values, as at organisational level, to understand in what way the organisational culture is affected or affects drastic structural changes as downsizing (Freeman and Cameron, 1993), improvement processes transformations as Total Quality Management (Deming, 1986) or Business Process Reengineering (Hammer and Champy, 1993) and new management philosophies, as Lean Thinking (Womack and Jones, 1996, 2003).

10.4. Healthcare cultures and subcultures

In Healthcare settings, organisational culture has been associated with work climate and job satisfaction (Anson, 2000; Lindberg and Rosenqvist, 2005), quality of service (Davies *et al.*, 2000; Montgomery *et al.*, 2011) and patient safety (Weick and Sutcliffe, 2001; Stock McFadden and Gowen, 2007). Graban (2008) presents Lean deployment in hospitals as all three items solution. Some authors present an evolutionary view of Healthcare organisational culture as the Healthcare sector transformations' emphasis shifted from functional to processes, with increasing need of speed, flexibility and network orientation (Vestal *et al.*, 1997).

However a common thread is present in not considering a unique culture, but the coexistence of subcultures along different departments, called "tribalism" (Bate, 2000). The tensions between clinical and non-clinical groups is described by this author by the "tribes" metaphor explaining the "culture of blame" and "culture of secrets" resembling the "silos" metaphor of management literature. In organisations with Healthcare professionals, with different subculture's tensions, a professional may be striving for innovation while resisting bureaucratic controls, supervision, and standards, especially in public organisations (Shaw, 2002). Throughout a visit to the British National Health Service (NHS), Merali (2003) assessed the manager's (mainly middle managers) view of their culture and public image illustrating the coalitions in subcultures and surprisingly finding that managers believed they held altruistic values and support public reforms of collaboration between purchasers and providers, despite their perceptions of a negative public image in society.

The subcultures within a Healthcare organisation are also explored by Faull, Kalliath and Smith (2004) distinguishing clinical culture from management culture, suggesting a “them-us” division. In a Microsystems perspective, Storey and Buchanan (2008) present some Healthcare idiosyncrasies or barriers to improvements: performance and productivity over-regulation focus; professional autonomy adverse to risk/error reports; craft worker mindset adverse to standardisation; professional overprotection adverse to transparency; and complacency and excessive complexity of safety systems that tend to lose relevance. Spear (2005) suggests that the ambiguity and work-around culture change could be made through small changes in a process approach just like in Toyota Production System (TPS).

10.4.1. Healthcare public culture

Due to the predominant public nature of Healthcare organisations in almost all national health systems, it seems suitable to review the literature on public sector’s culture. It is recurrent in the public culture analysis through the competing values map (Quinn and Rohrbaugh, 1981; 1983), the classification of public organisations as “hierarchical culture” also called the internal process model. This model enhances the enforcement of rules, conformity, and attention to technical matters and reflects the traditional theoretical model of bureaucracy and public administration supported in formal rules as control mechanisms (Denison and Spreitzer, 1991). It is desirable, according to these authors that the four models coexist in a balanced way within an organisation.

Different organisational constraints bound public and private service-based organisations, which in turn drive different cultures (Perry and Rainey, 1988). Public organisations have been constrained by political authority, activities and legislation resulting in critics regarding accountability and efficiency (Cole, 1988) who are distant to a rational goal model and emphasises a hierarchical culture. Several transformations towards a goal orientation, efficiency and productivity, since the “New Public Management” (Dunleavy and Hood, 1994) approach to, a more recent search for the private sector best practices by adopting Lean management practices (Radnor and Walley, 2008), had to deal with this specific public culture legacy along with some subcultures. Studying six public organisations adopting New Public Management

orientations, Parker and Bradley (2000) found a traditional and bureaucratic public culture resilience that prevented culture change.

Pedersen and Huniche (2011), studying Lean deployment in the Danish public sector, conclude that the outcomes don't depend only on tools and techniques, but mainly in the negotiation context in which the planning and implementation of Lean projects take place.

Reviewing the literature on management of change in Healthcare settings, Ferlie *et al.* (2003) underline the importance of a cross-national comparison and stress the importance of theory building to complement the exclusive focus on application. The authors characterized the existent literature by: strong organisational behaviour strand; strong Healthcare focus; mainly use of qualitative methods; excessive national centric focus; and lack of theory development with practice linkage. These authors present a future research agenda stressing the importance on the political and managerial discussion around governance issues to the “added value” of a public organisation. Likewise, Lega and DePietro (2005) explore the motives and changes that turned Healthcare organisations from professional bureaucracies to structures of bureaucratized professionals.

Radnor, Holweg and Waring (2012) presenting Lean as one way of introducing principles and practices of system thinking in the public sector, underline some barriers to the successful implementation of Lean principles and associated techniques in the UK public sector as: lack of clear customer focus; too many procedures; people working in silos; too many targets; lack of awareness of strategic direction; general belief that staff are overworked and underpaid, and lack of understanding of the effect of variation, systems thinking and process flow.

10.5. Changing culture in Healthcare settings

Organisational change has been a broadly explored topic in the literature (Dawson, 1994; Denis *et al.*, 1996; Ferlie, Hartley and Martin, 2003; Lewin, 1947; Mintzberg and Westley, 1992; Taylor and Wright, 2004; Van de Ven and Poole, 1995) addressing different perspectives: one focusing on successful changes exploring the drivers, the

strategic intent behind, the change process (in a more or less prescriptive way), among others; and another perspective focusing the unsuccessful attempts addressing mostly the cultural and “soft” issues as commitment, individual and organisational constraints and the management versus leadership issues. Studying organisational change for forty years, Beer and Nohria (2000) tried to explain the failure rate of 70 % in change processes through two theories of change. According to these authors, “Theory E”, representing the “hard” side of change, emphasizes the economic value related to restructuring processes. On the other side, the “Theory O”, the “soft” approach of change focuses in corporate culture development and human capability, trust building, emotional commitment by teamwork and communication. The authors posit that the combination of both theories enables successful change along the dimensions: goals, leadership, focus, process, reward system, and use of consultants. Hines’ (2010) iceberg metaphor seems suitable to this distinction, presenting the technology, tools and techniques along with process management, on the hard side, the visible side of Lean, and, below waterline, the soft side with the behaviour and engagement, leadership, strategy and alignment issues. A complete set of prescriptions for successful change in Healthcare organisations, supported in the literature on change, are presented by Steven and Lee (2000). Even the most prescriptive approaches (Kotter, 2007) stress the need of anchoring changes in the organisational culture to achieve a new “way we do things around here”.

Organisational culture change can be seen in two opposite ways, one that defends that change should start at the less visible and tacit part, at the assumptions, then values, until be visibly manifested in artefacts and practices, and the other way around, changing first the most visible part and through new practice and behaviour gradually change culture. This last view is defended by practitioners, in Lean literature (Shook, 2010), and also by academics like Schein (2009).

Organisational culture has also been studied in context of Total Quality Management (TQM) implementations (Becker, 1993; Bright and Cooper, 1993; Chang and Wiebe, 1996; Jackson, 2001) enhancing the importance of the cultural change. However, and according to Davies, Nutley and Mannion, (2000) there is little evidence to show that implementing TQM changes an organisation’s culture in Healthcare settings. Implementation problems of combined business improvement programs (TQM and

reengineering) are associated with a difficulty of “mindset” changing in Healthcare organisations (Trisolini, 2002).

There is a significant body of literature that explore the idea that the difficulty of organisational culture change by imposing norms and values in a top-down direction (Beer *et al.*, 1990; Molinsky, 1999). In Healthcare settings, this view is enhanced by studies that defend changes through individual behaviour (influenced by new physical work environment, roles and responsibilities) repeated by as many people in order to achieve organisational level (Olsson *et al.*, 2007).

Some authors present culture change as a learning process of knowledge sharing in the so called “learning organisation” with a big focus on continuous improvement (Burnes *et al.*, 2003; Wang and Ahmed, 2003). Others, addressing the evolution from bureaucratic to learning organisations through the development of empowerment, teamwork, trust, communication, commitment, and flexibility as requirements for personal mastery, mental models, shared vision, team learning, and systemic thinking (Jamali *et al.*, 2006). Following this stream, Taylor and Wright (2004), in public Healthcare services context, analysed the contribution of the factors: open leadership climate, information quality, satisfaction with change processes, learning from failure, and change vision and performance orientation to an effective knowledge sharing.

10.5.1. Changing Healthcare culture with Lean deployment

Culture has been historically moulded (Hofstede *et al.*, 1990) and deeply ingrained in an organisation and as a result is difficult to change (Atchison, 2002; Drucker, 1995; Hofstede *et al.*, 1990; Narine and Persaud, 2003). Called by some, “glue” that keeps an organisation together, the culture i.e. the way organisations’ members perceive daily practices, cannot be changed by force but through managerial shaping of new practices (Hofstede, 2000).

Mintzberg’s (1997) approach to Healthcare organisational culture as a professional bureaucracy, where standards are established externally, defends a systemic problem solving through change in collective behaviour, rather than strategic planning or structural reorganising. Moreover, the author posits that in professional bureaucracies, the purposes of persistence and order inhibit change. Resistance to change has been

treated in the literature as intrinsic to a change process for the difficulty of leave the comfort zone and a *status quo* of familiar ways of working (Kotter, 2007; Piderit, 2000; Strebel, 1996; Trader-Leigh, 2002). Pettigrew, Ferlie and McKee (1992: 268) argue that: “the management of change is likely to be contextually very sensitive that there is no “quick fix” or simple recipe and that there is no one way of effecting change”. The authors conclude that “the introduction of general management has not been at all general, and there seemed almost as many general managements as general managers” suggesting that the subcultures and silo structure is one of Healthcare big resistant factors.

Guimarães and Carvalho (2011a), presenting a organisational and national culture ground of Lean deployment in Healthcare organisations in a cross-national case analysis, posit that not all Lean deployments involve cultural transformations, while working only the hard issues of Lean, but to sustain Lean in long-term basis the culture change is an implementation enabler and the path to achieve it is working also the soft side of Lean. Furthermore, Guimarães and Carvalho (2012a), exploring the barriers and enablers of a sustainable Lean culture in Healthcare, posit that the discontinuity of deployment, taking Lean as experiment events, short-term orientation, exclusive focus on Lean tools, and lack of ongoing audits prevent the creation of a Lean mindset.

Achieving “Lean Thinking” (Womack and Jones, 1996, 2003) is though achieving a mindset, a way of life, or a “way of doing things around here”. Mann (2009) attributes to Lean management the linkage role to overlap the gap between Lean tools and Lean Thinking. Lean as a culture, in Healthcare, is address by Graban (2008: 21) recurring to the Toyota Triangle where Lean is presented as an integrated system that starts with people and human development (in the middle) surrounded by a balanced approach combining technical tools (what we do), managerial tools (how we manage), and philosophy (what we believe). However, if Healthcare organisations beliefs, varying with ownership and national culture, distant from Lean beliefs (Liker (2004), how can those organisations successfully deploy Lean? Visiting the array of Lean deployment cases in Healthcare settings, from the most iconic cases (Radnor, Holweg and Waring, 2012), to the most unknown, it seems that “people are much more likely to act their way into a new way of thinking, than think their way into a new way of acting” (Graban, 2008: 23).

10.5.2. Change's critical success factors

In the literature on Healthcare organisational culture, especially in quantitative studies, there is a wide range of cultural dimensions. The Mackenzie' (1995) questionnaire explores twelve dimensions: employee commitment; attitudes and beliefs about innovation; attitudes towards change; conflict resolution style; management style; confidence in leadership; openness and trust; teamwork and co-operation; action orientation; human resource orientation; consumer orientation; and organisational direction. The qualitative part of this study addressed the key organisation's values, the use of heroes, rituals and ceremonials to reinforce core values, the use of rewards and punishments and the attitudes to deviants. It presents merely a picture of a certain moment in a certain organisation without considerations on culture change.

Some of the literature of culture change in Healthcare settings presents, in a prescriptive way, a range of variables for success (Applebaum and Wohl, 2000). Atchison (1999) explore nine success factors in an American Healthcare unit: readiness to change; ability to change; timing of change; CEO leadership; internal champion (the change broker); guiding coalition (a sort of steering committee); communication strategy; vision statement and recognition.

Thus, it is worthy to address what is called in the literature by Lean implementation success factors. In manufacturing settings, Turesky and Connell's (2010) revision enumerates: top management support with long-term focus; cross-function effective communication flow; training and development; project preparation; employee engagement; desire to improve service; managing resistance; project team selection; completing the project; and accountability/ follow-up. Bhasin and Burcher (2006) present a technical and cultural requirement association to a Lean philosophy. In Healthcare setting, Eaton and Phillips (2008) point a set of Lean sustainability factors: communications; resources; involvement; training; implementation/measurement systems; compass; achievement; and leadership. The authors value also the reward spirit and the expertise of external support that is useful to "look outside the box".

- *Communication*

Studies in Healthcare settings have found that leadership and communication effectiveness are both necessary to create a culture or influence its changes (Applebaum and Wohl, 2000; Corbett, 1986; Narine and Persaud, 2003; Shaw, 2002). It is consensual the importance of the information communication regarding all the steps in the change process not only for alignment purposes but mostly for maintaining positive morale. Some of the resistance to change can be solved by effective communication where benefits for all are enhanced and feed-back is collected.

According to Narine and Persaud (2003), a clear and consistent communication is critical for gaining and maintaining commitment. The authors suggest that a good communication plan should include several methods as meetings; workshops; personal discussions; progress reports; newsletters and quarterly briefings, and the ownership of this plan must reside with a committed group of stakeholders representing every area and level of the organisation.

Some posit that transparent communication and trust relationships are rare in Healthcare organisations (Braithwaite *et al.*, 2007).

The communication factor is a constant in Lean transformations' phases, not only before implementation, in foundation and preparation, but also during implementation for reporting and problem solving, and after for communicating partial achievements in order to celebrate successes (Womack *et al.*, 1990; Turesky and Connell, 2010). Lucey (2009a) addresses the success celebration issue on a reward and consolidating perspective, consonant with Maslow's (1943) hierarchy of needs perspective. The author underlines a genuine two-way communication process as the base of employee engagement.

- *Leadership*

The sustainability of Lean deployments depends a great deal on the top management support and effective leaderships (Achanga *et al.*, 2006; Hines, 2010; Hines *et al.*, 2008; Mann, 2009). Leadership research in Healthcare settings has become an attractive topic. Schwartz, Tumblin and Peskin (2002) noted that most Healthcare organisations have transactional leaders. Bycio *et al.* (1995) found that Healthcare workers are more likely

to leave their positions and have less organisational commitment when working with transactional leaders. Gabbert (2005) review the prevalence of transformational and transactional leadership among hospital chief executive officers. Studying the merger of a number of Healthcare facilities Valentino and Brunelle (2004) postulated that ensuring a congruent leadership style and type of organisational culture would result in improved organisational effectiveness, improved communication, staff satisfaction, and including lower staff turnover. Magliocca and Christakis (2001) noted that transformational leadership enables and motivates real change by its proactive style, as opposed to transactional leadership of reactive kind. Nevertheless, there is a still unexplored hypothesis as organisation or sector in crisis may embrace a transformational leader, while an organisation seeking stability or the *status quo* may adopt a transactional leadership style. Moreover, other factors, such as organisational life cycles, size, and ownership, in terms of influencing transformational versus transactional leadership styles deserve further research.

A stream of literature has documented the relationship between leadership style and organisational culture (Bass and Avolio, 1993; Cameron and Quinn, 1999; *et al.*, 1990; Schein, 1990), providing a basis for the study of the correlation between various leadership styles and other variables as organisational types of cultures. If on one hand, leadership styles can affect types of organisational cultures (Campbell, 2004), on the other, the type of culture may affect leadership style (Bass and Avolio, 1993; Kerr and Slocum, 1987; Schein, 1985). Leadership shapes culture by affecting behaviours, values, and beliefs. Organisational culture shapes behaviours that influence the power of the leader. Hence, the process of influencing culture and leadership works in both directions.

The middle-management role has been treated in the literature as “innovator” (Kanter, 1982), the interface between strategic intent and implementation, sometimes even beyond implementation, especially in Healthcare settings (Currie, 1999; Mintzberg, 2002; Guo, 2003). In Healthcare settings, where the frontline staff visibility is determinant for service performance, middle managers need to have four competences: management of attention (new vision creation); management of meaning (communication of vision meaning); management of trust (reliability building); and management of self (make collective decisions) (Valentino and Brunelle, 2004).

Moreover, the authors subscribe Schein's eight steps for organisational change: create a compelling positive vision; coach and provide feedback; be a positive role model; provide opportunities for formal training; create employee empowerment; create interdepartmental groups and cross-department liaisons; provide support groups; and align the organisations reward and discipline systems with the new way of thinking and working. Thus, the power structure of an organisation defines different leadership levels, each one contributing differently for Lean sustainability (Mann, 2009). Doss and Orr (2007) inspired in leadership at Toyota, summarized nine Lean leadership behaviours relevant for Healthcare: teach and engage workgroups; respect for people; process focus; support and recognition; lead by example; deploy policy and objectives; commitment to standards; long-term vision and principles and support the change process.

- *Commitment*

Kegan and Lahey (2009) explain resistance to change by the coexistence of contradictory commitments, the visible commitments and the hidden competing commitments. Other authors stress the need for gain consolidation through feedback mechanisms that help to maintain the commitment level to change (Ingersoll *et al.* 2000; Narine and Persaud, 2003). The people involvement is the path for their commitment to effective change (Towill, 2009). Other authors call it "employee engagement" and stress the need of its assessment (Lucey, 2009a; 2009b). The author underlines the fact of the literature on engagement is underdeveloped and defines the concept of a "Lean sustainability zone" measured by engagement high scores. Furthermore, the engagement score required for the beginning of the Lean journey is, according to Lucey (2009b) less than the one required for sustain Lean. Lucey, Bateman and Hines (2005) research found a strong correlation between employee engagement and Lean sustainability. The Lean journey must be travelled by all members; hence, having everyone's involvement is required for culture change. Motivation of the members by "walking the talk" might avoid some of change resistance. However, some authors posit that successful Lean initiatives are front-line driven, by opposition to less successful that are management driven, stressing the overall impact of small ideas (Robinson and Schroeder, 2009).

- *Training*

Boan and Funderburk (2003) enhance the importance of training teams in Healthcare similarly to the training developed in airline industry for improvement programs. The benefits of training explored in a literature stream on “learning organisations” are broader than Lean skill development. It is an opportunity for trust building, employee empowerment and participation and promotion of cooperation and knowledge sharing between groups. McGill and Slocum (1994) present the learning organisation concept as a result of an evolutionary process of three previous phases starting from the “knowing organisation”, then the “understanding organisation” and the “thinking organisation”. Senge (2006) explains the same evolution through the process of shifting from single loop learning to a double loop. Hines *et al.*, (2008) added an evolutionary model of continuous improvement behaviour to present a sustainable framework of Lean transition where training plays an important role in every phase. Conversely, Turesky and Connell (2010) present “training and development” as part of the first (out of four) phase of Lean project, the foundation phase, without mention it in subsequent phases of “preparation”, “implementation” and “sustainability”. This view arises the question of the importance on on-going training, namely on-job training, to the sustainability of Lean.

- *Pace*

In the change process the implementation guidance has, to follow the planned path, achieve a consistent pace. Some authors consider being the main role of a steering committee (Jackson, 2001; Narine and Persaud, 2003). Again, the change project leadership is also at stake, but here it acquires a collective form by having representatives from each major function selected by the most senior leader in the organisation. Pace is addressed by Lucey, Bateman and Hines (2004) as a result of enthusiastic leadership, employee engagement and “Lean Coaches” program management. The importance of rapid improvement events (RIEs) sequence and pace in keeping high morale need to be completed with a systemic view of the change process (Radnor and Walley, 2008).

- *Monitoring*

Monitoring performance is considered by Radnor *et al.* (2012) one of the Lean activities, along with assessment and improvement. In Healthcare services several Lean appraisal forms have been already tried. Kollberg, Dahlgaard and Brehmer (2007) studied the suitability of a “flow model” to assess Lean deployment in Swedish Healthcare system. According to these authors the model seems useful to deal with waiting times and delays but need to be completed with other measurements, namely to reflect patient satisfaction, referral management, process mapping and fulfillment targets and policies. Thus, a holistic instrument that can cover not only the internal Lean deployment but the extended enterprise is necessary. According to Mann, (2010: 222) an assessment schedule and an application detailed plan should guide the implementation process and it should be posted where results can be seen. A monitoring instrument should cover both the hard aspects of Lean deployment as the soft aspects.

10.6. Methodology

This research departing point is questioning:

-How does Healthcare organisational culture change in Lean deployments?

- Why Lean programs fail?

These questions are, according to Strauss and Corbin (1998), flexible and sufficiently general to allow a bottom-up approach of gathering field data to the goal of conceptualization of findings. Thus, the grounded theory approach from qualitative data seems appropriate (Glaser and Strauss, 1967).

Literature was reviewed in order to find what “we know about this” subject (Hutchinson, 1993), stimulating theoretical sensitivity, providing a secondary source of data and supplementary validity (Strauss and Corbin, 1998). Contradictory answers on organisational culture change process were found, and although some references to soft aspect in Lean deployment in Healthcare settings, none seems to deeply explain a cultural change process under Lean deployment context. Therefore, and for capturing the complexity of organisational culture change the qualitative method of the

comparative case-study was chosen, as it is rooted in contextualism (Pettigrew, 1990, 1997) and is suitable to theory building (Eisenhardt 1989). Miles and Huberman (1994) reinforce the need for comparative analysis to generalisability and deeper explanation. Also, according to Yin (2009), case study method is appropriate to “How” and “Why” questions and to investigate a contemporary phenomenon in its real-life context when the boundaries between phenomenon and context are not evident. In case selection the inclusion criteria were: to be a Healthcare organisation running Lean projects (pilot short interviews tested the familiarity of the Lean concept) and to be a public organisation (reducing cultural idiosyncrasies and increasing chances of replication).

Four case studies in four public hospitals were conducted by gathering a range of evidence which included semi-structured interviews, site visits, implementation observation, and documental analysis (implementation reports, organisations’ annual reports and internal memos, newsletters and press releases). A two-step interview process was completed when data saturation was reached, between January 2011 and January 2012, following a semi-structured interview guide (Appendix A) covering the Lean success factors selected from literature review and treated as main codes: communication, resources, involvement, training, monitoring, pace, achievement, and leadership. Were interviewed significant participants (senior manager, programme lead, program team members, staff members who were affected by the change, consultants, relevant middle managers and service professionals) of the project implementation that was the focus of the study (Baker, Wuest and Stern, 1992). Taped transcripts were used to assist in data collection.

Data analysis followed Miles and Huberman (1994) recommendations on data codification, reduction and categorization techniques. There was an iterative process of interviewing, coding and analysis from data collection (Charmaz, 2006; Glaser and Strauss, 1967).

The cross-case analysis (Bourgeois and Eisenhardt, 1988) was conducted in two different moments: a preliminary analysis focused on data from each single case, then, data grouped by Hospital were codified and reduced in a systematic approach. The results were used in a second moment to perform cross-case analysis. The similarities and differences are presented in the following section.

10.7. Cross-case analysis: four public hospitals deploying Lean practices

Case “A”- A public general multi-site hospital (three units around 12 km distant from each other) with 580 bed capacity, an annual average discharges of 22,000 and annual outpatient average of 335,000, in a seven building structure in the central unit. In February of 2007, were identified as priority areas for massive improvement the logistics and supply chain department. Among the main problems and clinical services claims were: distribution problems, delivering errors, stock outs, excess of bureaucracy, difficulties in distribution routes optimization, paper-based information exchange (internal requisitions and between units), lack of stock visibility (internal and external), high inventory levels and “secret” safety inventory in each clinical service. The 5 year project (being the last two of replication the all sites) started with a pilot service, focused in four pillars: Processes – all material management processes were mapped and redesigned in order to resource optimization and waste reduction; Organisational structure – process orientation actions involving all material management staff, adjusting skills and providing adequate training; Information Systems (IS) – a big effort to implement and adjust systems to the redesigned processes; Infrastructures – lay-out redesign towards flow optimization. Warehouses were organised, distribution routes were created (joining non-clinical and pharmaceutical material in same route), new stock management was introduced and new supply chain practices.

Case “N” – A public central hospital (one of three unit governance group) operating as a large scale consolidated service centre (all support services are here centralized). With 596 bed capacity, an annual average discharges of 22,000 and annual outpatient average of 350,000 in 30 clinical specialities. For influence of the Logistics Director (actual CEO at Hospital-case 3) a consultancy company started a Lean project in the logistics (clinical, non-clinical and pharmaceutical products) and supply chain department for warehouse organising and introduction of *kanban* as replenishment system, followed by another Lean project in outpatient clinic, and a third in the operating rooms, for process organisation, increase productivity and reduce patient waiting times.

Case “H” - A public general hospital (including five primary care units and a long-term care unit in same governance group), with 439 beds, and annual discharge average of 17,200 and annual outpatient average of 220,200. With the Administration board

change, the new CEO (coming from Hospital-case 2) contracted the same consultants for applying the same recipe in logistics (clinical, non-clinical and pharmaceutical products) department. Warehouses were organised, distribution routes were created (although separating clinical and non-clinical route from pharmaceutical route) and *kanban* replenishment system was introduced.

Case “C” - A public central hospital (one from a two unit governance group) with 421 beds, and annual discharge average of 17,000 and annual outpatient average of 180,000. A technology cantered project was started for implementing *kanban* system in all clinical departments and operating rooms. The main purpose was to introduce new material management habits by pulling materials from each service consumption point and reduce consumption. The phased implementation plan implied, in a first phase, six clinical services coverage in four months, in the second, ten services in two months, and the third, nine services in five months.

All these four cases were considered Lean deployment cases for the core purpose of continually improve a process by either increasing customer value or reducing non-value adding activities, process variation, and poor work conditions (Radnor *et al.*, 2012). Table 10.1 provides an overall briefing of all studied cases.

Table 10.1 - Lean projects overview

	Case A	Case N	Case H	Case C
Scope/ start year	AA Project-Material Supply Chain Management (SCM) (2007)	P.1-Logistics (2005) P.2- Outpatient clinic (2008) P.3- Operating Rooms (2009)	K Project-Logistics (2009)	EK Project-Logistics (2008)
Duration	5 years	3 years (1 year/project)	1 year	15 months
Lean approach	Value Stream driven/SCM Bottleneck elimination, IT supported	Classic Kaizen Blitz (RIEs)	Classic Kaizen Blitz (RIEs)	Kaizen Blitz IT driven
Lean Practices	Outsourcing (Vendor Managed Inventory); Standardization (routes, tasks and materials);	Standardization (routes; documents) 5Ss <i>Kanban</i>	5Ss <i>Kanban</i>	Standardization (routes; tasks) <i>Kanban</i>
Pilot phase	Yes	Yes	No	Yes
Major Outcomes (Quality, Cost and Time)	SCM visibility and flow optimization; Stock reduction; Stock out reduction; Win-win partnerships	Stock reduction; Stock out reduction Replenishment frequency doubled; Patient waiting time reduction; Better outpatient work planning	Stock reduction; Replenishment frequency doubled	Stock reduction; Stock out reduction; Replenishment frequency doubled
Interviewees	11	12	6	6

Source: the author.

Table 10.2 presents the cross-case dimension comparison after data triangulation and analysis.

Table 10.2 - Dimensions/codes cross-case analysis

Codes	Case A	Case N	Case H	Case C
Wastes	Distribution problems; delivering errors; stock outs, paper-based information exchange; high inventory levels;	Distribution problems; High inventory; Stock out Out-of date material; High consumption; Low productivity	Distribution problems; High inventory; Stock out Out-of date material;	Stock out of date Paper work, time consuming No distribution method
Communications	Two-way free communication CEO project opening; Multi-function meetings Successes were celebrated	Two-way free communication Top Management project opening; Multi-function workshop team Successes were celebrated	One way communication Successes were not celebrated	One way communication Successes were celebrated only at high hierarchic level
Leadership	Transformational at all different levels (Top, middle +project management)	Transformational at middle and project management	Transactional at all different levels (Top, middle + project management)	Transactional at all different levels (Top, middle + project management)
Commitment	CEO; Middle Management; Project Leader, Steering Committee;	Top Management Middle Management; Project Leader, Steering Committee	CEO Project Leader	Top Management Middle Management; Project Leader,
Resources	External consultancy Software development IS equipment	External consultancy*	External consultancy*	External consultancy IS equipment
Involvement	High from all project participants	High from all project participants, with exception of clinical directors	Medium from all participants, and low from Logistics Director	High from project promoter and Logistic Director, Medium from clinical staff
Training	Process Mapping Technology use (PDA, RFID)	Weekly workshops; Tools: Process Mapping, 5Ss, Visual Management; <i>Kanban</i> replenishment Behavioural: (reception, waiting rooms)	Weekly workshops; Tools: Process Mapping, 5Ss, <i>Kanban</i> replenishment	<i>IS Kanban</i> replenishment on job;
Implementation	Weekly meeting in kickoff, twice a month meeting in first 2years. Pilot clinical service envied by subsequent ones.	Weekly workshops followed by site deployment	Weekly workshops followed by site deployment	Three phased implementation according to service complexity.

Table 10.2 (Cont.)- **Dimensions/codes cross-case analysis**

Codes	Case A	Case N	Case H	Case C
Assessment/ Monitoring	Weekly monitoring sessions (implementation phase) Daily site monitoring included in Logistics Manager routine (without specific instrument)	Overall project deployment audit 5 level instrument; 5Ss monthly audit system; Only during project time (consultant presence)	5Ss monthly audit system; Only during project time (consultant presence)	Initial and final project auditing;
Pace	Imposed by Project leader (an “internalized” consultant team member; Ongoing report to Top Management; No rescheduling)	Imposed by Middle Management with project leader	Imposed by project leader	Imposed by project leader
Achievement	Satisfaction with all results, measured and monthly reported. New habits incorporated.	Tendency to return to comfort zone; All expected results achieved, new habits incorporated, except in operating rooms	Persistence of task duplication and time wastes for not solved the pharmacy department resistance.	Lack of outcome consistency; New habits not incorporated.

* Same Consultant Company.

Source: the author.

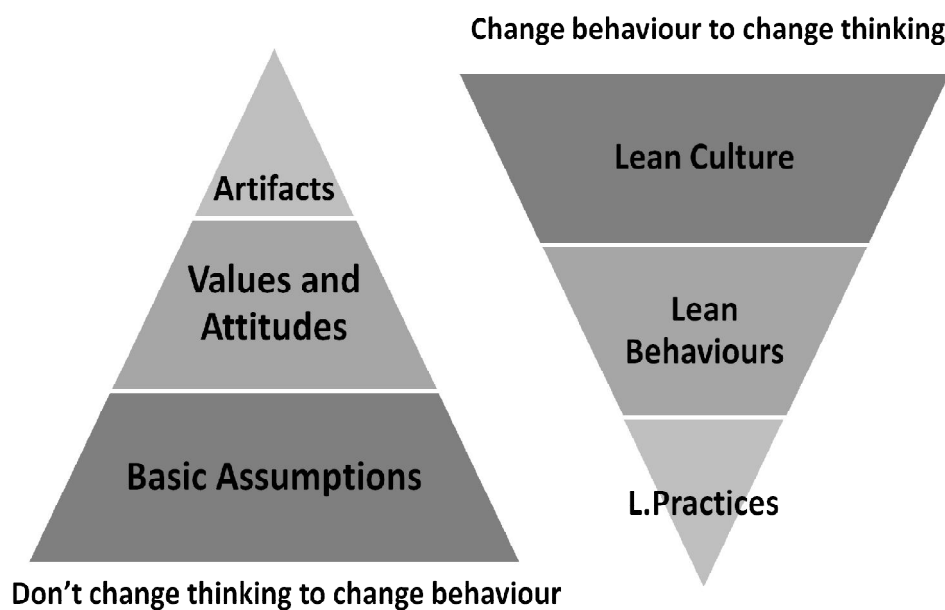
10.8. Discussion and theoretical propositions

From cross-case analysis some propositions regarding the lean culture construction arise. In all cases was evident the short-term orientation of the projects, only reverted in case 1 with the integration of the external consultant in hospital staff. In the other cases the evidence of taking implementation as experiments is confirmed with the absence on ongoing audit system and a “back to comfort zone” attitude, only contradicted by the willingness of the department Managers, were the deployment occurred. If some interviewees showed that thinking and habits were changed, the majority didn't.

However, the best succeeded cases, where no implementation rescheduling occurred, outcomes prevailed over time and interviewees tell the facts as present, not past, the

repetition of behaviour was stronger. Thus, it seems that the path of organisational culture change towards a Lean culture, changing behaviour to change thinking (from hard to soft). Therefore, as main theoretical proposition (TP), one can say that **organisational culture can be changed into a Lean culture through the repetition of Lean practices in the long-term**, as illustrated in Figure 10.1.

Figure 10.1 - Lean Culture Change Process



Source: the author

Or in a more specific way:

TP1.1. Lean culture construction depends on the frequency, scope broadness, and performance outcomes of Lean practices.

TP1.2. A lean practice learning is a single-loop process of Lean tools, in a first phase, to become a double-loop process in the long-term.

In the process change, the incorporation of habits, as emerge from data, was stronger in cases with a steady implementation pace, a multi-function steering committee, an effective communication from day one presenting the project as “The” hospital project and not a department project. Evidences of Lean habits incorporation, by strength order, appear first in case “A”, then in case “N”. The transformational leadership style in several hierarchic levels (the leader with communication skills and high frequency) is

also present in these two cases, although with some differences. Cases “H” and “C” have no real evidence of habits and new practices incorporation. It was interesting to observe that the Lean internal promoter of case “N” brought his “mark” to case “H” by hiring the same consultant and approach. However, as CEO, he seemed to be less committed to Lean results, addressing his first experience in previous hospital, often with the expression “we”.

For all exposed, this paper second theoretical proposition is that **critical success factors as communication, leadership, commitment, training, pace and monitoring are enablers of a Lean culture construction to be included in an ongoing assessment of Lean culture.**

From this proposition several theoretical propositions arise:

TP2.1. Free two way communications is critical in all project phases for commitment creation, in Lean deployment.

TP2.2. Commitment is a critical factor only as emotional commitment, in Lean deployment.

TP2.3 Transformational leadership can determine Lean culture in Healthcare if assumed by top, middle and front-line managers.

TP2.4. All critical success factors described depend on emotional commitment of both clinical and non-clinical staff.

In public Healthcare organisations, where top management changes according government elections, organisational culture, even if insipient, is a bottom-up construction, for the inexistence of a top inspiring leader. In the case of top leadership involvement (as in Case “A”), the leader characteristics (predominantly transformational) and commitment to the Lean deployment can be determinant for successful implementation. Although important, is no sufficient to ensure duration of lean practices after leaving the organisation.

10.9. Conclusions

Transforming an organisational culture into a Lean culture can be a titanic effort, depending on the strength of existent culture. In previous research (Guimarães and Carvalho, 2011a), we have explored the national culture differences associated with Lean deployment in Healthcare sectors. In this research, addressing organisational culture change in Healthcare, it is suggested that a national culture (short-term oriented, highly uncertainty avoidant, with large power distance and feminine), associated with a strong public culture, influenced negatively the change process.

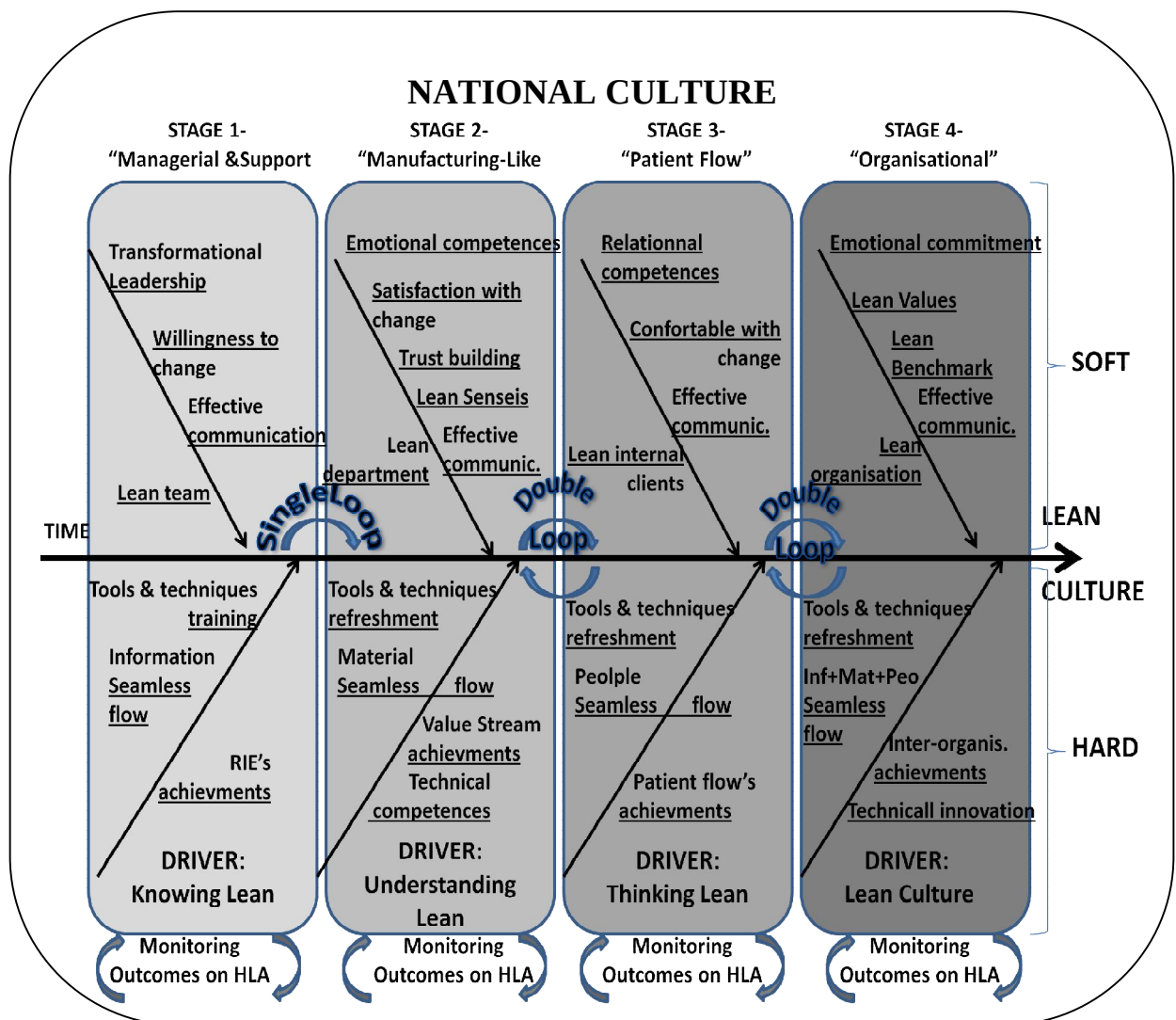
Healthcare has been one of the last services sectors deploying Lean. However the Lean classification to some improvement projects is abusive (Guimarães and Carvalho, 2012a). It is required some implementation time and ongoing learning of Lean to achieve “Lean thinking”, and some Healthcare organisations, claiming to be deploying Lean are still in the beginning of a long journey. Not innocent to Lean failures seems to be an Healthcare culture of “tribalism” that increases with the public sector constraints of politic contradictions, regulatory priorities, persistence of powerful professional groups as superior specialist expertise and high degrees of organisational complexity. Internal or external change promoters have to deal to Healthcare sector typical barriers: lack of teamwork, professional barriers, egos, poor cultural practices and organisational silos (Braithwaite *et al.*, 2007).

As posited by Lucey (2009b) the majority of Lean transformations failures are unrecorded as companies are reluctant to share their failures. It was not our intention to disclose Healthcare Lean deployment failures *per se*, but to understand what were real successes and real failures and its relation to culture elements. In this paper we suggest that Lean deployment success is Lean culture creation. More, in this paper we found new insight for Lean culture creation in Healthcare settings through a path of practices repetition, changing behaviour to change thinking. The propositions formulated provide a research agenda that requires deeper studying.

The hard and soft combination is a path explored to understand why change programs don't produce change (Beer *et al.*, 1990; Beer and Nohria, 2000). Although some authors have tried to prescribe a roadmap for Lean implementation in Healthcare considering hard and soft aspects, academics and practitioners still did not have an

ongoing Lean assessment instrument validated in Healthcare organisations. Such instrument, although with universal application, has to reflect the national culture idiosyncrasies (Hofstede *et al.*, 2010) with some flexible elements as deployment time. Thus, in Figure 10.2, a Lean maturity model for Healthcare organisations is presented as a starting point for developing a Healthcare Lean Assessment (HLA) instrument.

Figure 10.2-Model of Lean maturity in Healthcare organisations



Source: the author.

This model requires testing and further refinement in future research, but it can serve as a framework for designing an assessment instrument that could help Healthcare organisations keeping track in Lean culture construction.

11. Assessing Lean deployment in Healthcare – A critical review and framework proposal¹⁷

11.1. Abstract

This paper presents a critical review of Lean assessment in manufacturing and services settings as a base for development of a Lean assessment framework for Healthcare organisations aiming to help them throughout a long journey. Although the framework proposed requires empirical testing in further research for universal application, it can help Healthcare organisations providing a transformation roadmap and monitoring instrument and also contributes for the growing stream of academic research in this area.

11.2. Introduction

Lean implementation in Healthcare has been increasingly reported in the literature (Young and McClean, 2008; Winch and Henderson, 2009; Brandao de Souza, 2009; Poksinska, 2010; Mazzocato *et al.*, 2010b, Sobek and Lang, 2010) leaving, however, the question of “how much Lean” has been implemented without accurate answers. Partly it is due to some misconception of what can be called a Lean organization (Womack and Jones, 1996, 2003), focusing only in the “hard” side of Lean, i.e. tools and techniques and not exploring the “soft” side that is behind a true Lean culture (Badurdeen *et al.*, 2011). On the other hand, it is due to the difficulties of Lean deployment assessment and suitable metrics (Neely, 2007) in a sector that still struggles with a universal performance evaluation system (Henri, 2006, Barros *et al.*, 2011; Saltman *et al.*, 2011). Moreover, a Lean assessment instrument is never context free (Radnor and Boaden, 2010). Lean projects in Healthcare should be: specific, measurable, action oriented, relevant and timely – SMART- (Stamatis, 2011: 305).

¹⁷ This chapter is based on the article: “Assessing Lean Deployment in Healthcare – A Critical Review and Framework”, in *Journal of Enterprise Transformation*, forthcoming.

Other authors stress the importance to staff morale and continuous improvement in Healthcare settings and of measuring and publicizing achievements (Trisolini, 2002). However, three questions don't seem to have a clear answer in the literature: (RQ1) Why assess Lean deployment in Healthcare?; (RQ2) What Lean deployment dimensions have to be evaluated in Healthcare?; and (RQ3) How to assess Lean transformations in Healthcare?

In order to answer these research questions and, being aware that metrics are one of the biggest challenges of Lean deployment in Healthcare (Young and McClean, 2009), a critical review of all Lean assessment systems in manufacturing and Healthcare settings was carried out and completed with semi-structured interviews to Healthcare managers and Lean deployment consultants. The framework is a result of a path of multi-case studies in Healthcare organizations running Lean projects and struggling with Lean sustainability.

The Lean assessment framework proposed, being part of a broader research project, will be tested for universal application in Healthcare settings and the results will be addressed in future reported work. The proposed Lean assessment framework's structure is based in the Shingo Prize (2011) and presents Lean deployment as a journey through achievement of Lean maturity levels, in alignment with some of the previously reviewed assessment instruments.

The development of such an instrument takes into consideration some of the limitations related to the standardization issue (Kosuge *et al.*, 2010) and sustainability factors (Lucey *et al.*, 2005; Jorgensen *et al.* 2007). Careful adaptation was carried out considering the deployment settings constraints resulting from (i) Healthcare services idiosyncrasies, and (ii) public sector particular Lean deployment challenges (people, process and sustainability issues) (Radnor and Boaden, 2010).

11.3. Methodology

A multi-case methodology (Yin, 2009) was carried out to find the difficulties in monitoring Lean deployment through semi-structured interviews (see interviews guide

in Appendix A) and document analysis (of the audit reports and templates). The semi-structured interviews Healthcare managers and Lean deployment consultants were conducted in March and April 2012, to determine what sort of difficulties exist in Lean assessment adoption. To complete the Healthcare interviews findings, also automotive managers (Toyota Caetano Portugal, S.A.) were interviewed to have a comparison with the current assessment of the Lean founders.

Four public hospitals were chosen for having conducted Lean projects and are named for privacy reasons as Cases A, N, H and C.

Case “A”- A public general multi-site hospital (three units around 12 km distant from each other) with 580 bed capacity, an annual average discharges of 22,000 and annual outpatient average of 335,000, in a seven building structure in the central unit. The interviewees described a 5 year project focused in the hospital supply chain.

Case “N” – A public central hospital (one in a three unit governance group) operating as a large scale consolidated service centre (all support services are here centralized). With 596 bed capacity, an annual average discharges of 22,000 and annual outpatient average of 350,000 in 30 clinical specialities. Three Lean projects were sequentially developed. The first two year Project was in the logistics (clinical, non-clinical and pharmaceutical products) and procurement department. Another one- year Lean project focused outpatient clinic and a third, also one-year project in the Operating Rooms (OR).

Case “H” - A public general hospital (including five primary care units and a long-term care unit in same governance group), with 439 beds, and annual discharge average of 17,200 and annual outpatient average of 220,200. The two year Lean project focused in logistics (clinical, non-clinical and pharmaceutical products) department.

Case “C” - A public central hospital (one from a two unit governance group) with 421 beds, and annual discharge average of 17,000 and annual outpatient average of 180,000. A technology cantered project was started for implementing *kanban* system in all clinical departments and operating rooms.

Along with the four public hospital middle managers interviews, three operational managers at Toyota (Operations Director, Quality Director and Quality Manager) and

two consultants of different companies were interviewed. Interview transcriptions were analyzed according to Miles and Huberman (1994), using data reduction and coding instructions in order to identify Healthcare dimensions for building a Lean assessment instrument.

At the same time, a systematic search in electronic databases (ABI/Inform, B-On, PubMed) was conducted with the purpose of gathering information and examples from both the scientific and grey literature (Farace, 1998) on Lean assessment in all deployment settings. The grey literature played an important role as some Lean assessment instruments were developed by consultants. The key words “Lean assessment”, “Lean deployment evaluation”, “Leanness”, “Healthcare Lean assessment”, “Lean monitoring” and “Lean measurement” were used and the articles found were examined in order to understand the need for Lean assessment instruments in Lean deployment, what instruments were used in Lean deployment in manufacturing and service settings, including Healthcare settings, and what specific Healthcare contingency factors would include or exclude the available instruments adoption. Were excluded from the analysis all instruments/models not tested and validated.

Cross-references were examined to complete the review. All the papers were classified in three categories: (i) addressing the need for Lean assessment; (ii) presenting a Lean assessment instrument/model; and (iii) methodologies and recommendations in assessing Lean deployment (according to the three research questions of- why, what and how). A short list of the selected papers addressing what instruments/models was analyzed covering the issues: (i) distinction of manufacturing from service Lean assessment instruments/models; (ii) items/dimensions measured; (iii) measurement approaches (how items were measured); (iv) instrument/model user.

The fitness of each instrument categories to the SP model was evaluated and a list of categories was build for each SP assessment dimensions. A final revision of the instrument followed all the findings and concerns of the interviewees.

11.4. Why Lean transformations need assessment

11.4.1. Avoiding return to comfort zone

When addressing the sustainability issue in Lean deployment, some of the factors affecting the success of Lean initiatives are named as: to complete the project, monitoring implementation and follow-up information (accountability and continual evaluation of implemented changes effectiveness) (Bateman, 2005; Radnor, 2011; Turesky and Connell, 2010). The difficulty of sustaining Lean practices in Healthcare and turn to previous comfort zone (Radnor *et al.*, 2012) corroborates the change of research focus from “how to be” to “how to stay” Lean (Lucey *et al.*, 2004; 2005; Hines, 2010). In consonance, Guimarães and Carvalho (2012a), addressing the barriers and enablers of a sustainable Lean culture in Healthcare, posit that the discontinuity of Lean deployment, short-term orientation, exclusive focus on Lean tools, and lack of ongoing audits prevent the creation of a Lean mindset. Like any process of change, Lean deployment requires not only to be lead but to be measured as, following Drucker’s axiom, “What doesn’t get measured doesn’t get managed”.

Another reason is the reported difficulty, in Healthcare organisations, of completing the cycle Plan-Do-Check/Study-Act (PDSA) in continuous improvement, staying in Plan and Doing, without overcoming the constraint of studying and assessing, completing a learning cycle (Walley and Gowland, 2004). Closing PDCA loop and assessment work are mandatory for turning process improvement activities into continuous improvement ones (Bateman, 2005). Measurement also helps people to complete the cycle as motivates them to support the measures (Johnson, 1992).

11.4.2. Guiding the Lean journey

Most of the identified problems in Lean program failure in Healthcare setting are (among others): (i) lack of systematic project-tracking system; (ii) lack of a uniform method for project management and control; and (iii) too many uncompleted projects (Stamatis, 2011: 212). In fact it seems essential to have a deployment monitoring system that includes deployment process and results metrics, but not easy to link both metrics (George, 2003: 236). Despite of Lean in Healthcare case reports list their care

process and patient outcomes improvement (or lack of improvement), most of them are only assumed, not measured (Holden, 2010).

According to Goodman *et al.* (2007) the Lean project ending is just the beginning and a navigation instrument for keeping the Lean track is needed. Such instrument would prevent the misjudgement of considering “real Lean” when there is just an imitation (Emiliani and Stec, 2005). Pursuing Lean is a journey towards Lean enterprise achievement (Womack *et al.*, 1990; Nightingale and Mize, 2002) in a holistic and systemic perspective, as evidence proves the failure of archipelagos of isolated Lean projects (Bozdogan, 2010).

In previous research (Guimarães and Carvalho, 2011a) we have identified a path followed by Healthcare organisations pursuing Lean, using Brandao de Souza (2009) taxonomy (Figure 10.2 of section 10.9), finding that what makes an organisation change into a superior level of implementation is not always the willingness to improve but monitoring the improvement process, making sure that Lean practices are continuously implemented and the Lean mindset gets generalised. Some research poses the Lean assessment issue in a benchmarking perspective (Bayou and De Korvin, 2008; Comm and Mathaisel, 2000; Gurumurthy and Kodali, 2009) not addressing the difficulties, especially in Healthcare, of comparing different realities. Despite of the useful learning from iconic Healthcare Lean cases (Radnor *et al.*, 2012) the assessment should, first of all, have a self perspective for overcoming difficulties and exceed organisation and sector expectations.

11.5. Lean appraisal forms

There is a significant stream of literature that, through empirical studies in organisations deploying Lean, try to find leanness measurement constructs (Jorgensen *et al.*, 2007) as a first step to follow a path of building as Lean assessment instrument (Shah and Ward, 2007). However, the developments made in services settings, especially in Healthcare, are still a few, comparing to manufacturing literature.

This literature review analysed only tested (in manufacturing, services, or both settings) instruments and models structured in key construct categories, including research

surveys. This analysis is summarized in Table 11.1. The key categories were measured by a set of constructs that differed from case to case. These instruments/models are not used to gauge compliance with defined practices or standards of performance, progress towards pre-defined levels of capability achievement, or levels of excellence (as ISO standards, European Quality Award-EFQM, Malcom Baldrige National Quality Award and Shingo Prize (2011)). They represent planned enterprise performance improvement models or frameworks, even though the implementation of the defined practices and metrics at various maturity levels could propel an enterprise to a higher maturity level, marking a higher level of performance. Some posit that the integration of Lean with ISO can benefit the formalization of principles and tools such as Lean metrics (Chiarini, 2011). Others stress the importance on Lean metrics for big achievements as earning the Shingo Prize (Schonberger, 2003). Kennedy *et al.*, (2007) posit that performance measures for Lean enterprise differ from those in “traditional” organisations.

Table 11.1 – Lean Assessment instruments/models for manufacturing and services settings

	Instrument/Model	Type of Items Measured/ Key categories	Measurement Approach	Instrument User
Manufacturing	Lean automotive model (James-Moore and Gibbons, 1997)	Waste elimination; Flexibility; People; Process control; Optimization	“Yes” or “No” deployment	Self-assessment
	Karlsson and Ahlström (1996) model	Checklist-Waste elimination; Continuous improvement; Zero defects; Just-in-time;	“should increase”, “should decrease”, “should change in this direction”	Researchers
	Rapid Plant Assessment (Goodson, 2002)	11 Categories	Eleven Likert scale from (1) poor to (11) best in class	Consultant
	Survey for Lean Practices (after review al existent industrial assessment tools and lean surveys) (Doolen and Hacker, 2005)	Principles and practices in six areas: Manufacturing equip.and process; shop-floor manag.; new product develop.; supplier rel.; customer rel.; HR management	Five point Likert scale (always, most of the time, some of the time, rarely, or never)	Researchers
	Personnel Behaviour Based Lean Model - PBBL (Sawhney and Chason, 2005)	Matrix f six categories of human behaviour and six categories of Lean implementation phases	Rating availability of human behaviour in implementation five stages: 0%; 25%; 50%; 75% and 100%.	Researchers
	Shah and Ward (2007) instrument	48 lean practices (supplier related, customer related and internally related)	Likert scale from (1)no implementation to (5) complete implementation	Researchers
	Leanness measure (Bayou, and De Korvin, 2008)	Eight lean key characteristics (JIT, Kaizen and Quality Control)	Benchmark against industry best practices; use fuzzy logic	Researchers
	Kaizen KKSA (Doolen <i>et al.</i> , 2008)	P-Lead-time, floor space, work-in-process (WIP); defect rate, cycle time, etc. HR-Knowledge, Skills and Attitudes	Survey-Kaizen impact on Human resources (HR)and business performance (P)	Researchers
	Leanness Audit (Bhasin, 2011)	104 indices divided into 12 categories	One to ten rate score; seven maturity stages	Researchers
Man.+ Serv.	Lean Enterprise Self-Assessment Tool (LESAT-V3) (Nightingale and Mize, 2002) + Government Lean Enterp. Self-Assess. Tool (GLESAT)(MIT,2005)	54 Practices: Lean transformation/leadership; Life Cycle; Enabling Infrastructure; Adaptation Government programs terminology (GLESAT)	5 Level Capability Maturity- least capable (Level 1) to world-class (Level 5)	Self-assessment

Source: the author.

One interesting instrument was not included in Table 18 for having the driver of continuous improvement (CIRCA- Continuous Improvement Research for Competitive Advantage (Caffyn, 1999)) as the main driver was not explicitly to get Lean. We did not

included, in this analysis, multi-sector surveys based on existent models as in Soriano-Meier and Forrester (2002) as it is based in a small sample incidence that difficult benchmarking and it brings few insights regarding instrument deployment guidelines to this particular research.

The interviews in Toyota and in Healthcare public managers, selected by having a growing Lean deployment process, followed a general script of “what measures of Lean deployment exist, how are used (user and frequency) and why they are used”. All interviewees referred the concomitancy of two appraisal levels: an overall/systemic assessment and a project by project one. Other common issues were: (i) the appraisal of both current capability (as is) and desired capability (to be); (ii) only internal “Lean teams” and/or consultants frequent assess Lean deployment process and outcomes; (iii) customization of each instrument according to the organisation’s needs. Toyota has a particular way of rating: it rates the organisation stage by the lowest score achievement, which means that if one functional area has level 1, the entire organisation is labeled by that improvement score.

11.6. Discussion

It is conceptually and operationally different to assess the process of Lean deployment, or what some authors called “Lean journey” and asses the impacts of this journey. Therefore, despite the linkage between Lean deployment process and outcomes, it seems important to differentiate them in any assessment instrument. Most of assessment research focuses only in outcome measures. Trying to solve a conflict of interest between the performance determinants; cost, quality and delivery time, Wong *et al.*, (2012), propose a socio-technical “Lean performance index”, excluding, however, supply chain performance (Agarwal *et al.*, 2006). Considering that Lean is about the journey and not a goal itself, the assessment process used as a self-assessment instrument promoting continuous improvement, overlaps the mere results quantification. Useless assessments occur, most of the times, without trend analysis associated or even dissociated from strategic goals (Schonberger, 2008).

On the other hand, instruments too much focused in Lean strategic plans are only assessing strategic intents, not practices or behaviours, as in LESAT (Nightingale and Mize, 2002), adopting only a top-down perspective. Another characteristic of LESAT, the identification of relevant stakeholders and determination of their value propositions, can be distractive for the Lean foundational value: focus on client, including each process' internal clients.

Another flaw of exclusive focus on pursuing established outcomes scores is to lose capacity for questioning the basic assumptions and innovation. Taking Healthcare financing system as an example, it is questionable that lagging production indicators should be used for feeding incremental budgets favouring wastes created by the so called "defensive medicine" or simply capacity utilization. Thus, performance measures should serve a Lean strategy not only technically, but behaviourally and culturally (Kennedy *et al.*, 2007). It seems suitable to think of lead Lean indicators for assess progress towards such a strategy.

Some authors (Radnor, 2010, Schiele and McCue, 2011) underline the importance of preconditions as management commitment and employee understanding of Lean philosophy before implementing and assessing. We do not see those factors as preconditions but as constant items to be evaluated since most of Lean Healthcare journeys are interrupted by substitutions in Administration Boards, other staff turnover and tendency to return to the previous stage before Lean deployment.

In services settings, there are few attempts in the academic literature to develop a Lean deployments assessment instrument. Two of them only focus on outcome variables such as lead time reduction, inventory reduction and productivity (Cuatrecasas, 2004; Kollberg *et al.*, 2007). The only attempt in Healthcare settings is the non tested "flow model" developed by Kollberg *et al.*, (2007) which measures lead times as process (clinical not Lean deployment process) control measures and their improvement in Healthcare. The authors state that the model doesn't measure policy deployment, respect and participation and continuous improvement through Lean work practices and need to be completed with other measurements.

From reviewing the instruments it became clear that sector surveys used by researchers found the difficulties in subcategorization of respondents, lack of Lean language translation and consequent understanding by respondents and instrument validation within a single sector.

11.6.1. Lean assessment dimensions in Healthcare

In this research it became clear that there are three kinds of dimensions groups to be assessed: (i) Lean readiness or preconditions; (ii) Lean hard and soft deployment; and (iii) Lean outcomes. Some authors (Radnor and Walley, 2008, among others) place readiness and preconditions before Lean deployment. We, otherwise, posit that ongoing assessment of the same preconditions (as top management engagement, commitment, communication, beliefs (Losonci *et al.*, 2011)) is needed to move on to the following phase. Moreover, culture (national and organisational) determines the effort needed in Lean deployment (Guimarães and Carvalho, 2011a).

Lean journey in Healthcare has been reported through an evolution towards a “learning organisation” (Wang and Ahmed, 2003), following the path of practice repetition, changing behaviours to change thinking and not the other way around, consonant with the idea that the only way to measure a Lean philosophy level is through Lean work practices (Ahlstrom, 2004).

Each stage described in Figure 10.2 (section 10.9) includes both hard and soft dimensions to be included in the deployment assessment framework. However it requires some caution with scale levels that simply add number of areas to improve without sense of priorities, as the whole is not the sum of the parts and running events for number is not the same of evaluate them through their impact of organisation’s performance. Discreet variables should be more “the number of people in the organisation that full understands Lean” than “the number of departments running Lean projects”. Standardization should not only be understood under the clinical governance umbrella pursuing the guidelines for quality and safety purposes, but in terms of redundancy elimination (in materials usage, in activities’ range in similar processes and even the human resources selection).

11.6.2. Healthcare Lean Assessment (HLA) framework proposal

From all reviewed instruments and interviews covering Lean assessment forms in manufacturing and in services three major requirements should be guiding any assessment instrument: (i) to be grounded in systemic thinking, (ii) to allow on-going monitoring; and (iii) to promote discipline by training. As such, a framework seemed to gather all these three requests: the Shingo Prize (2011). Moreover, the changes made to the Shingo model in 2008 although moderate, represent a shift in focus to a Lean enterprise, rather than a manufacturing plant. The Shingo model is now more flexible that it can be applied to Individual site/plant, a complete division, or the entire business enterprise in services settings as Healthcare.

The only Healthcare organisation that received this award was Denver Healthcare, in 2011, achieving the Shingo Bronze Medallion for Operational Excellence¹⁸.

“Consistent Lean Enterprise Culture”, is the biggest change in the new edition. The goal of this new section is to see how well lean principles are understood and applied in all business processes and at all levels of the organisation.

There are two subsections in this new section. The first, “Enterprise Thinking”, examines how well Lean and a system perspective is used in five critical areas: Financial and other reporting, Business Development and Organisation Design and Development, Information Management and Leadership Development. The second subsection, “Policy Deployment”, examines how well the strategic planning and implementation systems are based on scientific thinking, employee involvement, and respect for the individual. More specifically, this subsection looks for scientific thinking as a philosophy and as a management process.

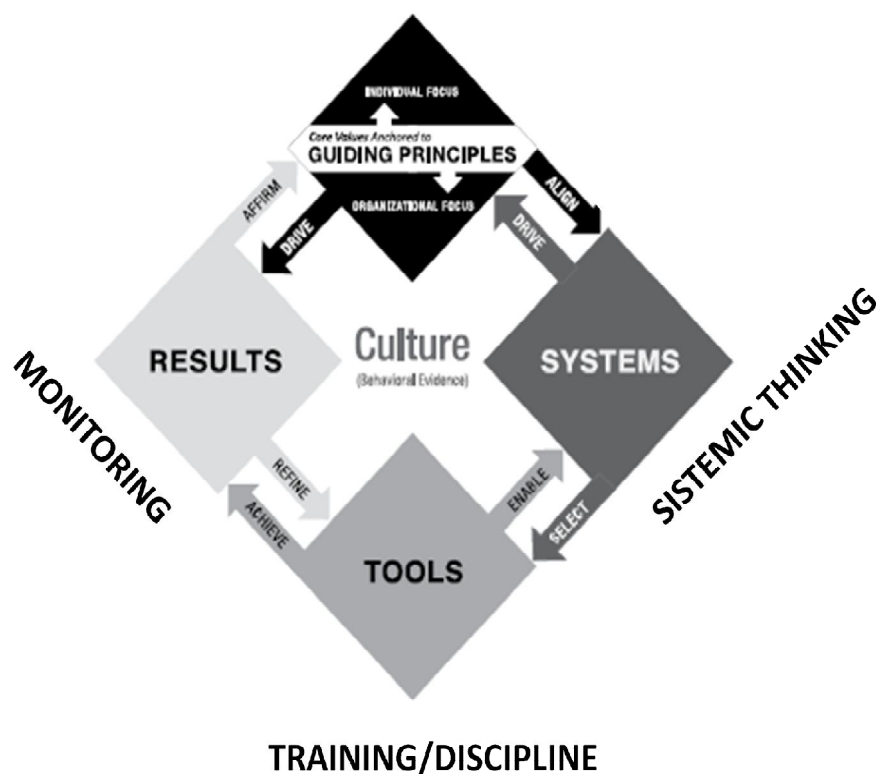
As showed in Figure 11.1, the Shingo transformational process, the Shingo diamond, suggests a systemic approach to continuous improvement of processes. It focuses in both individual and organisational guiding principles promoting both top-down as bottom-up assessment. At the center is the organisational culture as a sum of predominant Behaviours that is a reflection of how is performed continuous improvement on systems, structures and processes. Systemic thinking plays a major role

¹⁸ Information on Denven Healthcare recognition available at <http://denverhealth.org/LEANAcademy.aspx>

in integrating the improvement process in a holistic way to avoid the islands of improvement projects. This is consonant with the idea that system thinking underpins Lean and stressed by a literature stream (Seddon and Caulkin, 2007).

Also, it relies on one of the principles of operational excellence, the scientific thinking by promoting experimentation and deep learning that occurs when people see for themselves the cause-and-effect of each improvement practice understanding the value of each principle to them personally. That is only achieved by training and gaining discipline in using tools that derive from each particular system (and not the other way around) and in making sure, through monitoring, that results reinforce each principle application.

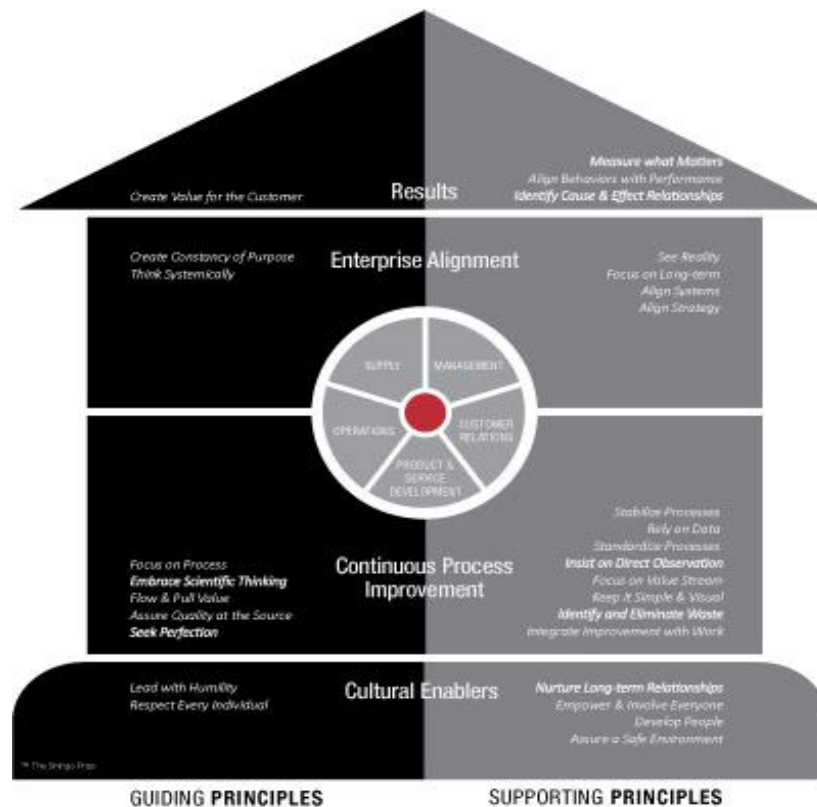
Figure 11.1 - The Shingo transformational process



Source: Adapted from Shingo Prize (2011), Version 6, available at www.shingoprize.org.

In consonance, the HLA must be rooted on SP assessment dimensions: Cultural enablers, Continuous Improvement, Enterprise Alignment and Results as presented in “Te House of Shingo” Figure 11.2.

Figure 11.2 - The Shingo Prize principles in each dimension of operational excellence



Source: Shingo Prize (2011), Version 6, available at www.shingoprize.org

The HLA framework presented in the following section has four levels of leanness matching the four stages (Figure10.2). The first stage for having a Lean learning based in single loop, for being characterised by isolated Lean events, can be assessed through Shingo Prize (2011) dimensions but not eligible for award. The stage 2, 3 and 4 have a correspondence to Shingo Prize (2011) (SP) award levels (Bronze Medallion, Silver Medallion and The Shingo Prize). The “Lean readiness or preconditions” correspond to SP Guiding Principles. The Lean soft deployment corresponds to SP first dimension “Cultural enablers”. The Lean hard deployment (tools and techniques) corresponds to SP second dimension “Continuous Process Improvement”. The “Lean outcomes” correspond to SP dimensions 3- “Enterprise Alignment” and 4 -“Results” (Quality, Cost/Productivity; Delivery; Customer/Patient Satisfaction and Morale) scores should be linked to an overall organisation performance assessment instrument or scorecard. These correspondences are only the structure of the HLA instrument that needs to be customized according to each service reality creating an internal award (Sanford, 1992).

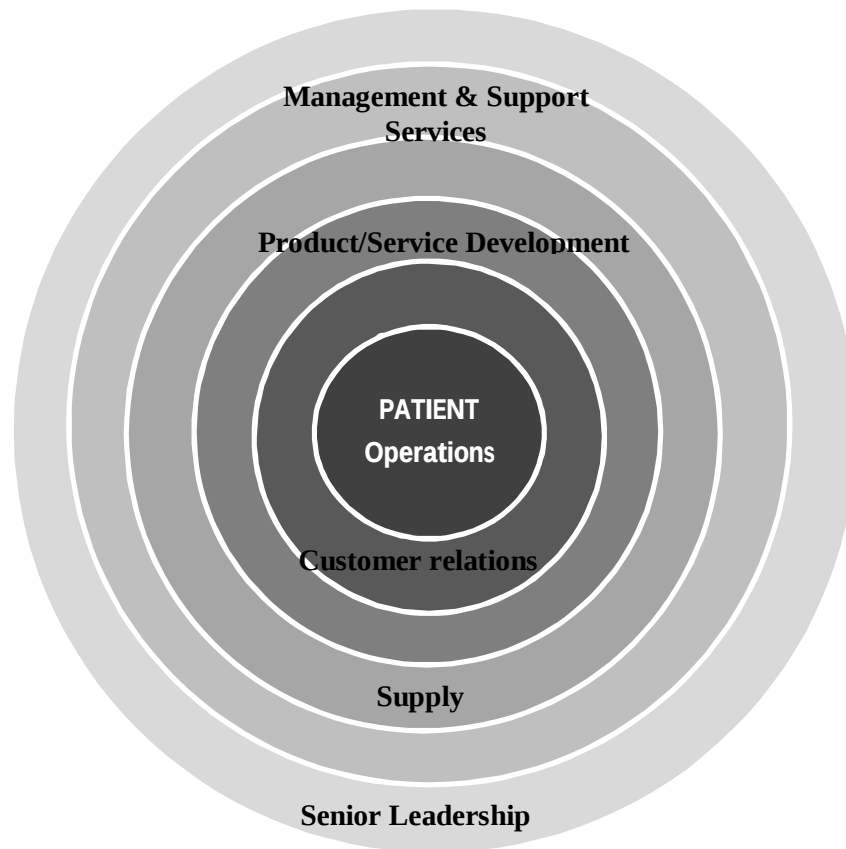
11.6.3. Healthcare Lean Assessment (HLA) instrument

Although supported by Shingo Prize framework, the HLA instrument does not aim to simply find a score of eligibility for the prize. Rather, it aims to be a monitoring system of Lean deployment. As stated before, a central aspect of Lean is that Lean is not a static state to reach but a dynamic state characterized by constant improvement. Thus, both Shingo's scores as HLA different stages' scores must be seen always as an on-going assessment having as reference each previous milestone.

Therefore, it is not the absolute level of flow efficiency that is at stake but its improvement over time. The possibility of appliance to SP and award achievement can only be seen as an external recognition of a continuous effort done. In sum, the HLA instrument should be seen as a tool to make sure a Healthcare organisation learn something every day which means that despite of the periodicity of this assessment strategic usage, the instrument has to be feed constantly and have permanent visibility.

The SP organisational processes division seems suitable for a Patient-centered organisation. Figure 11.3 shows the macro processes displayed according to patient criticality and centrality.

Figure 11.3 - Healthcare organisations macro processes



Source: the author.

In HLA the first three SP assessment dimensions (Cultural enablers, Continuous Improvements and Enterprise Alignment) have different weighting in total score depending on the group of business process that is being assessed (Senior Leadership, Customer Relations, Service Development, Operations, Supply and Management Support Processes) (Appendix B.1). The “Results” dimension’s score is equally divided in six categories: Quality, Cost/Productivity, Delivery, Customer Satisfaction and Morale (Appendix B.3) and another one –Safety - chosen for its importance to Healthcare organisations and also for being one of results dimensions at Toyota.

In terms of Behaviour assessment the HLA follows SP Behaviour Assessment Scale splitting organisational Behaviours (overall assessment of different levels: leadership, managers, associates and the inclusion extension of Behavioural measures in organisation performance evaluation system as scorecards) from individual Behaviours

assessed by: frequency, duration, intensity and scope in a five point Likert scale (Appendix B.2).

Each of results category (Quality, Cost/Productivity, Delivery, Customer Satisfaction and Morale) is assessed under different lenses: Stability, Trend/Level, Alignment, and Improvement in a five point Likert scale as presented in Appendix B.3.

Hence, the HLA structure follows a dimensional assessment as presented in the following four tables with an example of a group of processes' assessment:

Table 11.2- HLA: Cultural enablers' assessment

Areas	Groups of Business Processes	Senior Leadership	Customer Relations	Product/Service Development	Operations	Supply	Management & Support Processes																										
								Items	Levels					Levels					Levels					Levels					Levels				
									1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
People Development- Education Training & Coaching (50 pts)	Individual or job-specific development plans (Lense-Duration)																																
	On-the-job coaching in Lean practices (Lense-Scope)																																
	Structured programs on continuous improvement concepts (Lense-Scope)																																
	Formal systems (meetings and training) for transferring lessons learned from improvement efforts (Lense-Frequency)																																
	Training programs on standardize work procedures (Lense-scope)																																
	External training Programs																																
	Cooperative endeavors with schools and training organizations to ensure qualified workforce (Lense-Organ. Beaviors)																																
	People Development- Empowerment & Involvement (50 pts)	System of encouraging voluntary employee suggestions and improvement activities (Lense-Intensity)																															
Cross-training program and regular job rotation to maintain skills and enrich the job (Lense-scope)																																	
Clearly communicate hiring and promotion standards for leaders and associates (Lense-scope)																																	
Communication of organ. performance (quality, cost & delivery) (Lense-Frequency)																																	
Use of teams for problem solving and improvement projects (scope-Frequency)																																	
Recognition and reward system for temas/individuals contribution to continuous improvement (Lense-Duration)																																	
Successs celebration (Lense-Frequency)																																	
Commitment to find and eliminate waste (Scop- Organ. Behaviors)																																	

Table 11.2 (Cont.) – HLA: Cultural enablers' assessment

Areas	Groups of Business Processes	Senior Leadership					Customer Relations					Product/Service Development					Operations					Supply					Management & Support Processes				
		Levels					Levels					Levels					Levels					Levels					Levels				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
People Development- Environmental & Safety Systems (50 pts)	5S Metodology deployment for clean, safe and ergonomic work environment (Lense-Frequency) ☆																														
	Implementation of a risk management program for information, materials and for patient safety (Lense-Scope)																														
	Education, awareness and practices for employee health and wellness (Scope-Frequency)																														
	Formal systems (meetings and training using tools as FMEA) for error report and analysis (Lense-Scope)																														
	Initiatives regarding environmental issues, healthcare waste treatment and disposal alternatives (Lense-Scope)																														

Present state: ● — ●

☆ - Specific 5S auditing results should be the input for this item (See Appendix...)

Future state: ● - - - - ●

⚙ - The risk-management program in Operations at Healthcare organisations implies to have at level 4 mistake-proofing (*poka-yoke*) systems that can end up in “stop the line” actions (*Jidoka*) as the examples given by Grout and Toussaint (2010).

Source: the author.

This table presents a common base for Healthcare organisations in pursuing the guiding principles of: “Leading with Humility”, “Respect Every Individual” and more tangible supporting principles of: “Nurture Long-term Relationships”, “Empower and Involve Everyone”, “Develop People” and “Assure a Safe Environment”.

It has to be stressed the importance of employee safety and combat to blame culture in mistake analysis and error root cause analysis as culturally paramount and determinant to the next dimension's good score.

Table 11.3– HLA: Continuous process improvement' assessment

Areas	Groups of Business Processes	Senior Leadership					Customer Relations					Product/Service Development					Operations					Supply					Management Support Processes				
		Levels					Levels					Levels					Levels					Levels					Levels				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Continuous Improvement (400 pts)	Map each process using SIPOC structure (Lense-Scope)																														
	Conduct Value Stream Mapping (VSM) to identify bottlenecks (Lense-Scope)																														
	Formal and informal "customer voice" system (Lenses-Frequency)																														
	Benchmarking of processes' best practices (Lenses-Duration)																														
	Number of improvement process projects (monthly and annually) (Lense-Scope)																														
	Employee's percentage of participation in at least one improvement project (Lense-Scope)																														
	Formal systems to improve visibility in Supply Chain in all nodes (Lense-Scope)																														
	Percentage of standard procedures development (Lense-Scope)																														
	Emphasis on direct observation (gemba walk) and data-based decisions (Lense-Intensity)																														
	Visual devices and systems for error and complexity reduction (Lense-Frequency)																														
	Problem approach and root cause systems as PDCA, A3, and DMAIC (Lense-Frequency)																														
	Use kanban system for material and patient flow (Lense-Duration)																														
	Use activity-based costing as potential improvement finding system (Lense-Scope)																														
	Revisit lessons learned of each improvement process (Lense-Frequency)																														
	Use "Pitch"(tack time) calculations for each service reference (Lense-Frequency)																														
	Implement SMED for changeover improvement (Lense-Frequency)																														

Table 11.4 – HLA: Enterprise alignment improvement' assessment

Areas	Groups of Business Processes	Senior Leadership					Customer Relations					Product/Service Development					Operations					Supply					Management Support Processes				
		Levels					Levels					Levels					Levels					Levels					Levels				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Enterprise Alignment (200 pts)	Percentage of standard procedures adoption (Lense-Scope)																														
	Standardized communications and reporting systems (Lense-Scope)																														
	Integration level of Informations Systems (Lense Scope)																														
	Usage of a balanced performance assessment system (Lense-Frequency)																														
	Widespread communication of vision, mission and values consistent with lean principles (Lense-Duration)																														
	Use a daily 15 minute meeting at change shifts (Lense-Duration)																														
	Proactive relationships with key stakeholders (Lense-Intensity)																														
	Milestones'achievements visibility between departments (Lense-Duration)																														
	Hoshin plans integration across departments (Lense-Scope)																														
	Improvement multidisciplinary steering committees (Lense-Frequency)																														
	Deploy Yokoten (Lense-Scope)																														
	Financial reporting system supported in Lean accounting (Lense-Duration)																														
	Use of Knowledge management systems and active information and idea sharing at all levels (Lense- Duration)																														
	Employee rotation systems (Lense-Duration)																														

Source: the author.

Table 11.5 – HLA: Results improvement' assessment

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*Labor Productivity- organisational physical or financial output as compared to labor quantity.

** Asset Productivity- organisational output compared to value of physical assets employed.

Table 11.5 (Cont.) – HLA: Results improvement' assessment

			Groups of Business Processes	Senior Leadership	Customer Relations	Product/Service Development	Operations	Supply	Management Support Processes																								
Areas	Items	Levels								Levels					Levels					Levels					Levels								
		1								2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Results (250 pts)			Customer satisfaction	Market share above last year mark (Lense-Trend)																													
				Lead time reduction (Lense-Improvement)																													
				Internal and external customer satisfaction surveys above last year/time average (Lense-Improvement)																													
			Morale	Turnover rate below last year (Lense-Improvement)																													
				Absentistm rate blow last year(Lense-Improvement)																													
				Referrals for work (Lense-Improvement)																													
				Number of ideas per employee (Lense-Improvement)																													
				*Commitment to change assesement (Lense-Stability)																													
			Safety	Error prediction increasement (Lense-Trend)																													
				Errors reduction/elimination (Lense-Trend)																													
Safety industry KPIs better than latst benchmark result (Lense-Trend)																																	

*Commitment to change assessment is presented by Herscovitch and Meyer (2002).

Source: the author.

All presented items are not prescriptive as each organisation, in a continuous improvement commitment, should add (but not withdraw) other significant items to better represent its contextual specificities. Different organisations can achieve the same goals and principles using different means.

11.7. Conclusions

This paper sought to answer three questions: “Why assess Lean deployment in Healthcare”?; “What Lean deployment dimensions have to be evaluated in Healthcare”?; and “How to assess Lean transformations in Healthcare”?

Lean deployment in Healthcare is needed to understand the depth of Lean deployment, avoid misconceptions of Lean and guide healthcare organizations in pursuing a new management philosophy rather than a fad. Most of Lean changes lack monitoring that, along with continuous double-loop learning, prevent returning to the comfort zone and contributes to Lean sustainability.

The importance of a self assessment for a sustainable Lean journey method overlaps the mere sector comparison. However, a well tested Lean audit instrument can be applied to similar organizations in order, not to compare the incomparable (as each organization may have started at different timing and not always have followed an ongoing Lean implementation) but to serve as a Lean maturity guide, a benchmarking tool for organizations in the same sector. However, the extant body of literature lacks an objective quantitative integrated measure of leanness that addresses the issue of Lean sustainability (Wong *et al.*, 2012). The proposed HLA framework’ structure aims to fill that gap presenting Lean deployment as a journey through Lean maturity levels achievement, consistent with some of the previous reviewed assessments instruments.

Regarding the second research question, the HLA is based in the Shingo Prize, not only to honor Lean’s origins but for its adaptability to Healthcare for combining “soft” and “hard” dimensions of Cultural Enablers, Continuous Improvement, Enterprise Alignment and Results. The Shingo Prize seems suitable to base a Healthcare Lean assessment instrument as it presents cultural aspects not as pre-conditions but as items to be achieved and assessed during Lean implementation. Nevertheless, for being presented as the first group to be evaluated it is underlined the foundational role of culture in Lean deployment. SP model serves the HLA instrument alignment of (i) culture, (ii) discipline and (iii) processes. The development of such instrument takes into consideration some of the limitations related with the standardization issue (Kosuge *et al.*, 2010) and sustainability factors (Lucey *et al.*, 2005; Jorgensen *et al.* 2007). A careful adaptation work was carried out considering the deployment settings constraints

resulting from (i) Healthcare services idiosyncrasies, and (ii) public sector particular Lean deployment challenges as the people issue, deployment process issue and sustainability issue (Radnor and Boaden, 2010). Moreover, specificities of the sector as government policies and regulations were also considered.

Answering the third question, we posit that the HLA should be used as an “as is” diagnosis tool, assessing whether each process should be improved, disrupted or eliminated and an on-going implementation assessment, as well, providing control measures and correction actions. After proper testing through pre-test, refinement in workshops, pilot study and a large scale survey in Healthcare organizations, the HLA can be used as benchmarking and/or self-assessment instrument. We stress, however, its main importance as a self-guiding instrument as the focus on improvement should not be distracted by others’ slower paces. Thus, it should be used not only by researchers but also by Healthcare managers, helped or not by external consultants.

Therefore, this paper makes a significant contribution by presenting a monitoring system framework to Lean deployment that will assess the pace and the depth of change in Healthcare organizations pursuing Lean.

12. Lean sustainability in Healthcare – Beyond patient’s pathway¹⁹

12.1. Abstract

One frequent question in Lean literature is “Why major lean transitions have not been sustained” (Lucey *et al.*, 2005). Going through all the literature reviews in Lean Healthcare, the same question is not completely answered. This paper aims to answer this question exploring, in three embedded case-studies, the barriers, enablers, risks and sustainability factors of Lean deployment in Healthcare. Also, conclusions on the evolvement of Lean deployment validate the theoretical proposition posed on the sequence of Lean projects’ focus from information flow, to material flow, up to patient flow. Considerations on a superior Lean stage, a Lean organisation, are also addressed.

12.2. Introduction

Lean deployment in Healthcare is reported in the existent literature basically as a sum of implementations’ successes in departments as a sequence of Lean projects. The few “organisational cases” (Brandao de Sousa, 2009) are longer experiences that turned possible to spread a new way of thinking to the entire organisation and so can be suitably called “Lean Hospitals”. It is our purpose, in this paper, to understand how a cluster of Lean islands can defy the sustainability issues and contribute to a “Lean Hospital”.

There are few reported less successful Kaizen events in the Lean manufacturing literature (Farris *et al.*, 2008), but none in Healthcare context. With this paper we aim to contribute to fill that gap and encourage theoretic and practice discussion on the learning process from both successful and less successful Lean deployment projects.

From previous research (sections 5 and 10 of this thesis) a theoretical proposition on a Lean deployment path in Healthcare organisations emerges, positing that **the pathway to achieve organisational Lean state is starting with information flow as Lean**

¹⁹ This chapter is based on the article: “Lean sustainability in Healthcare – Innovating beyond patient’s pathway” submitted to The Service Industries Journal, forthcoming

deployment focus (“managerial and support” cases), then evolve to material flow (“manufacturing-like” cases) then “patient flow” and finally becoming an “organisational case” as defined in Brandao de Sousa (2009).

However, in this Lean evolvement process, and according to the findings of the multi-case study presented in the following sections point, the passage to another state does not imply to abandon the first approach. Rather it seems critical to a project outcomes survival to add approaches instead of substituting them. In fact, the three flows: information, material and patient coexist and are interdependent. Another theoretical proposition, completing the first one, is here at stake: - **the issues: risks, enablers and barriers are sustainability pre-conditions evolving with different contributions to Lean sustainability depending on each maturity stage.**

Other findings regarding the implementation barriers, enablers and risks were possible to obtain from the 3 unit of analysis representing the Lean journey of a central hospital, and are presented in the following sections.

12.3. Lean sustainability

According to Fiksel (2006), sustainable enterprise resilience is the “capacity for an enterprise to survive, adapt, and grow in the face of turbulent change”. Organisations seek sustainability through process improvement methodologies as Lean management (Johnson, 2006). But the issue is to understand that for that achievement, sustainability, the starting point is the change management process. It is necessary to select a change management program sufficiently structured and tailor-made at the same time, to pursue such task. The Shingo Prize framework, proposed in section 11, provide a combination of both characteristics.

Moreover, through Shingo Prize framework is possible to focus not only on the “hard” but also on the “soft” aspects that are crucial to change process in Healthcare organisations (Laschinger *et al.*, 2001; Leach, 2005). Issues as leadership, commitment and empowerment are presented as key factors in any change management process and in particular in Lean deployment, namely in problem solving (Zhang and Bartol, 2010). It's in focusing on both “tangible and intangible” elements of a Healthcare organisation

that lays the ground of successful changes (Atchison, 1999). This author also underlines “time” as one of most important change success factors. In fact, Lean as a journey is time consuming and has to serve a strategic intent. It cannot be used only at operational level to solve chronic problems without strategic focus (Hines *et al.*, 2004). To build a “Lean Hospital” is to build a Lean organisational culture (Atkinson, 2010), and it takes both time and strategic alignment.

Hines (2010), using the iceberg metaphor, shows that sustainability factors are below waterline, as: (i) strategy and alignment; (ii) leadership; and (iii) Behaviour and engagement. It is as important the front-line engagement (Lucey, 2009; Lucey *et al.*, 2004; Johnson, 1992) as the top management engagement, in a Lean transformation. Especially in bureaucratic structures as Healthcare organisations where the Administration board endorsement is mandatory.

Critical factors such as a shared vision, team learning and systems thinking are not possible without commitment. Alongside with commitment is management support and this aspect in conjunction with effective leadership is crucial to the sustainability of any change effort (Senge, 2006; Turesky and Connell, 2010). Systems’ thinking is another factor enhanced in Shingo Prize’s framework and necessary to change Public Sector management system (Seddon, 2008). It involves viewing the organisation as a whole with its interdependent and complementary relationships rather than in “snapshots” or focusing only on particular areas of the organisation and it presents a challenge due the complexity of Healthcare organisations (Rich and Piercy, 2012).

In previous research (section 10.5.2), six change critical factors were found as main issues to assure Lean Behaviour in the long-term and, therefore, Lean sustainability: (i) Communication; (ii) Leadership; (iii) Commitment; (iv) Training; (v) Pace; and last, but not least, (vi) Monitoring. Some authors (Yang and Yu, 2010) reduce these six factors to four: Leadership (with main involvement of senior manager); Good communication platform; Performance evaluation system to monitor deployment; and Learning organisation. In this last factor, we find important to stress that it includes training and pace for a better understanding of any learning process.

Also in previous research, sustainability is presented not as a state, but a continuous challenge, a self-feed achievement that evolves throughout the four different Lean

deployment phases (as in figure 27 of section 10.9). However, there are some pre-conditions to these sustainability factors that need to be addressed since the first moment, in a planning phase and that can be determinant to any lean implementation phase. Those factors are always present in Lean Healthcare literature (Guimarães and Carvalho, 2011a) and can be grouped into: (i) Barriers; (ii) Enablers and (iii) Risks, to Lean deployment.

Addressing Lean deployment in public services, Radnor *et al.* (2006) point as main barriers:

- scepticism about change programs in general;
- lack of ownership in either of current activities or of proposed processes;
- the improvement team members are often only made up of those willing to get involved, rather than those who should do so;
- compartmentalization in functional and professional silos;
- weak link between improvement programs and strategy;
- lack of resources; and
- over-use of jargon and the lack of a clear message to staff.

Another barrier that is presented as intrinsic to Healthcare organizations is an embedded culture of “tribalism” (Bate, 2000). The tensions between clinical and non-clinical groups is described by this author by the “tribes” metaphor explaining the “culture of blame” and “culture of secrets” which prevents problem solving under a Lean thinking frame.

A complete analysis to Lean implementation barriers is presented in Brandao de Sousa and Pidd (2011) and are summarized in Table 12.1.

Table 12.1 - Barriers to Lean in Healthcare

Barrier	Evidence	Context
Perception	Lack of understanding of Lean principles by Healthcare professionals that see Lean as a manufacturing exclusive;	H
Professional skills	Intrinsic differences in personal and professional skills between Healthcare and manufacturing professionals;	H
Hierarchy and management roles	Cultural issues based on hierarchy of Healthcare staff and the way management roles are allocated without management skills concerns;	H
Terminology	New (Lean) vocabulary introduction	
Organisational momentum	The constant change of strategy for improvement (locally) and governmental policy (nationally)	M+H
Professional and functional silos	The fragmentation of Healthcare into silos/departments and all bureaucracy that inhibits flow	M+H
Data collection and performance measurement	Difficulties of information flow in Healthcare and (feeding and managing data) leads to poor performance measures	M+H
Resistance to change/scepticism	Engaging Healthcare professionals and staff empowerment are keys to combat “comfort zone” addiction	M+H

Source: Based on Brandao de Sousa and Pidd (2011); Yang and Yu (2010).

(H-Healthcare; M-Manufacturing)

Although we can see Lean enablers as the other side of the Lean barriers, the way of turning a barrier into an enabler might not be easy but is a Lean thinking characteristic.

In fact, for a lower chance of resistance from employees and to produce more effective outcomes, Turesky and Connell (2010) enhance the need of an effective communication strategy of change initiatives with feedback from employee’s regarding awareness, sense of inclusion and achievement in Lean efforts. The authors also address the need to involve all professional groups. It is not uncommon for doctors to set themselves apart from the culture of management and inherently feel that external processes of change are nothing less than interference.

Hence, participation in training from managers and technicians at all levels of the organisation was found necessary to build knowledge and understanding of the benefits of Lean, in order to implement Lean successfully and, thus, provide an example for change. Training also helps to “build trust, solve problems, increase employee

empowerment and participation and foster knowledge sharing and cooperation between groups” (Turesky and Connell, 2010).

Some professional groups work as Lean enablers either for being closer to implementation, or being more open to innovation. Burnes (2011) examining the crucial role of middle managers in the change process, argues that middle managers that were once seen as obstacles to change, are now seen more as facilitators of change.

The only basic thing to change is a learning individual and organisational Behaviour. Thus, a Lean organisation is a “learning organisation” for being committed to learning, improving and therefore to change (Garvin, 1993; Senge, 2006; West, 1994). And to become learning organization, it can take several generations of leadership change (Koenigsaecker, 2007). In Healthcare context, building a learning organisation means “developing nurses before delivering care” (Ballé and Régnier, 2007).

Very scarce research is known on risks of Lean. The Institute of Personnel and Development (1998) in UK, helped by two university research teams, point as Lean implementation risks the inevitable turmoil with staff troubles, insecurity, retention crises and motivation difficulties. This report stresses the profound risks of fragility for employers due to heavy pressure on staff and the effect of relentless change on organisations. There are often tensions between what is demanded and the style of management which often remain hierarchical, controlled, standardized and supervisory. A “downsizing black cloud” still hangs on some Lean approaches.

This is one aspect considered by Radnor and Boaden (2004) addressing the risk of “anorexia” when “doing more with less” evolving to: - doing less with less and less. The authors posit that as Lean is not context-free, it can be seen as a fragile system bounded by the limits of organisational tolerance. Hence, the Leanness achievement i.e. having the optimal amount of each type of resource for the circumstances in question, can be jeopardized by the inability to modify the resources effectively during Lean deployment, becoming anorectic of some sort of resource, not only of staff. Thus, there is a much broader understanding of “anorexia” than the one that is addressed by some authors (Tyler and Wilkinson, 2007) that consider only downsizing.

All the enablers, barriers and risks just enounced, are proponed in the literature as pre-conditions for a successful Lean deployment and therefore, direct factors to its sustainability (Communication; Leadership; Commitment; Training; Pace; and Monitoring).

12.4. Methodology

The main research question addressed in this paper is “How to achieve Lean sustainability” or **How to develop a sustainable Lean culture?** As the previous section implies, this question is related to other research questions: - **What are the enablers, barriers and risks of Lean in Healthcare?** Through literature review on Lean deployment both in manufacturing and services settings, namely in Healthcare, the issues: risks, enablers and barriers are addressed as pre-conditions to Lean sustainability. Our Theoretical Proposition adds another view: **Lean risks, enablers and barriers evolve showing different contributions to Lean sustainability depending on each maturity stage.**

This derives from a previous theoretical proposition on a Lean deployment path in Healthcare organisations, positing that **the pathway to achieve organisational Lean state is starting with information flow as Lean deployment focus (“managerial and support” cases), then evolve to material flow (“manufacturing-like” cases) then “patient flow” and finally becoming an “organisational case”** as defined in Brandao de Sousa’s taxonomy (2009).

Due to the nature of above research questions and according to Yin (2009), case study method is appropriate to “How” and “Why” questions and to investigate a contemporary phenomenon in its real-life context when the boundaries between phenomenon and context are not evident, recurring to several data collection techniques and different evidence sources. This qualitative method was chosen for allowing a deeper understanding of phenomena through in-depth case-study (Flyvbjerg, 2006). The method selection had as purpose to be able of “telling a good story” (Dyer and Wilkins, 1991) unveiling the dynamics of a particular phenomena, Leanness in Healthcare.

The case selection had, though, as inclusion criteria:

- to be an Healthcare organisation (public or private) running process improvement projects and/or practices that clearly served customer (internal or final) value increase;
- the goals of the improvement projects/practices had to clearly state the reduction of non-value adding activities, redundancies rather than staff or FTE (Full Time Equivalent) reduction;
- the improvement projects/practices' goals (as process variation reduction and/or poor work conditions elimination) had to be subsequent to non-value adding activities reduction goal.

According to the embedded type of case study designs (Yin, 2009: 46), we considered each Lean project as the embedded unit of analysis. Thus, in the first approach to the hospital was asked if “where there any Lean project deployment” and the selection depended on having a positive answer along with an explanation that should include process improvements out of downsizing contexts. Four senior (top) managers; three middle managers, three service staff, one Lean programme leader and one consultant (Lean advisor) were interviewed following the same guide (Appendix A).

As recommended by Yin (2009) in data collection and analysis, a study protocol was followed. Multiple sources data triangulation was given special attention during data collection (Eisenhardt, 1989). Data collection occurred in three phases as there were three units of analysis (three “Kaizen Projects”). Also we recurred to document analysis (internal regulation, press releases, workshop presentations, internal memos, structural charts, written procedures, quality manuals and training documentation) and direct, non participant observation (*gemba* visits in all departments involved) (Saunders *et al.* 2007). Interviews had an average duration of two hours and were tape recorded and fully transcribed. Data analysis followed Miles and Huberman (1994) recommendations on data codification, reduction and categorization techniques. Data gathered from different informants and sources was reduced to precise categories in common tables (Miles and Huberman, 1994), and then systematically interrogated (Yin, 2009) comparing and noting patterns (Miles and Huberman, 1994). Eighteen categories were created for case analysis on enablers, barriers and risks of each one of the six Lean sustainability factors: communication, leadership, commitment, training, pace and monitoring.

Data triangulation (using the several data sources: interviews, non participating observation of Lean target processes and internal/external documents) was pursued addressing construct validity and reliability and assuring that data was worthy of analysis.

Data interpretation followed data coding in a phased stream of writing each individual embedded case in chronological order and each analysis was validated by the senior managers involved in each unit of analysis. Cross-case analysis and literature consideration allowed the issues on lean sustainability pre-conditions and critical factors to be developed. The results are presented in following sections.

12.5. Case N – a “Patient Flow” unit

Case “N” – A public central hospital (one in a three unit governance group) operating as a large scale consolidated service centre (all support services are here centralized). With 596 bed capacity, an annual average discharges of 22,000 and annual outpatient average of 350,000 in 30 clinical specialities. By 2004, a consultancy group specialised in Kaizen events made its first approach with a project draft to the Operating Room (OR) department but it was not well received by the clinical staff. A second approach to Logistics department was more successful as this department director was aware of good results of the consultants in manufacturing sector.

With this consultancy company 3 Lean projects - Unit of Analysis (UA) were sequentially developed. The first two year Project (Unit of analysis 1) was in the logistics (clinical, non-clinical and pharmaceutical products) and procurement department started in 2005. Another one- year Lean project (Unit of analysis 2) in outpatient clinic started in 2008, and a third, also one-year project (Unit of analysis 3) in the ORs started in 2009.

12.5.1 – Unit of analysis 1 - the “Hospital Logistic System” project

The first approach to Lean occurred due to the identification of some problems/”improvement opportunities” (according to most of the interviewees) in the logistics department, such as: high level of stock, frequent stock-out situations, bad organisation, no identifications, no visual management and difficult access to the

material. An inexistent flow of information was shown in very long manual tasks, the excessive process dependency on human experience, duplicated operations (rework) and a lot of paper documents. The long distance between the storage of materials and point-of-use (POU) fear of stock-out led, allegedly, to several “safe” stocks spread by all clinical services. In sum, the initial situation was a confusion of human, material and information movements as presented in Table 12.2.

Table 12.2 - Initial situation and improvement opportunities detected (UA1)

Initial situation	Improvement opportunities
• Reliable information inexistence • Long waiting in warehouse • for material weekly supply • Stock control • “Smell oriented” ordering • Clinical services’ returns • Multiple storage points • Multiple storage points • Redundant and manual administrative work	• Information Systems improvement • All material coding, and ABC categorization • PAR level replenishment • Storage centralization in central warehouse • Mapping and simplifying administrative processes • Promote professional procurement

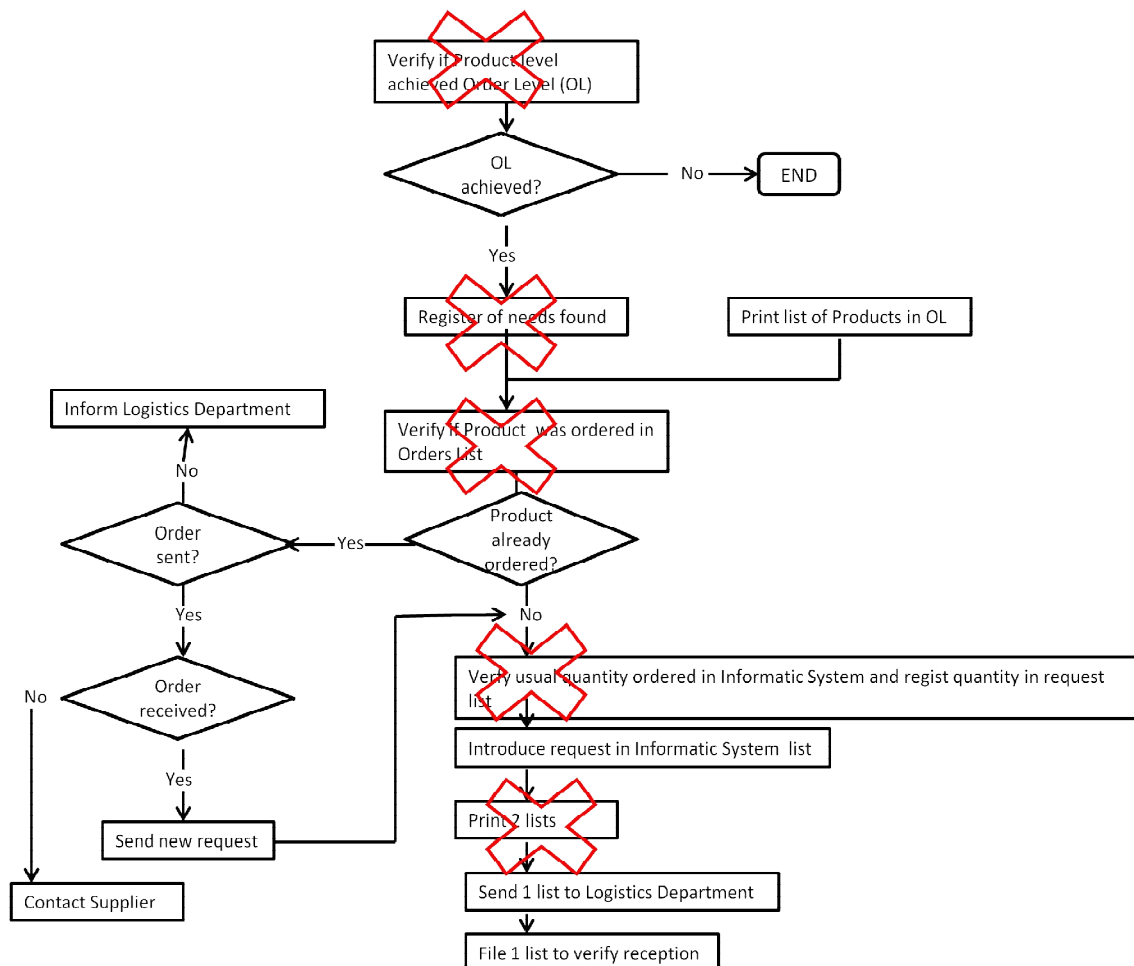
Source: the author.

Despite some “what’s the use and how do I benefit” resistance statements, the improvement team, led by the consultant, started weekly *kaizen* events with a “workshop plus homework” system. The starting point was 5Ss deployment in the clinical material warehouse and administrative offices with the conviction of “changing physical spaces to change way of doing the work”. Those helped clarifying all tasks in each process and easily visualizing redundancies. The material request process was reviewed and some of the steps were though eliminated (red crosses in Figure 12.1).

Also “Purchasing Needs’ Definition” and “Suppliers’ evaluation” processes were reviewed and shortened (as in Appendices D.1 and D.2).

The material distribution process was also redesigned (see Appendix D.3). In two pilot clinical services, a *kanban* card system was introduced for stock management in a supermarket system inside each clinical service. A *misuzumachi* (see glossary in Appendix E) system was also introduced for continuous replenishment.

Figure 12.1 - Material request process revision



Source: Adapted from an internal report accessed in July, 2011.

The satisfaction with this project is evident in a nurse statement: "...it allowed the nurses to do nursing, materials now are properly tidy and visible, spaces are now optimized, consumption is controled, stock-outs are less probable, there is less waste and deviations, and the relationship between logistics and clinical services is improved".

The nurse release from material requests, the stockout reduction and out of date avoidance were the most cited gains by clinical and non clinical staff that daily

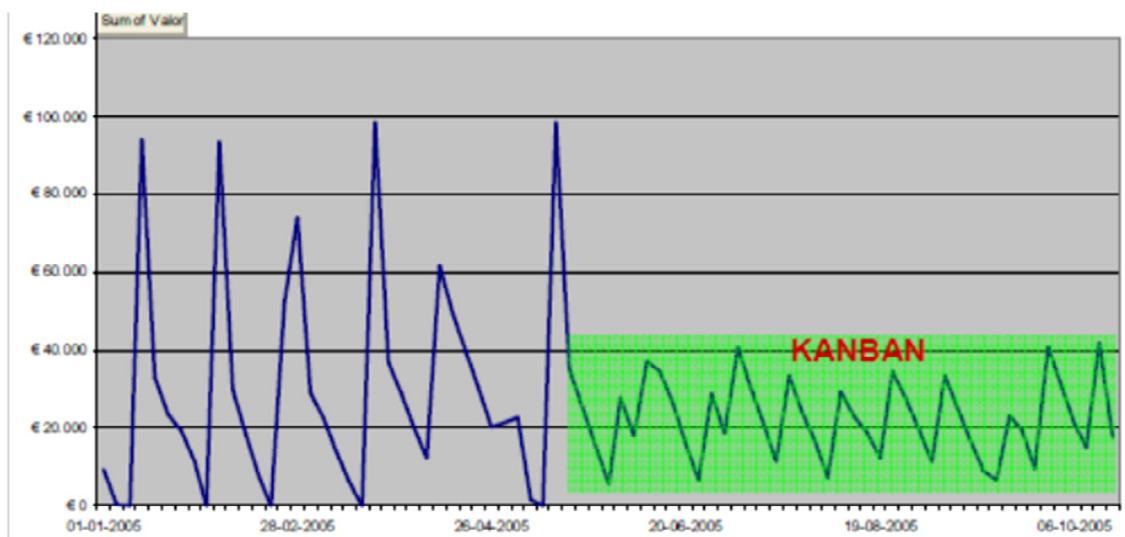
identified gains in quality (clinical service improvement), time (less distance and less movements) and costs (less devolutions and out of dates and lower inventory).

The respondents point some key factors for the successful implementation of this project as:

- “win-win” conscience in both Logistics and Clinical Services’ departments;
- awareness of the project goal by all people involved ;
- top management support;
- team motivation and focus in continuous improvement;
- external consultants’ support.

The project covered all clinical services with 104 “supermarkets” of clinical material in a replication system (Appendices D.4 and D.5). Also a replication of the project was carried out in pharmaceutical material which is managed separately from logistics department (Appendix D.6). Despite of the resistance to synergic usage of the same *misuzumachi* of clinical material and reluctance to “HLS” label usage, the *kanban* system introduction had some good results in stock levels as shown in Figure 12.2.

Figure 12.2 – Kanban effect on pharmaceutical stock level



Source: Retrieved from an internal report dated of October 2005, accessed in July 2011.

The first impact gains (in the first assessment) of the project were:

- 40% pharmaceutical stock level decrease;
- 35% clinical material stock level decrease;
- Stock-out reduction;
- 20% space free;
- Every tasks every day
- Standardized working areas
- Standard work
- Simple and standardized management (visual management)
- People oriented to value added

Although the first gains are always satisfactory some monitoring system was introduced, at least in terms of 5Ss auditing and work productivity (Appendices D.7 and D.8) first on weekly basis, but lately, only the productivity indicators are daily updated. The warehouse manager conducts now a fifteen minute “good-morning” meeting for problem sharing, collection of improvement ideas and productivity awareness, just as his logistic director started to do.

To this empowerment contributed a new training sessions’ set from another external Lean expert with the main purpose of creating *senseis* and refreshing some Lean concepts for future spreading the HLS to other material management (office and housekeeping). It was also a new form of auditing the implemented system and creating a new focused auditing system simpler (without levels, in a “yes” or “no” classification) and more frequent. A new staff rotation was implemented (3 months per route) and an A3 report system (similar to Appendix C.2). A new stream value analysis was conducted and more document printing was eliminated. New inventory adjustments were made but the materials in the usage list did not reduce as new codes were created.

12.5.2 – Unit of analysis 2 - the outpatient clinic’s project

The project in the outpatient clinic was launched with the main goals of: process organisation, increase productivity and reduce patient waiting times. To the external help of the same first consultant company was added two engineers specially recruited for this project in a resource sharing agreement. The steering committee was completed

with the Outpatient Clinic Manager, the Clinical Director (doctor), the Chief Nurse, the outpatient department Chief Nurse, the Quality Director (doctor), the Quality Manager, the administrative officer and an administrative assistant.

In the *gemba* (Appendix D.15), consisting of 159 consultancy rooms of 30 specialties, 15 nurse assistance points and 20 secretaries, occurred 1500 consultations per day and the waiting list was around 4000 consultancy requests per month.

According to the interviewees, the project goals were to improve: (i) the patient pathway in terms of time (length of stay) and accessibility; (ii) functionality of physical spaces; (iii) patient and staff satisfactions; and (iv) coordination with all support services (as Logistics).

In order to uncover redundancies in all activities, a value stream analysis was conducted (Appendix D.9) exposing different groups of problems/improvement opportunities in: the infrastructure, the patient pathway, stock management, work leveling and administrative processes.

The infrastructure led to a complex and unclear processes of calling the patient. Also the consultancy rooms' layout was not functional and some consultation equipment was missing. In the patient pathway, the main issues were the enormous waiting time, the lack of available information to the patient, frequent orientation difficulties, low patient autonomy and delays. The stock management processes revealed high inventory levels, requests periodicity was once a week and without criteria, out-of-date or obsolescence, lack of organisation and difficulty of finding material and out-of-stock frequent situations. In work leveling, it was clear the discrepancies of tasks among the administrative staff due to a specialty work division and the differences in the queues' sizes between posts. In the administrative processes, there were too much paper, laxness in answering, long waiting for consultancy booking, complicated processes, information circuits with too many stoppages and too many people involved, task duplication and errors.

The deployment plan started with sixty 5Ss training sessions in administrative areas, consultancy rooms and support service's rooms with visible immediate results (Appendix D.11). As an example, all the paper collected from the first secretary's

drawers, in the “Sort” step, was enough to supply the whole outpatient clinic. The introduction of visual signs for patient information along with a new electronic call system reduced the long queues and helped in patient orientation.

Tasks were improved as result of processes redesign in referral (Appendix D.10) with a lead time reduction from 34 to 8 days. Also procedures were standardized as different specialties had different procedures, forms’ types reduced from 400 to 300 and was introduced a weekly tasks’ distribution visual display along with procedures for each task.

Stock management was linked to the goals of the previous Lean project in Logistics. This project alignment with the previous project allowed the end of weekly replenishment, manual material request by nurses, several storage points and high inventory, untidiness, stock-out and out-of-date situations and its substitution for daily replenishment, *kanban* replenishment system, nurses doing nursing, storage concentration and inventory control in a simple system reducing out-of-stock situations.

In terms of time reduction it as visible not only in referral and triage but also in the time a patient has to wait for a consultation as the Table 12.3 shows.

Table 12.3 – Patient waiting time for consultation (days)

	Jan/09	Feb/09	Jun/09	Jul/09	Oct/09	Dec/09
Inscribed Nr.	16.897	16.516	17.309	17.524	19.111	22.459
Waiting Time (median)	72	63	38	47	47	46
Waiting Time of national reference area (median)	121	115	87	95	104	96

Source: Data retrieved from workload and performance internal report of year 2009.

A five stage auditing was implemented for assessing the results of the project on weekly basis and the consultants left the project with the recommendations of maintaining the auditing system that is not now followed in regular basis. Some interviewees refer in a

second interview that hope the new Administration board retrieves the initial purposes of auditing and monitoring the improvements made and regret the exemption of the two engineers after deployment phase.

12.5.3 – Unit of analysis 3 - the operating rooms' project

The third Lean project started as the consultants team was released from the previous project. According to previous project common interviewees, the operating rooms had much more improvement's need than the outpatient clinic.

However, the approach was similar. Starting with a VSM involving all processes decision makers into the twelve element project team, it was built a diagnosis picture as presented in Appendices D.12 and D.13. All times were measured and were established goals for throughput time – the time from service request to the time the service is fully delivered. An implementation plan (Appendix D.14) was drawn covering the main improvement issues and included workshops for more than 130 participants. The whole project influenced more than 320 people in the OR department, including 138 nurses, 55 operational assistants, 3 administrative assistants and one surgeon of each specialty.

The main issues were not only leveling workflow but mainly to establish interfaces with ancillary services as logistics and equipment maintenance. The workshops focused in (i) adjusting starting time, specially for first operation of the day in each one of the fifteen OR; (ii) “calling next patient” process (recurring to visual dynamic work plans); (iii) introduction to a tidiness culture with 5Ss; (iv) standardization (not only of workplace) but work processes for avoidable errors reduction; (v) standardization of logistic flows of all material kinds (clinical, office, housekeeping, sterilized); (vi) usage optimization of surgical instruments (with visual management help) and (vii) work (daily booking) visibility.

Standardization was a primer in this project. Through 5 Ss deployment were reviewed all surgical kits adopting a simplified coding system that led to the substitution of all damaged or inappropriate material; elimination of 23 inadequate kits and creation of 6 new kits. Also standard work was introduced in booking (although taking into account clinical specialties' idiosyncrasies) and patient calling process.

The booking process was linked to material management processes and a check-list system was added to the *kanban* system previously adopted. Booking procedures were also standardized considering not only time but equipment constraints. The set-up of OR between patients was made using quick changeover method (Appendix E) also helped by check-lists.

The whole patient path was reviewed in terms of setting the standard works (improving the existent check lists) for patient preparation to surgery, arrival, communication with anesthesiologist, etc.

Some interviewees reported that “Lean lives of small changes...if we have one small change a day, after a year we will have a big change. Nobody accepts big changes as a start”.

The major resistance to Lean came from the group that became the major adjutant, some nurses that underestimate their nursing time trying to control materials ineffectively and with lots of bureaucracy.

This project ended the material requests in paper and the duplication of information in IS. Information flow gained speed and liability and nurses were released for nursing ending the extraordinary requests and frequent extra motion. Information between the OR and wards was also improved not only for better planning as to avoid bottlenecks, unnecessary motion and long waiting during peak hours.

More than the visible gains in organisation in all rooms (as in Appendix D.15), this project gains were, according to the interviewees and internal documents, divided into three kinds:

- Quality gains: as avoidable errors reduced immediately after the first implementation month (as in Appendix D.16); increase of 320 real nursing hours per year;
- Cost gains: despite different ways of understanding efficiency some indicators were introduced as efficiency of OR (sum of standard time average for each surgery kind divided by time of available room) combined with occupation rates (time since first entrance to last patient transfer to

wards); Efficiency indicator improved 5% during deployment period; inventory reduction of 10% to 15%;

- Delivery gains: The daily kick-off operation started 15 minute earlier which represented gain 1, 5 hours at the end of last surgery²⁰; lead times improved; overbooking avoided; Waiting list reduction (overall and “OUTS” waiting list²¹, as presented in Appendix D.16).

Despite these project outcomes, the on-going result assessment is lacking, according the Nurse-chief underlining that: “the performance indicators have to serve the team and not only for the record...there is no real monitoring and consequences of it. We should have a transversal Lean team to spread it to the entire hospital”.

In the attempt to keep Lean alive, the organisation started a partnership with the consultant company with the flag:” Lean Hospital” that consisted of a set of workshops in specific areas aiming to provoke *kobetsu kaizen*. There are still no reported results of this partnership.

12.6. Discussion

The three sequential projects illustrate the path Lean deployment follows, considering the existent literature as presented in section 5.4 of this thesis. In fact, and according to Brandao de Souza’s (2009) taxonomy, the first Lean project (UA 1) although its main focus on material flow, started with information flow’s concerns as the “managerial and support” Lean Healthcare case studies. The real reason to start this project was to gain inventory visibility and information liability. Those two factors prevailed when the project assumed a typical “manufacturing-like” approach by improving material management in a hospital department that operates in the same way as in a manufacturing plant. In fact, the *kanban* system serves both purposes, information and material flow.

²⁰ This situation is described in the Lean Healthcare literature (Al-Hakim and Gong, 2012) as “preventable disruption” (poor information flow, lack of communication and coordination) and it can cause an increase in surgical time of app. 25%.

²¹ OUTS – Patients’ waiting list that exceeded the acceptable time for surgery and excluding the normal priority situation. In this hospital only 30% of surgery cases are high priority, the remained 70% are normal priority.

The implementation of effective material flow was only visible in the second project (UA 2) where the linkage to the client (internal and external) was made. In the outpatient clinic project, despite the flag of reducing patient disorientation and waiting time, the material flow approach was predominant. It would be an important gain to this project to include information flow concerns and develop a leaner solution for patient records instead of continuing the duplication of files and increasing the file warehousing without any rationality. This is a common problem to all public hospitals that are still waiting for regulation and decisions for establishing the electronic record as the only record, allowing the articulation with primary care services.

The third project (UA 3) aimed to make a deeper difference in patient care attempting to improve patients' flow within the hospital OR by streamlining the patient pathway, so it can be considered a "patient flow" kind of case. However, the manufacturing-like approach is also present as material flow was one of the focuses. Despite some interviewees' opinion that the OR project has more similarities with manufacturing projects than the pure service project in outpatient clinic, it is possible to distinguish what is pure patient flow analysis from material and information flow analysis as the color grounds in VSM, presented in Appendix D.13. By skipping the first approach to any department – the "managerial and support" approach- it led to jeopardize this project monitoring as information circuit should have been completed and performance indicators should have served operational purposes. On the other hand, it was also the shorter project in terms of deployment time, but the longest in terms of gathering all project stakeholders, revealing special difficulties with doctors.

Thus, despite of the sequential order of Lean deployment path, in most of the cases, starting with information flow focus ("managerial and support" approach), passing to material flow focus ("manufacturing-like" approach) to patient flow focus ("patient flow approach), the three approaches should coexist cumulatively as the operational linkage of the three approaches brings consistency to Lean deployment. Nevertheless, consistency is not sufficient to Lean sustainability. As all the three projects studied stress, the monitoring system, not really implemented, was neglected leading to "refreshment needs". Other claimed solution for the projects sustainability would be

(according to some interviewees) to have a “Lean team” to keep the “spirit alive”. Yet, no Lean team would be able to behave in a “stop the line” mindset. It has to be embedded in all organisation staff. This is just one example of some missing Lean elements in the three projects studied.

Another aspect that was stressed in all three projects was the need for top management involvement and support to the project leader. In the first two projects the Administration board was much more present (kick-off meetings) than in the third. The motivation of teams was not always democratic, as described by interviewees. The OR Chief- nurse addresses this issue stating that “Lean is not yet the organisation’s philosophy...is lacking to think Lean” and that “Lean is a bottom-up movement, but it needs top-down endorsement”.

However, the awareness of Lean sustainability need in the medium and long-term led the organisation to start a partnership with the consultant company with the flag: “Lean Hospital”. Top and middle managers refer the need to continue improving using the Lean approach and that Lean could not be resumed to “islands of projects” where struggling for the leading protagonist mislead Lean to a department’s decor . Taking this willingness, it will be interesting to observe the organisation’s Lean evolvement and study future deployment to confirm the initial proposition of this paper by which the final stage in Lean deployment is illustrated by “Organisational case studies” (Brandao de Souza, 2009).

A potential solution to the issue surrounding clinicians not being engaged with Lean training is to involve clinicians in hospital decision making, in order to align their goals with the change program and share them with top management (Grant, 2008).

There is also a Lean risk, not addressed in the literature, of excessive dependency on external consultants to develop and deploy Lean project. This is consonant with all possible risks of outsourcing described by Guimarães and Carvalho (2011). To entail Lean journey based on the presence of an external consultant is to be on another road that does not lead to Lean.

From cross-analyzing the results of the three unit studies it is possible to establish the link between the sustainability pre-conditions, as presented in Table 12.4.

Table 12.4 - Lean Healthcare Sustainability Pre-conditions and Direct Factors

SUSTAINABILITY/DIRECT FACTORS	SUSTAINABILITY PRE-CONDITIONS								
	“Hospital Logistic System” project			Outpatient Clinic’s project			Operating Rooms’ project		
	Enablers	Barriers	Risks	Enablers	Barriers	Risks	Enablers	Barriers	Risks
Communication	Visual Management	Failing “Good morning” meetings	Lean language misunderstandings	Visual Management	Department size; bureaucracy	Lean language misunderstandings	Visual Management	Stakeholders difficult involvement	Lean language misunderstandings
Leadership	Sensei creation	Top management lack of involvement	Excessive dependency on extern. consultants	Sensei creation	Top management lack of involvement	Excessive dependency on extern. consultants	Sensei creation	Top management lack of involvement	Opinion differences among doctors
Commitment	Middle management commitment	Not celebrating success	Political change (Adm. Board change)	Middle management commitment	Middle management change	Political change (Adm. Board change)	Nurses, after discovering Lean benefits	Nurses, before discovering Lean benefits	Political change (Adm. Board change)
Training	Novelty interest	Work schedules	Staff rotation	Novelty interest	Work schedules	Staff rotation	Buzz word palatability	Work schedules	Staff rotation
Pace	External consultant	Competition between departments	Resource scarcity	External consultant	Competition between departments	Resource scarcity	External consultant	Competition between departments	Project short schedule
Monitoring	Information access	Inexistent linkage to performance assessment	Lack of system thinking	Information access	Inexistent linkage to performance assessment	Lack of system thinking	Information access	Inexistent linkage to performance assessment	Lack of system thinking

Source: the author through cross-case data analysis and triangulation.

12.7. Conclusions

Lean Healthcare sustainability is a gradable long-term achievement starting from information-flow Lean deployment, to material-flow, to patient flow, up to organisational and cross-organisational deployment. Despite of the different focus of each Lean deployment phase, to build a “Lean Hospital” all approaches must converge. The cross-case presented show some similarities of findings that point for the need of continuously work on the same pre-conditions to assure sustainability critical factors.

Despite of the few examples in Lean deployment, organisations learning curve on Lean is a lonely effort. It seems common to find Lean as a cost cut solution and observe a surgical department approach turning Lean deployment into a bunch of experiences that fade in time for communication, leadership, commitment, training, pace and, mostly for monitoring problems.

Kaizen alone, used as single tool is not enough to change an organisational culture, nor is to understand Lean as experiments in departments. Although good results can be achieved and quickly spread by novelty seekers, doing Lean in Healthcare is much harder than that. It is different to lean out a process than to build a Lean system. It is not so much about the concepts, but it has to do more with the resistance and willingness to change. Thus, there will never be an excess of Lean deployment, it will never lead “too far” in improvement processes as new challenges are always arising and defying creativity in problem solving. That is suitable to loosely coupled systems as Healthcare.

Lean hospitals need to take Lean in a strategic level, not only operational, and create a Lean alignment between micro deployments. There’s a difference oh having measurable objectives or having a purpose. Most Lean actions don’t have a purpose, and sometimes not even clear objectives.

Despite all the voices claiming the conservative nature of medical community, the different mindsets of different professional groups, the standardization myths, it is possible to (re)built a Lean Hospital, beyond patient path focus. There is a long, phased road to pursue where each step is a learning process.

13. Discussion

13.1. Introduction

Despite of the continuous discussions raised by each chapter presented findings, an overall discussion is imperious for a deeper analysis. Thus, a narrative on the research pathway opens this research discussion, followed by a reflection on scope of Lean evidences in Healthcare, a proposition of Lean culture construction in Healthcare completed by a proposal for Lean sustainability in Healthcare.

13.2. Research pathway

This research starting point was to find a clear distinction of what can be (and cannot be) called “Lean” deployment in Healthcare organisations. Lean awareness in Healthcare services settings, officially dated of 2002 with the first paper publication, twelve years after the “Lean” term coinage by Womack *et al.*, (1990), deserved deeper analysis and clarifications. All the theme’s reviews presented in the literature (Young and McCLean, 2008; Winch and Henderson, 2009; Brandao de Souza, 2009; Poksinska, 2010; Mazzocato *et al.*, 2010b, Sobek and Lang, 2010) lacked a full analysis on both “hard” and soft aspect of Lean deployment. Although all of them stressed the tools and techniques used in Healthcare and the most frequent outcomes, a holistic view of outcomes, barriers, enablers and sustainability factors was not addressed.

Therefore, a complete review of all Lean Healthcare literature was conducted, and updated during this research, having not only as goal to build a structured picture of the outcomes, measures, risks, barriers, enablers and sustainability of Lean deployment in Healthcare settings, as to place the existent cases under a national culture frame opening a discussion on cultural (national-organisational, and even sectoral) contingency of Lean deployment.

The cultural contingency, we posit as the only real contingency for Lean, was not explored in Lean literature, despite of consensual acceptance that change is not a technical-rational process, but a behavioural process (Atkinson, 2010).

Apart from cultural contingency, there were other aspects that can work as barriers (or turned into enablers) and even risks of Lean deployment in Healthcare settings that should be addressed. This deliberated order of issues would provide, we found, insights for sustainability holistic evaluation of Lean Healthcare deployment.

Having always in mind the fundamentals of Lean, and looking of some practices in Healthcare that even without having the “Lean “ label, had the same drivers, we found important to understand at what extent those practices, as outsourcing, could be called Lean practices. Thus, a comparison of both Lean and outsourcing drivers, outcomes, risks and benefits was pursued and intersection points were found. Moreover, different sorts of outsourcing, in and out the boundaries of “shop floor” were considered to be assessed as Lean solutions.

Some care was taken in comparing findings with the existent literature on Lean both in manufacturing as in services settings.

In fact, and despite some defenses of the same Lean phases roll out in services as in manufacturing (Allway and Corbett, 2002; Bowen and Youngdahl, 1998, among others), some authors present a reflection on “Lean” translations to services, pointing some “lost in translation” problems that derive from:

- The nature of the services characteristics (intangibility, perishability, simultaneity of high customer involvement “experiences”) when compared to products;
- Variability and heterogeneity association with standardization difficulties;

I became notorious that some literature reviews and cases analysis, revealed some Lean language understanding difficulties during Lean deployment not always solved by training sessions, specially in Healthcare services.

It was missing a deeper academic discussion on whether “Lean” in Healthcare is just a buzzword or a sustainable enterprise process improvement system; and whether context

variables, such as national and organisational culture, never addressed, contribute to the adoption and sustainability of a “production system” also called as a “way” of thinking.

This research was driven by the awareness that a crescent stream of literature, on a very rich services field, was not providing complete answers to a set of questions such as:

- RQ1 - What are the different outcomes from Lean deployment in Healthcare?
- RQ2 - What are the barriers to Lean implementation in Healthcare?
- RQ3 - What enables Lean implementation in Healthcare?
- RQ4 - What are the risks of Lean in Healthcare?
- RQ5 - How to measure Lean achievements in Healthcare services?
- (RQ2.5) Why assess Lean deployment in Healthcare?
- (RQ2.5) What Lean deployment dimensions have to be evaluated in Healthcare?
- RQ6 - How to develop a sustainable Lean culture?

Due to the nature of problem and research questions a multi-case method was defined as approach to the field. All reported and potential cases (assessed in a preparatory step to case selection) in Lean deployment in Healthcare presented a project structure, and so each Lean project was considered as the embedded unit of analysis in field research.

During the sequence of case studies a constant awareness of the fact that the majority of Lean transformations failures are unrecorded as companies are reluctant to share their failures, lead to a crescent spiral of evidence, often revisited for comparison and accuracy reasons. It was not our intention to disclose Healthcare Lean deployment failures *per se*, but to understand what were real successes and real failures and its relation to culture elements and provide answers to all six listed research questions. Those questions, sub-questions, and correspondent answers, supported by research findings are summarized in Table 13.1.

However, some issues deserve a more detailed discussion.

First, this research lies on a fundamental premise of Healthcare services, or better saying, “Systems” being under a mass customization paradigm (Hart, 1995; Piller, 2003). Thus, the importance of adequacy of “Lean” and “Agile” solutions had to be considered. Moreover, not only the boundaries of Lean should be clear defined, as the combination of both solutions should also be addressed in Healthcare settings, namely through modularity solutions. Modularity serves both Lean and Agile purposes, as the start-up case evidence shows. However, to start with a Lean paradigm, or close to one, is substantially different from changing into a Lean paradigm, which is the majority of cases in Healthcare organisations.

Second, Lean deployment is a change management issue, as big as the national/organizational culture differs from original Lean national/organisational culture, Japan. As literature is silent on Japanese Lean cases in Healthcare sector, we are left with western examples. Again, the need to other industries existent comparisons of TPS adoption, mostly in Toyota internationalization cases, was important to find Lean cultural marks and understand change through Lean deployment. The ground field of the research has a specific national culture characterized by Hofstede (2010:211) as uncertainty-avoiding culture and as though, slower in innovating. In fact, the author posits that a cluster of south-west European countries only change impelled by a crises or extreme situations as catastrophe.

In addition, due to intrinsic nature of Healthcare and the existence of sub-cultures related to the fact that Healthcare Systems are majority public and difficult to change, the Lean culture construction became a central aspect of this research. Moreover, a discussion on whether Lean is a cultural issue also in Healthcare and how is its building process was missing.

A specific taxonomy for classification of existent case-studies (Brandao de Souza, 2009) seemed suitable to show an evolution path in Lean deployment in Healthcare services, but only as a starting point. This evolution was confirmed by this research cross-case evidence but positing that only as complementary the different approaches could lead to sustainability, not in a substitute way.

This research pathway is visible through the sequence of findings and answers that are presented in Table 13.1.

Table 13.1 – Research findings

Chapter	Research Sub-Questions	Research Main Findings	Answers to Research Questions
3	-Does national cultural resemblance to Japan means a deeper deployment of Lean practices by Healthcare organizations?	- National Culture dimensions (in Work Place) linkage to Lean fundamental concepts: Collectivism with Flow; Masculinity with Continuous Improvement and Willingness to change; Power distance with Empowerment; Uncertainty avoidance with Problem solving and Visual Control; Long-term orientation with Sustainability. -Case classification (Brandao de Souza, 2009) allowing national cluster definition and case typology evolution over time (not publishing dates but case occurrence dates) showing Lean maturity levels in Healthcare.	RQ1- Lean different outcomes according to different Lean Drivers RQ2- National and organizational culture work as barriers when contradict Lean fundamental concepts RQ3- National and organizational culture work as enablers when support Lean fundamental concepts RQ4 – Risk avoidance (different from uncertainty avoidance) is linked to anxiety on Lean results present in South Europe’ cases. RQ5- Measurement culture marks (visual control and some sort of monitoring system) predominance in low uncertainty avoidance countries. RQ6- Long-term orientation serves sustainability purposes.
4	-How embedded is outsourcing in Healthcare sector?	-Structured cross-cultural comparison on outsourcing in Healthcare concerning: identifying (1) outsourcing decisions rationale, (2) the main drivers and their differences from other sectors, (3) specific risks and benefits of this decision related to outsourced clinical and non-clinical activities, and (4) the wide spectrum of private-public supplier relationships. -Outsourcing activity typology, outsourcing drivers, benefits and risks, lessons learned and future trends.	RQ1- Lean and Outsourcing share similar outcomes when moved by the same drivers RQ2- Lean and outsourcing find similar cultural barriers, namely in establishing a Long-term mindset. RQ3- Outsourcing benefits serve Lean purposes, thus outsourcing can enable Lean deployment. RQ4- Outsourcing risks, as in Lean, are related with lack of monitoring and as taking both as panacea solutions RQ6- Outsourcing and Lean, in Healthcare settings, have both “hard” and “soft” sides related to short or to long-term orientation and deepness and sustainability is achieved working the soft side.
5	-Is “outsourcing” a Lean practice?	-Outsourcing paradigm shifting -Outsourcing presented as a strategic Lean tool in Healthcare settings. -Different outsourcing paradigm drivers serve different Lean maturity levels, in Healthcare. -Parallel between Lean and outsourcing soft and hard sides.	RQ1- Strategic and transformational outsourcing can be considered Lean practices for having similar drivers and outcomes and share a common evolution path. Lean and outsourcing common drivers are related to cultural dimensions that distinguish different maturity deployment stages of different national cultures. Outsourcing works as a Lean tool by allowing focus in value-adding activities. RQ2- Both Lean and outsourcing journeys imply a change process to overcome common barriers as deep as the maturity stage achieved RQ3- Outsourcing concept evolution enables Lean deployment.

Table 13.1 (Cont.) – Research findings

Chapter	Research Sub-Questions	Research Main Findings	Answers to Research Questions
6	-How to find the best value equation combining internal and external resources offering innovative and highly customized services?	-Leagility concept is applicable on Healthcare Start-ups; -Lean, Agile and Leagile Paradigms distinguishing attributes in an outsourcing strategy; - It is a Lean philosophy that leads a start-up Healthcare organization to outsource “non-value” added activities in order to gain speed to market and flexibility in entrance momentum	RQ1- Leagility outcomes in Healthcare vary according to cost-time-quality trade-offs. RQ3- Outsourcing enables Lean implementation allowing a value equation construction by combining internal with external resources having in mind the “voice of the (internal and final) customer”. Agility needs a Lean paradigm to exist and that can be possible through outsourcing.
7	-How to find the best value equation combining internal and external resources offering innovative and highly customized services?	-Process modularization serve Leagility purposes, thus Lean purposes in mass customized Healthcare organizations and serves outsourcing strategic intents. -The “pull” system is better illustrated by the Integrated Value Chain (rather than the Porter’s Value Chain). -Leagile attributes in modularity are notorious in all system six characteristics in outsourced services. - The adoption of a PO perspective facilitates the definition of modules, interfaces and standards at organisational design level.	RQ1- Outsourcing and Lean expected outcomes need a Process Orientation approach for standardization of activities and outputs enabling activity’ mapping, costing and service design. RQ2/3- Outsourcing decisions can help or jeopardize the service, process and organizational modularity, depending if it serves Lean purposes or not. RQ5- The difficulty to control outsourced processes, and Lean processes, addresses the performance monitoring problem as a risk management issue.
8	-How VMI benefits serve Lean purposes in Healthcare and why its outcomes can be difficult to achieve?	-Lean thinking is applicable in Healthcare Supply Chain Management through VMI, not only in internal processes of “Shop Floor”. - The best way to look for enablers and barriers to any project implementation is to follow the root causes for benefits and risks.	RQ1- VMI, as an outsourcing solution, can reach Lean outcomes streamlining material and information flow by introducing visibility in the supply chain, decrease inventory costs and avoid bullwhip effect. The continuous improvement in material management areas cannot happen apart from a holistic view of Lean deployment in the whole supply chain. RQ2- VMI has the same barriers as Lean, especially those related with building relationships with trust. RQ3- VMI work as enabler to an extended Lean enterprise; at the same time VMI share some Lean enablers as trust building and supply chain visibility.

Table 13.1 (Cont.) – Research findings

Chapter	Research Sub-Questions	Research Main Findings	Answers to Research Questions
9	-What are the barriers to Lean implementation in Healthcare? -What enables Lean implementation in Healthcare? -How to develop a sustainable Lean culture?	- Lean roll out dissemination process in the same Healthcare organization is a mindset problem. Lean sustainability key factors in Healthcare settings are related to monitoring issues and mindset creation. -Lean mindset is visible in everyday tasks in professional and personal lives of well trained staff. -Pace of Lean practices deployment places an enabler role in Lean sustainability and is assured by external consultants with trained <i>senseis</i> help. - A team-based approach and success celebrations are crucial to sustain Lean achievements. - Lean projects without lessons learned lead to return to initial stages and need for a “take two”. -e.g. Table 9.3 for other findings.	RQ2- Change resistance, mainly by doctors, and returns to comfort zone in non monitored activities, and the discontinuity of <i>kaizen</i> programs are barriers to Lean implementation. Also financial reasons, dependency of external help of the consultants as source of engagement, lack of compass and leadership of the process (internal leadership and <i>sensei</i> training), worked as barriers. RQ3- The cultural issues along with practice repetition are the main factors for a Lean mindset construction. RQ5- Monitoring failures is a common lesson learned in Lean deployment in Healthcare; RQ6- Sustainability is related with monitoring Lean outcomes in regular basis and creates a holistic Lean Mind-set in the organization.
10	-How does Healthcare organisational culture change in Lean deployments? -Why Lean programs fail?	-Lean culture change process framework in Healthcare settings and critical success factors. - Lean culture construction follows the Schein (2009) bottom-up process as through practice repetition, culture is achieved. - Lean programs fail by failure of change critical success factors: communication, leadership, commitment, pace and monitoring. - Proposal of a Lean maturity model for Healthcare for long-term deployment.	RQ1- There are hard and soft Lean outcomes to be pursued in Lean deployment. RQ2- Healthcare sector culture is a barrier to Lean. RQ3-Each Lean maturity stage enables the subsequent one. The path of organisational culture change towards a Lean culture, is changing behaviour to change thinking, thus from hard to soft. RQ6- Lean sustainability lies in a Lean culture construction. Lean culture construction is only possible by assuring change management critical factors: communication, leadership, commitment, pace and monitoring over Lean practices repetition.
11	-Why assess Lean deployment in Healthcare? -What Lean deployment dimensions have to be evaluated in Healthcare? - How to assess Lean transformations in Healthcare?	-Proposal of a “Healthcare Lean Assessment (HLA)” framework based in Shingo Prize’s recommendations. - A well tested Lean audit instrument can be applied to similar organisations in order, not to compare the incomparable (as each organisation may have started at different timing and not always have followed an ongoing Lean implementation) but to serve as a Lean maturity guide, a benchmarking tool for organisations in the same sector.	RQ5-Lean deployment in Healthcare should be monitored by “HLA” for the need to “comfort zone” return avoidance, and journey guidance. Both hard and soft dimensions are included in such instrument. RQ6-The Lean self-assessment, as well as benchmarking, through HLA, is paramount for a sustainable Lean journey as each Healthcare organization is framed by the sector politic and economic constraints.

Table 13.1 (Cont.) – Research findings

Chapter	Research Sub-Questions	Research Main Findings	Answers to Research Questions
12	- How to develop a sustainable Lean culture? - What are the enablers, barriers and risks of Lean in Healthcare?	-Lean enablers, barriers and risks are Lean Healthcare pre-conditions to Sustainability Direct Factors: communication, leadership, commitment, pace and monitoring (table 12.4) - The excessive dependency on external consultants implies deployment pace interruptions according to budget constraints. - <i>Kaizen</i> alone, used as single tool is not enough to change an organisational culture, nor is to understand Lean as experiments in departments. -Becoming a Lean hospital needs to become a learning organization and pursuing Lean both at operational as strategic levels. - Lean is a bottom-up construction but needs top-down endorsement.	RQ1- Lean deployment evolves from focusing sequentially on information flow, material flow and patient flow outcomes clearly divided into quality, cost and delivery gains. RQ2-The strongest first change resistance comes often from the same professional group that becomes the first enabler. RQ3-freeing clinical staffs for clinical tasks and overall staff empowerment are enablers to Lean in Healthcare. RQ4- Lean in Healthcare has a frequent risk of excessive dependency on external consultants for kick offs and deployment pace maintenance; also it is frequent the risk of Lean misinterpretation as a staff reduction strategy or a material management tool. RQ5- Most monitoring systems are not used in regular basis and others, despite of been linked to an organisational performance assessment are only data warehouses. RQ6- Sustainability depends on consider the concomitancy of the three different flows (information, material and patient) rather that substitution of approaches. Short-term orientation (Lean projects) in Lean deployment doesn't concur to Lean sustainability for lacking Lean strategic thinking.

Source: The author.

13.3. Broader Lean thinking evidences in Healthcare

Lean encompasses not only a set of tools but several knowledge areas as Theory of constraints, six sigma, change management theory, among others, that allow at the operational level to develop Lean practices (operational level) that serve Lean principles (strategic level) (Hines *et al.*, 2004). Some authors call Lean an “operations strategy” (Modig and Ahlström, 2012: 139), but strategic intent does not always seem to be present in Healthcare settings. This research seem to answer to these authors’ defy of further research in a “green-field” where Lean application would be contingent and unique to a “particular value system and industrial sector” as Healthcare sector.

Following some issues of this challenge and aware that Lean is not context free, we seem to find crucial to stress the ones intrinsically to Healthcare and more critical to Lean “translation” in this kind of services:

- *Value versus cost*

Healthcare “value” definition has been presented as controversial by some authors that claim to be a “world full of values” (Young and McClean, 2009). In Healthcare, as any other service, the customer plays an active part in value creation process. However, the value-creation process is not restricted to a dyad (such as a supplier–customer dyad); rather, value creation occurs within a network of relationships among many actors. Within such a “value network”, value is not created in a linear process involving a sequence of actors in a production chain; rather, value is co-created in a constellation of networked co-operant actors (Normann and Ramirez, 1994).

This perspective is a shifting from the paradigm of a focal service system managing particular stakeholders to a paradigm of multiple service systems working together as partners to co-create value for all stakeholders through a relationship network, which seems suitable to represent Healthcare sector. According to this view, each of the many different customer groups effectively contributes to the co-creation of value while also expecting value in return for them. It is therefore more accurate to speak of “systems thinking” in public sectors as Healthcare (Seddon, 2008) to frame Lean thinking not only to address value creation and non-value added activities, but also to address the flow concept, intrinsic to Lean. There are two ways to increase customer value in Lean

Thinking: (i) reducing waste and thus the cost of a product or service and (ii) increasing the value-adding activities without increasing the cost of the service or product.

Thereby, Lean thinking represents a way of involving the contribution of the patient in value creation as the concept of service productivity in the context of Healthcare encompasses values such as experienced health, quality of life, accessibility, trust, communication, avoidable suffering and avoidable deaths, and not only reduced costs, activities and outcomes. It is necessary to address value in the whole Healthcare value stream and create a Lean discussion and broader academic research that could address issues as establishing the electronic record as the only record, allowing the articulation with primary care services, the coordination of the several services according to the real needs of the patients as the efficiency of the whole system, not to serve each “kingdom’s interests.

However, cost, representing just one face of performance (along with delivery and quality) is the first concern in most of the Lean deployments, neglecting the other two value creation components. Thus, only considering this triad, in Lean transformations, Healthcare organisations would be really following the Lean Principles.

- *Extended enterprise*

Healthcare organizations pursuing Lean, sometimes declare to have the goal of becoming a “Lean Hospital”. The concept of a Lean Hospital, this research evidence also underlines, is related to the concept of “Extended enterprise”. Lean enterprises are complex, highly integrated systems comprised of processes, organisations, and information, material and patient flows, with multifaceted interdependencies and interrelationships across their boundaries.

The same rationale is present when outsourcing (strategic or transformational) solutions are adopted and the entire supply chain of a Healthcare organization is streamlined.

In fact, a Lean enterprise is continuously evolving with its environment, seeking improvement and perfection. The full benefits of Lean can only be realized by re-thinking the entire enterprise: its structure, policies, procedures, processes, management practices, reward systems, and external relationships with customers and suppliers.

This research constant need to follow Lean origins led to clarify what should and couldn't be called Lean in Healthcare. More, it is completely different to define the throughput time of a service inside or outside organizations' boundaries. Thus the process should be analysed when a need arise and ending when the need is fulfilled.

Lean "experiments" can be very positive for Lean quick wins but fade over time if not pursued in an integrated and on-going way. Also, to ignore system thinking a Lean Hospital cannot be build and certainly will not be eligible for Shingo Prize award appliance.

- *Strategic versus operational*

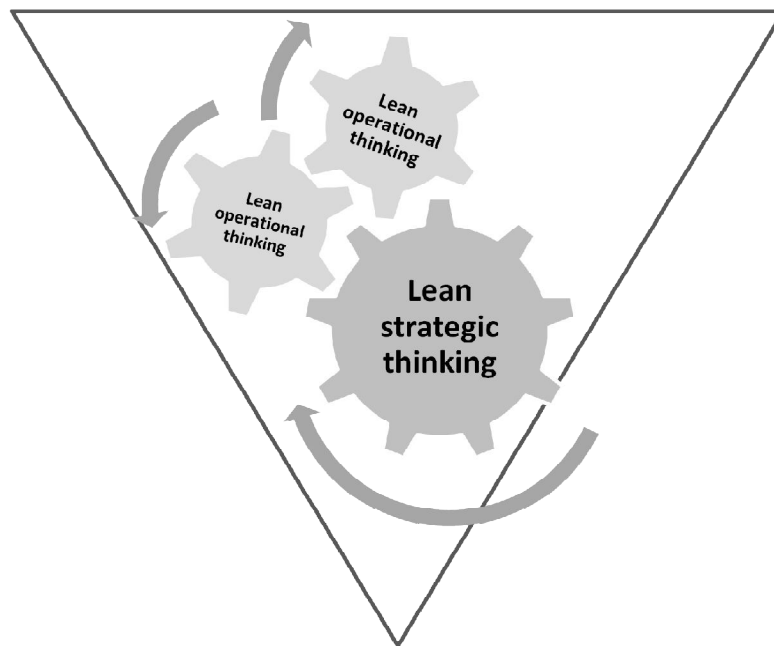
Also, the in broad and full understanding of Lean thinking, both operational and strategic aspects of deployment need to be addressed. Lean deployment in Healthcare is characterized by islands of projects, sometimes without any linkage between them. The Project structure, with all its requirements, might be suitable to operationalization of Lean but need to be agglutinated in a Program strategy.

Lean misconception lead to Healthcare organizations to restrict to Lean methods and tools. Again is useful to go to Lean origins and understand that tools are what an organization should have, methods define what an organization should do, principles define how an organization should think and values define how an organization should be.

Cases's evidence shows some difficulties in thinking and being Lean which results on the absence of Lean principles and values. Cases'evidence also stressed that although Lean is a bottom-up process construction, it need top-down endorsement. In public Healthcare organizations (as in private) top management involvement was referred as important to deployment. Yet, it is not sufficient to be present at kick-off and closing meetings, but to real define and lead a Lean strategy.

The bottom-up Lean construction must serve a strategic intent as several parts of the same engine, as illustrated by Figure, 13.1.

Figure 13.1- Lean operational thinking alignment with Lean strategic thinking.



Source: The author.

13.4. Lean thinking in Healthcare as cultural change

This research main stream defends that there is no Lean transformation without a cultural change into a Lean culture. Hence, Lean maturity levels were analysed under culture dimensions to place in a national scale, innovation propensity countries in an advanced stage of Lean deployment.

According to Smeds (1994), a radical innovation can be a result of many incremental innovations that reinforce each other to a common direction. A Lean enterprise is presented by this and other authors as a result of sequential changes, where each achievement serves as wedge for subsequent ones. This transformational process is described by Hines *et al.*, (2004) by a learning process of, first supported on single loop feedback and then on double-loop. The author defends that organisations with an integrated closed loop feedback mechanism tend to have higher maturity in their leadership/transformational processes and in their lifecycle processes than those with conflicting closed loop processes or open loop processes.

In consonance, and the cross-case evidence (especially on chapter 12) shows, the middle management and staff on the forefront state that every day little achievements lead, one year passed, to a major achievement. This bottom-up awareness (Burnes, 2004) has, in all studied cases, revealed itself not sufficient for evolving towards a lean enterprise without a top-down development strategy.

One of Lean sustainability critical factors is Leadership and transforming an entire enterprise to Lean has revealed new challenges in the role of leadership in effecting a change of this magnitude. Issues such as multi-program process standardization, global seamless information flow, and enterprise-level optimization across multiple stakeholder objectives are critical strategic factors. Leadership, commitment and alignment are imperative to becoming a Lean enterprise. Most critical are the overall enterprise leaders, who drive Lean practices and principles from the top of the organization. Thus, the leadership as sustainability factor, *lato sensu*, has to be addressed in Lean transformations in a cascade way, underlining the importance of the alignment between Lean project leadership, Lean program leadership and enterprise leadership and the CEO.

The fundamental notion of continuous improvement of individual tasks lead to creativity, productivity and work satisfaction (Mintzberg and Westley ,1992) as present in many interview's statements where Lean is described as a way of personal and working lives. But it is also notorious the lack of commitment to change (Herscovitch and Meyer, 2002) from some staff that do not have a leader role in the organizational structure.

Some literature defends that transforming hospital cultures can be accomplished through leadership development, a process that is helped by coaching, as one of training components of clinical and non-clinical professionals (Henchowicz and Hetherington, 2006). Other authors (Martins and Carvalho, 2012: 83) stress the difficulty of change in Healthcare organizations mostly due to : (i) multiple missions coexistence; (ii) Conflict of interest of multiple professions and other stakeholders; (iii) team and individual interdependency and consequent cooperation needs; (iv) Healthcare professionals power and influence on customer satisfaction and cost volume; (v) constant market, global economy, political and social values changes; (vi) technological changes; (vii)

expectations and needs of better informed patients; (viii) quality and service performance regulatory exigencies; (ix) investors expectations; (x) lack of information for managing change processes; and (xi) change resistance by staff with past bad change experiences.

Not having the goal of studying Healthcare change management, this research results ask, notwithstanding, for a deeper and longitudinal study on Healthcare organizational change through Lean deployment. However, some guiding insights are provided after data analysis, for distinguishing a Lean culture from Traditional culture, as presented in Table 13.2.

Table 13.2 - Lean culture versus traditional culture

Lean Culture	Traditional Culture
• Interdisciplinary teams • Managers teach/enable • Seek best in class and absence of waste • Root cause analysis • Rewards: group sharing • Supplier as ally • Share information • Removing waste lowers cost • Customer focus • Process driven	• Function silos • Managers direct • Benchmark to justify, not improving: (“Just as good”) • Blame people • Rewards: individual • Supplier as enemy • Guard information • Reducing volume lowers cost • Internal focus • Expert driven

Source: Adapted from Womack *et al.* (2005).

Each item of the Lean culture is not achieved without a daily *gemba* struggle for the five Lean principles (Womack, 1996, 2003), where each individual, with no exceptions, must be a change agent.

Thus, pursuing Lean implies that the culture change starts not at the bottom of the pyramid but on the top. According to Shook (2010), “It’s easier to act your way to a new way of thinking than to think your way to a new way of acting”, i.e. by changing

behaviour and actions, the culture change as a result.

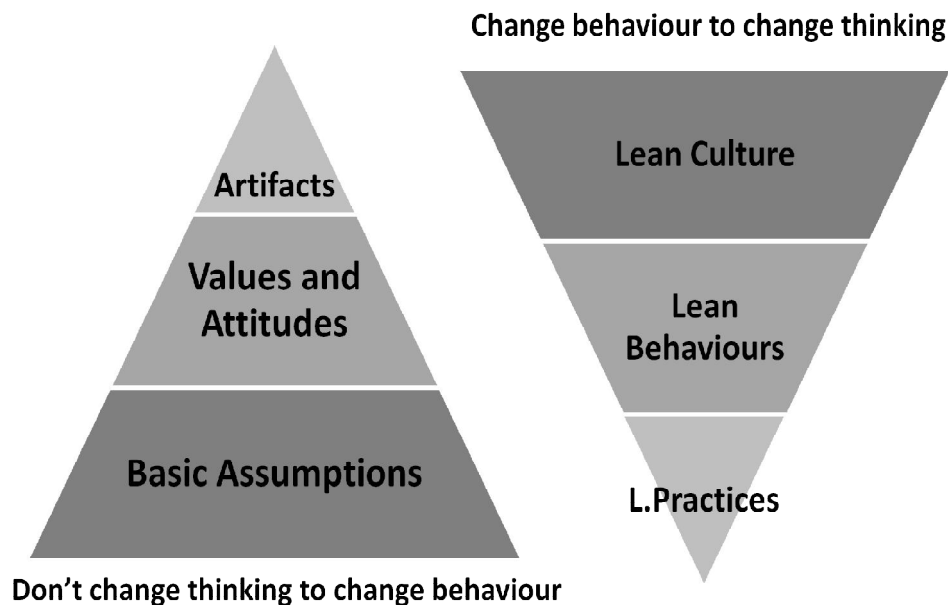
This culture change process contradicts the known dictum that structure follows strategy (Chandler, 1962) as structure can be redesigned according to a new value stream where wasting resources on non-core activities is substituted by externalizing them to external experts. These experts have the difficult task of helping to understand the reasons for such change, the tools and techniques to use, the relationships in each streamlined process, perform an on-going and solid group of change projects and manage risks of Lean deployment. Moreover, these experts have to face a major difficulty that is to deal with a culture of “tribalism” and an array of sub-cultures that feed bureaucratic organizations as Healthcare ones.

These difficulties are enlarged by a national culture background characterised by :

- A collectivist society (Hofstede, 2010:103) where the “interdependent self” (Hofstede, 2010:117) could be useful for “flow” notion but contradicts the proactivity need in Lean;
- Large Power Distance (Hofstede, 2010:103) contradicting empowerment, a Lean characteristic;
- Low Masculinity index (Hofstede, 2010:143;147) jeopardizing assertiveness needs, continuous improvement focus and willingness to change;
- The second highest country of high Uncertainty Avoidance (Hofstede, 2010:192) which could be helpful to standardization and *jidoka* purposes, but can inhibit innovation and “Just-in-time” deployment; and
- Short-term orientation (Hofstede, 2010:257) (just the opposite of Japan) which prevents looking at Lean as a journey and, therefore, building a Lean culture.

According to the Lean cultural process construction, explored in chapter 10 and illustrated by figure 10.1, the artifacts and practices are the motor of change.

Figure 10.1 - Lean Culture Change Process

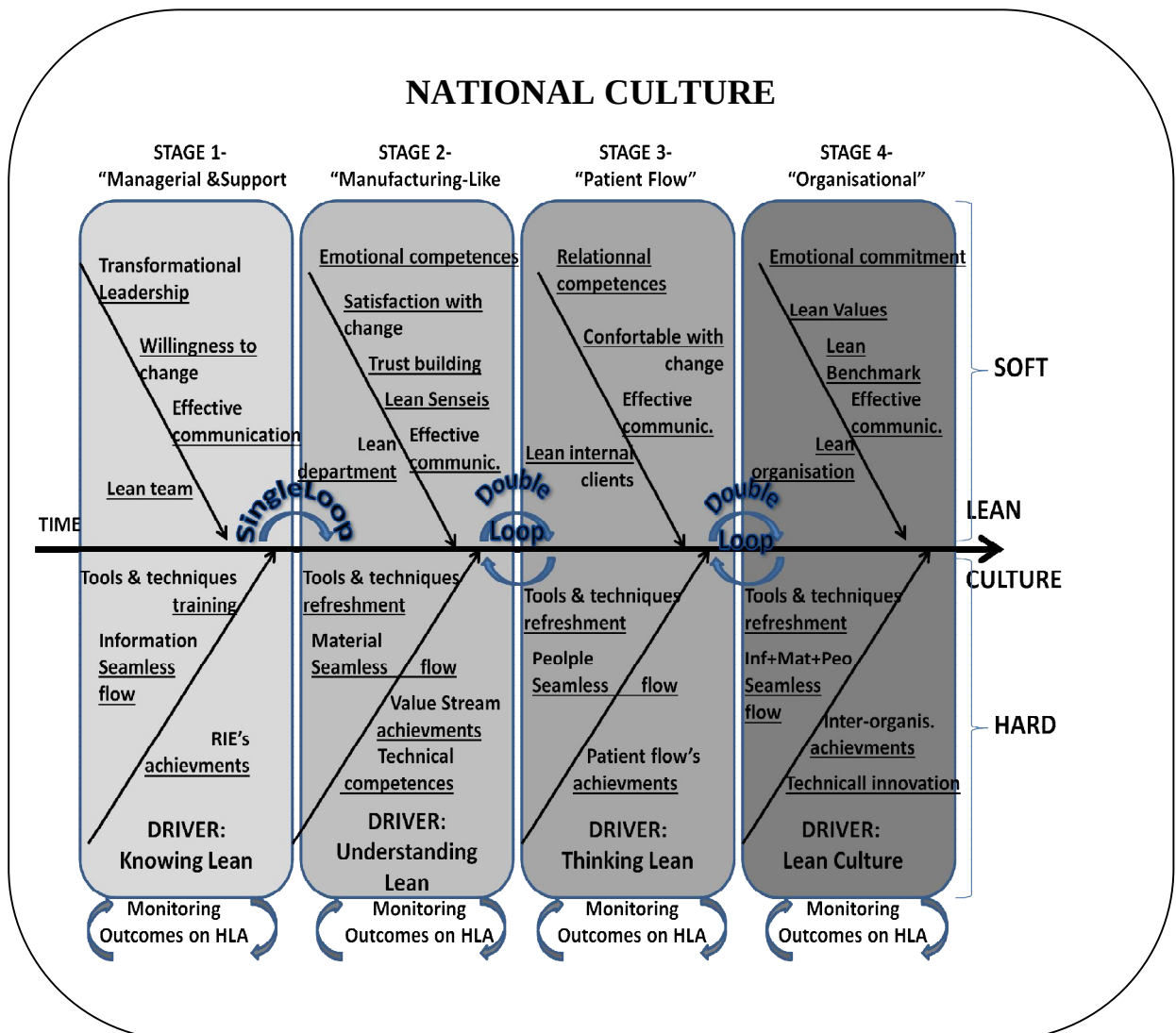


Source: the author

Evidence from all studied cases in other chapters showed that the culture change starts not at the bottom of the left culture pyramid (Figure 10.1) but on the top. This is consonant with culture change processes posited by Hofstede (2010: 19) and Shook (2010): “It’s easier to act your way to a new way of thinking than to think your way to a new way of acting”, i.e. by changing behaviour and actions, the culture change as a result. Lean is achieved by doing.

We posit that is through on-going Lean practices repetition and enlargement of scope that Lean readiness is achieved, by opposition to some authors that place Lean readiness as a pre-phase for Lean deployment (Radnor, 2011). Moreover, we found that four Lean deployment enablers should be present in all the different Lean maturity stages of figure 10.2 (chapter 10).

Figure 10.2-Model of Lean maturity in Healthcare organisations



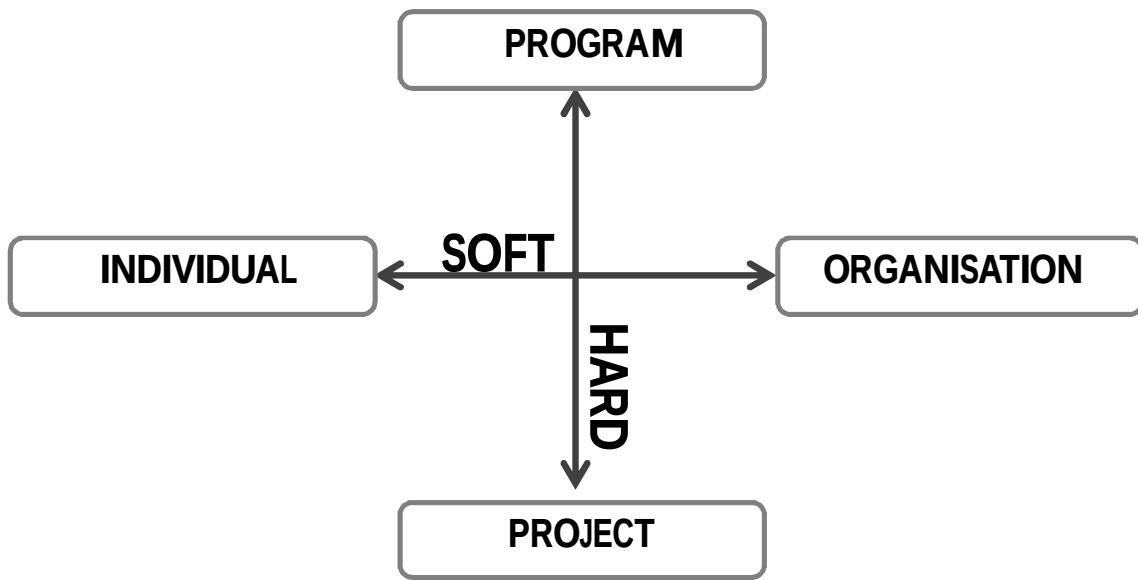
Source: retrieved from chapter 10 of this dissertation.

Lean enablers, although divide into hard and soft kinds, have to exist in two aggregation levels, from narrow to broader, from Individual to Organisation and from Project to Program, as illustrated by Figure 13.2. The enabler's level of the narrow scope side of each double arrow lead to "how to go Lean" while the broader scope side leads to "how to stay Lean".

Management needs feedback and communication about the progress of change along the evolution path, and the employees need the feedback to preserve their motivation and learning during implementation and stabilization of the new process design. And

monitoring should not be silent. Rather it has to be converted into visual milestones along the evolution path, since the visibility of discrete change projects gives the whole organization the possibility to learn from examples and celebrate successes.

Figure 13.2-Lean enablers' scopes



Source: the author.

13.5. Lean thinking sustainability in Healthcare

Lean sustainability lies in a Lean culture construction supported by Lean practices' repetition until they become *kata*, or a natural routine. In consonance, a set of theoretical propositions were developed during the course of this research, and should be used, we hope, as an agenda for further research.

The first TP posits that **organisational culture can be changed into a Lean culture through the repetition of Lean practices in the long-term**, and is sub-divided into:

TP1.1. Lean culture construction depends on the frequency, scope broadness, and performance outcomes of Lean practices.

TP1.2. Lean practice learning is a single-loop process of Lean tools, in a first phase, to

become a double-loop process in the long-term.

Second theoretical proposition is that **critical success factors as communication, leadership, commitment, training, pace and monitoring are enablers of a Lean culture construction to be included in an ongoing assessment of Lean culture.**

From this proposition several theoretical propositions arise:

TP2.1. Free two way communications is critical in all project phases for commitment creation, in Lean deployment.

TP2.2. Commitment is a critical factor only as emotional commitment, in Lean deployment.

TP2.3 Transformational leadership can determine Lean culture in Healthcare if assumed by top, middle and front-line managers.

TP2.4. All critical success factors described depend on emotional commitment of both clinical and non-clinical staff.

All these TP allow serving as inputs in a less explored, but emergent, research stream on Lean deployment in Healthcare organizations. As presented in multi-case finding, the issue moved from “how to deploy Lean in Healthcare” to “how to stay Lean in Healthcare”.

The framework presented in Figure 10.2, portrays the overall “flow” of action steps necessary to initiate, sustain, and continuously refine an enterprise transformation based upon lean principles and practices. This roadmap was developed from an enterprise perspective, with particular attention paid to strategic issues, internal and external relations with all key stakeholders, and structural issues that must be addressed during a significant change initiative.

This Lean Healthcare maturity model is supported by the HLA instrument that assesses both the “leanness” of a Healthcare organisation and its readiness to change.

14. Conclusions and future work

14.1. Conclusions

Our role as researchers is to create structure (or theoretical contribution (Whetten, 1989)) to make sense of the phenomena in specific contexts so practitioners can benefit from new insights.

This study has sought to create clarity on:

- What can be called Lean practices in Healthcare settings under the light of the concept's founders;
- What pattern of a Lean deployment journey was followed by Healthcare organisations;
- How different cultural (organisational and national) contexts can influence the pace in pursuing that pattern.

The assessment instrument proposed (HLA), for having an on-going deployment might (as it has to be tested) help changing the improvement mindset on Healthcare organisations. As most of the studied cases shown, there has been a static view of improvements in Healthcare organisations. Even those where some monitoring was started, over time as it did not continued, the absence of evaluation led to see Lean as an experience rather than a way of “doing things around here” or achieving operational efficiency.

Toyota's view of improvement is a dynamic view assuming that there are always going to be problems. TPS ensured that all employees know “how to fish” and Toyota's improvement projects are geared towards “teaching employees to fish”. This knowledge is difficult to decode and took almost a century to build.

The Lean biggest misjudgment in Healthcare is to look at Lean with a resource efficiency focus in a rather than focus on flow efficiency and don't really change the “push” mindset into a “pull” mindset. A combination of both is given with the Leagility paradigm where advantages of both efficiencies are explored in case “L”. Also this case

points out that the choice of which operational strategy to follow is dependent on the choice of business strategy.

This can apparently be easy in a modular start-up, despite the process of routines and standard operating procedures development, but gains complexity in all the other studied cases of change management. Getting an entire organisation to change its priorities from resource efficiency to flow efficiency and to get all employees to constantly think about how flow can be improved places enormous demands in Healthcare organisations.

Portuguese Healthcare organizations face two major difficulties in Lean deployment:

- The first of all is cultural, national and sectoral;
- The second, decurrent from the first, is in leadership and governance problems.

The majority of hospitals observed are stuck in vicious circles and there are a number of reasons that hinder them from moving forward:

- There is a lack of systems thinking and a clear supply chain vision.
- Hospitals lack relevant supply chain management expertise.
- Current systems do not capture and understand process variation; which leads to nurses and clinicians not trusting the processes.
- Deeply entrenched functional silos between support functions and core functions.
- Hospitals lack the expertise to become a learning organisation.

Lean deployment process has to pursue *kata* i.e. the process by which organisations improve must be turned into routine. In such a process, “it’s easier to act your way to a new way of thinking than to think your way to a new way of acting” (Shook, 2010), which supports this thesis TP of that by changing behaviour and actions, the culture change as a result.

Hence, some good advises from manufacturing should be recalled: “Lean isn’t a one-year program. It isn’t a five-year program or a ten-year program. In fact, don’t even call it a program. Don’t call it anything” (Womack in Quinn (2005)).

Lean in Healthcare faces a big challenge of not only leaning out processes inside each

organization but build lean systems (Liker and Franz, 2011:79) concurring to define a whole Healthcare system, starting at the *gemba*, leaning each process and pursuing all five Lean principles.

Another pitfall this research findings stream is the generalization of Lean deployment in Healthcare by *kaizen* instead of by *kaikaku*. Healthcare need a radical change first (*kaikaku*) and then pursue continuous, incremental improvement (*kaizen*), and not the other way around.

Finally, Lean is humility for learning, sometimes present in researchers that claim to contribute for Lean concept evolution, other times missing in research that present deviations from Lean essence.

Studying Lean deployment in a climate of cost cuts can be tricky as “Lean “ can easily be misunderstood by job cuts and exclusive focus on costs instead of value. Researchers in other countries had this same perception (Radnor, 2011b) and, arriving latter to the subject, we have a lot to learn with their journey. Hopefully, this work’s contribution presenting different national Lean stages can help our Healthcare sector, in this particular time, to think both short and long-term with Lean adoption.

14.2. Limitations of the study

The first limitation of a multi-case approach study is the availability of cases to study that could elective under the defined inclusion criteria of this research. In spite of the novelty of Lean phenomena in Portuguese Healthcare organizations, it was possible to undertake in deep case studies and conduct cross-case analysis.

Due to the nature of problem, study design and time constraints the proposed framework and assessment instrument was not tested, which could lead to corrections that were not made.

Also, some bias could occur by willful interviewers that wish to pass the image of Lean good students, which forced to a refolded care in data collection (observation and document analysis) and analysis (triangulation) for some statements confirmation.

14.3. Future research agenda

This research opens several paths for further research:

First, some Lean semantics is unexplored in Healthcare settings and requires further analysis, as the concept of “waste”, that should not be restricted to care interfaces waste analysis, but explore issues as medical errors, readmissions, defensive medicine and provide answers (recurring to Lean tools as six sigma, among others as example of some international cases) to effective waste reduction in Healthcare.

Second, this research proposal of the Model of Lean maturity in Healthcare organisations needs further testing and refinement. That would be possible through longitudinal studies in organisations pursuing Lean with medium to long-term orientation. It would also be interesting to test the HLA instrument that supports the Maturity Model through action-research methodology. Such approach would be guided by the several TP posed in this thesis.

Finally, it would be a natural extension of this thesis to explore the Lean deployment outside the organisation’s boundaries: the Lean evidences found in supply chain of Healthcare organizations should be completed by studying Lean practices under the supplier organization point of view. There are some interesting cases on Healthcare 3 PL and 4PL that deserved an academic discussion. Moreover, all the patient flow analysis should be considered in order to develop a useful research for supporting political decisions on:

- Location of services; size and design of infrastructures;
- Lean outcomes (cost, quality and delivery) conjoint analysis;
- Innovation in material, information and patient flows of the Healthcare national system;

only to name a few.

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Appendix A - Interview Guide

Time	Issues	Main Questions
BEFORE LEAN ("AS IS/WAS")	- Wastes/Muda	Describe all areas before lean process identifying wastes in each.
LEAN PROCESS	- Communications	- How was the organization informed about the programme (what and why)? - Where there any opportunities for two-way dialogue with staff?; - Were successes celebrated?
	- Resources	- What was the amount of time and people involved? - What other resources were needed?
	- Involvement	- Do you think that all the right people were involved? - What kind of contribute was given?
	- Training	-Who was trained and what was the duration of each action? - What concepts were explained and how? - Was the training enough to feel comfortable with the lean event?
	- Implementation	- Was there a clear vision for what you are attempting to achieve? - Was there a focus on redesigning the pathway from end to end? - What sort of teams was formed? - Was there an effective pace of change - not too fast or too slow? - Was there a strong management engagement in the process? - Was there a process of continuously reviewing and improving processes? - Was there a focus on short term gains and long-term change? - How did the organization deal with resistance? - Do you think that lessons are learnt and shared? How? - Did you noticed a singularly focus on using one specific tool?
	- Assessment	- What went wrong during implementation? - What enabled the implementation and what harmed?
	- Compass	- Describe the plan – at least for the first six months. - Were activities realigned accordingly?
AFTER LEAN EVENTS ("TO BE")	- Achievement	- How many wastes solved ?– quantify gains in terms of cost/quality/time - Satisfaction with outcomes –still sings of same improvements? - How were results monitored? What were the outcomes?
	- Leadership	- Describe its role in each step. - Where the Leaders (at all levels) directly involved in the programme at every stage? - The leader (top in the organization) took part in celebrating success and setting direction? - What was the role of the board level improvement Sponsor?

Appendix B.1 - Shingo Prize' score weighting by business process

		Senior Leadership	Customer Relations	Product/Service Development	Operations	Supply	Management Support Processes
Assessment Areas		BUSINESS PROCESSES					
Cultural Enablers (150 pts.)	<i>People Development-Education Training & Coaching (50 pts.)</i>						
	<i>People Development-Empowerment & Involvement (50 pts.)</i>						
	<i>People Development-Environmental & Safety Systems (50 pts.)</i>						
	Weight	33%	Weighting in this dimension for the five business processes is determined by the percentage of total excellence in each area multiplied by 60%.				
Continuous Improvement (400 pts.)	<i>Continuous Improvement</i>						
	Weight	6%	13%	6%	43%	13%	19%
Enterprise Alignment (200 pts.)	<i>Enterprise Alignment</i>						
	Weight	60%	8%	8%	8%	8%	8%
Results (250 pts.)	<i>Quality</i>	Measures (50 pts.)					
	<i>Cost/Productivity</i>	Measures (50 pts.)					
	<i>Delivery</i>	Measures (50 pts.)					
	<i>Customer Satisfaction</i>	Measures (50 pts.)					
	<i>Morale</i>	Measures (50 pts.)					
		Measures (50 pts.)					

Source: <http://shingoprize.org/model-guidelines.html>.

Appendix B.2 - Shingo Prize's Behaviour Assessment Scale

		Operational Excellence (Shingo)				
Lenses		Level 1 0-20%	Level 2 21-40%	Level 3 41-60%	Level 4 61-80%	Level 5 81-100%
Organizational behaviors relative to the standard of Operational Excellence	Leadership	Leadership focused mostly on fire-fighting and largely absent from improvement efforts	Leadership aware of other's initiatives to improve but largely uninvolved	Leadership sets direction for improvement and supports efforts of others	Leadership involved in improvement efforts and supports the alignment of principles of operational excellence with systems	Leadership focused on ensuring the principles of operational excellence are driven deeply into the culture and regularly assessed for improvement
	Management	Management orientation toward getting results "at all costs"	Managers mostly look to specialists to create improvement through project orientation	Leaders and managers involved in developing systems and helping others to use tools effectively	Managers focus on driving behaviors through the design of systems	Management primarily focused on continuously improving systems to drive behavior more closely aligned with principles of operational excellence
	Associates	Associates focus on doing their jobs and are largely treated like an expense	Associates occasionally asked to participate on an improvement team usually led by someone outside their natural work team	Associates trained and participate in improvement projects	Associates involved every day in using tools to drive continuous improvement in their own areas of responsibility	Associates understand principles "the why" behind the tools and are leaders for improving not only their own work systems but also others within their value stream
	Measures	Effective measures largely missing or driving inappropriate behaviors	Measures primarily focused on business results	Measures begin to communicate "cause and effect" for associates responsible for value creation	Scorecard has broad range of performance metrics and begins to include behavioral elements	Balanced scorecard includes both business results and behaviors relative to guiding principles
Frequency		Infrequent Rare	Event-based Irregular	Frequent Common	Consistent Predominant	Constant Uniform
Duration		Initiated Undeveloped	Experimental Formative	Repeatable Predictable	Established Stable	Culturally ingrained Mature
Intensity		Apathetic Indifferent	Apparent Individual Commitment	Moderate Local commitment	Persistent Wide commitment	Tireless Full commitment
Scope		Isolated Point solution	Silos Internal value stream	Predominantly operations Functional value stream	Multiple business processes Integrated value stream	Enterprise-wide Extended value stream

Source: <http://shingoprize.org/model-guidelines.html>

Appendix B.3 - Shingo Prize's Results Assessment Scale

Lenses	Level 1 0-20%	Level 2 21-40%	Level 3 41-60%	Level 4 61-80%	Level 5 81-100%
Stability	Little to no evidence of stability Little to no predictability Beginning to implement Unpredictable 0-1 years		Has begun to stabilize Initiating predictability Building maturity All levels have become comfortable with the measures 2-3 years		Stable Predictable Long-term Mature 4+years
Trend/Level	Level is low Trend is poor Little to no evidence of goals Little evidence to no evidence of benchmarking		Moderate improvement in level Benchmarking is industry-focused Trends are mostly positive to flat with some backsliding		High level of attainment considered world-class Benchmarks constantly raise the bar and are a function of process not industry Positive trend with very few anomalies to explain Trend is well above expectations
Alignment	Isolated with inconsistent usage of measures Little alignment Strong silos		Some areas aligned, other than operations Performance measures aligned in operations Silo's are beginning to fall Working toward enterprise-wide alignment		All measures align to corporate goals and down to the lowest level Enterprise-wide extended value stream No silos
Improvement	Little to no systematic feedback Sporadic feedback Little evidence of goal setting some evidence in operations		Regular feedback in some areas All areas do not address feedback systematically Many areas beyond operations have a process to set goals		Routine feedback to appropriate party Evidence of feedback in all areas Almost all areas have goals that are realistic and challenging

Source: <http://shingoprize.org/model-guidelines.html>

The scoring ranges are:

The Shingo Prize 775 or higher
Silver Medallion 675 – 774
Bronze Medallion 575 – 674

For example, an organisation received an overall mid-level 4 level, which is equivalent to 61-67%. This percentage converted to a point system is between 610-670 points out of 1000 possible points. The organisation's overall score falls within this range. This same method can be applied to each area of the scoring process. The Shingo Prize does not provide an exact score in the feedback, just a range. This places the emphasis and focus on improvement rather than points.

Appendix C.1 – SIPOC Diagram Template

SUPPLIERS	INPUTS	PROCESS	OUTPUTS	CUSTOMERS
Provider	Requirements and Measures	Start:	Requirements and Measures	Receiver
		High-Level Process Description:		
		End:		

Appendix C.2 – A3 Report Template Example

PLAN	Problem: 	Department: _____ Date: _____ Project Leader: _____ Project Team: _____																																				
	Background: 	Implementation Plan <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">What?</th> <th style="width: 20%;">Who?</th> <th style="width: 20%;">When?</th> <th style="width: 30%;">Progress</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td style="text-align: center;">⊕</td></tr> <tr><td> </td><td> </td><td> </td><td style="text-align: center;">⊕</td></tr> <tr><td> </td><td> </td><td> </td><td style="text-align: center;">⊕</td></tr> <tr><td> </td><td> </td><td> </td><td style="text-align: center;">⊕</td></tr> <tr><td> </td><td> </td><td> </td><td style="text-align: center;">⊕</td></tr> <tr><td> </td><td> </td><td> </td><td style="text-align: center;">⊕</td></tr> <tr><td> </td><td> </td><td> </td><td style="text-align: center;">⊕</td></tr> <tr><td> </td><td> </td><td> </td><td style="text-align: center;">⊕</td></tr> </tbody> </table>	What?	Who?	When?	Progress				⊕				⊕				⊕				⊕				⊕				⊕				⊕				⊕
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DO	Cause Analysis 	Follow-up <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;">Reasons for missing target</th> <th colspan="4">Results Tracking</th> </tr> <tr> <th></th> <th>Date</th> <th>Target</th> <th>Actual</th> <th>Gap</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	Reasons for missing target	Results Tracking					Date	Target	Actual	Gap																										
	Reasons for missing target		Results Tracking																																			
	Date	Target	Actual	Gap																																		
Target Condition 																																						

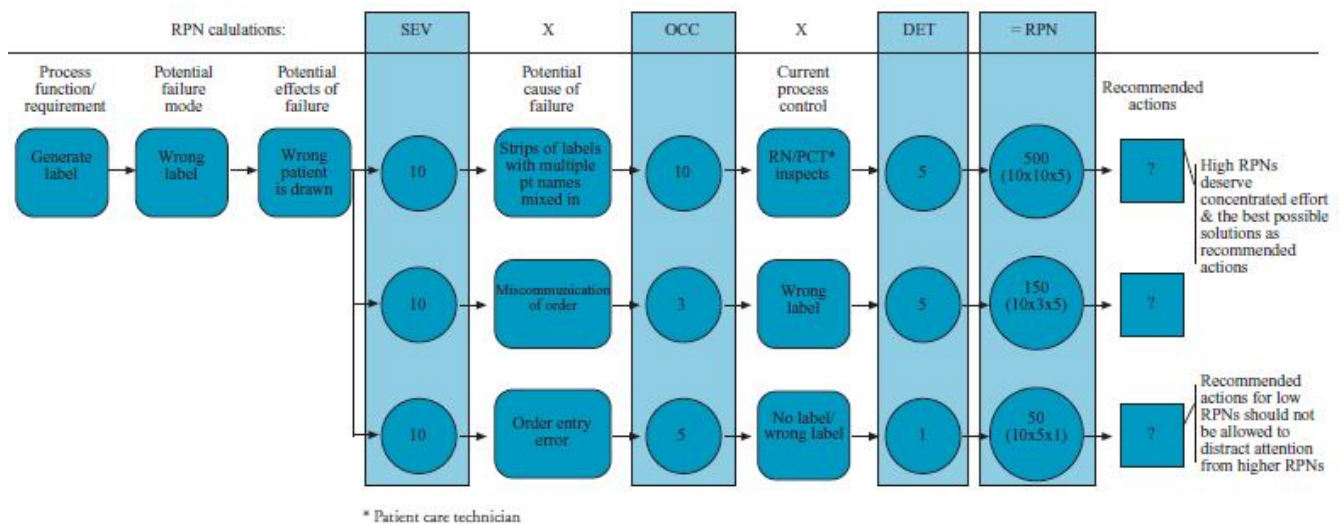
CHECK-STUDY & ACT

Gap = difference between target and actual

Appendix C.3 – FMEA Form

Process or product name:		FMEA TEAM:	Prepared By:	Original date:	Revised date:	Page _ of _	FMEA Number:							
Responsible:														
Process Step	Potential Failure Mode	Effect	SEV	Causes	OCC	Controls	DET	RPN	Actions Rec.	Actions Taken	SEV	OCC	DET	RPN

Healthcare Example:

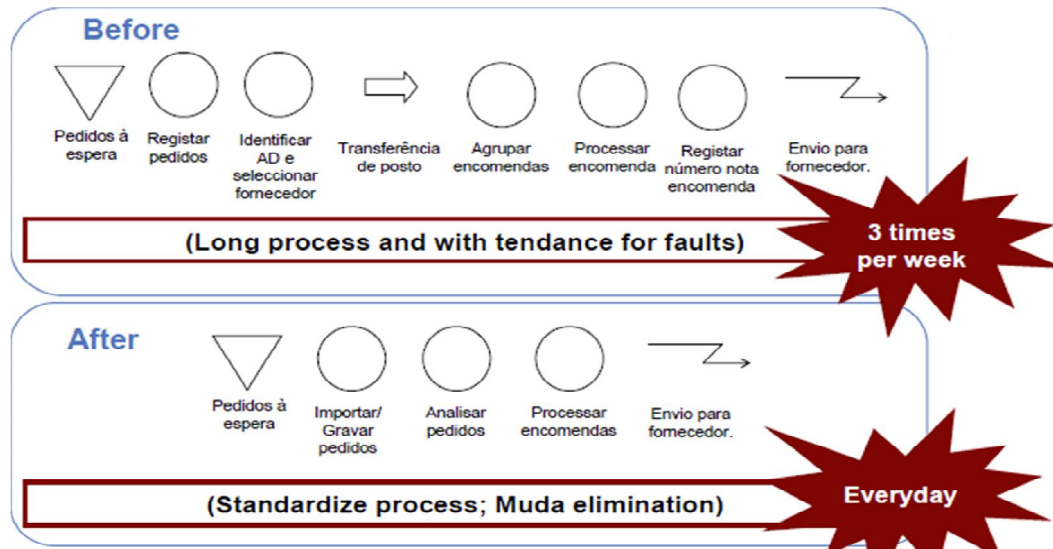


Appendix C.4 – 5 Why: Root Causes Analysis Form

								Corrective actions:	
1-Use this path for the technical root causes being investigated 2- Use this path to investigate why the problem was not detected 3-Use this path to investigate the systematic root	Define							Root Causes	
	Why ?	Why ?	Why ?	Why ?	Why ?	Why ?	Why ?	A	A-What was done to correct:
	Ask "why" at least 5 times before accepting that you have reached the real root cause.								B-What was done to improve detection:
		Why ?	Why ?	Why ?	Why ?	Why ?	Why ?	B	C-What was done to change:
		Examine the escape point in your process map to find the root cause for detection failure.							
		Why ?	Why ?	Why ?	Why ?	Why ?	Why ?	C	
Apply this systematic root cause process during your System Prevent investigation.									
Lessons Learned: 									
Investigated By: _____ Completed By: _____									

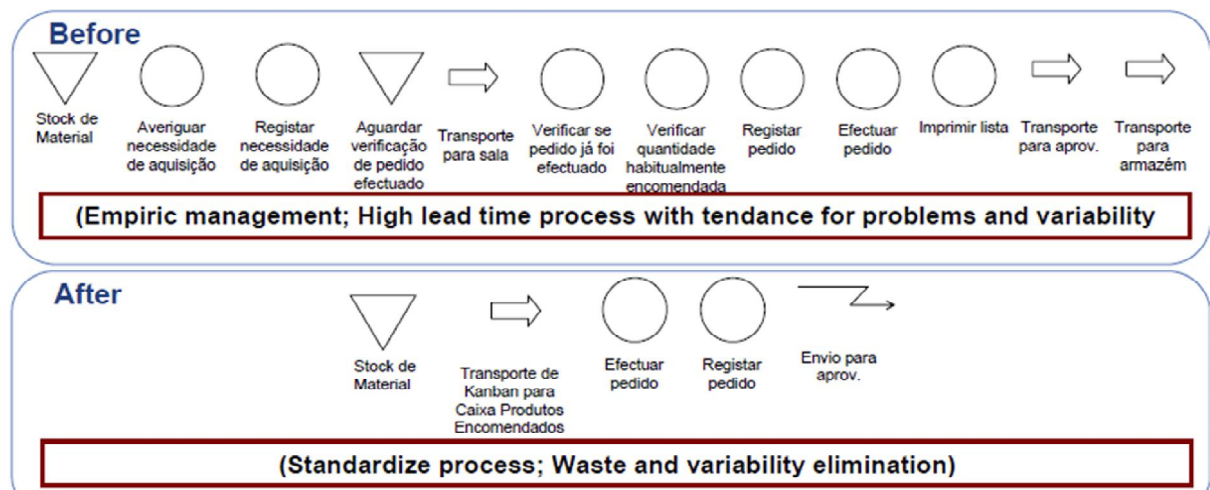
Appendix D.1 – Material Request and Purchasing Needs Processes Redesign

Case „N“ - Unit of Analysis 1- Material Requests Process : Before & After



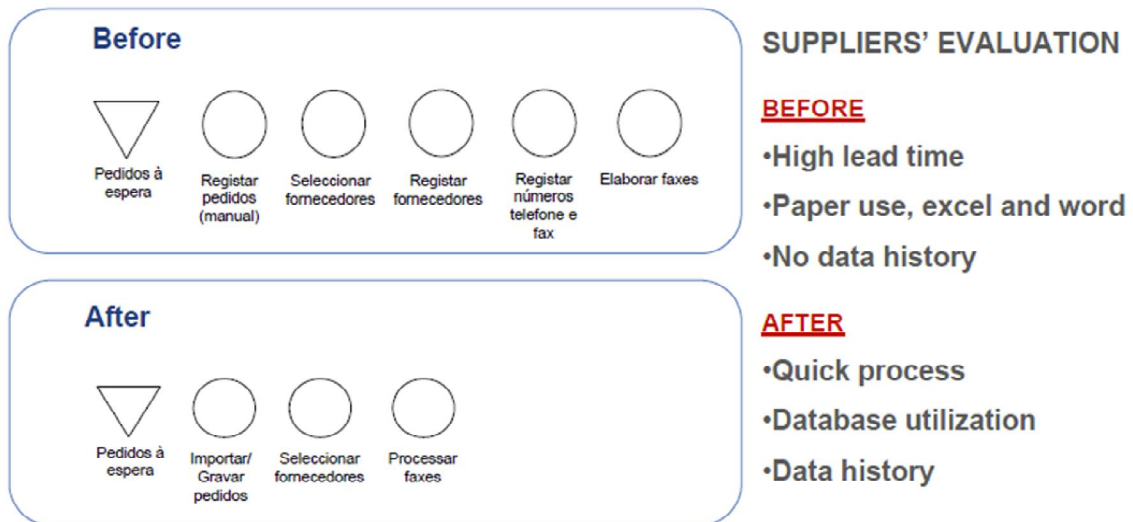
Case „N“ - Unit of Analysis 1- Purchasing Needs Definition : Before & After

PURCHASING NEEDS DEFINITIONS



Appendix D.2 – Supplier’s Evaluation Process Redesign

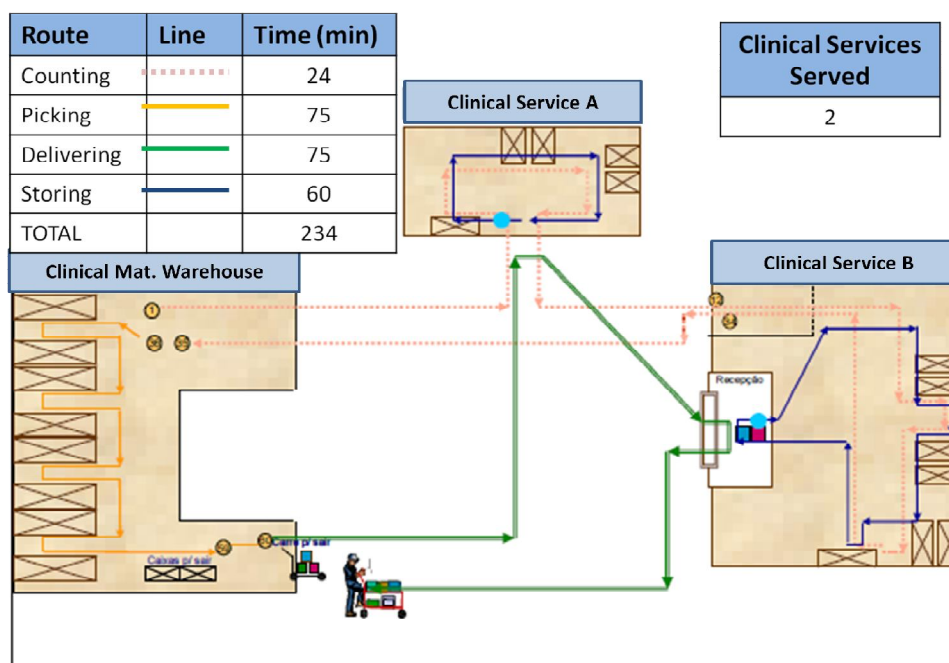
Case „N“- Unit of Analysis 1- Suppliers’ Evaluation : Before & After



Appendix D.3- Clinical Supplies Distribution Process- “As is”-“To be”

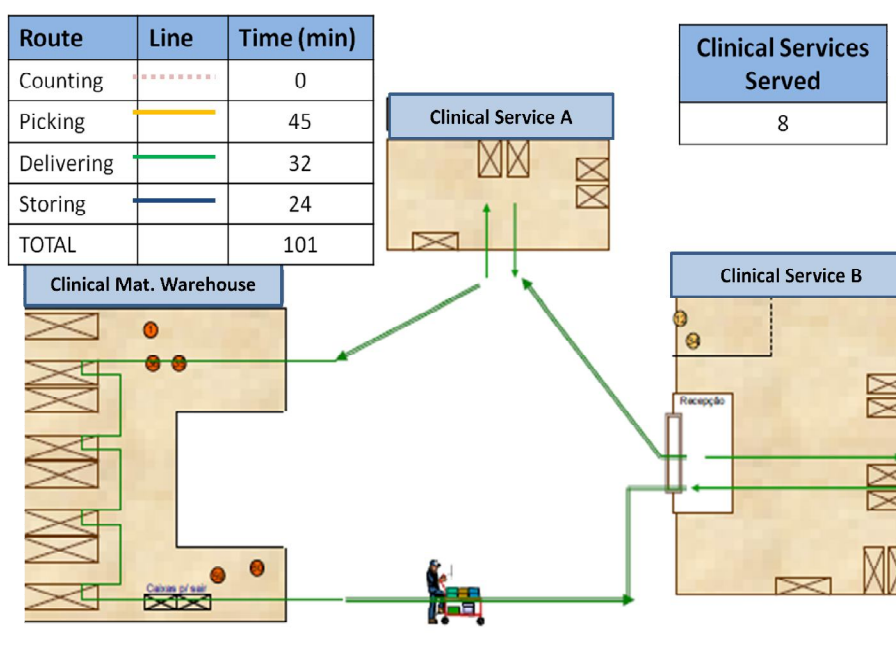
Case „N“- Unit of Analysis 1

Clinical Supplies Distribution Process – INICIAL SITUATION



Case „N“- Unit of Analysis 1

Clinical Supplies Distribution Process – FINAL SITUATION



Appendix D.4 – Case “N”, Unit of Analysis 1 – Standardization

Examples



PICKING STANDARD



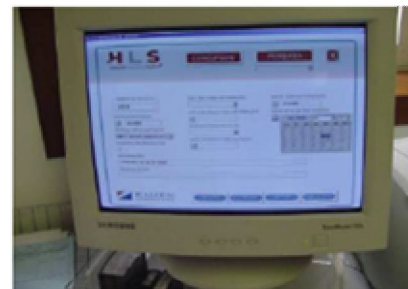
PRODUCTS LIST (MAP)

Appendix D.5 – Case “N”, Unit of Analysis 1 – Before/After Visually

BEFORE



AFTER



Appendix D.6 – Case “N”, Unit of Analysis 1 – Extension to Medication

Medication Warehouse



PICKING STANDARD



- Standardized supermarket
- Easy management
- Zero shortages
- Unidose A references always available

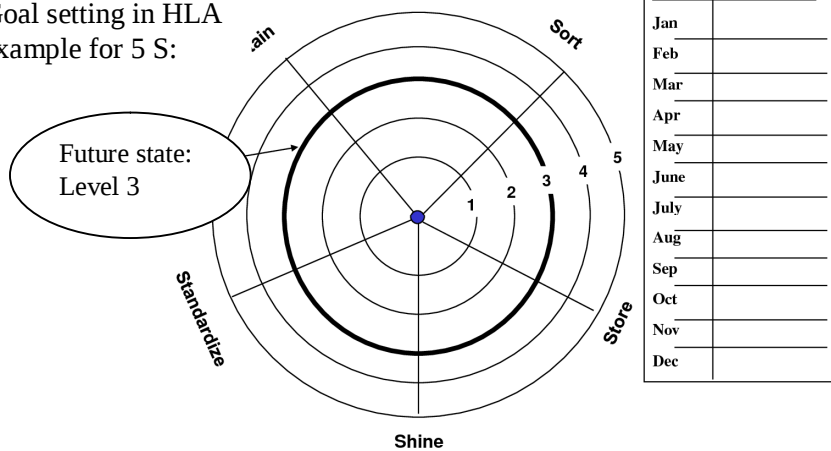
Case „N“- Unit of Analysis 1- Kanban Card

HLS Hospital Logistik System®	KANBAN
Código	
Descrição	 Hospital Geral de Santo António, s.a.
Ponto de Encomenda	
Qtd a Encomendar	

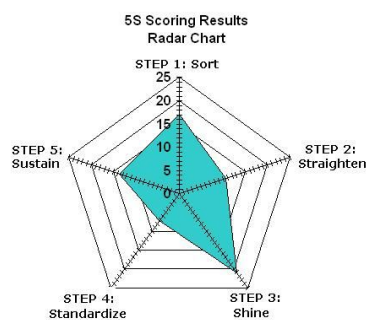
Appendix D.7 - 5S Auditing System

No	Category	Topic	Description & Score						/ 5	Improvement Points	
			Audit questions:	1	2	3	4	5			
1	Sort	Workplace condition	Unnecessary items are removed from	0% - 20%	21% - 40%	41% - 60%	61% - 80%	81% - 100%	of the audit area	3	Conduct another red tag activity
		Removal of unnecessary items	A process for removing unnecessary items	does not exist	exists but is not known	known but not used	often used	always used		2	Refresh training for all supervisors and operators in red tagging procedure
2	Straighten	Workplace condition	Necessary items are at point of use for	0% - 20%	21% - 40%	41% - 60%	61% - 80%	81% - 100%	of the audit area	3	Arrangement of items at point of use is good overall but there are clearly more tools than needed for the job
		Proper arrangement of items	A process for setting items in order	does not exist	exists but is not known	known but not used	often used	always used		4	There are standards for shadow boards and point of use tool storage
3	Sweep	Workplace condition	Free of trash, scraps, soil, leaks, dust, etc. within	0% - 20%	21% - 40%	41% - 60%	61% - 80%	81% - 100%	of the audit area	3	We need a better way to catch fabric scraps on the floor
		Cleaning to inspect	A process for daily cleaning to inspect the workplace condition	does not exist	exists but is not known	known but not used	often used	always used		1	Cleaning is ad hoc and up to the individual - recommend making time at start and end of shift to tidy up
4	Standardize	Workplace condition	Standards exist for markings, colors, item locations, signage, etc. at	0% - 20%	21% - 40%	41% - 60%	61% - 80%	81% - 100%	of the audit area	3	Some areas have excellent visuals (cutting area) while others none (GA)
		Revision of standards	A process to review, revise and update standards	does not exist	exists but is not known	known but not used	often used	always used		1	A process for revision of standards are needed - currently revision only occurs because of customer complaints
5	Sustain	Workplace condition	The current high score for 5S is maintained by	0% - 20%	21% - 40%	41% - 60%	61% - 80%	81% - 100%	of the audit area	1	There is no tracking of 5S scores
		Auditing 5S	A process for auditing and checking 5S condition and process	does not exist	exists but is not known	known but not used	often used	always used		1	Management does not audit 5S regularly
Total score for this audit, out of 100:									22	Auditor: C.R. Robinson Audit date: 3/11/08	

Goal setting in HLA
example for 5 S:

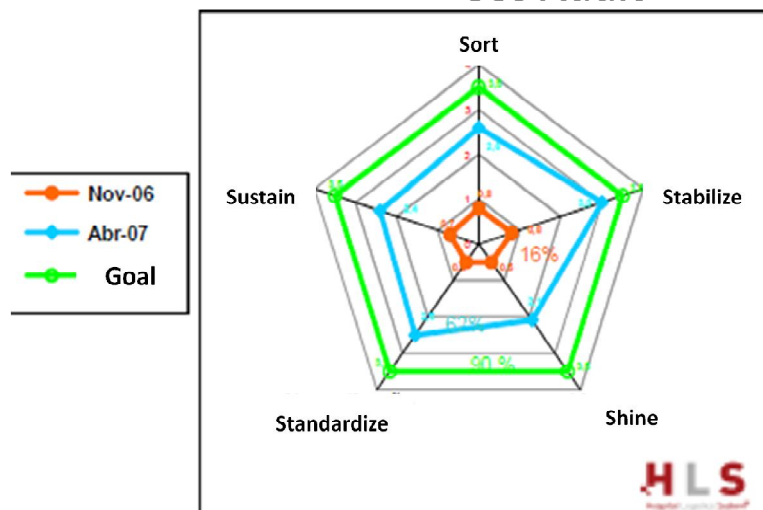


Score example:



Appendix D.8– Case “N”, Unit of Analysis 1 – A 5Ss Audit Example

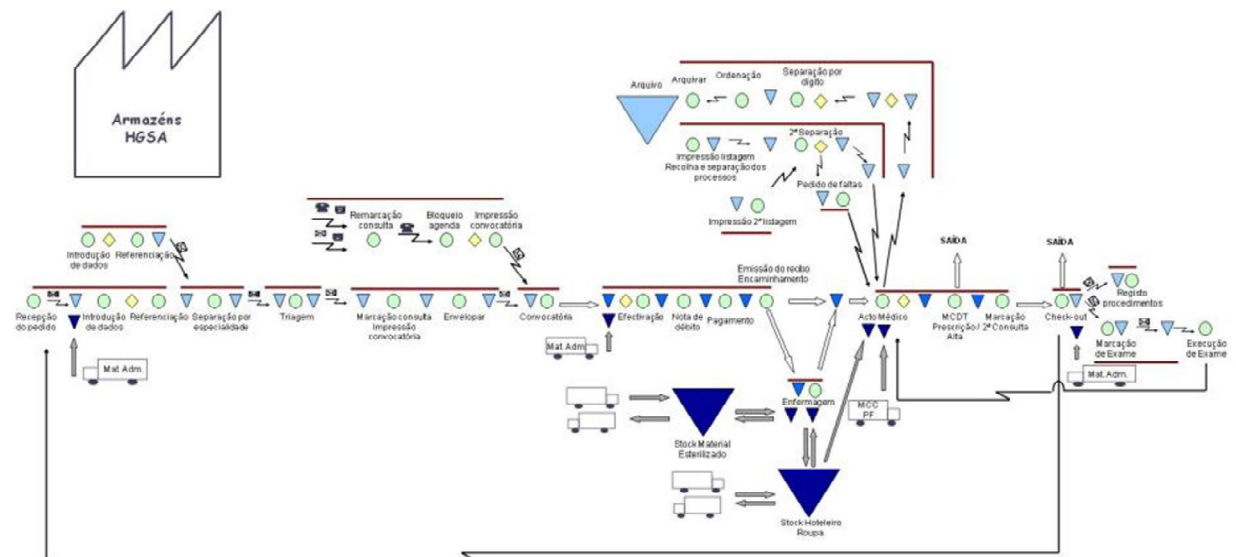
Case „N“- Unit of Analysis 1 5Ss Audit



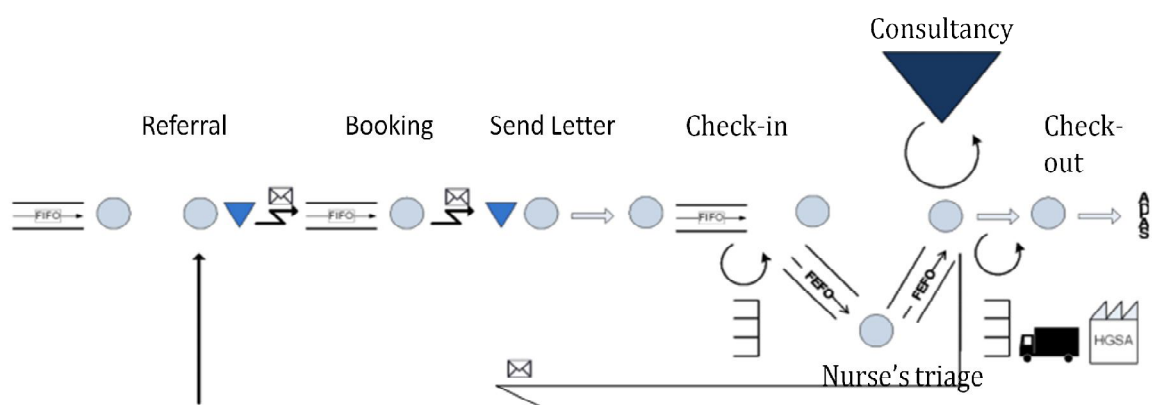
Date	Sort	Stabilize	Shine	Standardize	Sustain
Nov.-06	0,8	0,8	0,5	0,5	0,7
April-07	2,6	3,0	2,1	2,5	2,4
GOAL	3,5	3,5	3,5	3,5	3,5

Appendix D.9- Case “N”, Unit of Analysis 2 – “As is” – “To be”

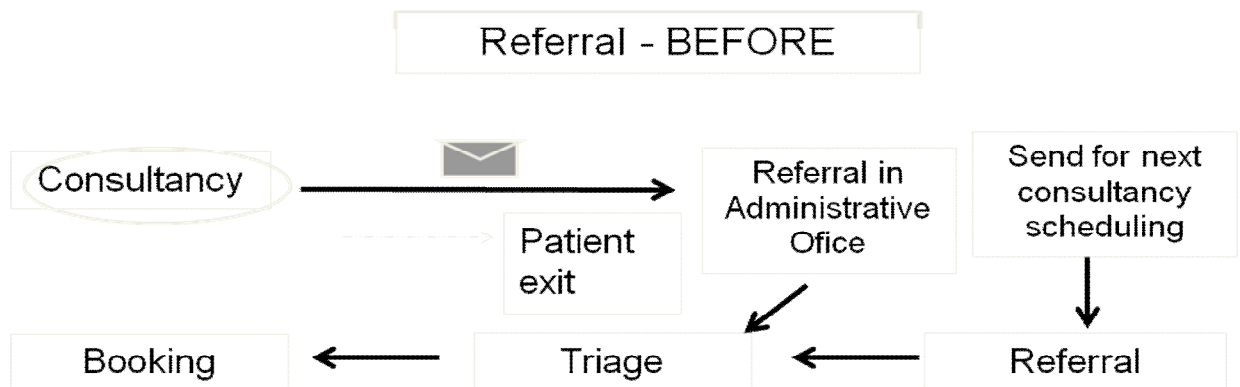
Case „N“- Unit of Analysis 2-INITIAL SITUATION



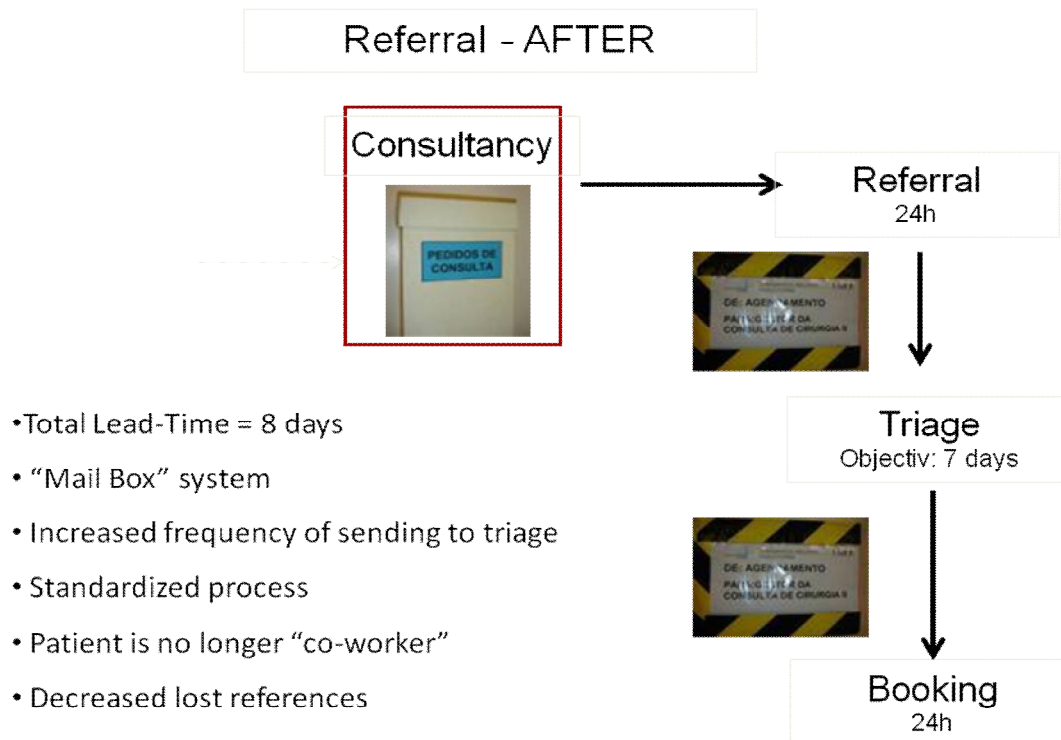
Case „N“- Unit of Analysis 2-FINAL SITUATION



Appendix D.10- Case “N”, Unit of Analysis 2- Referral Process Redesign

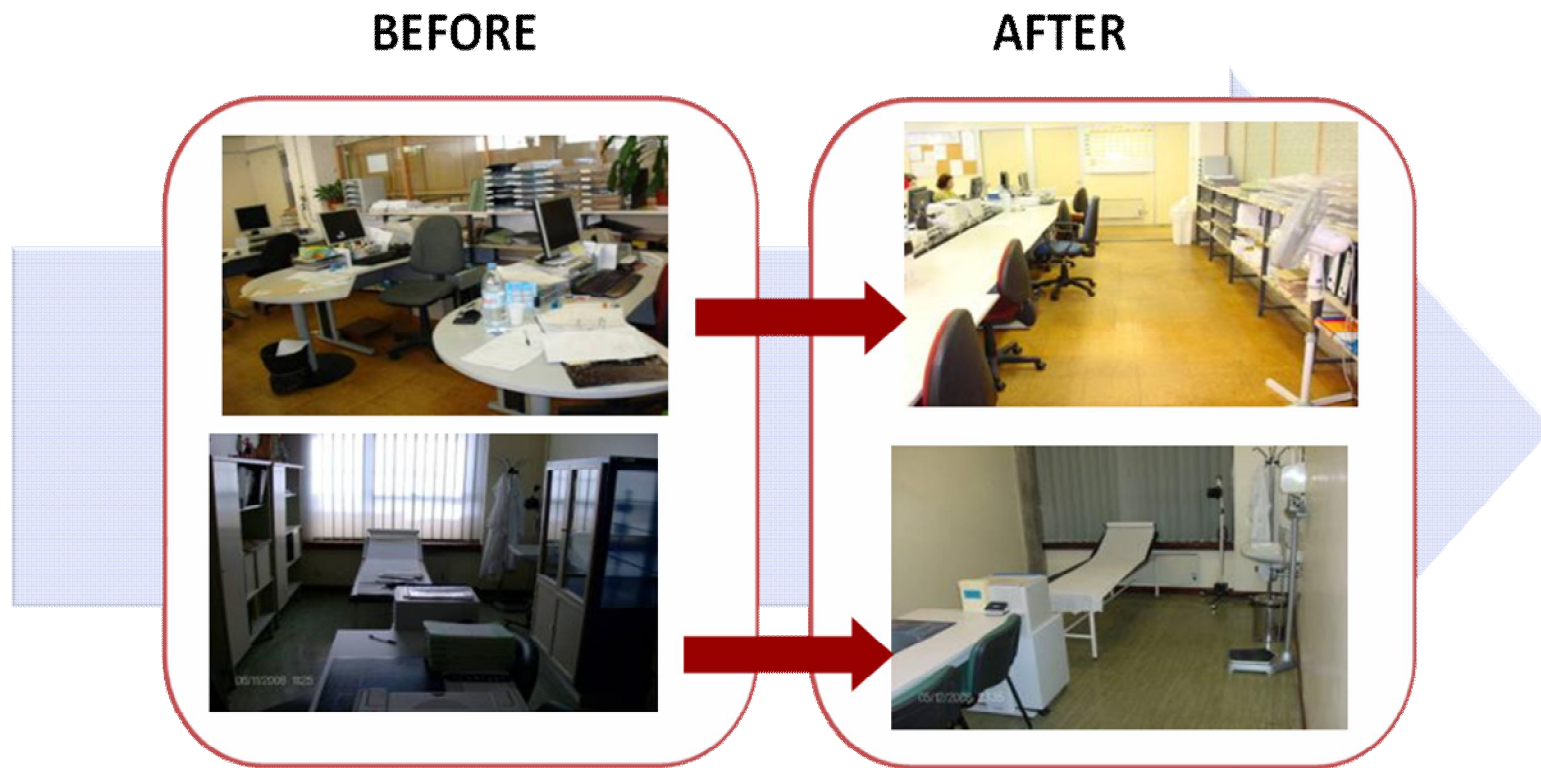


- Total Lead-Time = 34 days
- Lost References
- Referral errors
- Booking Errors
- Clinical information carried by the patient
- Process dispersed and not standardized
- Input concentration in Consultancy Manager twice a week



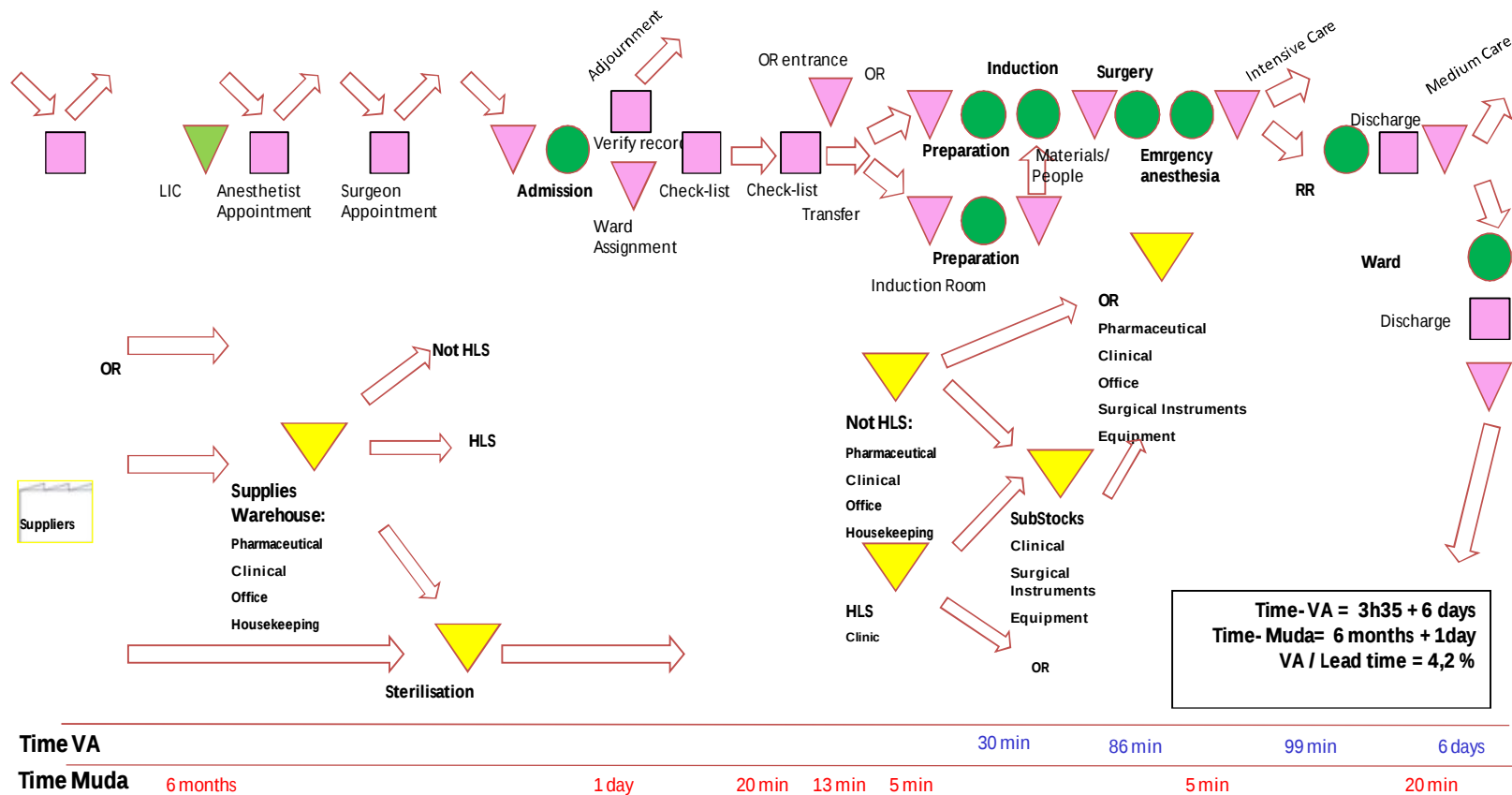
- Total Lead-Time = 8 days
- “Mail Box” system
- Increased frequency of sending to triage
- Standardized process
- Patient is no longer “co-worker”
- Decreased lost references

Appendix D.11- Case “N”, Unit of Analysis 2- Before/After Visually



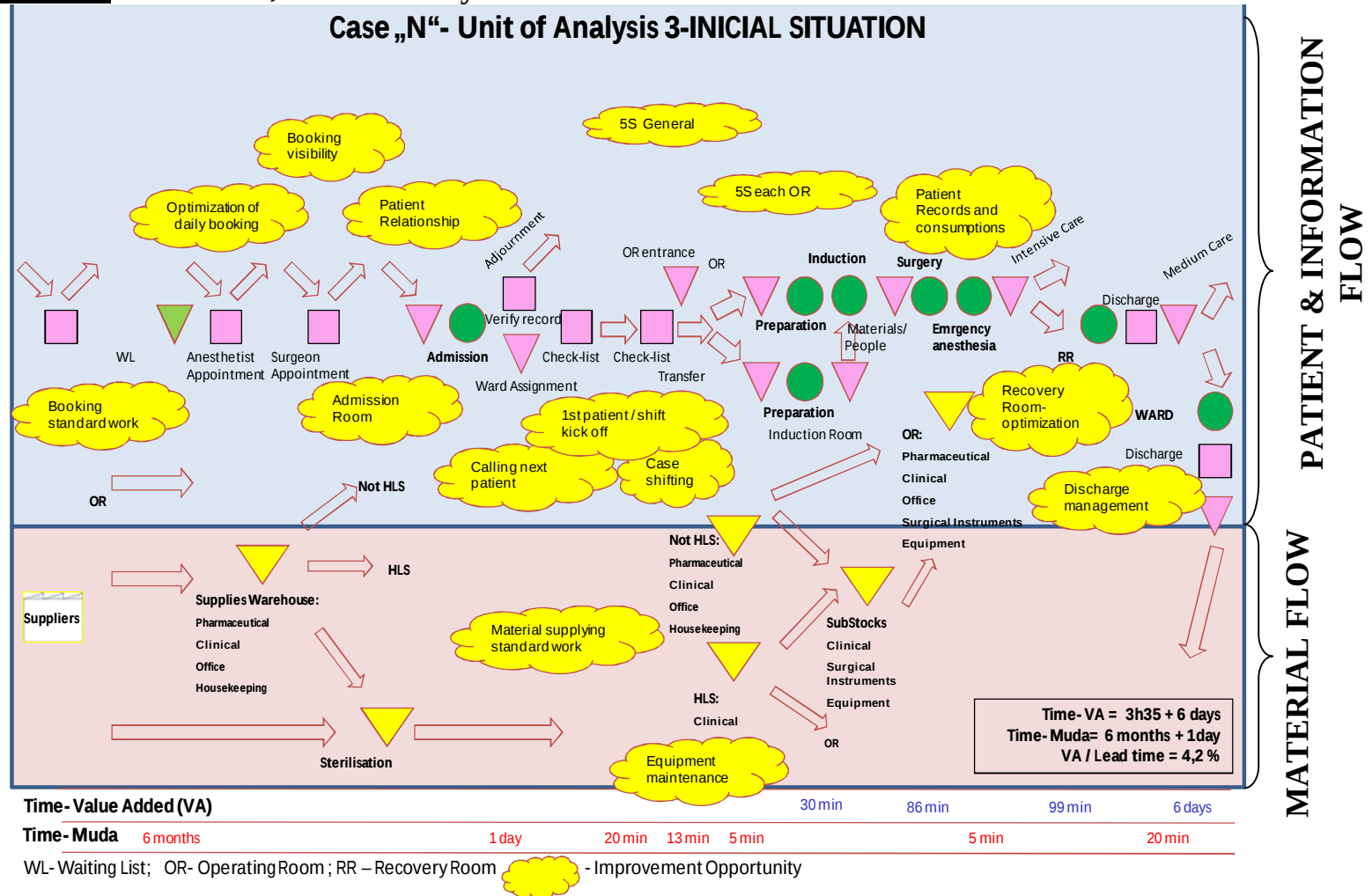
Appendix D.12 - Case “N”, Unit of Analysis 3 – Initial Situation

VSM- “as is situation” in OR



WL- Waiting List; OR- Operating Room; RR – Recovery Room - Improvement Opportunity

Appendix D.13 - Case “N”, Unit of Analysis 3 – Patient Flow and Material/Information Flow distinction



Appendix D.14 - Case “N”, Unit of Analysis 3 – OR Project Implementation Plan

Kaizen Project	12 Months											
	1	2	3	4	5	6	7	8	9	10	11	12
VSM												
Admission+ Discharge Management Room												
1st patient / shift kick off												
Next patient call												
Case shifting												
Patient Records and consumptions												
Recovery Room- optimization												
5S each OR												
5S General												
Patient Relationship												
Booking standard work												
Booking visibility												
Optimization of daily booking												
Equipment maintenance												
Clinical materials												
Pharmaceutical materials												
Office materials												
Housekeeping materials												
Surgical instruments												
Sterilised clothing												

 - Workshop

 - Project deployment

Appendix D.15 – Case “N”-Unite of Analysis 3 – Before/After visually

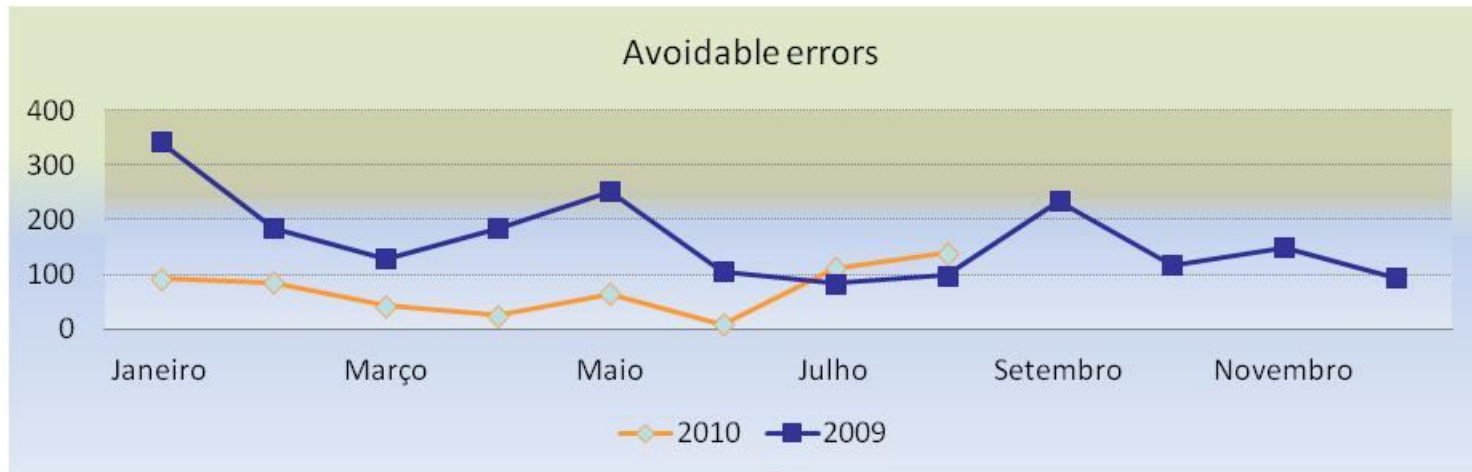
BEFORE



AFTER



Appendix D.16 – Case “N”-Unite of Analysis 3 – First Audit Results



Appendix E- Lean Healthcare Glossary

A3 problem solving:

A structured process improvement method. A team records the results of investigation and planning in a concise, two-page document – the A3 report – that facilitates knowledge sharing and collaboration.

Changeover time:

The time taken in each operation or step to readjust and reset equipment before the next set of material/patient/information arrives for processing or consultation.

Cycle time:

The amount of time it takes to complete a task or process. Time spent actually working (adding value) on service.

Continuous Flow:

Continuous Flow is characterized by the ability of a process to replenish a single unit of work (or service capacity) when the customer has pulled it. The concept of continuous flow is used to move work, patients or provide a service between processes with minimal or no wait (queue) time. It is further used to ensure that the process is performing the work required, no sooner or no later than requested, as well as in the correct quantity, with no defects (non conformances). The goal is to not do any work or service that is not requested by the downstream process (or customer). It is consonant with Just-In-Time. By focusing on continuous flow the team will be able to:

- Reduce or eliminate transport, delay, and motion waste
- Decrease lead times
- Reduce queue times
- Allow staff to identify and fix problems earlier
- Provide the needed flexibility in meeting demand changes
- Improve patient and staff satisfaction levels

Error Proofing or Mistake-proofing (Poka Yoke):

A defect-prevention system that builds into a production or service process devices or procedures that make mistakes avoidable or even impossible. In Japanese: *yokeru* (avoid) *poka* (mistakes).

Error Proofing is a process improvement to prevent a specific defect from occurring. There can be an error without a defect. There cannot be a defect without an error first.

Three Sides of Error Proofing:

- Physical - Install hardware
- Operational - Enforce procedure, sequence and/or execution
- Philosophical - Empowerment of workforce

Approaches to Error Proofing:

- Prevention - Prevents errors from creating defects
- Detection - Detects defects and immediately initiates corrective action to prevent multiple defects from forming

Flow:

The progressive achievement of tasks along the value stream so that a service proceeds from request to delivery smoothly and efficiently, without stoppages and waste. Flow is a very important concept in Lean thinking. In Healthcare services there are three important flows: information flow, material flow and patient flow.

5 Ss:

Step 1- *Seiri*: Sort (Organisation)

- Distinguish between what is needed and what is not needed: remove superfluous tools, equipment, and procedures from the workplace.

Step 2-*Seiton*: Stabilize or Simplify (Orderliness)

- "A place for everything and everything in its place."
- Determine the best location for all necessary items recurring to visual aids.

Step 3-*Seiso*: Shine or Sweep (Cleanliness)

- Eliminating dirt, dust, fluids, and other debris to make the work area clean.
- Adopting cleaning as a form of inspection and potential problems identification due to unsafe conditions or damaged equipment.

Step 4-*Seiketsu*: Standardize (Adherence)

- Maintain and monitor the first three "S's"
- Document process changes as they occur creating standard work;
- Check/Standardize/Maintain/Monitor/Improve

Step 5-*Shitsuke*: Sustain (Self-discipline)

- Correct procedures have become habit.
- The workplace is well ordered according to agreed upon procedures.
- Leadership, Management and Associates are deeply committed to 5S.

-A visually-oriented system for organising the workplace to minimize the waste of time.

5 “Whys” process:

Taiichi Ohno’s practice of asking “why” five times whenever a problem was encountered so that real cause is found and effective countermeasures could be developed and implemented.

Gemba:

Where the work gets done, i.e. the factory or hospital floor.

Heijunka:

Also known as leveled production, scheduling products and services in such way as to eliminate bottlenecks and maximize throughput.

Hoshin Kanri or policy/direction management

Hoshin Kanri is essentially a methodology that seeks to apply the plan, do, check, act (PDCA) cycle of Quality Control to managing change (i.e., deploying a policy) throughout a firm. The selected objectives are translated into specific services and deployed down to the *gemba*. It is supported in **Hoshin Plans** to monitor the coordinated processes that accomplish the core objectives of the business.

Jidoka:

The use of both people and technology, with the ability (even obligation) to stop any process at the first sign of an abnormality. A system that keeps the patient safe and prevents damage. In Virginia Mason Medical Center it is called “PSA-Patient Safety Alert”.

Just in time:

Just-In-Time (JIT) establishes a system to supply work (data, information, etc.) or services (patient care) at precisely the right time, in the correct amount, and without error. Just-In-Time is the heart of a Lean system and is an overriding theme for Lean Healthcare. JIT is attained through the understanding and application of continuous flow, the pull system, and *kanbans*.

Kaikaku

Process’ radical change or improvement not only to remove non-value activities and all waste, but to completely redesign the process (kaikaku implies bigger changes than kaizen). It is also called “System Kaizen”.

Kaizen:

Continuous incremental improvement or change.

Kamishibai:

Kamishibai means “storyboard”. It is used for preventive maintenance functions: there is a card for each item that needs to be checked every day and the cards are displayed in a board for direct feedback of what has to be done. In a complex multi-resource sharing as in Healthcare organisations it can be very useful as a check-list complement.

Kanban:

Kanban is a card or visual indicator that serves as a means of communicating to an upstream process precisely what is required at the specified time. In Japanese, *kanban* means "card," "billboard," or "sign." *Kanban* refers to the inventory control card used in a pull system. It is used to regulate the flow of work in and out of supermarkets as a visual control to trigger action.

Kanban is a form of visual control (information that allows a process to be controlled). This information states when, who, what, and how many work units are needed for movement. A *kanban* can be anything from an actual index card, a file folder, or some type of electronic signal. There needs to be a mailbox or some repository for the *kanban* to be deposited in, as well as the signal system identifying it is there. The *kanban* system is used to create a "pull" of material, in this case a supply item, from the downstream process to the upstream process.

Table - A typical re-order *Kanban* card

Supply Re-order <i>Kanban</i> Card
Item Name:
Maximum Quantity:
Minimum Quantity:

Re-order Quantity:
Supplier Name:
Catalog Page Number:
<i>Return this card to the Kanban envelop</i>

Kata

The Japanese term *kata* is often used for routines we must use to be successful in the martial arts. *Kata* is a well-rehearsed routine that becomes second nature. A “best practice”, a “guideline” is a routine as are all business processes that compose an ideal state.

Kobetsu:

Is the Japanese word for “individual” or “focused”. It is a Kaizen driven for a very specific issue, in comparison to a broad approach that some Kaizen addresses.

Misuzumachi (water spider):

An operator that drives all internal logistics movements between the POU (Point-of-use) and the warehouse. It makes the supply of the material using defined routes; makes the flow of all information and orders; and makes a standard work cycle.

Muda:

The Japanese word for waste. Taiichi Ohno described seven forms of waste: inventory, waiting, overproduction, unnecessary transporting, unnecessary movement, defects, and overprocessing. Recent literature addresses one more waste: wasted human potential.

In Healthcare services *muda* examples can be: overproduction of diagnosis tests (a so called “defensive medicine”), transportation (patients, equipment, etc), inventory (clinical and non-clinical supplies) and work in progress (tests waiting distribution), processing (excessive documentation), waiting (patients being patient), correction/defects (prescription errors, incorrect information, incorrect diagnosis) and motion (looking for missing patient information, sharing medical equipment/tools).

Nichijo Kanri – Daily Management:

Day to day standard activities including

- Roles and goals
- Division of duties
- Operating procedures
- Review and feedback

Par level:

The level of supplies and inventory considered prudent to maintain on hand.

Pitch:

Pitch is the time frame that represents the most efficient and practical work (or patient) flow throughout the value stream. It can be a multiple of Takt time. Since Takt time, for many Healthcare practices (i.e., blood draws, charting, dispersing medications, etc.) typically will be too small of a unit of time to move the work or information to the next

process immediately, pitch is a solution that can be used. Pitch is the *optimal flow* of work at specific times through the value stream. Pitch is the adjusted Takt time (or multiple of) when Takt time is too short of a time to realistically move something. Typically, each value stream (or process-to-process timed movement) will have its own pitch. Do not confuse *pitch* with the *cycle time*. Pitch will:

- Assist to determine the optimal patient or work flow
- Set the frequency for movement of the patient or work to the next process
- Assist in reducing transport and motion waste
- Allow for immediate attention when interruptions to work flow arise
- Reduce wait (or queue) times

Very important note: Each value stream may require a separate pitch.

Pitch is used to reduce wait time and other wastes that exist within and between processes. For example, a medical office found it was constantly calling in refill prescriptions every time a request from a patient had been called in that day. Pitch can be used as a tool in this case to reduce some of the wastes that existed in that process. The steps for calculating Pitch are:

1. Calculate Takt time.
2. Determine the optimal number of patients or work units to move through the value stream (i.e., number of labs to be drawn, number of patients to be seen within a specified time period, number of charts to be processed, etc.).
3. Multiply Takt time by the optimal number of work units. Pitch = Takt time (x) optimal number of work units

Point of use storage (POUS):

Medication, clinical supplies, equipment, work standards, procedures are stored where they are needed (where patients received treatment).

Pull:

A system of cascading production and delivery instructions from downstream to upstream activities in which nothing is produced by the upstream supplier until the downstream customer signals a need; the opposite of “push”.

Quality at the source:

Inspection and process control are carried out from the front line staff doing the work so they are certain the patient or product passed to the next process is of acceptable quality. Providing quality at the source eliminates the waste of re-inspection and correction.

Quick changeover:

The ability to change equipment and work areas (such as Operating Rooms) usually in minutes allows for more procedures using the same resources.

Rapid Process Improvement Workshop (RPIW, also known as *kaizen blitz* or *Kaikaku* or RIE-Rapid Improvement Event):

A team of people who do the work, fully engaged in a rigorous and disciplined five-day process that starts with a training section and followed by deployment using the tools of

Lean to achieve immediate results in the elimination of waste.

Set-up time:

All time spent getting ready to add value (e.g. preparing a consultancy room/laboratory collection room for a new patient).

Sensei:

A personal teacher/coach with the mastery of a body of Lean knowledge.

SIPOC:

A tool/diagram used to define the current state of a process. It shows for each process, the suppliers, inputs, main process steps, outputs and customers (internal, if it is the adjacent process in the value stream, or external if it is the final customer (patient)). The customer requirements are measured in terms of time, quality and cost. Also the frequency of these measurements (by minute, hour, day week or month) is identified.

SMED:

Single Minute Exchange of Die

Spaghetti chart:

A diagram of patient and staff flow describing their path.

Standard Work:

Standard work (Standard Operating Procedures) establishes and controls the best way to complete a task without variation from the original intent. These tasks are then executed consistently, without variation from the original intent. Standard work offers a basis for providing consistent levels of Healthcare productivity, quality, and safety, while promoting a positive work attitude based on well-documented work standards. Standard work, done properly, reduces all process variation by describing each work activity specifying cycle time, *takt* time, the work sequence of specific tasks for each team member, and the minimum inventory of parts on hand needed to conduct the activity. It is the basis for all continual improvement activities.

Takt time:

Takt is a German word for rhythm or meter. Is given by the available production time divided by the rate of customer demand. *Takt* time sets the pace of production to match the rate of customer demand and becomes the heartbeat of any lean system. Despite Healthcare intrinsic variability, *takt* time definition is important for planning and variation compensation.

Throughput time:

The time required for a service to proceed from request to delivery. This includes both processing (cycle time) and queue time (e.g. for outpatients service it starts on referral, goes through consultancy and ends in new appointment scheduling).

Value:

The patient's/client perception of how a service provided matches what he desires in terms of quality, price and time spent.

Value Stream:

The specific activities required to design, order and provide a specific service to the client.

Yokoten:

Yokoten means "best practice sharing" or "taking from one place to another." It encompasses the methods of communicating, documenting, and distributing knowledge horizontally within an organisation (peer-to-peer) about what works and what doesn't work from an improvement project (i.e., PDCA Kaizen Event). *Yokoten* is a form of knowledge management. At its most basic level, *Yokoten* can be the notebook that a team keeps as a history of the group and problems/solutions encountered. *Yokoten* can be the library of A3 problem reports (Storyboards) that a team or work group maintains for all to access. As a knowledge management device, the *Yokoten* process ensures information becomes part of the organisational knowledge base. At Toyota there is an expectation that copying a good idea will be followed by some added "*kaizen*" to that idea (copy + *kaizen* = *yokoten*). *Yokoten* standardizes a solution and shares it with the recognition that ideas cannot always be copied without modifications to adapt to a new environment. Sharing of standard procedures across an organisation is ideal but cannot be a context free replication. In Healthcare organisations this understanding is crucial.

Appendix F- Acceptance notifications of forthcoming publications

F.1 – Paper of Chapter 5

October 30, 2012

Dear Mrs. Guimarães:

It is a pleasure to accept your manuscript entitled "Strategic Outsourcing: a Lean Tool of Healthcare Supply Chain Management" in its current form for publication in Strategic Outsourcing: an International Journal. The Editor of the journal is glad to include your work in the next (normal) issue of SOIJ.

By publishing in this journal, your work will benefit from Emerald EarlyCite. This is a pre-publication service which allows your paper to be published online earlier, and so read by users and, potentially, cited earlier. Please note, EarlyCite is not a proofing service. Emerald operates a 'right first time' policy, which means that the final version of the article which has been accepted by the Editor will be the published version. We cannot allow further changes to the article once it has been accepted.

Please go to your Author Centre on Manuscript Central (Manuscripts with Decisions for the submitting author or Manuscripts I have co-authored for all listed co-authors) to complete the copyright assignment form. We cannot publish your paper without the copyright form. All authors are requested to complete the form and to input their full contact details, to ensure that a complimentary author pack can be despatched upon publication.

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Thank you for your contribution. On behalf of the Editorial Team of Strategic Outsourcing: an International Journal, we look forward to your continued contributions to the Journal.

Yours sincerely,
Prof. Daria Battini
Guest Editor, Strategic Outsourcing: an International Journal
daria.battini@unipd.it

F.2 – Paper of Chapter 7

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ARTICLE: Outsourcing in Healthcare through Process Modularization – a Lean perspective

AUTHOR(S): Prof. José Crespo De Carvalho, M.Sc. Maria Cristina Machado Guimarães

JOURNAL: International Journal of Engineering Business Management

NOTIFICATION OF ACCEPTANCE

26 July, 2012

Dear Prof. José Crespo De Carvalho,

On behalf of the Editorial Board it is my pleasure to inform you that your paper titled "Outsourcing in Healthcare through Process Modularization – a Lean perspective" has been accepted for publication in the *International Journal of Engineering Business Management* (ISSN 1847-9790).

We firmly believe that your contribution will be of great importance to the scientific community.

Sincerely yours,

Aleksandar Lazinica, CEO


INTECH
d.o.o. Rijeka

F.3 – Paper of Chapter 8

30-Oct-2012

Dear Mrs. Guimarães:

It is a pleasure to accept your manuscript entitled "Vendor managed inventory (V.M.I.): evidences from lean deployment in Healthcare" in its current form for publication in Strategic Outsourcing: an International Journal.

By publishing in this journal, your work will benefit from Emerald EarlyCite. This is a pre-publication service which allows your paper to be published online earlier, and so read by users and, potentially, cited earlier. Please note, EarlyCite is not a proofing service. Emerald operates a 'right first time' policy, which means that the final version of the article which has been accepted by the Editor will be the published version. We cannot allow further changes to the article once it has been accepted.

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Thank you for your contribution. On behalf of the Editorial Team of Strategic Outsourcing: an International Journal, we look forward to your continued contributions to the Journal.

Yours sincerely,
Prof. Daria Battini
Guest Editor, Strategic Outsourcing: an International Journal
daria.battini@unipd

