Towards Building a Theory of Lean Implementation in Healthcare:

Understanding the enablers and inhibitors of success

GRADUATE SCHOOL OF BUSINESS
UNIVERSITY OF CAPE TOWN

A Research Report

presented to

The Graduate School of Business

University of Cape Town

In fulfilment of the requirements for the Degree of

Doctor of Philosophy

By

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9th February 2011

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ABSTRACT

Lean, a management system based on the Toyota Production System, is increasingly being applied to healthcare contexts with mixed outcomes. While there are many case studies reporting on the outcomes of Lean implementation, there is little empirical evidence indicating which factors influence Lean implementation. Furthermore, there is an absence of critical and theory building research of Lean implementation. This study specifically addressed these gaps by identifying some of the enablers and inhibitors of Lean implementation, using empirical methods. The central research question driving this research was:

What are the enablers and inhibitors of Lean implementation at Southern Hemisphere Hospital?

Lean was implemented in five separate sites at a large tertiary hospital in South Africa, where the researcher facilitated the implementation. Action research techniques were used to collect data from observation, interactions and document reviews, generating over 900 pages of qualitative data. Of the five projects, two succeeded, two failed and one was prematurely terminated. The data was systematically analysed and assimilated using a range of grounded theory tools in iterative cycles that moved between data collection and analysis, resulting in the development of an interim theory. The theory was then tested in a separate phase of the study that involved semi-structured interviews with 46 of the key stakeholders across the five projects. This allowed a refinement of the theory and a more concrete description of the factors that enabled and inhibited Lean implementation. The theory clearly describes these 13 factors that influence Lean implementation success.

Among the theoretical contributions this study makes is the concept of 'Lean Readiness' which was shown to differentiate between the projects that succeeded and those that failed. Among the contributions to managerial practice, is an increased understanding of what to look out for before implementing Lean, with a view to improving the chance of a successful outcome. This study has developed a theory of Lean implementation that advances current thinking and lays the foundation for significant extensions of the study.

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ACKNOWLEDGEMENTS

At the end of such a long and testing journey, it is difficult to do justice to thanking all those that made this PhD possible. But I am clear that I must start by thanking God, for granting me strength and guidance every step of the way. As a small sign of my gratitude to the Creator, I open this document with His Name.

I would like to extend my sincere thanks to Professor Norman Faull for his wisdom, guidance and ability to motivate me throughout the research process. I will never forget his amazing skill of asking questions that led me straight to the answers rather than further confuse me. I thank him for advising me so expertly in chartering new territory with this research. I also extend a special thank you to Associate Professor Tom Ryan, whose depth of expertise recognised some of my errors and quickly set me on the right path. Tom reminded me of a professor stuck deep in his books but when you asked him a question, he had this supernatural ability of pointing you to a specific page where you could find the answer.

I owe my deepest gratitude to my mother and father, without whom the place I find myself in today would never have existed. It is through their inspiration, unwavering love and encouragement that I have studied for ten years straight to achieve what I have today. They made me live by the saying, **"Seek knowledge from the cradle to the grave**"-*Prophet Muhammad (PBUH)*.

To my endearing wife, Ayesha, I thank you from a special place in my heart, for taking care of so many things at home and understanding that I needed to make a sacrifice to complete this PhD. You stood beside me through the tough times, provided me with unconditional love and support to keep me going. I'll never forget your continual whispering of '**All is Well! You have never failed at what you do!'** that lit up the darkest moments. To my wife's parents I thank you sincerely, for bringing up such a wonderful daughter, and for treating me like your own son with your many words of encouragement and prayers.

To all my siblings (Shaik-Allie, Ali, Yasmin, Abdul-Aleem, Nazreena, Naeem, Samira, Fatima, Sadick) thank you for motivating me to continue something that started so quickly I hardly realized what was happening. Thank you for covering up for me when I was meant be at the numerous family lunches, braais and garawees. Thank you for having faith in my ability to

complete what seemed an impossible feat. A special thank you to my sister, Hamieda who served as my 24 hour toll-free PhD hotline, always ready to offer some advice and more importantly some moral support for which I am deeply grateful. A heartfelt thank you to all my nieces and nephews for making me forget about the worries I used to come home with. Your energy and light heartedness kept my spirits high and reaching for the stars.

To my dear friends who all kept saying to me, 'Zameer, when will you be done studying, so that you can stop depending on your wife?' – thank you for persistently highlighting the humour of it all. Your unwavering faith has helped me reach my potential and beyond, in completing this PhD.

There are three special people whom have gone out of their way to make the dream of completing this PhD a reality. Professor Marian Jacobs and Dr Reno Morar who so closely shared my vision to complete this PhD they did everything in their power to make sure I was supported during the process. The magnanimity of their character has left an indelible impression on me. I am deeply grateful for your support and understanding. Dr Saadiq Kariem served as a sounding board from even before the PhD and who until today remains a role model of profound calibre. I am truly appreciative of the many opportunities you gave me to excel and move beyond my limits.

Thank you to all the GSB staff who were always so keen to assist me and help pave the path I travelled over the last few years. A special thanks to the guys of the PhD room for encouraging me every step of the way and provided me great company. I will continue to be cheering for you to cross the finish line soon.

Lastly, it is a pleasure to thank all those that participated in the study and for giving up of your valuable time to help us improve our understanding of how to implement Lean, and in doing so improve the state of healthcare delivery in South Africa.

1. INTRODUCTION

This study has identified some of the factors that enable or inhibit Lean implementation in a healthcare setting. The 13 factors identified will have implications for Lean implementation going forward, as well as for further research on Lean implementation. This qualitative study was conducted using a combination of action research (AR) and grounded theory. The synergistic combination of these two methodologies will be illustrated in this study offering a further methodological contribution, in addition to the practical and research-related contributions. This chapter describes the background to the study, before providing the justification for the study and the conceptual framework of the study. A brief review of the methodology is then provided before sketching an outline of the thesis and providing definitions and delimitations for the study.

1.1 BACKGROUND TO RESEARCH AND PROBLEM

This study is set in South Africa and it is necessary to understand the current state of public healthcare in this country. This allows the identification of some of the challenges currently being experienced and how some of these can be addressed using Lean implementation. From a theoretical and academic perspective, there is a need to address a gap in the Lean implementation literature that relates to identifying factors that enable or inhibit Lean implementation.

1.1.1 Overview of South African Health System

The South African health system is currently said to be facing the quadruple burden of disease which includes infectious diseases (HIV/TB); non communicable or lifestyle diseases (diabetes, hypertension); traumatic injuries (violent and non violent) and maternal and child diseases (Mayosi, Flisher, Lalloo, Sitas, Tollman, Bradshaw, 2009).

According to Karim et al. (2009), "South Africa has the world's worst HIV and TB epidemics". An alarming statistic reflecting the HIV burden for South Africa shows that even though South Africa has only 0.7 per cent of the world's population globally, it bears 17 per cent of the global HIV burden (Karim et al., 2009). There are an estimated 5.4 million South Africans living with

HIV (Karim et al., 2009). In comparison to India, Brazil and a few African countries, South Africa has the highest TB incidence at 948 per 100 000 per year (UNAIDS, 2007). The South African health system is described as inefficient and is being overstretched by the burden of TB and HIV/AIDS (Kapp, 2009).

Non-communicable diseases or diseases of lifestyle are said to cause 28 per cent of the total burden of disease in South Africa as measured by the daily adjusted life years index (WHO, 2004). Violence and injuries in South Africa is a major problem accounting for the second highest number of deaths in the country (Seedat, Van Niekerk, Jewkes, Suffla and Ratele, 2009). The overall injury death rate is double the global average at 157, 8 per 100 000 population, and the rate of homicide of women by their partners is six times higher than the global average at 24,7 per 100 000 population (Seedat, et al., 2009).

Child mortality has shown worrying trends over the last two decades in South Africa which is one of only 12 countries globally that has experienced an increasing child mortality rate of children under 5 years old (Kleinert and Horton, 2009). The child mortality rate in South Africa is currently as high as 69 deaths per 100 000 children under 5years of age. This is very high when compared to other countries such as Peru (25 deaths per 100 000), Egypt (35) and Morocco (37).

With such alarming statistics about the state of South African healthcare, it is likely that many will feel that not enough money is being spent on healthcare in this country. The graph below indicates South Africa's relatively high percentage of GDP being spent on healthcare.
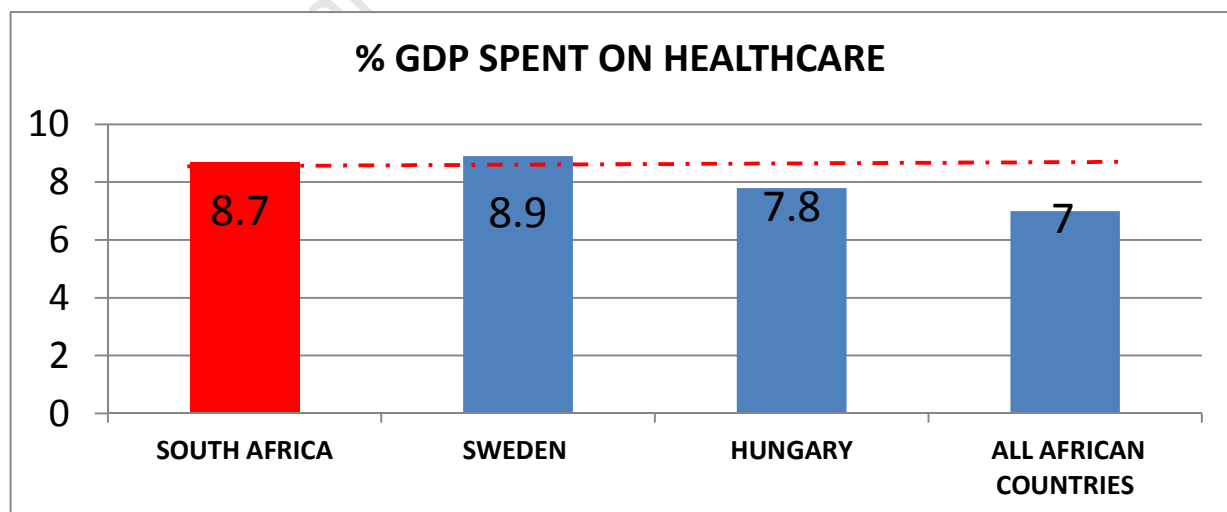
Figure 1.1 Percentage of GDP expenditure on healthcare (World Bank, 2008)

The relatively high expenditure on healthcare is further complicated by the gross disparity between public and private healthcare in South Africa. About 60 per cent of healthcare spending in South Africa is used for 7 million people who can afford private healthcare, while the remaining 40 per cent is used to care for the remaining 41 million South Africans (Kapp, 2009). This results in major differences in terms of quality and access to healthcare between private and public patients.

The relatively high healthcare expenditure coupled with poor outcomes (as described above) speaks to weak management (Kleinert and Horton, 2009) and the need for operational level improvement in order to improve service delivery. The national Minister of Health Dr Motsoaledi was quoted as saying, "you don't need to be extraordinarily rich to run a good health system" (Kapp, 2009). The minister cited poor managerial skills, failure to act on known deficiencies and poor accountability as some of the 'significant problems' within the health system (Kapp, 2009). This suggests that there are a number of options that can be investigated with a view to improving healthcare delivery in South Africa.

1.1.2 Improving the South African health system

The major service delivery problems and the massive burden of disease in South Africa call for different approaches to improve the situation, as expressed by the national Minister of Health and a number of research experts (cited above). It appears to be less of a funding problem than a problem of weak management and inefficiency. For this particular problem one can employ a number of methodologies to improve the status quo. These would include Total Quality Management, Business Process Re-engineering, Six Sigma and Lean.

Lean is well suited to the public sector of South Africa as it focuses on getting the most out of existing resources rather than looking to invest more resources as was found in the UK NHS (Westwood, Moore and Cooke, 2007). Lean is emergent and depends on the employees themselves to generate solutions instead of having expensive consultants make impractical recommendations that staff do not own. Lean should also be seen as appropriate to healthcare since it values people, their creativity and their efforts to improve the status quo. The delivery of healthcare is heavily dependent on people and their inputs should be valued. Lean is relatively cheap to implement in comparison with BPR that often requires a large initial investment, a

luxury that the NDoH is unable to afford. The simplicity of Lean also makes it attractive for a broad spectrum of healthcare workers in South African public hospitals. Another alternative to Lean is Six Sigma which due to its technical nature can often overwhelm individuals. Finally, Lean focuses strongly on improving quality and service delivery, removing waste and unnecessary expenditure and improves staff morale. With such a large expenditure on healthcare in South Africa relative to other similarly developed countries; there is a cause for concern that we are not getting an appropriate return on investment for the amount of money being spent. Lean may be a good mechanism to improve efficiency and quality, and reduce waste (De Souza, 2009).

1.1.3 Lean literature and gaps identified

Lean is a management system based on the Toyota Production System of the 1950s. It was brought to the West by leading thinkers such as Dan Jones and James Womack who detailed what the Lean system constituted, and stood for. Essentially, Lean places a strong emphasis on removing waste, developing people, specifying value, working with pull systems and pursuing perfection (Womack and Jones, 1996). Lean was described as "… not being merely a set of practices usually found on the factory floor, but rather as a fundamental change in how the people within the organization think and what they value, thus transforming how they behave" (Bozdogan et al., 2000).

Lean can be described as a form of innovation and method of effecting organizational change as covered in Chapter 4. As such it will be useful to identify some of the chief concepts associated with organizational change and how they relate to Lean implementation.

Lean was conceived in the automotive industry and migrated to other manufacturing industries and from about 1992 to service industries such as banking and consulting (De Souza, 2009). From about 2002, healthcare organizations across the globe started implementing Lean to increase quality and decrease costs and staff frustration (De Souza, 2009). Initial attempts at Lean implementation focused on the tools but neglected the people element of change.

A rapidly expanding body of research on Lean implementation to healthcare has shown success (Radnor and Boaden, 2008; Joosten, Bongers and Janssen, 2009). Some authors, however, have

highlighted that Lean is not easy to implement and not every organization implementing Lean will succeed (Scherrer-Rathje, Boyle and Deflorin, 2008). Scherrer-Rathje et al. (2008) reported that the failure of a food processor manufacturing company was based on poor organizational commitment and senior management reorganization. In their study of 20 participants they were able to develop tentative ideas on what led to Lean failure. Waring and Bishop (2010) note that Lean implementation in healthcare, is not without its problems. It has been acknowledged that a Lean journey is time consuming, challenging, requires complete buy-in at multiple levels in the organization and can be stressful for staff (Papadopolous and Ozbayrak, 2005). Waring and Bishop (2010) predict that Lean implementation in healthcare will be 'highly contested' as it is closely intertwined with social elements and that if these are not addressed sufficiently Lean is not likely to be sustained in practice. There are differing accounts of Lean implementation being successful and unsuccessful. There is a need to empirically identify the factors that enable or inhibit Lean implementation, which will result in improved Lean implementation.

The many case studies published do not allow for systematic analysis of those factors that enable or inhibit success. There are few studies that have conducted systemic analysis on Lean implementation (Young and McClean, 2008), and thus the implementation strategies for Lean still need clarification. Joosten, Bengers, Jannsen (2009) call for more critical and theory building research of Lean implementation that moves beyond simple evaluation. Specifically, it is important for both practice and theory to understand which factors enable or inhibit Lean implementation.

1.2 CONTRIBUTIONS OF THE STUDY

Based on the current literature and experience in the practice of Lean implementation, this study has posed the following research question:

What are the enablers and inhibitors of Lean implementation at Southern Hemisphere Hospital?

In answering this question the study has been able to make methodological, theoretical and practical contributions towards understanding how to implement Lean successfully.

From a methodological perspective this study illustrates how action research and grounded theory can be used synergistically to create an emergent theory to explain phenomena about which relatively little is known. In the case of Lean implementation, the aim was to identify factors that enable or inhibit its implementation and using these methodologies facilitated the identification of 13 factors that affect Lean implementation. Active and regular reflection allowed the researcher to document the challenges in using AR and grounded theory as methods (documented in Chapter 5). The third methodological contribution this study offers is being able to synthesize masses of qualitative data, in iterative cycles to develop a theory, using grounded theory and some ancillary techniques or methods such as concept analysis and archetypes.

From a theoretical perspective, three core concepts emerged from the data as part of a theory that explains, in part, the elements that affect Lean implementation outcomes. The first concept 'Using hard data to identify and solve problems', stressed the importance of using facts to drive change rather than sentiment or hearsay. This concept was found to be more present in projects that succeeded; where there was more attention to using data to drive change; where tasks had a clearer specification and where problem solving was focused. The second concept, 'Disposition of staff to embrace change' related to the willingness of staff to get involved and actively participate in Lean implementation, which in turn was linked to a spirit of working together and having many 'small wins' along the way. The third concept, 'Creating Safe spaces for change', linked closely to the need to create platforms for staff to experiment and improve continuously. This concept included the recognition for improvement, regular meetings about improvement, positive and clear communication about improvements, and ensuring that staff were comfortable offering their ideas for improvement.

The combination of concept two and three resulted in the realization of a fourth concept of 'Lean Readiness' which offers significant fresh insights from both an academic and practice perspective. The concept speaks of the state of the organization prior to Lean implementation with a view to identify possible obstacles and mitigate or remove them, to improve Lean implementation success. In linking the concepts to extant literature, it has reinforced some of the current thinking at times, and has also offered empirical evidence for what previously only existed in conceptual form. Furthermore, the study has offered possible new relationships between these concepts that have not previously been explored extensively.

From a practical perspective, the study has identified 13 factors for future Lean implementation efforts to take cognizance of. The study has offered some insight into the factors that need to be present prior to implementation in order to improve the implementation success. Furthermore, the findings of the study are timely as the national Department of Health in South Africa decides to upscale current Lean projects to a large national project. This study offers some guidance to improve the likelihood of successful Lean implementation and in doing so, address some of the ailments the current health system faces.

1.2.1 Defining Lean Implementation

Lean implementation has taken on various definitions and interpretations and since this concept is absolutely fundamental to the study, it needs clear definition. It is necessary to define implementation so that firstly the reader understands how and what was done; in addition if another researcher wants to replicate the study it is clear what was implemented and how, and finally the because of the variety of interpretations that exists.

In this research project Lean implementation referred to the following process:

- Meeting with the leadership of a unit and jointly identifying problem areas broadly
- Introducing some of the basic principles of Lean to the unit's staff through a 1 or 2 day workshop
- Jointly deciding on a specific problem and to try and resolve it as a team
- The researcher facilitated most of the initial meetings across projects and as they matured, the researcher consciously allowed others to chair meetings and served more as a guide than a facilitator
- Regular meetings (most frequently weekly, and least frequently monthly) were held in the unit with the staff. In addition the facilitator visited each project at least once a week.
- The meetings served to monitor progress on a previously planned intervention and then plot a course for either altering the approach with the same intervention or planning a new intervention (PDCA method described in 1.7 below)
- All projects started with the construction of a value stream map which facilitated the identification of bottlenecks and sites for potential improvement
- Other tools used included 5s, kaizen, spaghetti diagrams, fishbone analysis and visual cues

- The projects lasted between 8 and 14 months (more project specific details can be found in appendix 1)
- Operational staff actually made improvements while management encouraged the process
- Minimal resources were used during implementation. No additional staff or large equipment was acquired during the projects
- The aim of these projects was to make an impact by demonstrating that Lean can be successfully implemented and can reduce waiting times and improve quality
- These projects also served to start enlightening staff to the reality that things could be done quicker, better and more effectively without more resources

What Lean implementation in this project did NOT mean:

- The projects were restricted to a specific unit and not the entire patient journey, nor did this project constitute a lean organizational transformation
- Measuring sustainability of interventions implemented was not core to this research
- The project did not seriously focus on pure administrative processes (e.g. finance or human resource processes)

1.3 MOTIVATION FOR RESEARCH

The justification for the research has three core sections including the theoretical motivation, the practical motivation and the methodological fit or innovation.

1.3.1 Theoretical Motivation

While there are many case study type articles which report on Lean implementation, there is little empirical evidence focusing on the factors that specifically influence Lean implementation (Shah & Ward, 2003). De Souza (2009) reviewed the trends of Lean healthcare based on an extensive literature review and concluded that Lean implementation in healthcare appears to have enjoyed good success to date. However, De Souza (2009) noted that over 90 per cent of published Lean applications in healthcare are based in the USA, UK and Australia, with little published evidence of Lean application in developing countries. This study aims to specifically address this by being able to identify, empirically, some of the enablers and inhibitors of Lean implementation

using multiple case sites. This study starts to develop some theory regarding Lean implementation which lays the foundation for more quantitative studies to build on this theory.

There are a few important points that should be highlighted in this section relating to the core topic of Lean implementation, and to the broader discipline of organizational change. With regards to the Lean literature there have been many reports of case study type projects and some guidance on how to implement Lean in broad terms by Lean experts. However, there is a need to determine in more concrete terms, those things that enable or inhibit Lean implementation. This study was able to establish 13 factors that influence the outcomes of Lean projects. The 13 factors are clustered into 3 concepts that are described in detail for the benefit of researchers and managers alike. The 3 concepts include the 'Use of hard data to identify and solve problems', the 'Creation of safe spaces' for staff to experiment and the 'Disposition of staff to engage in improvement initiatives'. High levels of the last two concepts were associated with successful Lean implementation efforts, mediated by the 'Use of hard data to identify and solve problems'. The 'Creation of safe spaces' for staff to experiment and the 'Disposition of staff to engage in improvement initiatives' concepts combined to form the concept of 'Lean Readiness' which has offered fresh insights from both a theoretical and practical perspective. These are discussed comprehensively in Chapters 3 and 4.

Lean is firmly rooted in the operations management discipline where there is a preponderance of high quality quantitative studies. Since there is no existing 'theory' of Lean, it was not advisable to perform a quantitative study to identify enablers and inhibitors of Lean implementation. However, now that some of these factors have been identified, it opens the door for quantitative testing and more positivistic methods. Lean implementation will benefit from having a clearer sense of what needs to be in place before implementation commences, and what is needed to maintain implementation efforts.

1.3.2 Practical Motivation

From a Lean practitioner's perspective some sound advice has been offered by the Lean experts on the implementation of Lean. However, this advice remains quite broad and general in nature. There is a need for specific and concrete identification of the factors that affect the outcomes of Lean implementation. This study follows a rigorous process in collecting empirical data to

ascertain some of the factors that enable or inhibit Lean implementation. The study contributes to Lean projects locally, nationally and even abroad, by sensitizing the researcher and the practitioner about what to look out for before and during a Lean implementation to improve the success rate.

In keeping with the practical motivation, a strong case can be made for the use of Lean to deal with some of South Africa's healthcare problems. The NDoH is currently conducting a large Lean pilot project involving 18 hospitals nationally, with a view to scaling up to involve many more sites across the country. The outcome of this study will contribute to understanding how to implement Lean by providing clarity on what enables or inhibits Lean implementation. This study has carefully described in detail, the factors that affect Lean implementation, with a view to improving implementation success.

1.3.3 Methodological Fit and Innovation

There is little theory concerning Lean implementation. For this reason it is not appropriate to use quantitative techniques that are well suited to hypothesis testing. Qualitative studies conversely allow for deep understanding of the context (Maxwell, 2005) and allow researchers to investigate unexplored constructs (Morrow, Rakhsha and Castaneda, 2001).Qualitative research is able to provide rich descriptions of contextual problems, people and behaviours in orders to make sense of otherwise complex problems (Johnson and Onwuegbuzie, 2004). This type of research enables the researcher to study dynamic processes such as continuous improvement (Johnson and Onwuegbuzie, 2004). In addition, there is no 'Lean theory' to test quantitatively so in this study a theory was first constructed and then tested using qualitative techniques.

The research employed two methodologies: AR and grounded theory. In this study there was a dual need to develop theory on Lean implementation as well effecting positive organisational change and improvement at the hospital. AR is well suited to achieving these dual aims (Baskerville and Wood-Harper, 1996). A detailed discussion of AR is offered in Section in 3.4. Westbrook (1994) asserts that different research methods should be seen as complementary. Mingers (2006) suggests that multiple methods add depth through diversity of approaches. AR is sometimes criticized for being weak in constructing theory; a necessary output of this study (Baskerville and Heje, 1999). Therefore, Baskerville and Heje (1999) have suggested using

grounded theory to improve the rigour, reliability and practical utility of the theory developed using AR.

Grounded theory offers a method to 'discover theory from data' in instances where researchers have interesting phenomena without sufficient explanation (Martin and Turner, 1986). For example, Lean implementation in healthcare has experienced both failures and success, for which this study aims to offer some explanation. Grounded theory has gained prominence due to clearly articulated analytical processes which facilitate the development of pragmatic theories (Kennedy and Lingard, 2006).This study therefore uses a qualitative approach with a combined methodology using AR and grounded theory.

1.4 CONCEPTUAL FRAMEWORK

The purpose of the conceptual framework was to convey a sense of what I thought at the commencement of the study about the successful implementation of Lean. During the course of the study this thinking advanced substantially and the particulars of this evolution in thinking are detailed in Chapter 5. A conceptual framework is a system of concepts, assumptions, beliefs and theories that inform the research (Maxwell, 2005). Miles and Huberman (1994) suggest that the researcher use a conceptual framework to explain graphically what is to be studied.

In developing my conceptual framework I drew on my experience in the healthcare field, interaction with colleagues working in the field of health systems and my reading prior to starting the research study to guide the development of my conceptual framework. Partington (2002) cautions researchers not to be naïve in thinking they can enter a study with a theory-neutral state of mind, since their past experience is embedded in what they do and how they did it. Baker et al, (1992) say that grounded theorists should make use of past experience to better understand the process being studied. I will briefly detail my experience and the key ideas from the literature I perused in drafting my conceptual framework before the study commenced. I developed my conceptual framework between March and May 2008, prior to the commencement of the study.

My Background

I qualified as a medical practitioner having trained at SHH (Southern Hemisphere Hospital) as a student doctor, then later performed my internship and community service year at this hospital. I developed a keen interest in the management of the organization and wanted to make a real difference to the health system. In order to do this, I completed a Masters in Business Administration (MBA) that reinforced the idea of using a system's perspective to improve healthcare. Having completed my MBA I was recruited by the hospital's management for two years to function as a process analyst to help improve some of the hospital's processes. During these two years, I collected the data for my PhD on Lean implementation. My involvement with the institution may serve as a bias, but I think more importantly it meant that I better understood the hospital and the way it functioned.

The Literature

To summarize the literature on Lean implementation, I found many articles stressing the technical importance of Lean implementation, such as Value Stream Mapping, Fishbone Analysis, Cellular work, visual cues, kanbans and others. In reading the academic and practitioner based literature on Lean, it became quite clear that it was being applied to many different industries with varying levels of success. What was not clear for me was what led to the success or failure of Lean implementation.

Burgess and Radnor (2010) point out how the method of implementation of Lean is slowly changing from a tool based focus to a management system. They further posit that healthcare may experience such a transition too. Bodek (2008) notes how the West has implemented Lean tools such as 5s or Kazien but they fail to inspire and motivate people - something Toyota managers do naturally. Hall (2006) notes how too few companies focus on the people element of Lean implementation and then wonder why there is such poor engagement. Hall (2006) says that no amount of process improvement will get people on board; rather he recommends getting their buy-in and guiding the process along thereafter.

My medical training had taught me to only trust positivistic quantitative studies. To reinforce this thinking, I had just completed my MBA which focused on the 'hard' technical skills needed for

good management. With a combination of my training and experience, and the literature I initially reviewed, I developed my conceptual framework as depicted below in Figure 1.2.
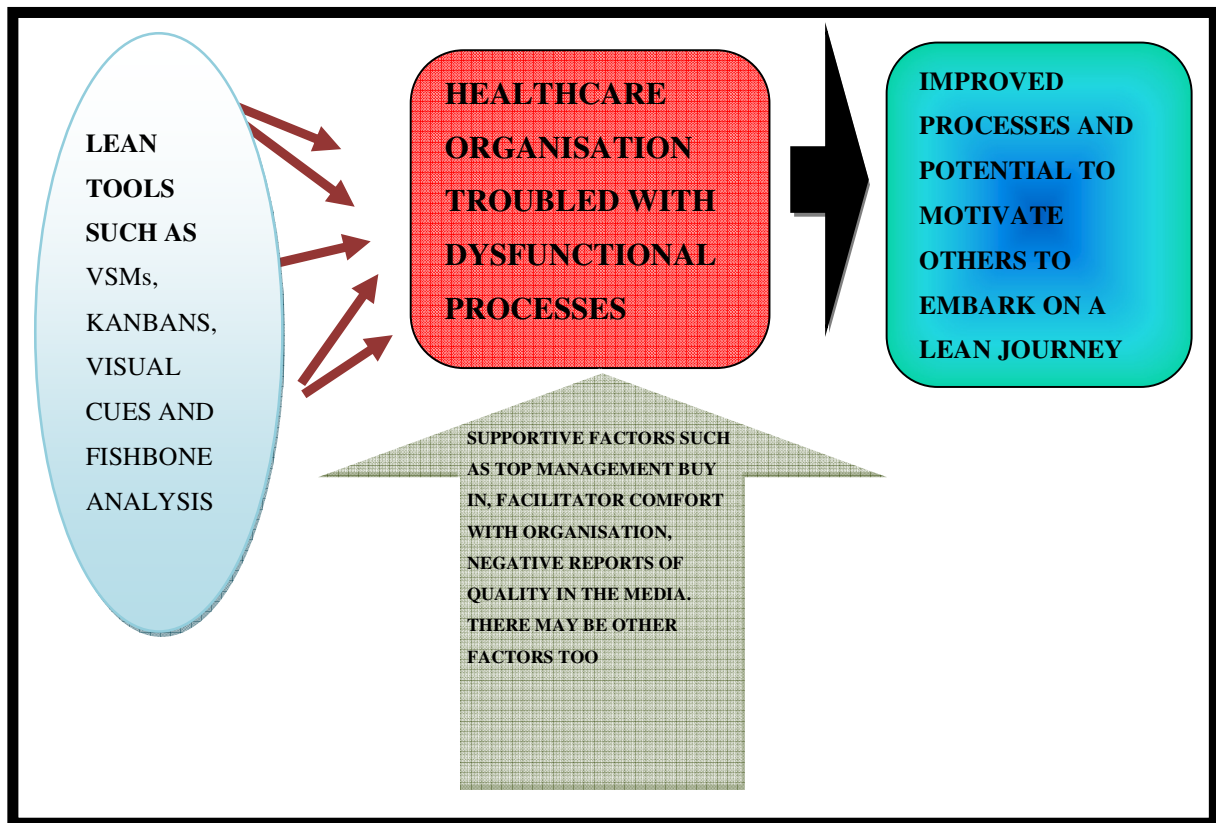
Figure1.2 Conceptual Framework at outset of study based on past experience and literature reviewed

Explanation of Conceptual Framework

This conceptual framework illustrates my mental model prior to the start of the study, and of how I thought I could improve hospital processes using Lean. Based on personal experiences and media reports of incidents at the hospital, the Southern Hemisphere Hospital was troubled with many dysfunctional processes. I believed that appropriate use of the Lean tools, in the presence of supportive factors would lead to improved processes (left side of Figure 1.2). This 'tool based'

view rested upon the ability of the facilitator, when in reality implementation was influenced by many other factors.

The middle part of Figure 1.2 speaks to the need for supportive factors. It does not, however, consider the possibility that there are factors that inhibit Lean implementation and these also play a crucial role in impacting Lean implementation outcomes. This particular idea of enablers and inhibitors led me to look at other bodies of literature related to implementing change and technology. Lastly, Figure 1.2 shows how applying the Lean tools to dysfunctional processes leads to improved processes. This naïve concept neglects the idea that once changes are effected, the main challenge is sustaining the changes and scaling them up to include the rest of the institution.

This conceptual framework, fully developed by May 2008 informed my thinking at the outset of the research. I feel it is critical to mention that while I had some theoretical understanding of Lean implementation, this study presented my first opportunity to implement Lean in practice. From an academic perspective, the framework above illustrates how Lean tools, supportive management and facilitator awareness can serve as enablers of Lean implementation. This study proved empirically which factors enabled or inhibited Lean implementation, which was quite different from my initial, quite limited thinking. In order to identify these factors, I implemented Lean across five sites at the hospital under study, using action research and grounded theory.

1.5 OVERVIEW OF METHODOLOGY

This study saw the synergistic combination of two distinct methodologies: AR and grounded theory. These methodologies have been applied singularly in many healthcare studies. The combination of AR and grounded theory is said to be ideal for studying change in organizations, as this study aims to do (Baskerville and Heje, 1999). Mingers (2006) asserts that multi-method research adds depth through diversity of approaches, sources and techniques

The methodology overview starts with a brief discussion on the research process, before detailing the ontological choices of the study. A brief review on the choice of the two research methodologies of this study follows. This study makes a methodological contribution by clearly explaining how AR and grounded theory can be used synergistically in an operations

management study. The study also offers descriptions of how data was collected, assimilated and analysed in order to practically illustrate to future researchers how this is possible. These contributions are introduced in this Section 1.5, and expanded on more comprehensively in the body of the thesis.

1.5.1 Research Process

The study consisted of two phases: a theory building phase which was followed by a theory testing phase. During the theory building phase, the researcher facilitated and guided the improvement process but did not drive the change. Five projects were eventually chosen for the study, and once a project was identified a team of individuals from the relevant unit constituted the Lean project team. They had weekly meetings where progress on previous interventions was discussed and future interventions were planned.

The theory building phase involved intense observation, document review and interaction with the relevant staff members of the projects. Each project naturally had a different focus but using the AR method, Lean was implemented across all projects. Over an 18 month period over 900 pages of data were collected in the form of observations, memos, documents and interview transcriptions. At different stages during the data collection process, data was analysed using grounded theory techniques which increasingly focussed further data collection. Data was analysed through three levels of coding that were iterative in nature. This culminated in a theory that offers understanding of some of the factors that enable or inhibit Lean implementation.

In the second phase of the study, this theory was tested using semi-structured interviews. Interviews were recorded, transcribed and then analysed using concept analysis which is discussed in more detail in section 3.4.4. Distinct differences were identified across the successful and unsuccessful projects. This allowed for further refining of the interim theory to develop the final theory. This theory sheds light on, and provides some empirical evidence of, the factors that enable or inhibit Lean implementation. The theory offers quite specific guidance to practitioners and researchers alike about what to watch out for when implementing Lean to improve the possibility of success.

1.5.2 Research paradigm

The research paradigm can be thought of as the researcher's lens, with which they view the world (Malterud, 2001). The choice of research paradigm guides the choice of research instruments, samples and techniques (Denzin & Lincoln, 2005). There are many paradigms described in the literature, some of which are discussed in detail in Section 3.3.1.

In this study, critical realism was used as an ontology, which is described by some as an ontology that borrows from other paradigms (Mingers, 2006). Mingers (2006) comments that critical realism is well suited to operational research and the management sciences. Critical realism has one very important characteristic - it operates at three distinct levels including an empirical, actual and real level. It is believed that researchers observe events or actions at the empirical level, which only represents a portion of what occurs in the actual level (some of which cannot be observed). However, what occurs in the empirical and actual levels are driven by what happens at the real level which is described as an underlying mechanism responsible for what is occurring at other levels. Relating this to the study, as the researcher, I observed many events and actions over the 18 month period. To make sense of these actions (enabling and inhibiting) I recognise that these actions are driven by an underlying mechanism, which culminates in the final theory of this study. This study builds a theory that, in part, explains some of the enablers and inhibitors of Lean implementation by using empirical evidence. Yeung (1997) suggests three methodologies that are clearly compatible with critical realism. These include grounded theory, iterative abstraction and triangulation in realist research.

1.5.3 Overview of Action Research and its suitability to this study

AR is a unique methodology that improves practice (by taking action) and contributes to the body of knowledge by following a research process. AR works by using cyclical processes of data gathering, feedback, analysis, action planning, implementation and evaluation (Coughlan and Coghlan, 2002). AR is said to be pioneered by Kurt Lewin (1951) who also described the classical planned model of change.

AR is well suited to this study since a pre-empted solution to the research question is not available (Coughlan & Coghlan, 2002).With Lean implementation there is emphasis on grass roots buy in, and AR encourages participants to reflect and analyse problems occurring in their work environment which leads to framing of problems (Gummesson, 2000). AR (like grounded theory) works towards theory building in incremental steps (Eden and Huxham, 2002). More detail of AR and its risks are discussed in Section 3.4.2. In this study AR proved successful both from a research and a practice perspective. Good quality data was collected using the AR process and significant improvements were made at SHH.

1.5.4 Overview of Grounded Theory and its suitability to this study

Grounded theory uses a systematic set of tools and processes to develop an emergent theory that accounts for a particular pattern through iterative cycles of data collection and data analysis (Strauss and Corbin, 1990; Kennedy and Lingard, 2006). Grounded theory is described as inductive, thus excluding deductive models of research (Tavakol, Torabi, Zeinaloo, 2006).

Details of the grounded theory process are described in Section 3.4.3 but it is useful to provide an overview of some key concepts here. The method of sampling, data collection and data analysis has unique characteristics that are fully described later. It is necessary to mention that grounded theory can be thought of as a process of moving from broad abstract topics towards more specific concrete topics. This process is referred to as theoretical sampling and ends when theoretical saturation is reached, in other words, when with more data collection nothing new is learnt.

Grounded theory is described as appropriate where there is a need to develop theory (Kennedy & Lingard, 2006), and where there is a need for deep understanding of the underlying mechanism resulting in specific outcomes (Struebert & Carpenter, 1999). This study is seeking to understand what the underlying mechanism of Lean implementation is so that the enablers and inhibitors can be identified.

1.5.5 Data Collection

As mentioned above this study had two phases, a theory building and a theory testing phase. In the first phase, data was collected with a view to building theory and therefore data techniques appropriate to this were used. The AR method generated many opportunities to collect data in the form of observations, documents, journal entries and informal interviews. All data was recorded using a Dictaphone or in narrative form. Grounded theory techniques meant that the researcher increasingly focused on emerging themes and concepts over time to ensure depth, not breadth of exploration. Data was collected till saturation was reached, and the theory emerged from the data through multiple rounds of analysis.

In the second phase of this study the theory generated was tested using respondent validation and semi-structured interviews with key stakeholders .This allowed perceived mechanisms to be 'verified' with key respondents and acted as a means to refine the theory generated in phase one. All interviews were recorded and transcribed to facilitate analysis.

1.5.6 Research Quality

Some qualitative scholars have deemed quantitative criteria for research quality as inappropriate to qualitative studies and have therefore proposed other criteria (Lincoln and Guba, 1985). These criteria include credibility, neutrality, confirmability, consistency, dependability, applicability or transferability. This study ensured validity, reliability and transferability.

One of the recommended ways to increase validity in qualitative studies is to use triangulation and respondent validation (Mays and Pope, 2006; Yeung, 1997). Triangulation can take different forms as Denzin outlines (1970) – multiple sources, multiple observations of the same phenomenon, multiple theoretical perspectives and methodological triangulation. This study employed multiple sources, multiple observations and multiple methods to increase validity.

Reliability relates to the degree of consistency of results over time. Care should be taken so that the entire research process can be verified from data collection (Campbell, 1996) to analysis and theory development. The reliability of the data is closely linked to the integrity of the final result (Bryman and Bell, 2007). This study recorded all interactions in document form or with a Dictaphone; and to ensure reliability all data analysis was stored in Atlas.ti.

Transferability relates to the extent to which results from one study are applicable to other studies and settings. This study does not aim to be broadly generalisable as with many quantitative studies (Bryman and Bell, 2007). There is much more emphasis on getting rich, complex descriptions of the study areas (Van Maanen, 1988). This study hopes to sensitize managers or Lean practitioners involved with future Lean healthcare implementations about potential enablers or inhibitors of Lean implementation.

1.6 OUTLINE OF THESIS

This thesis has five chapters: introduction, methodology, analysis, literature review and finally a conclusion. The slightly atypical format can be explained by the role of the literature review in grounded theory studies. As was mentioned above, in grounded theory studies, the theory emerges through iterative cycles of data collection and data analysis. If the existing literature is studied in detail before the study commences (as is the usual process) this will taint the emergent process and the researcher will not be open to novel theories. So in this thesis, I used the literature initially just to guide me as to where some of the gaps in the literature are. I then conducted my study and developed my theory. Only at this stage did I delve into the literature with the aim of locating my theory in the broader literature as suggested by Stern and Allen (1984). At this point I am able to indicate how this study makes a contribution either empirically or conceptually, to some of the concepts related to Lean implementation. Each chapter is introduced with a section on the objective of the chapter and the chapter outline.

Chapter 2(Methodology) of the thesis discusses the many aspects of the methodology used in this study. The research process is described and illustrated in detail before launching into a discussion on the research paradigm and approach taken in this study. This chapter then moves to an in-depth discussion of the two methodologies used in the study highlighting their respective processes, the reason for their appropriateness in this study, the risks of these methodologies and how they were mitigated. Data collection techniques are described before concluding the chapter with a discussion of how research quality was addressed.

Chapter 3(Findings) of the study describes the two phases of the research, the theory building and the theory testing phases, constituting the findings of this study. This chapter in some ways mirrors the methodology chapter in its form. It starts by describing the data that was collected, how this was analysed in stages, and how this guided further data collection. Since well over

900 pages of data was collected, it was not possible to illustrate how all the data was analysed, synthesized and assimilated into the final theory. Instead, in this chapter I show how one code evolved from being grounded in the data to its final place in the theory of this study. One code was captured from the point of being used to code the raw data, then to form part of a category and finally to how this category formed part of a concept which featured in the final theory of the study. At key points in the analysis journey I give examples of how other codes, categories or concepts related to each other and found their place in the final theory. This chapter uses a number of diagrams, pictures and screenshots to clearly illustrate the methodology of the study. In this chapter some of the relationships defined in the final theory needed to be explained using either the literature or empirical evidence from the study. The theory testing process commenced once the interim theory was developed. It involved semi-structured interviews and respondent validation with 46 stakeholders from the projects. Since two of the Lean projects in the study failed, two succeeded and one had a premature ending, it provided a good opportunity to test which factors promote or inhibit successful implementation. Using concept analysis each of the three core concepts were described in detail including the concept's attributes, antecedents, empirical indicators and consequences. Using the empirical indicators for each concept, their presence or absence was tested in each project. This resulted in identifiable differences across projects on certain indicators. This process allowed the identification of some of the enablers and inhibitors of Lean implementation.

Chapter 4 (Literature Review) concentrates on the literature review at three distinct levels. It was necessary to contextualize Lean in the literature on organizational change and innovation. The models of organizational change are discussed as well as the various classifications of innovation that relate to Lean. From this foundation, the literature on Lean implementation and Lean healthcare is then explored. In this chapter a conscious effort is made to link the elements of organizational change and Lean implementation to the final section of this chapter, which involved locating the theory of this study in the broader literature. The common threads allowed linkages to be established between organizational change, Lean, and the theory this study developed. The contribution this study makes to the existing literature is discussed in detail in Section 4.3. By way of introduction to the section it can be noted that the study has offered some concrete, empirically founded criteria that provide evidence for previous conceptual notions of Lean implementation and organizational change. The study reinforces some existing thoughts

and offers additional clarity to the topic of Lean implementation. This chapter concludes with a detailed discussion of how some of the enablers and inhibitors identified contribute to existing thinking.

Chapter 5 (Conclusion) crystallizes the discussions of the preceding chapters. The chapter starts by concluding the research issues and highlights the key aspects of the emergent theory and its relations to existing literature. The chapter then discusses the relevance of the study and the degree to which the study has answered the original research question and clarified some of the complexities of Lean implementation. The theoretical, practical and policy implications are then detailed. The methodology is critically reviewed with a strong emphasis on what worked well and what did not work well, both in terms of the research process and the research methodologies. This reflective component is meant to sensitize future Lean implementation efforts and research projects to be wary of certain things. The limitations and evaluation of the research conclude this chapter and provide a realistic perspective of the research, its ability to effect change and influence current thinking.

1.7 DEFINITIONS

In this thesis, there are a number of concepts and definitions that are not uniformly described in the literature. For this reason, many of these have been defined in the context of this thesis.

BPR – Business process reengineering is described by Hammer and Champy (1993) as "... the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical modern measures of performance, such as cost, quality, service, and speed". Davenport (1993) augments this by suggesting that it "encompasses the envisioning of new work strategies, the actual process design activity, and the implementation of the change in all its complex technological, human, and organizational dimensions".

DoH – Department of Health

Lean –Lean is a management philosophy based on the Toyota Production System. In this study Lean refers to more than just a set of tools but also looks to get people thinking and behaving in a new way (Sayer and Willimas, 2007).

NDoH – National Department of Health, South Africa

NHS – National Health System of the United Kingdom

PDCA – Lean tool (Plan Do Check Act) is a tool used for implementing changes in structured way. It is also known as the Deming Cycle. Planning involves preparing to meet the objective; Doing means to test the new plan or intervention; checking means to check whether or not the specified objective was achieved or not, and if not why not; and ACT speaks to how to formalize the change and make it sustainable.

SHH – Southern Hemisphere Hospital (fictitious name for the research site)

TPS – The Toyota Production System upon which Lean is based. It aims to provide the best quality at the lowest cost in the shortest lead time through the elimination of waste (Marchwinski, Shook, 2008)

TQM – Total Quality Management involves improving processes to deliver better quality. TQM is seen as a management approach in which all departments and staff are responsible for continuous improvement in order to meet customer expectations (Marchwinski, Shook, 2008)

VSM – Value stream map, "a simple diagram of every step involved in the material and information flows needed to bring a product from order to delivery" (Marchwinski, Shook, 2008)

1.8 DELIMITATION OF SCOPE AND KEY ASSUMPTIONS

It is necessary to identify the nature of the research in terms of what was done, what was identified, what conclusions were drawn and what was not done nor identified. The study was carried out in a large tertiary hospital in South Africa. It is acknowledged that organizational factors that were not included may have affected the results of the Lean implementation and the results of the research process. For example, organizational culture, organizational size, staff composition and complement, departmental size and location in the organizational structure could have all served as independent variables in determining the outcomes of Lean projects. These were beyond the scope of this study but it is acknowledged that these organizational factors may play a role in Lean implementation success.

In this study a number of factors were identified as enabling or inhibiting Lean implementation. However, this too does not represent the whole spectrum of factors that could enable or inhibit Lean implementation. Empirical evidence for some factors was quite clear in comparison to other factors where there was little empirical evidence. For example, this study was unable to establish the importance of management support, facilitator style and the impact of bureaucracy on the failure or success of Lean implementation.

This research study was focused on Lean implementation in a healthcare organization. It is acknowledged that the findings of this study may be easier to relate to other healthcare organizations rather than manufacturing ones. In addition, this study focused on Lean implementation rather than sustaining Lean and so it is difficult to comment on how the theory this study offers impacts on the sustainability of Lean initiatives.

The study was not designed as a case study; as the intention of the research was to systematically identify enablers and inhibitors of Lean implementation across five projects. The case study method would have allowed for much deeper description of the projects and offered different lessons compared to this study. There appears to be a need for more systemic studies of Lean implementation as compared to case studies (De Souza, 2009). Limitations related to the methodology are explored in more detail in Chapter 2.

1.9 CONCLUSION

This chapter has laid the foundation for the thesis. It started by providing a background which naturally moved into justifying the research, from a theoretical, practical and methodological perspective. The chapter then described the conceptual framework that was influenced by the researcher's experience and reviewed literature. The methodological decisions were described briefly before describing the outline of the thesis and the relevant definitions described more fully. The slightly atypical structure of the thesis was also justified since in grounded theory studies the literature is reviewed in detail later, rather than earlier. This thesis now commences with a detailed discussion of the methodology employed in this study.

2. METHODOLOGY

The previous chapter outlined the purpose of this study; the research gaps this study addresses and its contributions. This chapter discusses the methodology employed in this study to identify the factors that affect Lean implementation, and in doing so addresses the gaps identified in the Lean literature.

2.1. INTRODUCTION

More than 90 per cent of Lean Healthcare articles published come from the UK, US and Australia indicating a paucity of studies based in developing countries (De Souza, 2009). The majority of Lean healthcare studies are of a case study nature while this study focuses on building theory. At present, there is a need to develop theory that assists in identifying those factors that enable or inhibit Lean implementation in healthcare. It is necessary to better understand the role of management, how to empower people to implement Lean, and how to improve its sustainability. Hall (2006) notes how too few companies focus on the people element of Lean implementation and then wonder why there is such poor engagement. Fine, Hansen and Roggenhoffer (2008) mention that a key challenge in implementing Lean is being able to integrate the 'hard' tools about which more is known, with the 'softer' side about which less is known. Based on the above perspectives the research question for this study is:

What are the enablers and inhibitors of Lean implementation at Southern Hemisphere Hospital?

Howe and Eisenhardt (1990) advise researchers that, the research methodology should be chosen to respond appropriately and accurately to the research question. Given the paucity of literature on this specific aspect of Lean implementation and guided by the research question, this study was designed as a qualitative AR study, using grounded theory to help make sense of the large amounts of data generated. Qualitative methods allow researchers to investigate unexplored constructs (Morrow, Rakhsha and Castaneda, 2001) and understand human processes (Creswell, 2003). It is more likely that the researcher will discover fresh concepts and in doing so enhance creativity using multiple methods (Tashakkori and Teddlie, 1998). Different research methods are not necessarily mutually exclusive and should be considered as complementary (Westbrook,

1994). The appropriateness of the methodological choices will be fully discussed in Sections 2.3 and 2.4.

The purpose of this chapter is to clarify the steps taken to answer the research question: what was done; how it was done and the appropriateness of methodological decisions will be detailed.

2.1.2 Outline of Chapter

This chapter starts by giving the reader an illustrated overview of the methods used for this study, as well as the research process followed from start to end (Section 2.2). Guba and Lincoln (1994) emphasise that every researcher needs to be aware of the paradigm they use and how it relates to the methodology. The discussion in Section 2.3 deals with the philosophical underpinnings and the rationale behind choosing a qualitative approach.

A detailed discussion in Section 2.4 will cover the characteristics of AR and grounded theory, together with the appropriateness of these methodologies. Included in this section will be reference to the risks these methodologies pose and the attempts at reducing their impact in this study. A logical progression from this section is Section 2.5 – data collection.

The discussion of how validity, reliability and transferability were addressed in this study follows in Section 2.6. This chapter is concluded with Section 2.7 that discusses the important ethical considerations of this study.

2.2 THE RESEARCH PROCESS

This section aims to provide a clear illustration of the research process and methods involved in this study. In this qualitative study there were two distinct phases: theory building and theory testing. The four figures below illustrate how the study was designed and the sequence of events. Each figure builds on the previous one. The research process may appear as though the process was sequential. However, it is emphasised here and in other sections that there was significant iteration between data collection and analysis, especially in the theory building phase of this research.

There is little agreement amongst authors about the definition of theory and hence it is important to specify what the research refers to when speaking of theory. Sutton and Staw (1995) describe theory as the connections between phenomena, the nature of causal relationships, the underlying reasons that result in a particular outcome. Weick (1995) refers to theory as that which helps explain, predicts or delights the researcher studying a particular pattern of behaviour. This thesis aims to understand the enablers and inhibitors of Lean implementation; the relationship between the identified factors. In addition, it is envisaged that the derived theory will have benefits both theoretically and practically in more successful implementations of Lean in healthcare environments.

In this study, five projects were analysed separately. Two of the projects were successful, two were failures and one was a premature termination. The projects themselves are discussed in more detail in Chapter 4 and Appendix 1. The rationale for analysing the data separately was to elicit those factors that enabled and inhibited Lean implementation in different projects, at the same hospital. These analyses facilitated the building of theory (Meyer, Spilsbury, Prieto, 2000) by working at the 'meta-level', evaluating the overall research outcomes at a higher level of abstraction.

Step 1
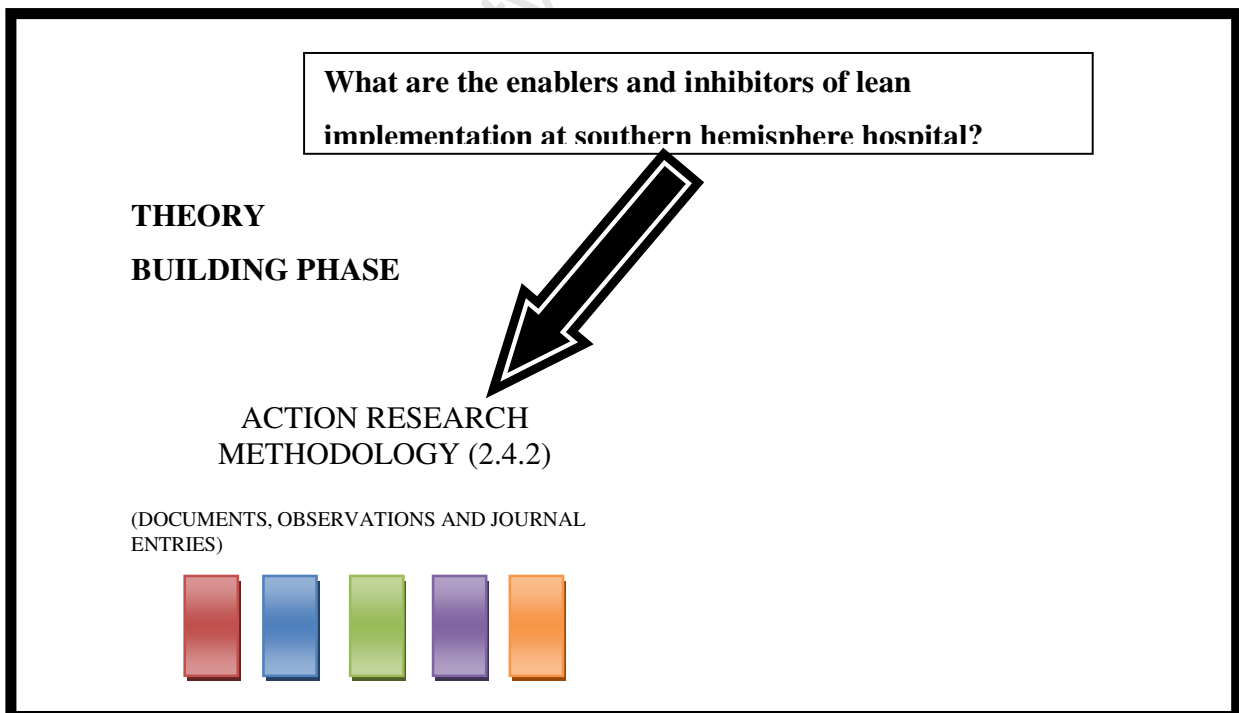
Figure 2.1 Step 1 of the Research Process

As part of Step 1 there were three elements that needed to be considered in relating to the research question - the appropriate methodology for this question, the data collection techniques and the selection of projects for this study.

The research question is substantiated in more detail in Chapter 1 and 4 of this thesis. To briefly summarise the facts that led to this question:

- There was a paucity of literature and theory on how to implement Lean in healthcare contexts.
- There was a need to identify enablers and inhibitors of implementing Lean in healthcare contexts. This had both research and practice implications.

Methodologies should be chosen to suit the research question (Suddaby, 2006). In this particular instance there was a dual need for research on Lean implementation as well as the need for organisational change and improvement at the hospital. AR is well suited to achieving these dual aims (Baskerville and Wood-Harper, 1996). In order to respond to the research question it became clear that there would be a need for the researcher to be immersed in the study environment. This enabled an understanding of the intricacies of change and the improvement process, and further substantiated the choice of AR as a methodology (see Section 2.4.2).

Data collection suitable for AR studies includes observation, interviews (formal and informal), document reviews and diary entries. During the research I spent 1200 hours observing events, behaviours and improvements in the field, attended 160 Lean project meetings and had many informal discussions with the 60 staff members involved in the projects over an 18 month period. This culminated in over 700 pages of data containing some 8000 quotes.

Random sampling is usually appropriate in quantitative studies when the purpose of the research is to develop generalisable findings. Qualitative research depends on small samples that are purposefully chosen (Williamson, 2006). However, with these projects, the aim was to illuminate and understand logical constructs and so theoretical sampling is considered more appropriate (Eisenhardt and Graebner, 2007).This is the process by which the researcher actually chooses what data to collect next, based on the emerging theory (Holton, 2010).

Eisenhardt (1989) suggests that projects or cases should be chosen through theoretical sampling rather than random sampling in order to highlight case-specific characteristics. I needed to find a

mechanism to 'sell' the idea where the hospital could derive benefit from the research. AR allowed me to perform the research and simultaneously facilitate improvements in the projects. The five projects chosen for this study represented a good spectrum of problems the hospital was experiencing including long waiting times, poor quality, and patient and staff frustration. Two of the five cases were chosen by the management of the hospital. The hospital managers chose areas that were seen to be 'problematic' (Outpatient pharmacy and the Emergency unit).

The other three cases started where the researcher developed good rapport with the relevant stakeholders and eventually got their buy-in and support to start projects. These projects all had serious process problems that needed improvement. Admittedly the choice of these three projects was also guided by how easy it would be for me to facilitate an improvement project and collect data for my research.

Step 2
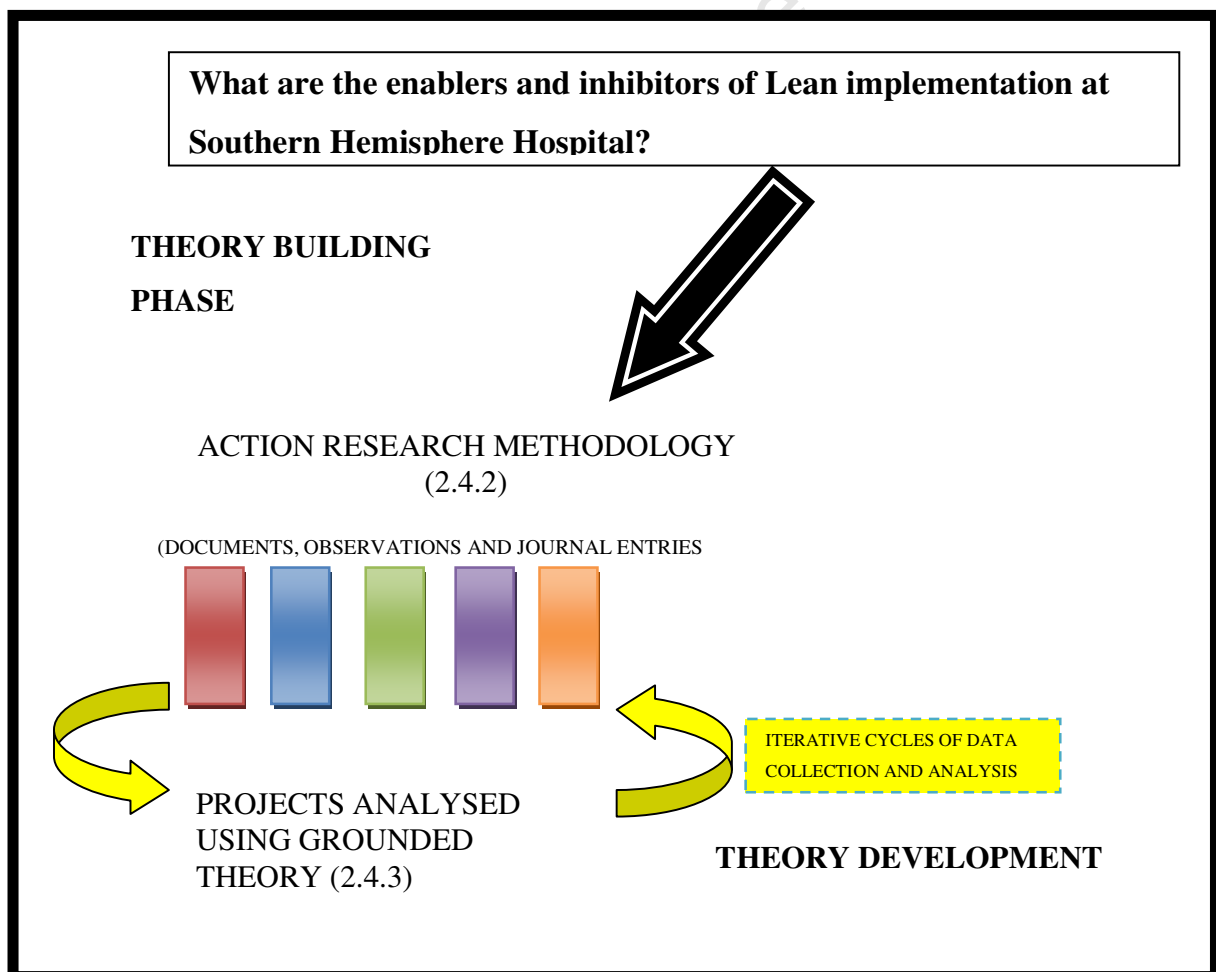
Figure 2.2 Step 2 of the Research Process

This was an intensive step that required many cycles of iteration between data collection and simultaneous analysis. Reflection throughout the process is a key tenet of AR and cycling between data collection and analysis is a cardinal trait of grounded theory (Maxwell, 2005; Cutcliffe, 2000; Kennedy and Lingard, 2006). These are discussed in more detail in Section 2.4.2. and Section 2.4.3. To give an example of how my ideas were refined through reflection and iteration between data collection and analysis: I started off with a general idea of the research area I wanted to study, which was Lean implementation in healthcare. Initially my focus was on the effectiveness of the Lean tools such as Value Stream Mapping, Plan-Do-Check-Act and Root Cause Analysis. Having spent four months in the field, I soon realised I needed to shift my focus onto the people element of Lean implementation. Over time my research question was refined to looking at the enablers and inhibitors of Lean implementation with a focus on the people element.

After the first set of data was collected from the five projects, I began the coding process. The data consisted of transcribed meeting minutes, some diary entries, and informal discussions with the members of the project teams. At this stage data was coded in each project and not pooled. The first level of coding was really to get a feel for some of the issues that needed further exploration as suggested by Strauss and Corbin (1990). Each line of the text was read and coded resulting in a list of more than 100 substantive codes, and some 8000 quotes. This then led to the next cycle of data collection and coding to refine the list of substantive codes down to 70, then 55. As I became comfortable with the list of codes, I began second level coding also known as theoretical coding. This involved the clustering of codes around common characteristics to form categories. At this stage I looked for common features across projects in formulating the categories. From this process 14 categories emerged. These categories were then used for Level III coding to identify the basic social processes that I understand to be part of the emerging theory. In this study all coding was done with the use of Atlas.ti software, which is a qualitative software package.

Throughout this theory building phase of the research process there were four background processes occurring simultaneously:

1. With each code and category being formed there was constant comparison with existing codes or categories to ensure mutual exclusivity

2. Reduction of data into workable sizes by looking at overlap/duplication/redundancy between codes/categories. Codes with less than five quotes were omitted towards the end of this theory building process.

3. As I progressed through the research, my sampling of data became more focussed with fewer categories. This allowed me to limit the breadth of my exploration and focus on the depth of issues at play. This process is referred to as theoretical sampling

4. Memoing is the process by which I made many notes of varying length about the possible relationships and patterns of behaviour I observed. These helped to guide me through the analysis and write up phase as these memos served as aide memoires.

Step 3- Transition from theory building to theory testing
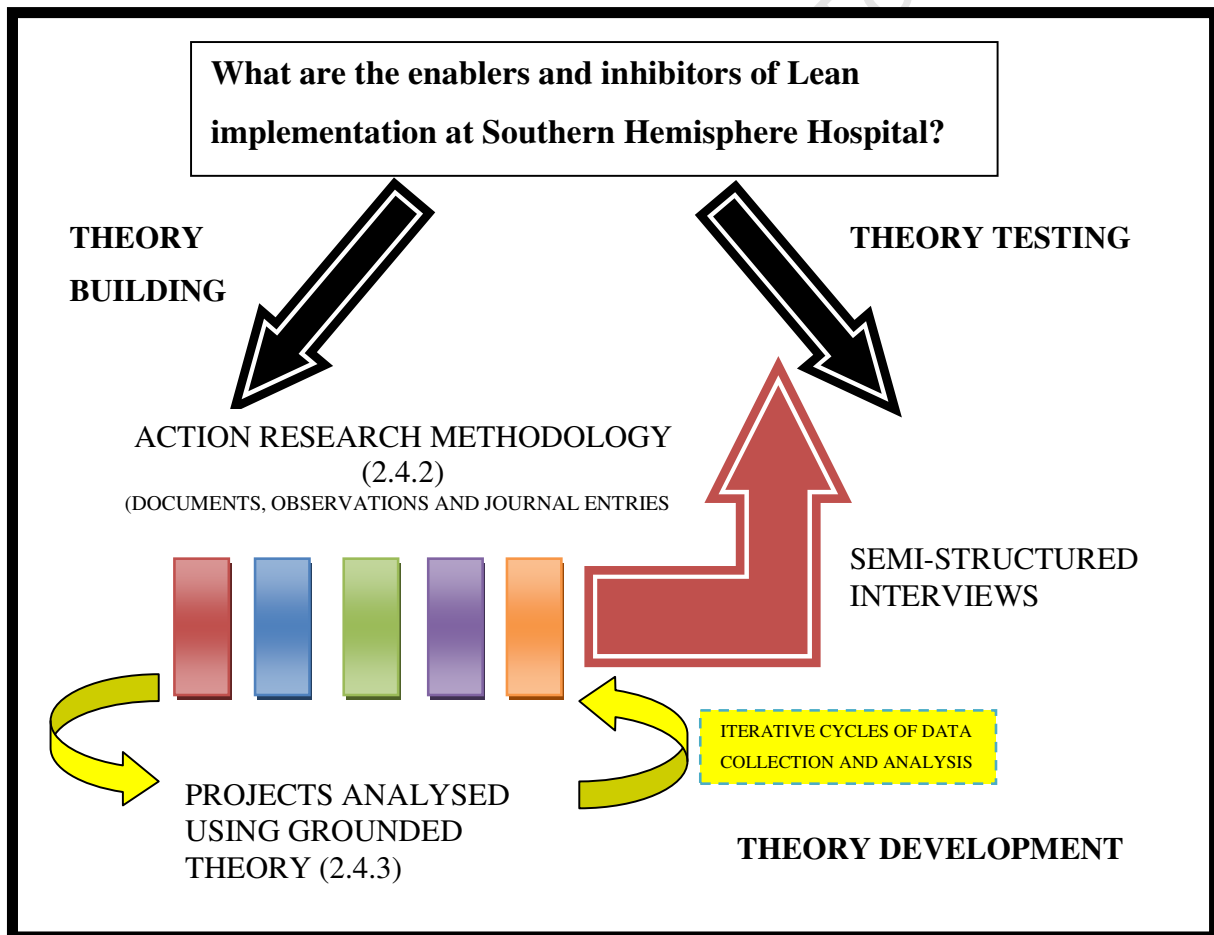
Figure 2.3 Step 3 of the Research Process

During this step there is a transition from the theory building phase to the theory testing phase. In order to guard against the risk of using circular reasoning, different data was used for the theory building and theory testing phases. Circular reasoning involves repeating a premise to support itself (rather than basing it on a conclusion) and in doing so creates a fallacy. In this thesis it would translate into using the same data to build the theory and then test the theory. To guard against this in this study, tentative theory was developed using the data gathered from the projects. This tentative theory was then used to build a semi-structured interview protocol (Attached in Appendix 2) in order to test the theory using semi-structured interviews. There were some guiding questions posed to the interviewees but they were given latitude to express their views about related issues that did not directly link to the questions. Similarly, as the researcher, I used the opportunity to explore interesting issues in depth. More details of the interviewees and the interview process can be found in Section 2.5.3. Forty-six interviews were conducted with staff involved in the five projects.

Step 4
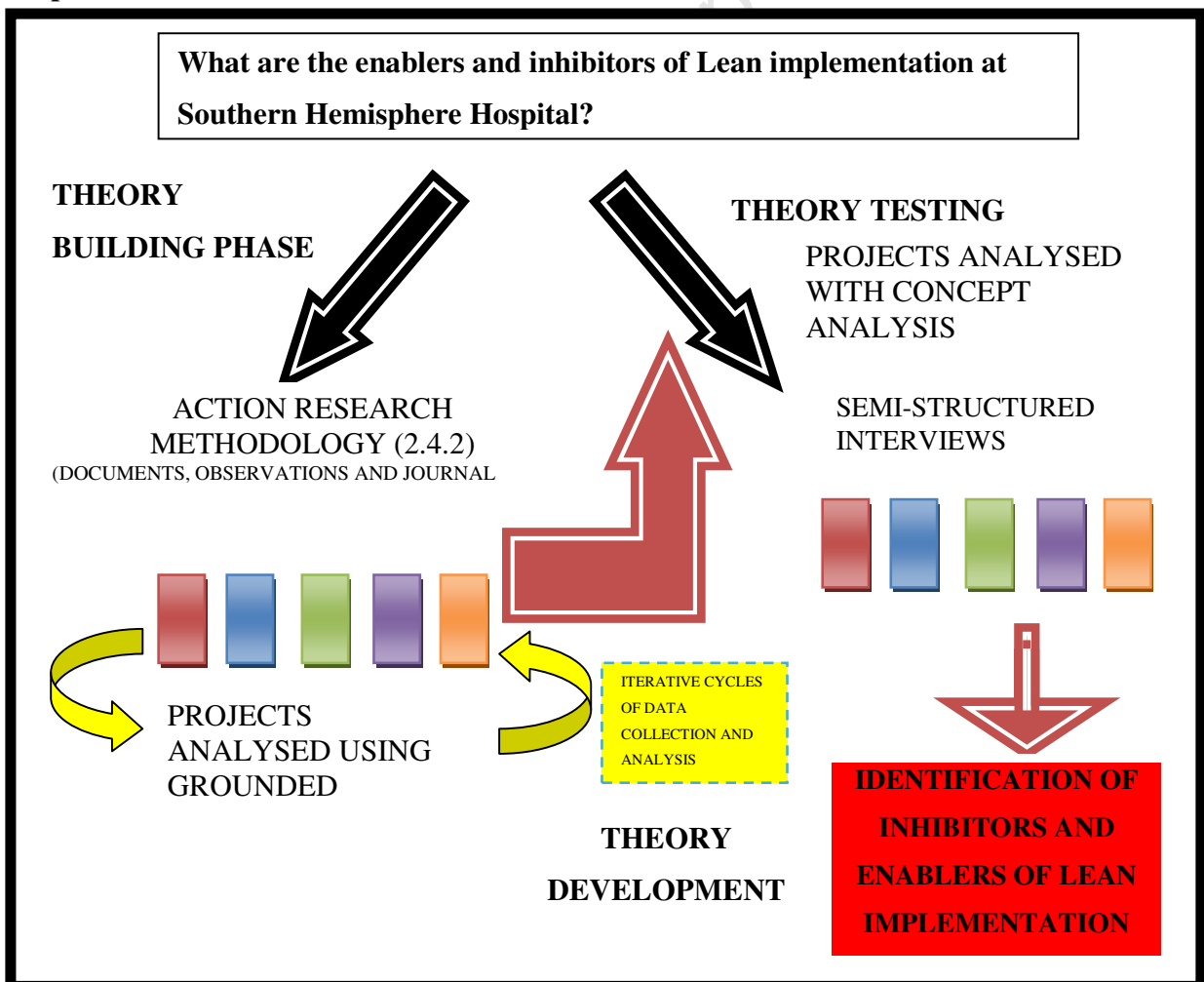
Figure 2.4 Step 4 and Overview of Research Process

The interviews provided a rich source of data and enabled the final step of the research process, which was to test the theory generated. This was done using concept analysis, described in Section 2.4.4. This was applied to the individual projects looking for variation across projects. Indeed the results discussed in Chapter 3 show some stark differences between the projects that failed and those that succeeded. This has allowed further refinement of the theory and the development of a set of enabling and inhibiting antecedents. There are both practical and theoretical implications of this as will be explained in Chapter 3 and 5.

2.3   THE RESEARCH PARADIGM AND APPROACH

2.3.1 Ontological and Epistemological Considerations

a. Introduction to Research Paradigms

Maxwell (2005) highlights the importance of using a research paradigm as 'critical'. The historian Thomas Kuhn is said to have used the word 'paradigm' to refer to ontology and epistemology (Maxwell, 2005). Paradigms can be thought of as a set of basic beliefs that represents a world view that defines for its holder, the nature of the world. Malterud (2001) refers to this theoretical frame of reference as the 'analyst's reading glasses'. Previously the research paradigms were oversimplified by some researchers who either used qualitative or quantitative approaches. The choice of paradigm can guide the choice of research instruments, samples and methods (Denzin & Lincoln, 2000). It guides the appropriate methodology and it enables the reader to see the research through the same lens as the researcher. There are numerous paradigms that researchers can use to conceptualise their studies (Ponterotto, 2005). Increasingly different philosophical underpinnings are finding their way into management research (Chia, 2002). Lincoln and Guba (1985) offer a useful schema and classification of four paradigms that includes positivism, post-positivism, constructivism–intepretivism, and critical ideological theory.

Positivism relies on the hypothetico-deductive method where hypotheses are tested most commonly in the form of quantitative studies (McGrath & Johnson, 2003; Guba and Lincoln, 1994). The core focus of positivistic studies is explanation that leads to prediction and control of phenomena (Ponterotto, 2005).

Post-positivists perceive an objective reality but acknowledge that one can never capture the full reality (Guba and Lincoln, 2000). Post-positivists focus on discovery and theory verification (Chawlisz, Shah and Hand, 2008). Positivism and post-positivism both aim for explanation of phenomena, focus on causal linkages and both form the basis of quantitative research. Post-positivism asserts that the whole truth is never fully understood but is incrementally approached through research (Lincoln and Guba, 1985). It is well suited to questions that are socially and culturally complex, whilst remaining sensitive to positivist objectivity and rigour (Harris, 2003). The post-positive ontology is compatible and complementary to both AR and grounded theory (Baskerville and Heje, 1999).

Constructivism–intepretivism involves the belief that there are multiple, equally valid realities (Schwandt, 1994). Key to this paradigm is the interaction between researcher and object of investigation (Ponterotto, 2005). It is through this interaction that the researcher is able to make sense of phenomena. This paradigm chiefly involves qualitative methods.

Critical-Ideological Theory serves to challenge the status quo and transform situations (Kincheloe and McLaren, 1994). Power relations within social and historical contexts contribute to the lived experience (Kemmis and Mc Taggart, 2000).

Positivists and post-positivists try to keep to the 'pure' scientific method of controlling variables and regard the researcher's emotional or experiential viewpoints as irrelevant (Panterotto, 2005). This research aims to explain phenomena and lead to generalisable findings. This usually involves experimental methods.

Constructivists and critical realists embrace more naturalistic designs involving researcher-participant relationships and extended durations of field study (Lincoln and Guba, 1985). These paradigms favour techniques such as interviewing and observation (Panterotto, 2005). Critical realism uses elements from the post-positivist and constructivist paradigm, in trying to explain the underlying mechanisms that result in certain observed behaviours and events.

b. The Ontological stance of this study – Critical Realism

This study has used the critical realist paradigm as ontology. Critical realism does not subscribe to any of these distinct paradigms but rather uses elements from each of them and offers a new perspective (Mingers, 2006). Mingers (2006) comments that critical realism is well suited to operational research and the management sciences. Critical realism aims to explain social processes and events (Fairclough, 2005). Critical realism operates at three distinct levels (Bhaskar, 1978) (see Figure 3-5 below):

i. **The empirical world** is constituted of experiences and events as observed (e.g. Bypass surgery, labour strike). These are experienced using our senses or perceptions of what is occurring. Sometimes the objects observed can deceive one e.g. Line patterns which appear uneven but in fact are perfectly horizontal (Burnett, n.d.a)

ii. **The actual world** includes those observed events and those that are not observed (dropping standards of care, erosion of the ozone layer)

iii. **The real world** that consist of the underlying processes, structures, powers and mechanisms that generate events (arteries that are blocked resulting in need for bypass surgery; class struggle that generates strike action). Things in the real world often occur independently and are out of kilter with events in the actual world (Carlsson, 2004)
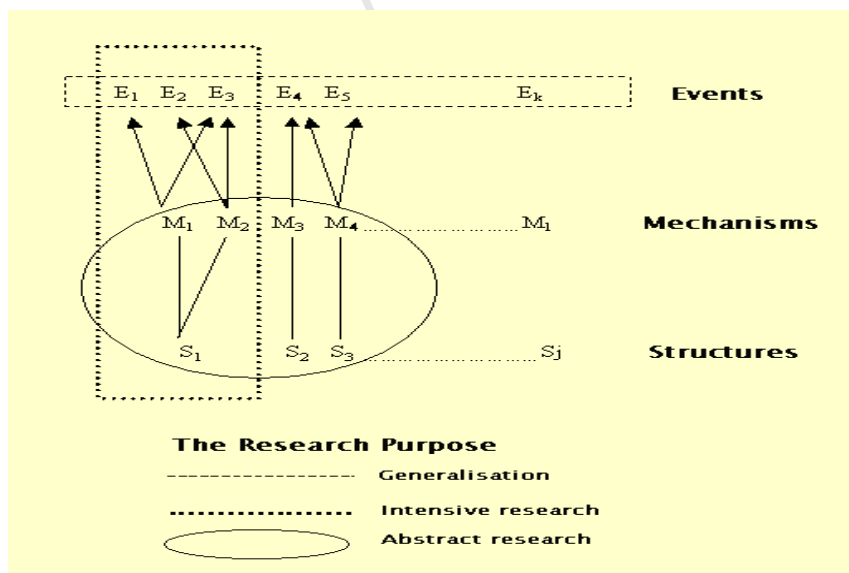
Figure 2.5 The different levels of critical realism (Sayer, 1992)

Figure 2.5 above illustrates the relationships between these three levels and how empiric observations are actually a result of underlying mechanisms and structures. The aim is to understand how underlying mechanisms, structures and behaviours result in certain effects and outcomes (Carlsson, 2004). If linkages between these real and actual levels are forged, it will result in illogical and incorrect causal relationships. The critical realist approach is to start by observing connections between actual events. The next step is to postulate the existence of real structures or mechanisms.

Yeung (1997) suggests three methodologies that are clearly compatible with critical realism. These include iterative abstraction, grounded theory and triangulation in realist research. Charmaz (2006) has identified both positivist (explicit coding, reductionist and analytic techniques) and post-positivist (constant comparison) elements in grounded theory. Grounded theory uses inductive reasoning with clear analytic steps and thus fits into the post-positivist paradigm (Chwalisz, Shah and Hand, 2008). Grounded theory assumes multiple realities (Panterotto, 2005) and therefore fits into the constructivist paradigm.

c. Epistemological consideration in this study

Fairclough (2005) and Yeung (1997) caution that ontology should be separated from epistemology. Epistemology refers to how one acquires knowledge (how one knows what one knows). The 'epistemic fallacy' is characterised by confusing the nature of reality with our knowledge of reality (Fairclough, 2005; Bhaskar, 1978). From an epistemological stance the critical realist approach is non-positivist, as values and facts are difficult to separate and make sense of individually. From an epistemological stance social systems are inherently open and interactive (Mingers, 2006). Theory testing is thus difficult and also possibly compounded by other factors. The focus is on explanatory power not predictive power (Mingers, 2006). There is very limited scope to test and measure things quantitatively (Mingers, 2006).

The above arguments suggest that paradigm choices are valuable in guiding the researcher to specific data courses, methodologies and analytic techniques. It is also important for the researcher to be aware of the paradigms, its role and its implications.

2.3.2 The Quantitative and Qualitative Decision and Approach

a. Introduction to the Choice between Qualitative and Quantitative Approaches

Management science was traditionally dominated by empiricists and quantitative methods (Mingers, 2006). There has been a gradual shift from these 'hard' positivist studies to the 'softer' interpretive studies with increasing recognition for the value of such studies (Mingers, 2006). There are clear limits to the usefulness of traditional scientific methods in operations management and other empirical research (Westbrook, 1994). A survey conducted by the Academy of Management Journal found that most of the articles identified as 'interesting research' were qualitative in nature (Bartunek, Rynes and Ireland, 2006). Qualitative and quantitative research strategies have different strengths and logics, and should be used to address questions appropriately (Maxwell and Loomis, 2002).

	QUANTITATIVE	QUALITATIVE
ASSUMPTIONS	• Variables can be identified and measured • Usually an outsider's view	• Variables are complex and often hard to measure • Usually an insider's view
PURPOSE	Generalisability, prediction and causal relationships	Understanding context, people's behaviours and perspectives
APPROACH	Starts with hypotheses and theories, control, uses formal instruments, deductive	Ends with hypothesis and grounded theory, emergent in nature, researcher is instrument, searches for patterns
RESEARCHER'S ROLE	Impartial and aims to be detached	Involved and empathetic

Table 2.1 Characteristics of the two approaches (Adopted from Glesne & Peshkin, 1992)

In some fields, such as medicine, qualitative research is still regarded with scepticism due to a perceived paucity of facts and high levels of subjectivity (Malterud, 2001). Mintzberg (1979) strongly defends the value of qualitative work claiming thus far that organization theory has focused on rigour at the expense of progress and relevance of the research. He further reinforces the need for more inductive, theory building work.

Qualitative studies usually do not have hypotheses but quantitative studies rely heavily on them. Maxwell (2005) offers a clear explanation of the difference between research questions and hypotheses. Research questions are about what you want to learn, while research hypotheses are

a statement of what the possible answers to the questions are (Maxwell, 2005). Some see research hypotheses as incompatible with qualitative research. It is usual in some forms of qualitative research for a hypothesis to be an end result of the study, for example in using grounded theory. In grounded theory, the hypotheses emerge and cannot be planned from the start (Glaser and Strauss, 1967). The risk of having well formed hypotheses is that they may act as 'blinders' inhibiting the researcher from looking openly at what is happening (Maxwell, 2005). It should be noted that researchers grounded in statistical methods may describe these studies as 'fishing expeditions' unless there are clear hypotheses to test (Maxwell, 2005). An important point to be made is that there is no need for statistical testing in qualitative research, and hence explicit hypotheses are not necessary, nor appropriate.

Qualitative research places much emphasis on inductive approaches, and aims for deep interpretation of the social world and its complex phenomena (Bryman and Bell, 2007). Furthermore, Bryman and Bell (2007) note a few distinct characteristics that differentiate qualitative from quantitative research, such as:

- Qualitative research often focuses on the opinions of the participants of a study, whereas a quantitative study focuses on the researcher's view.

- Qualitative researchers are often close to the study site and study participants, as was the case in this study, where I was based at SHH for two years.

- Qualitative studies are less structured and aim for deep contextual understanding versus generalisation of findings in quantitative studies.

b. Appropriateness of the Qualitative Approach

Strauss and Corbin (1990) suggest that qualitative studies are used to understand phenomena about which relatively little is known (Morrow, Rakhsha and Castaneda, 2001) or due to the nature of the subject, where quantitative analysis is not possible. As mentioned above in Section 2.1, there is relatively little literature available that examines the topic under study.

Qualitative strategies are particularly useful when the aim of the research is one or more of those listed below (Maxwell, 2005). My particular methodologies resonate well with all five aims listed below:

AIM OF QUALITATIVE RESEARCH	HOW THIS FITS IN WITH MY STUDY
1. Understand the meaning of actions and behaviours and how they are perceived	Attempt to understand what enables and inhibits Lean implementation- string link to actions and perceptions
2. Need for deep understanding of context and small sample	The study is not aiming to have broad generalisable findings. Rather it wants rich contextual information that could help sensitise future Lean implementations
3. Generate theory that is understandable	The theory developed in this study is meant to have theoretical and practical implications
4. Improves practice not only assesses it	Embedded in all the projects was the attempt to improve the status quo
5. Strong focus on collaboration between researcher and participants	Without the researcher the projects would not have been started and without the participants no changes could have been effected

Table 2.2 Aims of qualitative studies (Adapted from Maxwell, 2005)

There is a paucity of research which focuses on the people and social elements of Lean implementation in healthcare. In keeping with the research question, this research aims to develop a deep understanding of the factors that enable or inhibit staff's involvement in Lean implementation. Leedy and Omrod (2001, p. 134) mention that qualitative research can assist in defining what is missing from existing theory and what needs to be studied in the future. Even though it can be seen that the qualitative approach is well suited to this research question and broader study, it is not without its risks and limitations.

C. Applying Qualitative Techniques

STRENGTHS	WEAKNESSES	HOW THE WEAKNESSES WERE ADDRESSED IN THIS STUDY
Useful for studying a limited number of cases in depth	Limited generalisability	This is true but the findings from the study will sensitize future lean implementations despite not having statistical evidence. There was a contextual component that

		enriched the research.
Useful for describing complex phenomenon	Difficult to make quantitative predictions	This was not the aim of the study. I was aiming to develop a list of enablers and inhibitors of Lean implementation.
Enables cross-case comparisons and analysis	Very difficult to test hypothesis and theories	The study was designed primarily to build theory not test it.
Provides rich description of contextual phenomena, people and behaviours with the aim to make sense of them	May be perceived as inferior to quantitative work by some administrators	Addressed validity, reliability and credibility of the study before and during the study to ensure a high quality process was followed.
The researcher is able to study dynamic process (e.g. Continuous improvement)	Takes more time to collect data	Was able to collect data while employed at Southern Hemisphere Hospital as it formed a crucial part of the improvement work in the projects
Can use 'grounded theory' to generate a tentative explanatory theory	Data analysis is often time consuming	This was a major challenge as I had to do analysis after hours while employed at the hospital.
Ability to respond to local situations and stakeholder's needs	Researchers biases and idiosyncrasies can creep into the results	Discussed this in Chapter 1 and Section 4.2. I had worked at the hospital before which I think may have advantages and disadvantages
Qualitative data in the words and categories of participants lend themselves to exploring how and why phenomena occur		

Table 2.3 Strengths and Weaknesses of qualitative research (Adapted from Johnson and Onwuegbuzie, 2004)

2.4 RESEARCH METHODOLOGIES

This section starts with a description of multi-method research, which this study employs, as it is necessary to understand how the combination of methods is complementary and not divergent. A detailed discussion on AR and grounded theory follows.

2.4.1 Multi-Method Research

Multi-methodology is a broad term that refers to the use of more than one method that can be either located in the same paradigm (as in this study) or across multiple paradigms (Mingers, 2006). Mingers (2006) asserts that multi-method research adds depth through diversity of approaches, sources and techniques.

As with many methodological choices, there are advantages and disadvantages to the use of more than one method. Firstly, it enables triangulation (of data sources, methods or analysis), which is discussed in more detail under section 2.6. It is more likely that the researcher will discover fresh or paradoxical concepts and in doing so enhance creativity using multiple methods (Tashakkori and Teddlie, 1998).

However, there are some challenges with using multiple methodologies both practically and philosophically. Firstly, there may be a paradigmatic clash with methods being used from different paradigms (Mingers, 2006). Fortunately in this particular study, this challenge did not arise as grounded theory and AR arise from a similar paradigm (Baskerville and Heje, 1999). Secondly, the organization under study may not be primed to enable multi-method studies. The challenge will be for the researcher to work with more methodologies than he is comfortable with. Mingers (2006) believes that these obstacles are not insurmountable and some countermeasures are offered in this regard.

With regard to paradigmatic incompatibility, Mingers (2006) outlines that in reality the boundaries between paradigms are sometimes fuzzy and that it is possible through conscious and critical techniques to separate a method from its paradigm. Critical Realism is one of the paradigms that argue strongly against paradigmatic incompatibility, promoting the notion of plurality (Bhaskar, 1986; Mingers, 2006). Organizational culture acting as a barrier can be overcome, if the gap between the organisation's paradigm and that of the proposed research

method is not too wide (Mingers, 2006). Some evidence from the UK has shown how in the information systems industry (seemingly positivist) more than half of the research was qualitative as the researchers themselves (>70%) had come from social science backgrounds. Less than 10 per cent of the research studies were actually positivist in nature (Mingers, 2006). With regards to the psychological barrier of doing multi-method research, Mingers (2006) again illustrates how this can be overcome. Individual personality traits have been linked to the type, method and style of research an individual is comfortable with. However, Munro and Mingers (2002) conducted a survey into the use of multiple methodologies by system practitioners and operational researchers. The results showed that 20 per cent had moved out of their original discipline, 63 per cent felt they had become truly multidisciplinary and none of those from a science discipline had remained wholly within the parameters of their discipline (Mingers 2006).

Baskerville and Heje (1999) highlight the synergies in conducting a grounded AR study, a particularly relevant element of this study. They assert that grounded theory improves the rigor, reliability and practical utility of the theory developed using AR. As in this study AR is effective where organizational change is necessary (Baskerville and Wood-Harper, 1996). One of the weaknesses of AR has been theory development which as Baskerville and Heje (1999) argue can be overcome by blending AR with grounded theory.

Some challenges when combining these two methods (Baskerville and Heje, 1999) are:

- AR often starts with well defined problems and predetermined categories and concepts; this approach is not fully compatible with grounded theory.
- Theoretical sampling does not really work well with an interventionalist strategy as in AR. With AR there is a focus on a single problem with little room to move to another problem area unlike grounded theory.

Some synergies in combining the two methods include (Baskerville and Heje, 1999:

- Both methodologies work with an iterative cyclical style of data collection and analysis
- Both methodologies force researchers to be 'embedded' in the environment for long periods of time to understand the underlying processes
- Both AR studies and grounded theory studies cease when saturation is reached.

The combination of AR and grounded theory is ideal for studying change in organizations, as this study aims to do (Baskerville and Heje, 1999).

2.4.2   Action Research

Thousands of quantitative studies have been performed in healthcare contexts with the aim of advancing technology, improving patient care and treatment outcomes. There is, however, a clear recognition that there is a failure to act on findings from these quantitative studies in healthcare, which has led researchers to look for other means of effecting change (Meyer, 2000). In addition, management research needs to be made more relevant and should not be restricted to academic relevance (Perry and Zuber-Skerritt, 1992). One strategy has been to use AR, which helps to both identify problems in clinical practice and effect changes.

There is an increasing need to find solutions to complex 'messy' problems that cut across organizational structures (Westbrook, 1994). Knowing this we can learn from the social sciences on how to use empirical research methods in operations management (Westbrook, 1994). AR has also proved particularly useful in managing organizational changes (Remenyi, Williams, Money and Swartz, 1998).

a. *What is Action Research?*

AR is a style of research rather than a specific method (Meyer, 2000). There appears to be some variation in how AR is defined. Rapoport's (1970:499) definition seems to be the most often quoted, "AR aims to contribute both to the practical concerns of people in an immediate problematic situation and to the goals of social science by joint collaboration within a mutually acceptable framework". It includes actually intervening in a process to see its effects in solving a given problem (Coughlan and Coghlan, 2002). The learning does not only occur at the end of an experiment but throughout the AR process. Smith and O'Neil (2003) describe AR as learning through experience.

A critical distinction to be made between case study research and AR (which share commonalities) is that with the action research, the researcher is not only an observer but also a participant in the implementation of changes (Westbrook, 1994).

It is useful to have an idea of some AR studies as tabled below:

AUTHORS	TITLE OF ARTICLE	AIM OF STUDY	CHANGE IMPLEMENTED	FINDINGS
Meyer (1993)	Lay participation in care in a hospital setting	To understand the difficulties in introducing lay participation in care at a hospital	Facilitated a process for friends and family to be more involved in patient care	Key barriers to introducing lay participation were identified such as lack of time; patients don't like the idea of lay participation, etc
Brooker (1997)	Improving wound care in a paediatric surgical ward	To improve and maintain wound care	A wound survey chart was introduced, the head of the surgical department championed the project, nursing staff were informed and community of learning was set up.	Wound survey dramatically improved nurse consciousness of wound checking, realization that many staff were missing the training as they were on leave.
Morisky, Ang, Coly, Tiglao (2004)	A model HIV/AIDS risk reduction programme in the Philippines	Reduce sexually transmitted diseases	Peer counselors were recruited and trained to reinforce safe sex practices	Improved condom usage and attitude towards usage, reduced STI incidence.

Table 2.4 - Examples of action research studies

b. The Action Research Process

The organisation needs to be willing to partake in the AR process, the rigorous inquiry that accompanies it and the uncertainty of outcomes. This translates in that permission is given for the researcher to access information and key stakeholders' time (Schein 1995; Gummesson, 2000). Two aspects that must be discussed are the potential benefits to the organization as well

as their expectation of the research outcomes. In some respects this is linked to the preparation step discussed in Section 2.1. I spent the first, four months of the time I was based at the hospital building up relationships, preparing staff and making a case for the Lean projects and for the AR.

There are three components to any AR initiative, as outlined by Coughlan and Coghlan (2002). The first consists of understanding the context and purpose of the research. The second component consists of six steps which will be discussed below. The third component consists of the monitoring and reflection of each AR cycle. To assist with the multitude of processes occurring at the same time, it is recommended that the action researcher keep a journal. Experiences, behaviours, perceptions and quotes should all be documented. These will assist the researcher to better anticipate future experiences and in doing so, learn what to do and what not to do (Raelin, 2000). Van Maanen (1988) argued that field notes serve as a continuous reminder to the researcher about what is really happening in the research setting. During the course of the projects I made 148 diary entries and found it particularly useful in forcing me to reflect about the projects, and to remind me of what was happening in the projects at a later stage of thesis writing. Eisenhardt (1989) elaborates by suggesting that field notes should be written on whatever impressions occur as it is uncertain which of those actions will become important in the future as constructs emerge.

The second component of AR as outlined by Coughlan & Coghlan (2002) is composed of six individual steps, comprising of data gathering, feedback and analysis of the data, planning, implementing the plan and evaluating the results of implementation (Figure 2.6 below). As researcher and process analyst, I was careful to tackle each Lean project slowly, steering clear of any tempting 'quick wins' as these have been shown to lack sustainability (Spear, 2005).

I disagree with Fillingham (2007) who believes the benefits of Lean are more likely to be recognised over years or decades rather than weeks or months. During the first few months there were significant improvements in some of the projects, and I believe these actually contributed to the sustained momentum and positive attitude towards the Lean projects. Each project tried to implement the AR cycle below, with varying degrees of success.
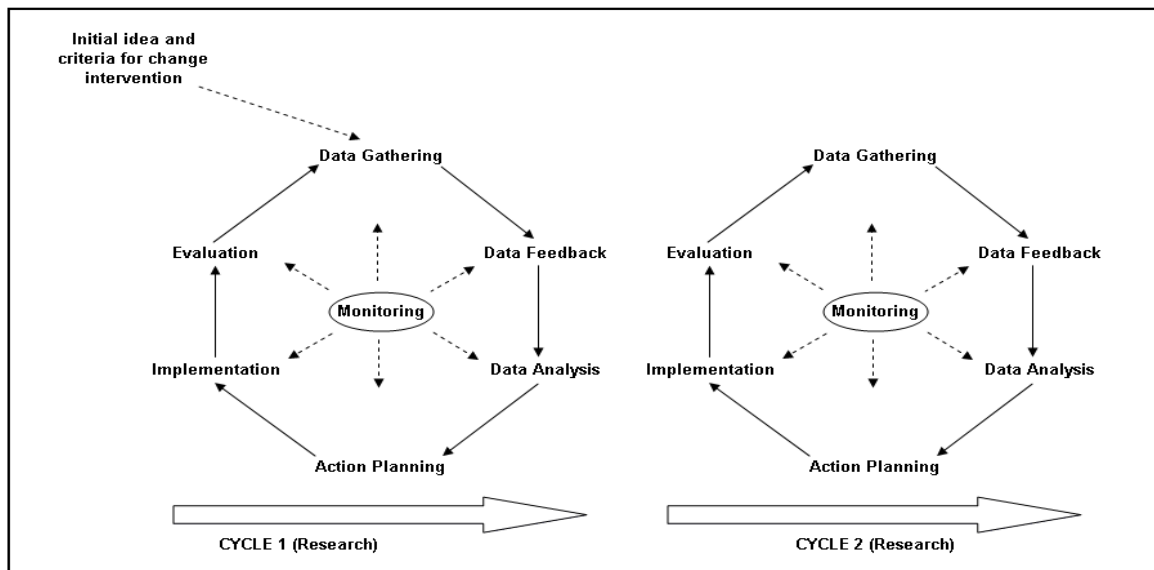
Figure 2.6 Action Research Cycle (Coughlan and Coghlan, 2002:)

The third component refers to the iterative and reflective cycles embedded in AR. In Figure 2.6 above, before every data gathering step there is an evaluation step. During this evaluation step the action researcher has a responsibility to carefully consider how the countermeasures are being implemented and, how the research or learning aspect relates to the broader question. It bears some similarity to the grounded theory tenets of constant comparison and theoretical sampling, as discussed in Section 2.4.3.

c. *Appropriateness of AR in this Research study*

Reason and Bradbury (2001) highlight that AR is flexible in theory and practice, and thus it broadens the potential diversity when applied to research questions. This allows the researcher to draw out, capture and build on the status quo rather than using conventional, analytical methodologies to dissect the problem at hand. Smith and O'Neil (2003) offer a good illustrative example: AR is like "… throwing a net around slippery experiences …" to capture them as learnings.

Motivation for using AR for Lean implementation at Southern Hemisphere Hospital includes the following reasons:

RESEARCH RELATED REASONS FOR APPROPRIATENESS	PRACTICE RELATED REASONS FOR APPROPRIATENESS
AR is suitable where a pre-empted solution is not available and the research is of an emergent nature (Coughlan & Coghlan, 2002).	It increases productivity, the quality of decision-making and employee satisfaction (Bushe and Shani, 1991). This ties in well with the research objectives of this study.
AR forces participants to reflect and analyse problems occurring in their work environment which leads to framing of problems, a critical step in process improvement and good research (Gummesson, 2000).	An objective of this study is to ensure sustainability of the continuous improvement process and AR has been shown to improve sustainability by being more inclusive in problem solving (Schein, 1995; Reardon, 2000). AR enables management and operator level staff (Gilmore and Smith, 1996).
The Lean philosophy emphasises that improvement is a journey not a destination and so AR is powerful when the research evolves over a number of steps as this proposal illustrates (Coghlan and Brannick, 2001; Gummesson, 2000).	AR focuses on generating solutions to practical problems (such as improving flow, reducing waiting time) and empowers healthcare workers by getting them to engage with the process (Meyer, 2000).
AR is also more effective in solving problems that have ill-defined cause-effect relationships or tend to have no right answer (Coghlan and Brannick, 2001). In the author's experience many of the problems at the hospital fit this profile.	Greenwood and Levin (cited by Reardon, 2000), point out that AR is very well suited to problems occurring in contexts that have high levels of social interaction. Indeed, healthcare is one such context.
AR (like grounded theory) works towards theory building in incremental steps (Eden and Huxham, 2002). There is also an emphasis on emergent theory rather than theory testing.	

Table 2.5 Appropriateness of action research, research and practice based

d. *Risks of Action Research*

It is evident that AR, like all research methodologies, should be applied to address appropriate research questions. However, AR is by no means an infallible methodology. The threat to validity and the confusion between consulting and AR seem to be important risks researchers need to be aware of. Consultants tend to work under tight budgetary and time constraints. AR is cyclical and speaks to the capacity to continue to improve, while consulting usually has a finite end point that is defined and generally relatively short-term. Gilmore and Smith (1996) note that consulting solutions are often viewed by the company's staff as being imposed upon them from an outsider, as opposed to AR where the solutions are generated by the people themselves.

There has been some criticism that AR studies are not replicable and thus lack rigour (Eden and Huxham, 2002). This has also made them less suitable for theory testing as each study will have slightly different circumstances. Unfortunately some studies have incorrectly or inappropriately used AR as their apparent method and have given the method a bad reputation.

Bushe and Shani (1991) emphasise the challenge of creating the right environment for AR to flourish. They recommend that AR teams work with a 'different culture' as compared to the rest of the organisation. This 'differentiated' space should include participative leadership, open information sharing and little use of authority (Bushe and Shani, 1991). This was created with varying success across the five projects and will be discussed further in Chapter 5. Coghlan (2001) warns researchers to be aware of staff converting meetings into 'bitching sessions', especially early on in the process. Another risk is that top management does not fully support middle management's endeavours (Coghlan, 2001). I addressed this by meeting with top management at least once a month to report on the projects' progress. They appeared full of intent to support Lean implementation, but support was limited as will be discussed in Chapter 5.

Reason and Bradbury (2001) also caution researchers that AR is time consuming, takes lots of energy and may be de-motivating with high levels of resistance to change.

Threats to the validity of AR can be allayed by the researcher who consciously adopts strategies to maintain rigour in the research process (Coughlan and Coghlan, 2002). Triangulation can and should be exploited in AR to increase rigour and credibility (Eden and Huxham, 2002). Fisher and Torbert (1995) suggest the following for the researcher:

- **Maintaining impartiality throughout the research process.** I viewed my role as facilitator not project champion or leader. Even though I wanted to make suggestions myself I realised that I needed to allow each team to own their project and so I maintained my neutrality from early in the process.

- **Defining the problem with the entire team and ensure there is common purpose in solving it.** The teams chose the problems they wanted to work on for all the projects. As facilitator I could guide them, though the final decision was theirs.

- **Telling a story allows individuals to follow progress and developments**. This was addressed using the 'storyboards' in the theory testing phase of the research.

- **Occasionally ask participants questions about their perceptions of the process.** This was done informally during the theory building phase and more structured during the theory testing phase.

One of the weaknesses of AR has been theory development (Baskerville and Heje, 1999). As discussed, this can be remedied by the synergistic combination of AR with grounded theory (Baskerville and Heje, 1999). The next section will detail the nature, process and challenges of grounded theory.

2.4.3 Grounded Theory

Grounded theory can be described as a qualitative method that uses a systematic set of procedures to develop an emergent theory that accounts for a pattern of behaviour that is interesting and relevant (Strauss and Corbin, 1990; Tavakol, Torabi, Zeinaloo, 2006). Grounded theory has become one of the 'most established and respected qualitative methods' (Panterotto, 2005). It has been termed the 'market leader' in qualitative research (Mcleod, 2001 p.70).

a. *What is Grounded Theory*

Kennedy and Lingard (2006) describe grounded theory as "… a research methodology that, through iterative cycles of data collection and constant comparative analysis from emergent

themes, develops theoretical explanations of social phenomena that are grounded in practical experience".

Martin and Turner (1986) asserted that grounded theory is best applied when no explicit hypotheses exist to be tested in a logical, deductive way. This is the gap, grounded theory fills by offering a method to 'discover theory from data' in instances where researchers have interesting phenomenon without sufficient explanation. For example, Lean implementation in healthcare has experienced both failure and success and this study aims to offer some explanation for these.

Grounded theory aims to build theories using inductive approaches which can be contrasted with deductive approaches that aim to test existing theories or hypotheses. A theory is a set of well developed categories, with well defined relationships, that explains some social or other phenomena (Strauss and Corbin, 1998). Grounded theory has gained prominence due to clearly articulated analytical processes resulting in pragmatic theories (Kennedy and Lingard, 2006). Glaser and Strauss (1967) point out that grounded theory should have two characteristics, situational fit and practical relevance. Fit refers to categories that are readily applicable and not forcibly fit to the data. Practical relevance refers to the ability of the theory to explain particular behaviours or effects under study (Glaser and Strauss, 1967).

Grounded theory is emergent - there are no hypotheses only research questions (Tavakol, Torabi, Zeinaloo, 2006). The question itself needs to be quite open ended and broad enabling theory development (Tavakol, Torabi, Zeinaloo, 2006).

b. *The Grounded theory Process*

Unlike with physical phenomena it is very difficult to study social phenomena using experimental designs which can perfectly replicate all study conditions and controlling all extraneous variables (Strauss and Corbin, 1990). In grounded theory, hypotheses are not developed and tested (Kennnedy and Lingard, 2006) as this may limit the openness of the researcher to the real underlying mechanisms or constructs.

As was the case in this study, grounded theory is maximally effective when data sources include observation, interviews and documents (Bamford, 2008). Data collection and analysis in grounded theory occurs simultaneously and repeatedly (Baker et al., 1992). Performing the

analysis in grounded theory studies can be both complicated and time consuming (Bamford, 2008). Please see Figure 2.7 below for an illustration of the process.

Theories cannot be built with raw data derived from multiple events or incidents (Corbin and Strauss, 1990). Instead the raw data needs to be given conceptual labels (codes) which are the basic units of a theory. There are three levels of coding. Firstly the transcripts are read line by line to develop substantive or in vivo codes capturing the essence of the raw data Level I coding. As new Level I codes are formed they are compared to existing ones. Level I codes are then clustered according to common characteristics to form categories - Level II coding (Strauss and Corbin, 1990). These concepts or codes are then linked to form categories which have a higher level of abstraction (Strauss and Corbin, 1990).
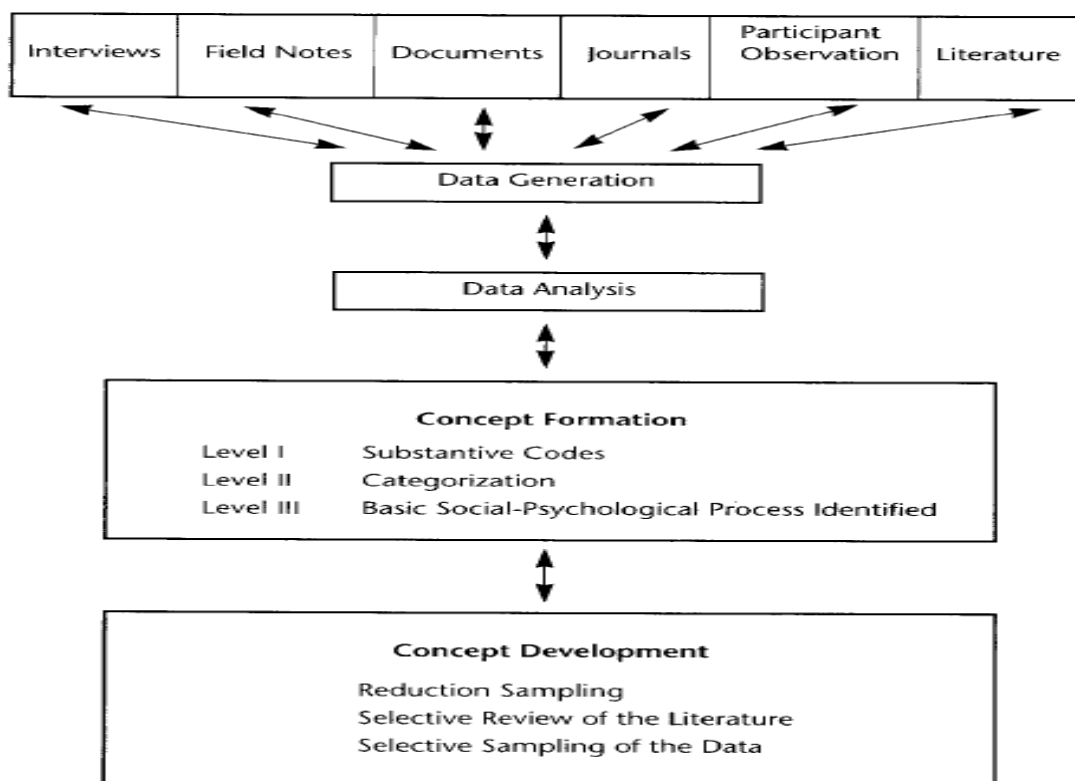
Figure 2.7 The Grounded theory process (Adapted from Struebert, Carpenter, Lippincott, 1999)

Each category is compared to others to ensure mutual exclusivity. The next step is to look for linkages between categories to form a tentative conceptual framework (Sterna and Pyles, 1986). The emergent theory is then consolidated by reduction techniques, selective sampling of literature, and selective sampling of data (Stern, 1980). This continues until the point of saturation, when no new ideas or concepts are emerging. Finally, Level III coding collapses Level II coding in order to identify theoretical constructs that will eventually identify the basic social process (BSP). This leads us to explain the underlying mechanisms resulting in a set of actions, behaviours or events (Cutcliffe, 2000). Examples of the actual codes, categories and themes will be presented in Chapter 3.

Grounded theory is markedly different from other research processes that follow linear paths of data collection, analysis and then drawing of conclusions. It does, however, bear similarities to the AR process where there is a constant reflection on progress, and the need to change course depending on progress. There are several systematic techniques that characterise grounded theory as discussed below.

1. <u>Sampling</u>

Grounded theory uses non-probability sampling. The basis for this is that in order for concepts and categories to emerge, theoretical sampling is used until each category is saturated (Cutcliffe, 2000). Saturation occurs when nothing new is learnt from any of the data sources being used in the study. Several authors have stressed the importance of describing in detail the sampling strategy and process to minimise confusion (Morse, 1991), to improve quality (Coyne, 1997) and avoid method slurring (Baker et al., 1992).

2. <u>Data collection</u>

Interviews and observation are the most common sources of information in grounded theory studies (Kennedy and Lingard, 2006). However, to promote a richness of perspectives and experiences other sources are also appropriate, such as diary entries, focus groups and relevant documentation. This complements the concept of triangulation which is discussed in Section 2.7.

3. <u>Memoing</u>

Strauss and Corbin (1990) recognise that the researcher cannot keep track of all categories, hypothesis and properties as the analysis progresses. Maxwell (2005) emphasises the value of keeping memos throughout the research process. They can be used for many purposes but are essentially tools to record ideas ensuring good ideas and thoughts are not lost during the research process (Maxwell, 2005). Memos have the effect of enhancing the understanding of the environment, the characters, the mechanisms, and the theories at play in the research study (Maxwell, 2005). Memos can also be used in the formulation and revision of theory, starting with the first coding session until the end of the study (Strauss and Corbin, 1990). A memo can range from being as simple as a comment in response to a research findings or data, or as comprehensive as an essay. Memoing in the early stages is useful for the researcher as it enables theoretical sampling that sensitizes the researcher to develop conceptual ideas and brings some focus to the grounded theory process.

4. Reduction

During the data collection, it is not unlikely that hundreds of pages of data are collected. In the analysis of this data a large number of categories will be formulated. Working with this can be confusing and frustrating. Comparing the categories will facilitate clustering, connection and reduction of categories. This is similar to clustering in factor analysis (Tavakol, Torabi, Zeinaloo, 2006). This step is vital in identifying the core variable and the basic social process (BSP).

5. Coding

Charmaz (1983:112) provides a clear working definition of coding: "(coding will) serve to summarize, synthesize, and sort many observations made of the data … coding becomes the fundamental means of developing the analysis … Researchers use codes to pull together and categorise a series of otherwise discrete events, statements, and observations which they identify in the data. At first data may appear to be a mass of confusing, unrelated accounts. But by studying and coding … the researcher begins to create order". Coding is a core element of the grounded theory process, enabling conceptual abstraction from data and then theory generation (Holton, 2010). The three levels of coding used in this research are discussed above.

There has been considerable debate about the place of Computer Assisted Qualitative Data Analysis Software (CAQDAS) in academic research. The primary function of CAQDAS is to assist the researcher with coding software. CAQDAS has both advantages and disadvantages for the researcher, but there is consensus that CAQDAS is part of the analysis and not a substitute for analysis (Rettie, Robinson, Radkeand Xiajiao, 2008 citing Coffey and Atkinson (1996)). In this study all coding was done using Atlas.ti software.

ADVANTAGES OF CAQDAS	DISADVANTAGES OF CAQDAS
Facilitates data reduction, systematic coding, effective searching and analysis of large data sets (Fielding 1994, Catrall & Maclaran, 1998)	Removes the contextual value and may misconstrue meaning (Bong, 2002)
Allows the researcher to focus more on the interpretive aspects of the study instead of the mechanical coding (Conrad & Shulamit, 1984).	Too many codes may be generated with loss of overall direction (Wilson, 2002).
Reduces the time needed for coding	May lead to superficial analysis of data (Rettie et al., 2008)

Table 2.7 Advantages and Disadvantages of using Qualitative Software (Rettie et al., 2008)

6. Theoretical Coding

This is the process whereby the researcher looks for relationships among substantive codes. This is considered of paramount importance in the grounded theory process to the extent that some theorists believe that grounded theory without theoretical coding is not grounded theory at all (Strauss and Corbin, 1994). This is the process whereby relationships among individual concepts are sought in a creative manner, often looking for unusual linkages (Holton, 2010). It is this openness to work outside of conventional accepted linkages that result in novel or non-conventional theories (Holton, 2010).

7. Constant Comparison

This is considered to be one of the pillars supporting grounded theory. Constant comparison refers to a process whereby the researcher looks to see if data being collected continues to support the emerging categories. Through this it provides further substantiation for the categories by defining their characteristics and properties (Holton, 2010). This helps to keep the researcher

cognisant of not collecting unnecessary data that is irrelevant or does not contribute to saturating categories (no new properties or characteristics of a given category are being identified). As the constant comparison process progresses, incidents are compared to emerging concepts with the aim of establishing the best fit between potential concepts and a set of indicators with the move towards building theory (Holton, 2010). It should be noted as Kennedy and Lingard (2006) point out that grounded theory is not all or nothing. There may be instances where a data set cannot be analysed after collection (e.g. where the data already exists, or for ethical reasons).

8. Theoretical sampling

This is the process by which the researcher actually chooses what data to collect next based on the emerging theory. Essentially data are meant to be coded; this then guides further focused data collection and this cycle is repeated until saturation of codes occurs (Holton, 2010). The researcher is actively looking for gaps in the emerging theory as this will guide further data collection (Holton, 2010). Theoretical sampling is guided by the theoretical needs of the study at any given time (Morse, 2008). Theoretical sampling is quite different to purposive sampling which is usually based on prior experience and literature reviewed to guide selection of participants that will yield information rich participants (Breckenridge, 2009).

9. Theoretical saturation

One of the biggest challenges to me and other researchers is when to stop collecting and coding data (Holton, 2010). Data collection ceases when saturation occurs. Saturation occurs when with more data collection nothing new is learnt about the properties and characteristics of categories or concepts. The point of saturation then results in an easier process of abstraction to a higher level of conceptualisation (Holton, 2010).

Creswell (2002) defines theoretical saturation as having occurred when:
- No new information emerges from a category
- The category sufficiently explains the variation observed
- Relationships are clearly defined and explanatory

10. <u>Emergence of the Core Category</u>

As constant comparison matures, the core categories will emerge which will direct further selective data collection and coding. The recognition of a core category is an indispensable part of classic grounded theory (Holton, 2010). It need not be a single category but can be three or four core categories (Holton, 2006). Strauss and Corbin (1998) define a central category as having the following six criteria:

1. All categories are related to it
2. It appears frequently in the data
3. The explanation of its relation to other categories is logical and consistent
4. The phrase of the core category is sufficiently abstract to enable further research
5. The theory grows in explanatory power as it is refined analytically through integration with other concepts
6. The core category is still valid with changing conditions

c. Appropriateness of Grounded Theory

Grounded theory is well suited to some types of research questions (Suddaby, 2006). One of the most appropriate times to use grounded theory is when the researcher wants to understand the process by which actors make sense of their experiences (Suddaby, 2006). It is less appropriate when the research is looking to make 'knowledge claims about an objective reality' (Suddaby, 2006).

Grounded theory is appropriate where complex social interactions are involved and the aim is to develop, rather than test theory (Kennedy and Lingard, 2006). When there is a need for deep understanding of the characteristics of a phenomenon, grounded theory is appropriate (Struebert, Carpenter, Lippincoot, 1999). Grounded theory also provides a sound analytic process to develop codes, categories and themes. Discovery is what grounded theory is about and so it is more appropriate when little research has been done on the specific topic (Streubert, 1998).

This study aims to have both research and practice implications for Lean implementation in healthcare. In achieving this aim, there needs to be a deep understanding of complex social processes that enable or inhibit Lean implementation. This reinforces the need to use grounded theory in this study.

d. Risks of Grounded Theory

One of the major misconceptions is that with grounded theory it is acceptable for the researcher to start a study with no direction (no research question), a blank slate (ignore all past experiences and knowledge), and ignore all literature before starting the grounded theory study (Suddaby, 2006). This may well leave the researcher with masses of data waiting for a theory to jump out serendipitously. Furthermore, this may result in unstructured manuscripts likely to frustrate any reader (Suddaby, 2006).

Particularly in operations management there are some scholars who believe grounded theory is too unstructured to bring about a meaningful outcome and can lead to confusion (Westbrook, 1994). In my research I guarded against this by starting with a research question which was refined over time. The research question guided decisions about sample, methods and extent of data collection. On the other hand there are some authors who have attempted to guide a grounded theory process too much. Grounded theory is built on an emergent process and is not amenable to hypothesis testing; thus it is considered to be methodological slurring when hypotheses are tested using a grounded theory approach (Suddaby, 2006; Goulding, 2002).

Secondly, another very real risk of the grounded theory approach is that the researcher actually 'reinvents the wheel' and studies something that has already been studied in great depth. Realizing that grounded theory is an emergent process based on data, one needs to consider the down side of being too deeply embedded in the literature. Stern and Allen (1984); Lincoln and Guba (1985) suggest the researcher should avoid reviewing the literature early on as this decreases the likelihood of emergent theory development as the researcher uses 'predefined' categories, concepts and themes resulting in little addition to the body of knowledge (Kennedy and Lingard, 2006). This can be managed by reviewing some of the literature that is not directly linked to the topic of the study as discussed in Chapter 4.

There are mixed views on the purpose and timing of literature reviews amongst grounded theorists. Hutchinson (1993) notes that it is only through the literature review that the researcher really understands the gaps in the literature and can make a case for the research. There have been some authors who have seen other alternatives that do not have such strong positions. Cutcliffe (2000) suggests doing some review of the literature in the core elements of the topic but not the actual topic. In other words, if the thesis was on Lean implementation in healthcare, the

researcher, for example, can review literature related to Lean implementation and look at innovation in healthcare. This will provide some conceptual clarity and help separate the study's concepts from similar ones in the literature (Cutcliffe, 2000). Smith and Bailey (1997) suggest a superficial kind of literature review to get a 'feel' for the gaps in the literature.

Having noted this, a researcher cannot enter the field with a blank slate - his past experience and knowledge is bound in the process of data collection and analysis (Cutcliffe, 2000). Glaser and Strauss (1967) speak about the legitimacy of the researcher having formulated a framework of local concepts with some gross features identified through the literature. In my study I performed an initial superficial literature review to identify the gap my study would begin to fill. I also used this literature, coupled with my own experience, to develop my conceptual framework for this study as illustrated in Chapter 1. Once my theory was developed, I then used the literature to locate my findings and provide it with context.

The third risk is that grounded theory does not end with the description of themes but with theory. It is from the theory that the greatest potential lies for understanding and implementing change. There appear to be numerous studies (Kennedy and Lingard, 2006) that have ended with beautiful descriptions and illustration of themes but where there is no real theory. Without this abstraction it will be difficult to discover key relationships and linkages amongst themes. In this study, it was essential to develop the theory before moving to the second phase of the research, which involved the testing of this theory.

Creswell (2002) provides some guidelines in ensuring the quality of grounded theory studies:

CRITERIA FOR QUALITY	HOW IT WAS ADDRESSED IN THIS STUDY
Clear connection between categories and raw data	There were a number of iterative cycles (constant comparison) looking for linkages between new data and existing categories.
Theory is useful to explain the process under study and actual problems	This study has produced a theory with linkages and reference to the research site
The theory can be modified with changing conditions	The theory testing phase allowed me to refine the theory to ensure it had broader applicability
The theory conceptualizes an action or process	The theory in this study addresses the process of Lean implementation
The core category is at the heart of the model	The core category was linked to most of the other categories, indirectly or directly
There is emergence of the theoretical model through levels of coding	As will be mentioned in Section 3.2 and 3.4.3 there were three levels of coding with a number of cycles
The theory is located in existing literature and extends current understanding	Aspects of theory were investigated in depth towards the end of the study to identify the gap this research fills.

Figure 2.7 Criteria for quality in grounded theory studies (Creswell, 2002)

This section concludes a discussion on what grounded theory is, the multiple aspects of the grounded theory process, the scenarios where it is appropriate, and the risk the methodology has. Despite the strengths of using grounded theory techniques in analysing qualitative data, the researcher consciously needs to be aware of the risks the methodology has and how it can be mitigated. In this study, grounded theory serves to complement AR to understand how better to implement Lean in a hospital.

2.4.4 Concept Analysis

Concept analysis was used in Step 4 of the research process (please refer to Section 2.2). The aim of this was to analyse the data from the interviews and test the theory generated from the previous three steps.

a. *What is Concept Analysis*

Concepts can be considered the basic building blocks of theory or even more appropriately concepts can be thought of knotted threads, carefully interwoven to form a closely connected theory (Penrod and Hupcey, 2005a). Concepts are mental images of phenomena or ideas but they are not the actual thing or action (Walker and Avant, 1994). Concept analyses allow us to classify our experiences in a logical manner and facilitate the linking of concepts. Concepts are often expressed as variables making them useful for research purposes (Walker and Avant, 1994). Concept analysis is said to be part of knowledge development, sharpening problems and providing justification for analysis (Risjord, 2009).

Concept analysis is a formal method to determine the definition, attributes or characteristics of a concept (Walker and Avant, 1994). Concept analysis can be performed in a number of ways and are broadly categorized into qualitative and quantitative techniques (Cutcliffe and McKenna, 2005). Although many published articles have used the quantitative techniques it has come under substantial criticism. Unlike the concepts developed in this study, quantitative techniques of concept analysis are said to be more appropriate when dealing with a well defined agreed upon concepts (Penrod and Hupcey, 2005b). It is therefore more appropriate to use qualitative techniques to perform a concept analysis since the concepts are not well established and agreed upon. Penrod and Hupcey (2005b) do however point out that concept analyses allow the advancement or increased understanding of a given concept. I therefore recognise that as concepts are increasingly defined and better understood, they become better suited to analysis using quantitative techniques.

However, in this study, the quantitative approach was not used as the steps are clearly indicated and therefore ensure the researcher follows a logical pattern (Cutcliffe and McKenna, 2005). The approach is said to be too rigid and superficial and therefore stunts deep understanding of the concept being analysed (Rodgers, 1994). Concept analysis has enabled theory to be understood better and improves practice (Chinn and Jacobs, 1987). Morse (1995) has developed six different

approaches to define concepts based on the current state of the concept and the required outcome. One of Morse's techniques involves a literature review first, followed by interviews, focus groups or participant observation to confirm the use of a given concept in current context (Risjord, 2009). In this study the concepts were developed through rigorous analysis in the first phase of the study and then the concepts were analysed in more detail using the second phase of the study, the theory testing phase with respondent interviews. Penrod and Hupcey (2005a) believe that the power of concept analysis lies in its ability to identify how a concept works within a given theory.

b. *The process of Concept Analysis*

Concept analysis occurs in concurrent steps with some iteration between steps (Walker and Avant, 1994). It includes the following steps:

1. Select a concept – choose something interesting or relevant. However, in my case the concepts chosen were those which emerged from the theory of this study (not from the theory in the literature). The presence or absence of these concepts was then empirically tested in phase 2 of the study with the responses to the interview questions. Essentially, concepts were the outcome of phase 1 (theory building). In phase 2 their presence was tested in each project and correlated to the success or failure of each project.

2. Determine the purpose of the analysis – The concept analysis assisted in specifying the characteristics of concepts used in theory

3. Identify all uses of the concept –This related to psychosocial, physical, and abstract uses of the concepts

4. Determine defining attributes – Looking at all the instances of the concept and try to detect patterns and develop provisional criteria

5. Construct a model case which includes all the attributes of the concept

6. Construct borderline, related, contrary cases

7. Identify antecedents and consequences to assist in further defining concepts.

8. Define empirical referents that will often overlap with critical attributes of the concept

In this study I used these steps to clarify what the emergent concepts meant by detailing their antecedents, characteristics and empirical indicators. These empirical indicators were then

measured across the 5 different projects. There were significant differences when comparing the projects that failed and those that succeeded. These are further discussed and illustrated in Chapter 3.

c. When Concept Analysis is appropriate

Concept analysis usually distinguishes between a concept's defining attributes and its irrelevant attributes: the likeness and unlikeness between concepts (Walker and Avant, 1994). Concept analysis is usually applied to words as part of a linguistic exercise. It can also be used for defining ambiguous terms, help clarify overused vague concepts in a given discipline, and to develop precise operational definitions.

Concept analysis is considered to be appropriate in assisting with the developing and refining of theory (Walker and Avant, 1994). It does so by conveying the basic understandings of a concept and its characteristics. The researcher can then build hypotheses which reflect inherent relationships between concepts (Walker and Avant, 2000).

2.5 DATA COLLECTION

In qualitative studies the researcher is considered to be the key research instrument (Patton, 2002). Their insight is regarded as vital in making decisions about how to collect data, how much data to collect, who to sample, and when to sample. This section specifically deals with data sources.

For this study there were four sources of data. The theory building phase focussed on participant observation, document analysis and diary entries over an 18 month period (May 2008-November 2009). In the theory testing phase of this study interviews were conducted with staff involved in the five projects. Bogdan and Biklen (1982) noted that interviews can be used as a primary data source, or in conjunction with observation and documents. Interviews supplemented by observation provide deep contextual knowledge to the researcher and facilitates relationships that even the participants themselves may not be aware of (Patton, 1990).

ADVANTAGES	DISADVANTAGES	HOW THESE DISADVANTAGES WERE ADDRESSED IN THE STUDY
Faithful source	Risk of technical failure, loss or damage	The only real problem I experienced was the batteries would run flat. I always kept spares when going to an interview.
Allows interviewer to focus on interview	Can be seen as a barrier to participants to be open with the interview	I made a conscious attempt to inform people about the anonymity of their responses. I also had this written on the interview protocol for them to read as it was a request from the Research Ethics committee.
Precludes recall bias as there is a complete record	Transcription is very time consuming	This was a challenge and I was able to get some assistance in doing this.

Table 2.8 Advantages and Disadvantages of Transcription (Combined views from Lincoln and Guba (1985), Patton (1990), Streuber (1998))

In theory building studies, data collection goes through a funnelling process. The researcher starts out quite broad and over time becomes refined and more focused with regard to what is collected. There is a real risk that reams of data are collected but the researcher is unable to answer the research question as the data does not correspond with the data (Remenyi, Williams, Money and Swartz, 2005). At the beginning of the data collection process there was a great deal of interesting data that was unrelated to the study. However, the grounded theory process forced me to continuously focus my research on specific items and not get distracted with 'peripheral' issues.

2.5.1   Participant Observation

Scientific thought starts by observing events and people with an aim to understand 'some systematic order in them' (Handfield and Melnyk, 1998). Observation aims to make sense of behaviours and understand the meanings of actions. It is also useful to describe settings, people and activities. Observation includes watching actions, verbal and non-verbal cues (Hoepfl, 1997). Schatzman and Strauss (1973) have classified different degrees of observation and interaction. In this study the interviewer can be classified as 'Observer as Participant'. In this category the researcher is a full participant enabling a deep understanding of the social dynamics that exist in a given environment. It is easier for such an individual to establish relationships with important stakeholders (Schatzman and Strauss, 1973). However, the researcher risks being drawn into the activities of the group and they may rely too heavily on the researcher to come up with the counter-measures (Schatzman and Strauss, 1973). I managed this risk by establishing a team of staff in each project who met weekly with or without me as the facilitator. This meant the team took ownership of their progress and were only guided by myself as the facilitator.

Recording of observations can be done using several mediums such as note-taking, drawing of maps, video recording, photos or tape recording. There has been considerable disagreement about the need for recording interactions using a recorder and then transcribing these interactions. Patton (1990) for instance regards a tape recorder as 'indispensable' while Lincoln and Guba (1985) see it as more of an obstacle. In this study I chose to record all interviews using a Dictaphone.

Observation was an important and appropriate data source for this study as it facilitated:

- A real understanding of both the context and behaviours (as highlighted by Remenyi, Williams, Money and Swartz, 2005)
- Relationship building with staff in the projects so I was not perceived as the typical consultant who only was present for a short while and then left
- A process through which I could start making sense of the underlying reasons people behaved or thought in a particular way

2.5.2   Interviews

Interviews have become a commonly used method in qualitative studies. It has also become a technique for generating masses of data with relatively little effort (Remenyi, Williams, Money and Swartz, 2005). However, there is a real risk that reams of data are collected but the researcher is unable to answer the research question as the data does not relate to the question (Remenyi, Williams, Money and Swartz, 2005).

Patton (1990) has classified interviews into: 1) informal 2) semi-structured 3) structured. In qualitative studies, it is usual for interviews to be more open ended and less structured. In this study the interviews were semi-structured and the interview protocol can be found in Appendix 2. This allowed me to ask some prepared questions but also to explore more deeply topics that emerged during the interviews, thus offering more insight. This guide of preset questions ensures good use of time and ensures interviews are more systematic and consistent (Hoepfl, 1997).Williamson (2006) advises that when using semi-structured interviewing, it should be piloted to ensure the right type of data is collected. I performed three pilot interviews and adjusted questions accordingly to improve the interviewees' understanding of the questions.

All interviews were conducted by the researcher (face-to-face) at the research site, involving a cross–section of staff directly involved with the five projects (Table 2.9). The sample also included middle and top managers at the institution. Barring two managers, all respondents invited to be interviewed, accepted. One postponed several invitations without real reason, while the other did not reply to the requests to be interviewed. All interviews were recorded and transcribed for coding and further analysis. As in the theory building phase, data was analysed according to projects before performing a 'meta-level' analysis. The table below shows a breakdown of interviewees:

PROJECT	TOTAL NO OF STAFF BASED IN THIS UNIT	TOTAL NO. INTERVIEWED	MEDICAL DOCTOR	HEAD OF UNIT	PHARMACISTS AND ASSISTANTS	CLERK	JUNIOR LEVEL NURSE	SENIOR LEVEL NURSE	MID LEVEL ADMINIS TRATOR	SENIOR ADMINIS TRATORS
OUTPATIENT PHARMACY	14	9	0	1	8	0	0	0	0	0
GENERAL MEDICAL WARD	18	6	0	0	0	1	3	1	1	0
EMERGENCY UNIT	60	8	2	2	0	1	1	2	0	0
NEONATAL ICU	40	6	2	1	0	0	1	1	1	0
INPATIENT PHARMACY	18	7	0	1	6	0	0	0	0	0
MANAGERS	14	10	0	0	0	0	0	0	4	6

Table 2.9 Interviews conducted across Staff Categories

Chiovitti and Piran (2003) encourage respondent validation to increase credibility. This was done with every interview in this study. I prepared a 'storyboard' of the project indicating all events, changes and results relevant to that project. With each interview I started by going through this storyboard and made adjustments as people corrected it. These storyboards served three purposes: they ensured I had captured the projects accurately; they reminded interviewees about the events and outcomes of projects; and they motivated staff by showing them all what had been achieved to date in the projects.

The interview protocol contained 22 questions, 14 of which were open-ended. Questions across projects were kept consistent to allow cross-case analysis later (Bryman & Bell, 2007).

Interviews need to guard against bias and to counter this the researcher can choose to interview participants that offer diverse perspectives and who have diverse backgrounds (Eisenhardt and Graebner, 2007). Where possible I did this by interviewing different categories of staff as shown in Table 2.9 above. I also chose people who had different views about the improvements discussed in the project meetings.

Both the reflection on the storyboard and the questions posed to staff reinforced the concept of triangulation that is detailed in Section 2.6 (Jick, 1979; Bryman & Bell, 2007). Interviews are seen by some scholars as a highly efficient technique for gathering rich empirical data (Eisenhardt and Graebner, 2007).

2.5.3 Documents

These can be an invaluable source of data to qualitative researchers and may include official records, letters, diaries, newspaper clippings and reports (Hoepfl, 1997). In this study I used minutes of meetings, records of informal discussions and my own diary entries as documents that were analysed during the theory building phase. I saw the documents as an opportunity to triangulate some of my findings and thoughts. For example, there were instances where people said they were acting in accordance with 'what the policy said'. On closer examination of the policy, this was not so; they either misinterpreted the policy or were disregarding the policy in their actions.

2.6 RESEARCH QUALITY

There seems to be general agreement that the quality of qualitative and quantitative research needs to be judged according to some set criteria. There does, however, seem to be some resistance from qualitative scholars (Stenbacka, 2001; Lincoln and Guba, 1985) where so-called quantitative criteria are inappropriately imposed on qualitative studies. For example, Golafshani (2003) and Winter (2000) cite reliability and validity as belonging to a positivist paradigm and are therefore better suited to quantitative methodologies.

Healy and Perry (2000) assert that the quality of a study should be judged by the paradigm within which it is located. Lincoln and Guba (1985) have offered criteria designed to assess qualitative studies. These criteria include credibility, neutrality, confirmability, consistency, dependability, applicability or transferability (Lincoln and Guba, 1985). Stenbacka (2001) has commented on the difference in opinion of the two grounded theory experts Glaser and Strauss on the topic of reliability and validity. The Straussian perspective strives for systematic and clear procedures with which the data gets treated in order to arrive at the final theory, which some link to reliability. Glaser (1992) on the other hand stresses the need for emergence and not forcing the data through a given template, which speaks to validity. Stenbacka (2001) sees an interesting 'middle path' encouraging the researcher to be consciously systematic throughout the process and to describe it as fully as possible. This speaks of both reliability and validity, as data is not forced into a framework yet it is dealt with systematically.

For this study, validity, reliability, transferability and researcher bias are specifically relevant and therefore addressed below. Validity precludes the risk of reporting a one-sided (researcher's) perspective – an aspect this study needed to be wary of. Reliability ensures that the researcher is explicit about techniques used, data collected and process followed to ensure consistency and clarity. Transferability allows the outcomes of the research to have some applicability outside of the reported study and thus increases its relevance both practically and theoretically.

2.6.1 Validity

Joppe (2000) asserts that "Validity determines whether the research truly measures that which it intended to measure" (cited by Golafshani, 2003). The concept of validity in qualitative research

takes on a different meaning, as it is often difficult to determine, at the outset of a study what exactly will be measured. This is particularly true in grounded studies where the theory is emergent and not predetermined.

Mays and Pope (2000) recommend techniques to improve validity. These include triangulation, respondent validation and clear explanation of methods followed (Malterud, 2001). Triangulation will be discussed in detail below while respondent validation was performed during the interviews (see Section 3.5.3).

Malterud (2001) points out that internal validity deals with whether the study examines what it is meant to, while external validity deals with the contexts to which the findings can be applied. Indeed the aim of much research is to produce information that is applicable beyond the study site (Malterud, 2001), whilst acknowledging that no study can produce universally applicable findings. An outcome of this research is to produce a 'tick list' or 'scorecard' of the enabling and inhibiting antecedents to be aware of before starting a Lean healthcare journey. In addition, it could be used during a Lean implementation to increase the likelihood of successful implementation by attending to potential problematic areas.

Triangulation

The word triangulation is borrowed from a technique that cartographers use where more than one angle is used to increase validity of the map (Malterud, 2001). It is true that a given object (e.g. an elephant or car) looks quite different from above, below or the side. Triangulation aims to increase understanding of a given phenomenon. Triangulation is described by Denzin (1970, Ch.12) as using data triangulation with respect to time, place and person, or using investigator triangulation via multiple observations of the same phenomenon. In addition, Denzin (1970, Ch.12) speaks about theoretical triangulation which uses multiple theoretical perspectives with respect to the same set of objects. Finally, he refers to methodological triangulation which involves using dissimilar methods or variations within the same basic methodology. Using data and theoretical triangulation were addressed in this study by having an extended field study period. I was able to observe and experience different perspectives over time.This meant that there were conscious efforts to ensure that a single view was validated with other participants before being accepted as fact. Triangulation improved validity by ensuring a view was shared by more than one individual in one instance. Finally, methodological triangulation was addressed by

using action research and grounded theory in this study, further enhancing an alternative perspective.

Triangulation can contribute significantly to improving the validity and reliability of data (Yeung, 1997). Triangulation reduces the risk that the researcher's conclusions are nothing but systemic biases or limitations of a specific method or source. The more perspectives brought into a research study, the more it is likely to represent reality.

Threats to validity are nullified by evidence not by methods (Maxwell, 2005). Maxwell (2005) also identifies researcher bias as an important threat to validity. It is impossible to totally remove the researcher's preconceptions or experiences but it is important to note how the researcher's preoccupations played a role and were minimized (Maxwell, 2005). In Chapter 1, I have discussed the researcher's conceptual framework (mental model) before entering the research site.

2.6.2 Reliability

Reliability is defined by Joppe (2000) as "The extent to which results are consistent over time … and if the results can be reproduced under a similar methodology, then the research instrument is considered to be reliable" (cited by Golafshani, 2003). Stenbacka (2001) refers to reliability in qualitative studies as 'misleading' and 'inappropriate' as a criterion of quality and adds that reliability involves measurement which is absent in qualitative work and thus an irrelevant measure of quality.

Reliability can, however, refer to consistency of both process and outcomes of the research (Hoepfl, 1997). By being able to verify the raw data, data reduction procedures and process notes will support the consistency of data (Campbell, 1996). Reliability in qualitative research ensures that something observed by the researcher can also be identified by other researchers. However, with non-positivist research, much emphasis is placed on contextual detail making it difficult to replicate perfectly (Remenyi, Williams, Money and Swartz, 2000). This was addressed in this study by providing rich contextual information.

There appears to be some overlap between reliability and validity in qualitative studies. Dependability means that if necessary, one should be able to follow conclusions backwards to the original source data. The integrity of conclusions or inferences is thus dependant on the reliability of raw data storage and organisation (Bryman and Bell, 2007). In this study data reliability or dependability was established by recording interactions either with a Dictaphone or in document form. Coding procedures were preserved in Atlas.ti software. Numerous memos also served as aide memoires.

2.6.3 Transferability

The relevance of this measure is often debated in qualitative research. Unlike quantitative research, qualitative research does not aim to provide broadly generalisable conclusions (Bryman and Bell, 2007). Van Maanen (1988) is more concerned with obtaining rich, complex descriptions of the study areas and seems nonchalant about developing generalisable theory. Qualitative research should provide deep contextual information or as Geertz (1973) calls it 'thick description' of what is really going on. As mentioned previously this study does not aim to be widely generalisable, the findings are relevant and have been arrived at through a robust process, providing a good basis for future studies. It does, however, aim to sensitize future Lean implementation projects in similar healthcare environments, of the enablers or inhibitors when implementing Lean.

2.6.4 Researcher Bias

When using qualitative methodologies such as grounded theory and AR, it is important to be cognizant of potential researcher bias throughput the researcher process, with a view to reducing its impact in the study. This does not mean that the researcher's background, experience and preconceptions are discounted to ensure their thinking is sterile before commencing a study.

Baker et al, (1992) say that grounded theorists should actually use past experience and knowledge to better understand the process being studied. This tacit knowledge should not be ignored or abandoned. Argyris and Schon (1974) propose an important delineation for theories people believe their behaviour is based on (espoused theory) and theories implied by their behaviours (theory-in-action). They suggest that people are often unaware of the theories-in-use

and these are often the theories they actually do subscribe to (subconsciously). Argyris (1980) suggests that developing congruence between espoused theory and theory-in action will result in individuals who can better control their actions. Indeed it is worth noting that the researcher's actions may be subconsciously guided by his theory-in-action more than his espoused theory described above.

Furthermore, Fetterman (1998) says the researcher should enter the field with, 'an open mind, not an empty head'. More about the researcher is discussed in Section 1.4. Triangulation may reduce bias associated with the researcher but it is more difficult to use triangulation with qualitative methods as it is less compatible with qualitative studies (Massey, 1999). In this study, I reduced researcher bias by using triangulation of research methods, sources and types of data collected. In addition, I used respondent validation to ensure I understood what was being said and respondents could correct my understanding.

2.7 ETHICAL CONSIDERATIONS

This study was conducted in a hospital and primarily involved the observation of human interaction. For these two reasons it was important to apply for ethics approval through a recognised body. In 2008, the Research Ethics Committee from the University of Cape Town granted me approval to perform the study (REC REF: 392/2008). The committee further asked me to ensure that all persons are protected in this study and are completely anonymous. They also asked me to inform all the Heads of the Sections in which my study was to be conducted about the nature of the research. I complied fully with both these requests.

I was fortunate to have qualified as a medical doctor and therefore was also able to adhere to the accepted conventions of conduct and behaviour of medical doctors during my study. This was to ensure that no patient was harmed during this study. For example, I would discuss with all participants before projects commenced that, if they felt patients were being disadvantaged in any way we would stop the projects. We also spoke to patients to ensure they did not feel that the quality of the service was seriously compromising their well being. For example, in the outpatient project, I regularly spoke to patients about the new system being implemented and took patient feedback to the weekly project meetings. This gave a voice to patient concerns and perspectives.

3. FINDINGS: THEORY BUILDING AND TESTING

The previous chapter explained the methodological path this study has pursued in building and testing theory. This is the empiric chapter of the thesis which presents the findings of the study. As mentioned in the previous chapter, the data was treated systematically to build a theory grounded in the data. This process was iterative and non linear, cycling between data collection and analysis. This chapter will detail the findings of the theory building and testing processes of the study. It is not practical to illustrate every aspect of the process in this chapter as it will hamper the logical flow of the chapter. Eisenhardt and Graebner (2007) recommend that the researcher utilize many tables and figures when presenting the information as it is unrealistic to write about every single observation, linkage or proposition.

The theory building part of this chapter is divided into the three coding levels described above. The theory is a culmination of these processes and is presented in a way that locates some of the findings within the literature. Locating the findings within the broader literature will occur in the next chapter. After the theory is presented, the outcome of the testing phase is detailed. This chapter then considers the tenets of good theories, before concluding with the practical and theoretical implications of the theory developed here.

3.1 THE THEORY BUILDING PROCESS

Bacharach (1989) describes a theory as, "a system of constructs and variables in which constructs are related to each other by other propositions and the variables are related to each other by hypotheses".

Theories are statements about generic behaviours that hold true across a broad range of different instances (Sutherland, 1975 cited by Wacker, 1998). The value of theories is that they reduce complexity, remove idiosyncrasies and allow similarities across cases to emerge (Siggelkow, 2007). In my study I am looking at building theory to respond to the question of which factors enable or inhibit Lean implementation at SHH.

The theory building process starts with data collection, followed by coding procedures and finally theory development.

3.1.1 Data Collection and Preparation

This section describes the types of data collected, the timelines associated with the collection, the quantity of data collected, and the treatment of the data in this study. All data for this study was collected at Southern Hemisphere Hospital over the 18 month study period using AR.

Data was collected in different forms and at different times from the five projects. The projects ran concurrently which posed challenges for data collection which are discussed later in this chapter. I tried to get all data into text form to make it easier for coding purposes using Atlas.ti software. Verbal interaction included 140 hours of recorded meetings, many informal discussions, and recording of my own reflections.

The diversity of sources used in this study is in keeping with the concept of triangulation discussed in Section 2.6.1. Some authors have highlighted the value in having multiple cases in one study. There is power in having multiple cases as contrasting and, or similar characteristics are confirmed or highlighted (Yin, 2009). Multiple cases also increase the quality of the emergent theory (Eisenhardt and Graebner, 2007). For example, adding three cases to a single case increases the analytic power four-fold (Eisenhardt and Graebner, 2007). Theory building from multiple cases serves as one of the 'best bridges' between qualitative evidence and mainstream deductive approaches (Eisenhardt and Graebner, 2007).

Table 3.1 below shows the breakdown of data collected and quotes captured across the five projects.

PROJECT	DURATION OF RESEARCHER INVOLVEMENT	SOURCES OF DATA COLLECTED	NUMBER OF PAGES OF DATA GENERATED	NUMBER OF QUOTES GENERATED
OUTPATIENT PHARMACY	18 MONTHS (MAY 2008-NOV 2009)	MEETING MINUTES, INFORMAL DISCUSSIONS, DIARY ENTRIES	108	1168
GENERAL MEDICAL WARD	8 MONTHS (MAY 2008-JAN 2009)	MINUTES OF MEETINGS, INFORMAL DISCUSSIONS, DIARY ENTRIES	50	359
EMERGENCY UNIT	14 MONTHS (SEP 2008- NOV 2009)	MINUTES OF MEETINGS, INFORMAL DISCUSSIONS, DIARY ENTRIES	381	3336
NEONATAL ICU	8 MONTHS (MAY 2008-JAN 2009)	MINUTES OF MEETINGS, INFORMAL DISCUSSIONS, DIARY ENTRIES	55	456
INPATIENT PHARMACY	14 MONTHS (OCT 2008- DEC 2009)	MINUTES OF MEETINGS, INFORMAL DISCUSSIONS, DIARY ENTRIES	149	1029

Table 3.1 Data sources, volume and duration

The five projects above yielded 743 pages of data during the theory building phase. Even though these were not formally coded, there was another 220 pages of data which contained important conceptual clues that influenced my thinking. These were from meetings not directly linked to the Lean projects but yet had some indirect connection with them.

The theory testing phase of the study involved semi-structured interviews with 46 stakeholders in the projects. Apart from the 10 managers interviewed, all the other interviewees were directly involved with the Lean projects. These interviews yielded more than 200 pages of data, which was also coded - the outcomes of which will be discussed in Section 4.2.

Raw data was collected, then prepared through transcription and captured on Atlas.ti software. This laid the foundation for me to code the data and then analyze it using the 3 levels of coding. All coding in this study was based on empirical data and not on literature. The literature was used to locate findings of the study. Each coding process has a distinct function and output as illustrated in the table below.

INPUTS	PROCESS	OUTPUTS
RAW DATA COLLECTED THROUGH VARIOUS SOURCES	**LEVEL I CODING**	SUBSTANTIVE CODES
SUBSTANTIVE CODES	**LEVEL II CODING**	CATEGORIES
CATEGORIES	**LEVEL III CODING**	CONCEPTS TO FORM THEORY

Table3.2 Overview of coding processes

Once data was collected and prepared for coding, Level I (substantive coding) commenced. I felt it was important to have an image of what was happening and what the process entailed. In Figure 1. below I point out the cycles of iteration between data collection and data analysis. In addition, there is an increasing move to saturate categories over time, as well as reduce the number of codes and categories being worked on.

SATURATION

REDUCTION

CONSTANT COMPARISON

INTIAL DATA COLLECTION

CODING AND INTIAL CATGEORISATION

MORE FOCUSSED DATA COLLECTION

CODING AND REFINING CATEGORIES

MORE FOCUSSED DATA COLLECTION

CODING AND REFINED CATGEORIES

EMERGENCE OF CORE CATGORY
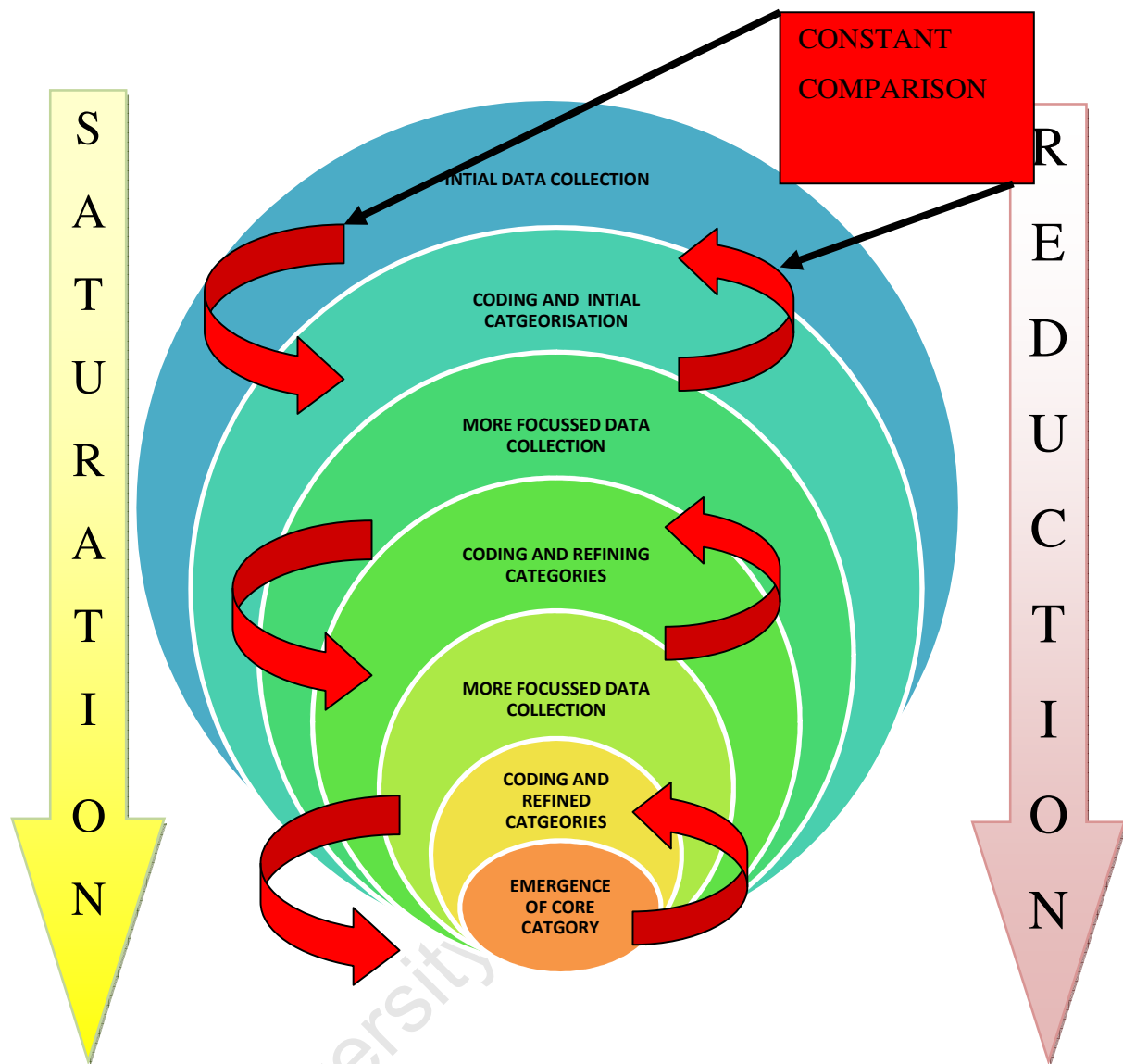
Figure 3.1 Process this study used between data collection and analysis

3.1.2 Level I Coding: Substantive Coding

This coding took many hours of intense concentration and perseverance. In keeping with the grounded theory concepts discussed above (Section 3.4.3), Level I coding was done at different stages of the fieldwork. Although time consuming, the coding process begins to reveal structure in the large amount of data.

The process of Level I coding or substantive coding is explained in detail in Section 3.4.3. Briefly, every utterance of the data was read and coded. In my study I coded over 100 different

codes which cumulatively contained more than 8000 quotes amongst them. This was reduced and refined as the study progressed. Some of the Level 1 codes are captured in Table 3.3 below.

This process took about three months due to the large amount of data I collected. However, as was emphasised earlier, coding did not occur at one point but rather at a few points in the data collection process, as illustrated in Figure 3.1 above.

'SOFT' PROBLEMS RELATING TO PEOPLE AND ORGANISATION HAVE 'HARD' IMPACT
APPLAUDING STAFF EFFORTS AND IDEAS
DEEP DOWN WHAT IS CAUSING THIS PROBLEM?
FACILITATOR ASKS INCISIVE QUESTIONS TO GET STAFF THINKING
HOME GROWN EXAMPLES THAT RESONATE WITH INDIVIDUALS
HOW CAN STAFF BE PUNISHED FOR BEING EFFICIENT
I DON'T CARE ABOUT HIM/HER AND I WILL TREAT AS SUCH
I FEEL SUPPORTED AND VALUED IN MAKING IMPROVEMENTS
I KNOW THE BOAT IS SINKING BUT THE VIEW FROM HERE IS NICE
IMPROVED INITIATIVES WRAPPED UP IN RED TAPE
NEW SOLUTIONS TO OLD PROBLEMS
OUTSIDERS LOOK AND SEE STAFF EFFORTS TO IMPROVE
PAYING ATTENTION TO THE INFORMAL, CAMOUFLAGED DYNAMICS
STAFF ARE VERBALLY SALUTED FOR THEIR EFFORTS
THIS IS MY ISLAND SO GET OFF!
WHILE WE HAVE MANAGEMENT'S EAR, LET'S TRY TO GET SOME RESOURCES

Table 3.3 Some of the codes used in Level I coding

Overlapping codes and codes that were not sufficiently supported by data were removed towards the end of Level I coding. In the initial coding scheme, I had a code called 'Planning an

improvement makes things easier'. This code was merged with the code 'to use Plan-Do-Check-Act or not' as this mostly covered the content of the 'Planning an improvement makes things easier' code.

Similarly after a number of cycles of data collection, the code 'Attempts to change the way staff do day-to-day tasks' became redundant as it was covered by two other codes - 'I simply don't want to change' and 'This is our project - we want to improve things here'. In this way the number of codes was reduced to 70 after a number of cycles of data collection. Atlas.ti was helpful in identifying overlapping between codes and redundant codes.

In keeping with grounded theory, as data collection became increasingly focused, the codes were refined and reduced over time. Using constant comparison (Section 3.3.4) codes were compared to each other to ensure they were mutually exclusive and they were then clustered to form categories entering Level II coding. The codes were emergent and not preselected in keeping with grounded theory. Figure 3.2 is a screenshot of the process of Level I coding using Atlas.ti software.

Data collected is read carefully and then coded. To illustrate how I arrived at the findings of this chapter, I will follow one code through from Level I to Level III and into the final theory. The code used to illustrate this is 'This is my island, so get off', which relates to the notion of siloism and working in isolation rather than as a team.

Figure 3.2 Screenshot from Atlas.ti -example of Level I coding (The Speech bubbles have been added to explain the content of the screenshot)

[6:551][3739]

There is no dumping
If there is any kind of dumping you nip it
butt and that is it
Because the last thing we need is dumpin
it got the potential to dump big time
If any one is starting to dump nip it on th
so that they not ever dump again

[6:1056][1709]

So I ask for a bed status.
There were between 20 beds on the G floor,
11 in oncology, 4 in G17, 3 in G5 and 2 in G12.
Still patients were waiting here overnight.
Point in case that in fact patients don't move to
during the night as they should. But I didint feel
like I could make a fuss about it cos I didn't
have the authorirty to act.
There was an issue this morning because the
intern had found which I didn't know
And so I think the authority issues having a big
impact on true representation of bed capacity.

[6:996][1030]

We should not have that area packed like
sardines in the morning when there are beds still
available . I agree holding often becomes a
dumping ground.

[4:19][87]

Then what we started to pick up in the meeting
was the blue board and TTO functioned as
separate silos
So wasn't cross capacity
Initially there was a feeling
F1 felt that the floor layout wasn't suitable for
Blue boards and TTO later
We thought that it may actually worked

[3:189][11]

This will meant that they want to look at a
lean project for the wards and then another for
the kangaroo mother care unit. The processes
are massively different and I am very sceptical
to take on another project. The difficulty here is
that the HOD nenonatology is wanting us to
drive a project that is in fact in the obstetrics
arena. This has the potential to become
problematic.

[6:1197][413]

Another concerns that was raised is that the
medical rounds are not being done often enough
in the wards. there was much 'externalisation'
of the problems from the management quarter.
It is quite obvious to all working in the casualty
unit that the HOD's are doing many rounds
during the day

[1:44][94]

Some of the looks like it was tick adequately
some of it did not
I left a message for her to kind of get the
nursing staff to tick off
A concern was that nurses just tick off at
random and inflate the number of times they
down to kind of bolster the motivation for a
messenger
I will have a look at that next week, which w
be part of my plan for next week

★ THIS IS MY ISLAND SO GET OFF!

[4:213][5341]

But I think the doctors are a bit unreasonable of
doing it as well
I got a not from Dr C████ saying please
contact us for your queries don't send scripts
back it wastes time
So I send the note back saying do you realize
how long you wasted on the phone phoning
everyone
And if you don't consult
Surely you have a speed dial which you just
didn't bother to put on it
I think they also just expecting a bit to much of
us to contact them for every thing
Contacting them would be easier if it is a
smaller portion

[6:1198][736]

That is a 30% increase across EMS and so this
is the cause for the increase demand on the
services
I think it is still speculation about the Mitchell's
Plain drainage area but I can disprove this
without data. At this meeting also people tend
to externalise the problem and work in silos.
The chc's seem to be extricated from the
healthcare system

Surgeons don't communicate to casualty plan.
We must rummage through notes to figure out
what will happen to pat

[7:254][5067]

Unfortunately in large health care systems we
tend to work in cylose and so there is a war
component a lab component and an icu
component and it is difficult to get interventions
of success across the cylose
A patients journey is almost always horizontal
were as we working is vertical cylose
Like with the H1N1 outbreak
There was a proposal to place a couple of more
icu beds
That is fine but then what happens when the
patients come out of icu
There is no ward beds for them to go or how
does that deal with the pressure on casualty
and so on
We discussion the infection control system and
we talk about specific people
May be one way of handling this is to follow
up on how far our task teams

[6:513][3056]

The oncology wards over the weekend there
was an old man that was lying down here from
the 12th to the 15th and there were lots of
beds in G7 and G8 but because it was a
Hematology patient

[6:985][883]

Whether they have been transferred from other
hospitals can go upstairs
That would be one
That would also put pressure for them to see
the patients more frequently

[6:247][939]

But one there is a porter issue for starters
-externalising and silos
The second thing is either they saying but the
visitors are coming there now and somebody
needs to see the visitor
There is always sort of patty issues
So there is no policy at all written or unwritten
that says patients may not be transferred from
the C floor or the C floor or whatever to the G
floor
As long as there is a bed

Figure3.3 Some quotes from the Code 'This is my island so get off'

The figure above shows 14 quotes linked to this code, which in total had 137 quotes. In addition, there were 49 Level I codes that in total have some 8000 quotes attached to them.

The code 'This is my island get off' relates to the silo functions within the hospital that often prevented smooth flow of patients and the smooth transition between departments. As evidenced by the comments and quotes above there were often difficulties between departments which led to compromised quality of care and long waiting times. A significant example of this is captured in quote [6:996] above: "we should not have the area packed like sardines when there are beds available". This was referring to the fact that the emergency unit was bursting at the seams with patients waiting up to four days to be transferred to the wards where beds were available.

Challenges Of Level I Coding

The coding process proved to be mentally and physically taxing since large amounts of data had to be coded. However, it was easier to do the coding in batches interspersed with data collection, since it allowed me some breathing space between coding sessions. It also forced me to focus on only the emerging categories which minimised the distractions to investigate other interesting ideas. Atlas.ti also made a major difference to the organisation of coded data, which I found very helpful.

3.1.3 Level II Coding

With Level II coding there is a move to reduce the complexity of the Level I coding, by increasing the level of abstraction at the expense of some of the details. This process also involves the recognition of common characteristics amongst codes in order to form categories. The search for relationships between substantive codes is considered by some to be fundamental to grounded theory (Strauss and Corbin, 1994).

Having reduced the number of Level I codes from over 100 to 70, it was time to start building my initial categories. A category is a group of Level I codes that share some characteristic or attributes and so Level II codes can be thought of as a clustering process based on the data collected during the research. The initial categories allowed me to focus my data collection more, before returning to the analysis and then collection again, in an iterative pattern. I performed four

cycles of Level II coding (shown in Figure 3.4 below) during the study to arrive at the final categories. After the first cycle of Level II coding, I had 18 categories which were eventually reduced to 11 in the final theory. To emphasise, Level II coding is empirical in nature and therefore the categories derived from this process are derived from data.

I started Level II coding by printing each Level I code onto a 15x4 cm piece of paper, giving me 70 pieces of paper. Using the grounded theory concept of constant comparison, I grouped codes according to common characteristics and attributes, to form categories (see Figure 4 and Red Circle).
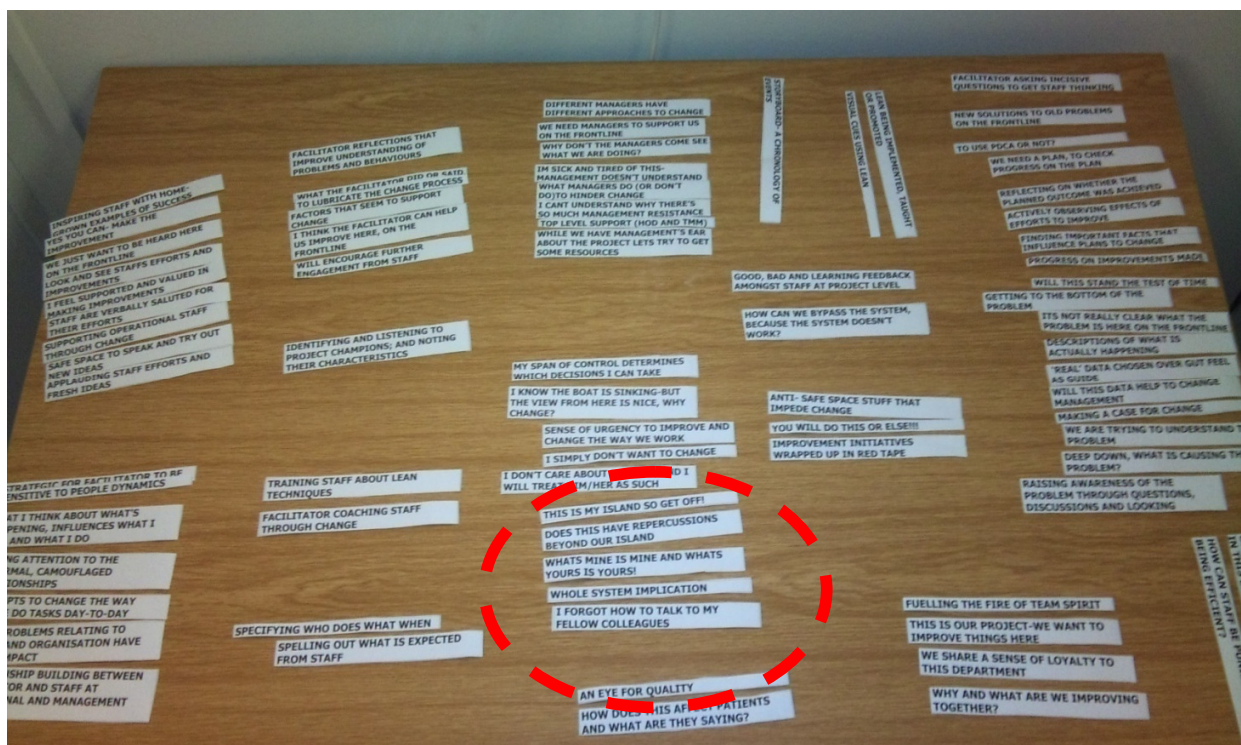
Figure 3.4 Process of building categories (Level II coding)

I specifically chose to do it as shown above as it allowed me to visualize better, be more flexible and creative in establishing relationships between codes. Holton (2010) encourages this as these creative linkages lead to novel theory development. I found this 'wrestling' with the codes useful in developing a higher level of abstraction, which is needed at this stage of the grounded theory process.

The code 'This is my island so get off' was clustered with five other codes that shared characteristics related to 'Silo Thinking'. This category is characterized by a sense of silo functions that often inhibit efficiencies and good quality. There is an unhealthy competition to protect individual departments or units at the expense of a smooth overall process for the ultimate benefit of the patient. As illustrated with the formation of the category 'Degree of Silo Thinking'; other categories were also created with 5 – 12 codes. Details of other categories can be found in Appendix 3. I need to emphasise that the categories emerged from the data during the second level of coding and were not derived from literature at all. Literature is only used much later in the study to locate the findings of the study. The list of categories was also refined as more data was collected and analysed.

Figure 3.5 An example of one category 'Silo Thinking'

I continued to work through iterative cycles (as illustrated in Figure3.1 above) until I was nearing the point of saturation. In other words, with more data collection I was not learning anything further about the categories I was focusing on (discussed in more detail in Section 3.4.3). During

this stage of the process, I started identifying relationships between categories. The relationships between categories are part of the theoretical coding process (Level III coding).

Challenges of Level II Coding

During Level II coding, I struggled with reaching the degree of abstraction that was necessary in order to move towards a theory. I found it difficult to find the words or phrases that accurately described the categories being formed. I was careful not to refer to any literature at this stage as this would taint the process and stunt the creativity that was emerging. I did make use of a dictionary and thesaurus to find the words to accurately describe what the categories reflected.

3.1.4 Level III Coding- Theoretical Coding and Theory Building

The two grounded theory processes that assisted me in developing the core categories were constant comparison and reduction. Constant comparison meant that I was continually trying to better define characteristics of codes and categories to ensure their uniqueness. It also proved helpful in ensuring I did not collect 'random' data but rather data that would allow me to explore relevant concepts more deeply.

With reduction I had a sense of distilling and filtering my data over time. I started off with large amounts of messy, incomprehensible data that were refined as codes, which were condensed to form categories, categories were condensed to form concepts, and concepts condensed to form the theory. I visualized this theory as the few gems that were produced from a lengthy process of collecting and analysing mountains of data.

In comparing the 11 categories from the section above, three concepts were formed. As illustrated in Figure 3.6 below, each coloured circle represents a category formed from Level II coding. They are clustered to form the three core concepts of the study.

In following an example through from Level I coding to its place in the final theory, the code 'This is my island so get off' was clustered with the category 'Degree of Silo Thinking'; which in turn became part of the concept of '**Creation of safe spaces influences willingness to engage in an improvement project**'.

The concept of 'Creation of safe spaces influences willingness to engage in an improvement project' represents a concept about the importance of creating enabling environments for experimentation and improvement. The details of this concept are elaborated on below when the final theory is described more fully in Section 4.3. It will also be explored in the literature chapter of the thesis.

The two other concepts were: 'Facts help to locate problems fairly and transparently, and then develop solutions to them', and 'Disposition of staff to embrace improvement project'. The concept of 'Facts help to locate problems fairly and transparently, and then develop solutions to them', relates to the critical nature of measurement, finding root causes and developing true solutions to problems organizations face, as part of an improvement project. The third concept of 'Disposition of staff to embrace improvement project', relates to the extent to which staff will engage an improvement project, sometimes referred to as 'buy-in'. Both these concepts will also be described in more detail below and in the literature chapter of the thesis.

USING A FACT BASED APPEOACH TO IDENTIFYING TO AND SOLVING PROBLEMS

DEFREE TO WHICH PROBLEM SOLVING IS INSTITUTIONALISED

FACTS HELP TO LOCATE PROBLEMS FAIRLY AND TRANSPARENTLY, AND THEN DEVELOP SOLUTIONS TO

ABILITY TO DEAL WITH VARIETY AND ITS EFFECTS

DISPOSITION TO RECOGNISE THE CURRENT STATE OF THE SYSTEM

DEGREE TO WHICH THERE IS SPIRITUAL CONGRUENCE AMONGST THE TEAM ABOUT IMPROVEMENT

N STAFF CE ENT

SENSE OF BEING VALUED

SOCIO POLITICAL SENSITIVITY OF THE FACILITATOR

ENVIRONMENTAL ANTECEDENTS

ZONE OF SAFETY

CREATION OF SAFE SPACE INFLUENCES WILLINGNESS TO ENGAGE IN

MANAGEMENT STANDS URETY FOR THE PROCESS

DEGREE OF SILO THINKING

hree core concepts with egories

The next step was to establish the relationships between these three concepts in developing the final theory. This process is termed theoretical coding - (See Section 2.4.2). Theoretical coding is emergent and relationships cannot be predetermined or superimposed on the data (Hernandez, 2009). The quality of theoretical coding depends on the quality of substantive coding (Hernandez, 2009). Kelle (2005) argued that the key difference between Glaser and Strauss's idea of grounded theory hinged on the coding family. Strauss preferred to work with well structured 'pre-ordered' coding families compared to Glaser who emphasised emergence. Whereas Strauss chose to use only one coding family, the Six C's; Glaser (1978) developed 18 coding families that would assist in identifying possible relationships between codes and categories. Some of which included the Six C's, Process, Degree, Dimension, Type and Strategy family. The coding families specify certain elements that a researcher needs to consider when describing a theory. For example, if one used the 'Type' family, one would need to discuss the type, form, kinds, styles, classes and genres of the theory under study. The Six C's included causes, context, contingencies, consequences, covariance and conditions. Glaser expanded on this list of 18 families later in his books (Glaser, 1998 and Glaser, 2005).

Theoretical coding potentiates the explanatory power, completeness and relevance of a grounded theory (Hernandez, 2009). Theoretical coding can be thought of as a process by which 'fragmented' ideas are brought together to form a theory explaining some specific phenomenon. Each category is compared to others to ensure mutual exclusivity. The next step is to look for linkages between categories to form a tentative conceptual framework (Sterna and Pyles, 1986). Theoretical coding helps the researcher build theory and clarify relationships. Furthermore, the ontological perspective used in this study, critical realism, asserts that there should be some logical connection between these three concepts (refer to Section 2.2.1 for more detail on critical realism).

Theoretical coding should provide the researcher with a model or theory that identifies some causal relation between the codes and concepts. The critical realist framework encourages one to seek an explanation of the underlying causal mechanisms at play and so theoretical coding enables the researcher to offer such an explanation by using an archetype. In this study, I found it more fitting to use a system archetype to assist in building my theory compared to Glaser or Strauss's method. System archetypes were developed in the mid 1980s at Innovation Associates

and are able to summarise and communicate generic ideas about complex systems (Saleh, 2000). I used these archetypes as a theoretical coding process, similar to using Glaser's 18 coding families discussed above. Having developed my concepts from the data as illustrated above, I needed to find the links between these concepts and for this I looked to system archetypes to see if any of the archetypes resonated with my thinking and theory developed thus far. An important distinction should be made at this point in keeping with the debate presented in Section 2.4.6 on researcher bias (Argyris and Schon, 1974). The distinction is that an archetype does not represent a theory of the researcher (or his experience) that could be classified as theory-in-action. Rather it is more appropriate to think of the archetype as a representative scientific theory. The validity of system archetypes is supported by a lot of qualitative and quantitative modelling representing patterns of behaviour over time (Forrester, 1994; Wolstenholme, 2003). System archetypes are rooted in the systems thinking field. System archetypes consist of generic casual loop diagrams that describe relationships in an array of management situations (Goh, Brown, Spickett, 2010). These archetypes help to simplify complex situations by highlighting relationships between concepts and pointing to high leverage areas for change (Goh, Brown, Spickett, 2010).

Worrell (1995) points to the versatility of using system archetypes across a range of disciplines and systems. Archetypes are described as structure diagrams that illustrate cause and effect relationships (Breur, 2006). These archetypes are powerful for facilitating the simplification of business concerns in order to effect change and deal with complexities (Breur, 2006). The visual language of causal loop diagrams and system archetypes can clarify complex scenarios and reduce ambiguities (Bardoel, 2003). Hirsch and Immediato (1999) have described the application of archetypes in the health industry of America with the aim of clarifying potential strategic choices.

Senge has developed 10 archetypes that represent different patterns of behaviour and include different types of concepts. Of these, the most appropriate one to this study was the 'Attractiveness Principle' archetype. Braun (2002) provides a simple overview of each of the archetypes identifying their characteristics, purpose and behaviour over time. Archetypes can also reveal insights into existing structures in order to anticipate and plan for potential problems that may arise (Braun, 2002). In this study it must be emphasised that the system archetype is

only used as a means to find possible linkages between three concepts that are empirically derived. The theory is thus not built on an archetype.

The 'Attractiveness Principle' alludes to the concept that 'you cannot be all things to all people'. Thus, for sustainable growth, firms need to choose obstacles or inhibitors to growth, that they plan to deal with, and so mitigate their impact (as shown in Figure 3.7 below, Braun, 2002). The name of this archetype is based on the reality that the company will need to decide which inhibitor to tackle first, with the knowledge that addressing an inhibitor will have a positive future impact. There are often many inhibitors, and managers need to decide how and where to use their limited resources to mitigate the effects of these inhibitors. In the diagram below the manager has chosen to tackle A, and hence has reduced the negative impact A has on the results. Bellinger (2004) advises that organisations that are experiencing growth in a certain product or service should insightfully identify possible inhibitors or obstacles to this growth and plan to mitigate or remove it altogether. When there are multiple obstacles, the organisation will need to choose which ones to work on to reduce or eliminate, and which ones to live with (Bellinger, 2004).
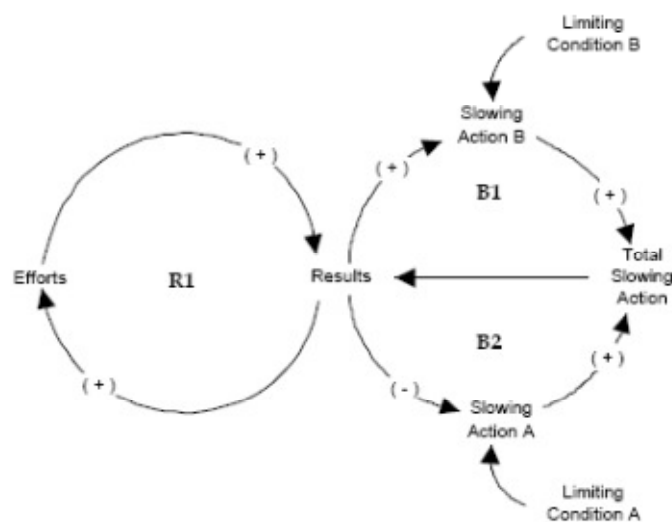
Figure 3.7 Attractiveness principle generic archetype (Braun, 2002)

The + signs indicates that a change in the net result will lead to a change in the efforts, in the same direction, while the – signs indicates a change in the opposite direction. Slowing Action A and slowing Action B combine to form the Total Slowing Action which has a negative impact on the results, while the efforts have a positive reinforcing impact on the results.

The behaviour associated with this dynamic is illustrated below in Figure 3.8 below. Performance will improve significantly initially (solid line) but then as the inhibitors overcome effects of the growth (slowing action dashed line), it becomes stunted and eventually declines, despite more effort being put into improving performance (efforts dashed line). This archetype can be associated with challenges of continuous improvement, which is fundamental to Lean management. With Lean implementation, I experienced a significant improvement in results in the first few months, but then things decline if the 'inhibitors to change' are not adequately addressed. I find the archetypes useful in identifying a pattern of relationships between concepts and have applied it as such to my theory. Scherrer (2009) comments that knowing what the potential inhibitors are to improved performance, is the first key to successful implementation. This study aims to identify specific factors that affect the success of Lean implementation.
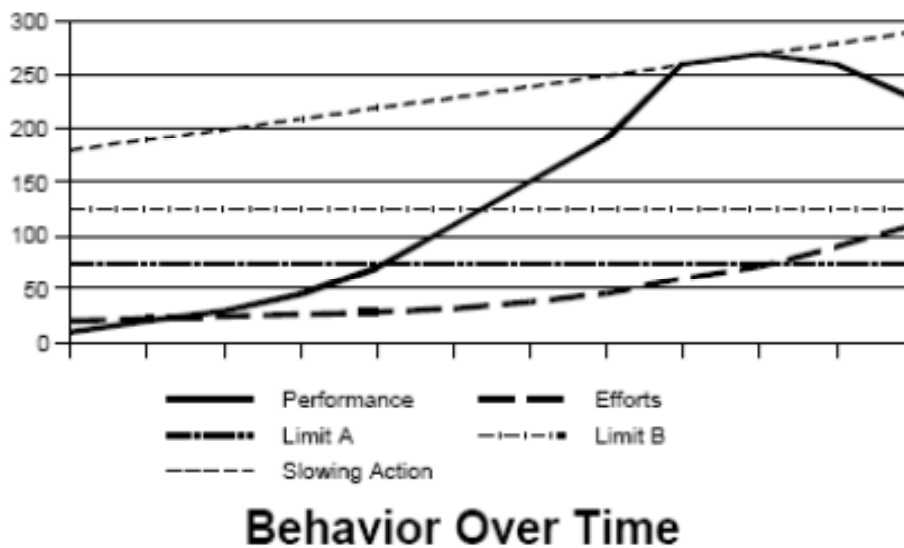
Figure 3.8 Behaviour over time of Attractiveness Archetype (Braun, 2002)

It is advised that the researcher develop a visual theory summary using 'boxes and arrows' (Eisenhardt, 1989). Diagrams help to improve a researcher's understanding of facts and enable integration of ideas or concepts (Corbin and Strauss, 1990). Diagrams also aid research to

convey a clear message to others in an organized way (Corbin and Strauss, 1990). Miles and Hubermann(1994) promote the use of diagrams in qualitative work extensively and suggest that it makes it easier for the researcher to work with drawings at a conceptual level. This also enables the researcher to find unique or interesting relationships between otherwise seemingly disparate concepts. Miles and Hubermann (1994) also describe how causal networks are created by using boxes to illustrate variables, and arrows are used to show relationships between the variables. These relationships become most meaningful when they are accompanied by analytic text describing the nature of the relationships. Using this Attractiveness archetype I have developed the interim theory using grounded theory, based on the three concepts of Figure 3.9. See Figure 3.10 for the theory.

Figure 3.9 Three core concepts before establishing relationships

Using the generic archetype structure above, my initial theory mirrors the Attractiveness principle archetype closely. The variables and structure of the generic archetype were useful in understanding the possible relationships between variables in my own tentative theory. Figure 3.10 below illustrates this tentative theory and one can see that it closely resembles that of the Attractiveness principle. The results (or 'outcomes of improvement projects') are dependent on

the effort (to use 'hard fact to locate and solve problems') and the level 'change readiness' (a combination of 'safe space creation' and 'staff embracing improvement'). If change readiness is neglected it will have a negative impact on the outcome of the projects. Change readiness is made up 'safe space' and 'disposition amongst staff to embrace improvement projects' in this theory.
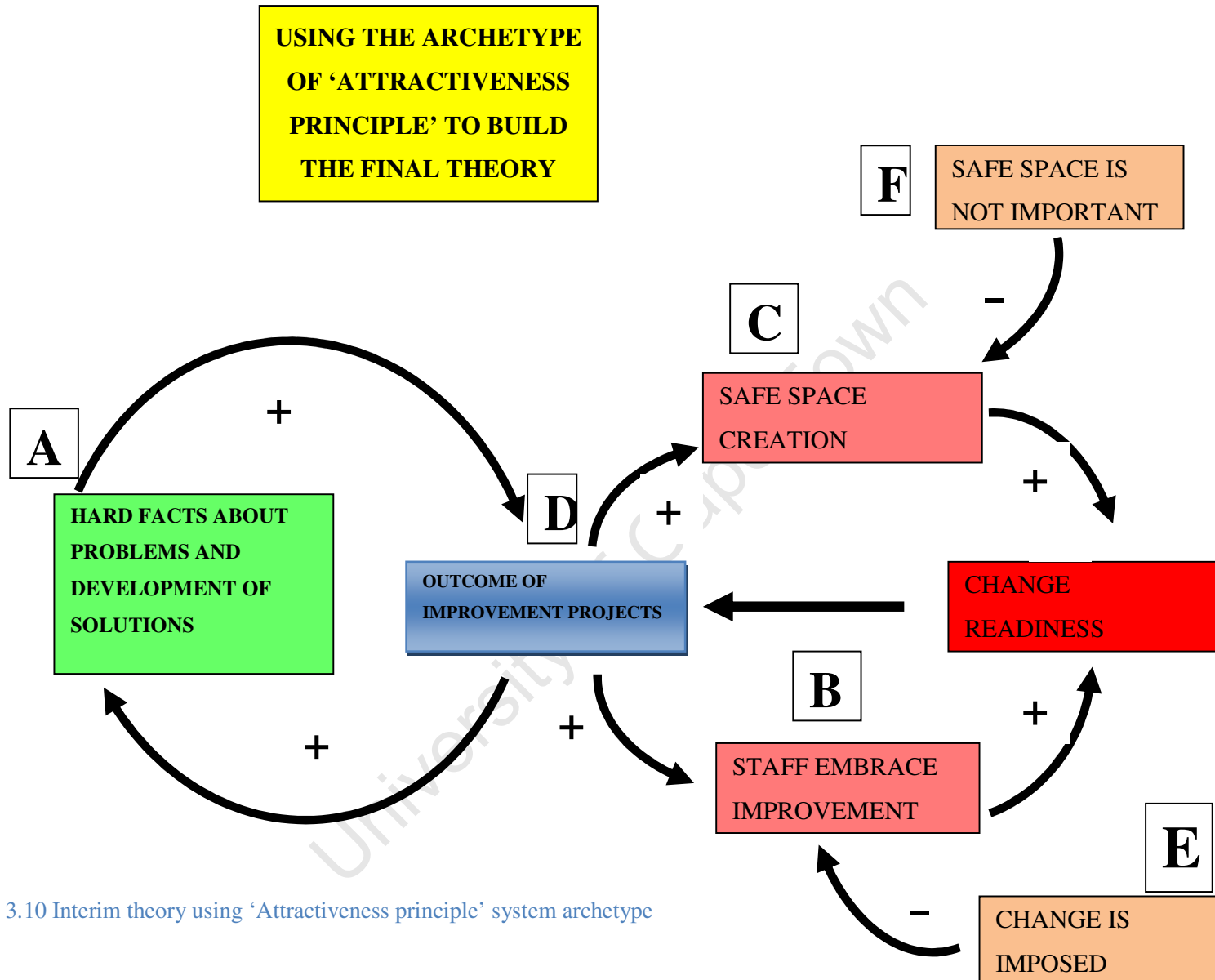
Figure 3.10 Interim theory using 'Attractiveness principle' system archetype

In explaining the archetype developed above I will detail how each concept and each relationship was developed, and what it translates into. Concepts A, B and C are the three core concepts of the study developed using grounded theory. At this stage they can only be described broadly, since the specific elements that constitute them will be only be established in the theory testing phase (the categories which show a difference across successful and unsuccessful projects).

A- This concept refers to the value of using facts to identify problems and solve them using good structure. The concept bears similarity to evidence based management.

Concept A includes 10 categories which stress the importance of using a fact basis approach to change, of specifying tasks and reducing variability, focussed problem solving, knowing the demand and supply of the system, and using a structured plan for improvement. However, of the 10 categories constituting Concept A, only a few may be seen to have an appreciable difference between projects that succeeded and those that failed.

B- This concept relates to the willingness of staff to embrace change initiatives. It can be linked to the idea of 'buy-in' or taking ownership of a change initiative.

Concept B has 13 categories linked to it at this stage, some of which will be shown to have an appreciable difference between successful and unsuccessful projects in the theory testing phase. The categories associated with Concept B relate to participation by staff in improvements, the attention and ability of the facilitator, teamwork and optimism, empowering staff, using small wins and establishing good relationships between team members, the facilitator and leadership.

C- This concept speaks to the creation of a safe space that will impact the willingness to be part of an improvement project.

Concept C has 14 categories associated with it before theory testing which will determine which of these categories differentiate between successful and unsuccessful projects. This concept includes categories that speak of creating a space for staff to experiment and improve, where staff is recognised for their input, there is a willingness to work together and staff are

comfortable giving their input, bureaucracy has low impact to obstruct progress and management is supportive of improvements.

Change Readiness is a concept derived from the combination of 'Safe Space Creation' and 'Disposition of staff to embrace improvement initiatives'.

The notion of been 'change readiness' is relatively new and has both theoretical and practical relevance. In this study, the concept of 'Lean readiness' may become crucial in identifying those things that are necessary and need to be in place prior to commencing a Lean project, in order to improve its chances of success. In this study the theory testing will allow us to observe if there is a difference between projects that succeeded and those that failed in terms of their 'Lean Readiness'.

The relationships between concepts in the archetype (Figure 10) need to be explored in some detail. These include A-D and D-A, D-B, D-C, C-E and B-E, and lastly E-D.

A-D and **D-A**
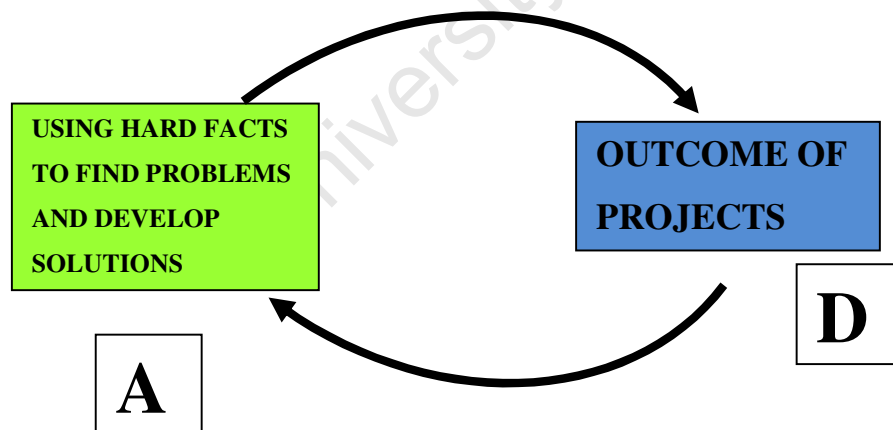
In this relationship I suggest that the presence or absence of hard facts to identify problems and develop solutions has an impact on the outcome of the improvement project.

Jerry Harvey coined the Abilene paradox which asserts that often decisions are taken by groups of people based on gut feel, poor communication, and inaccurate facts. These decisions often turn out to be counterproductive, damaging and frustrating to members of the organization (Harvey, 1988). Problem solving often fails and sometimes aggravates the situation even further (Harvey, 1988). Communication which is clear, precise, open and honest would overcome this problem. In addition, there needs to be an acknowledgement of what is data versus, 'gut feel'. In this way one can appreciate that decisions based on good information and clear communication will lead to better results, which in turn will motivate further improvement.

D-B
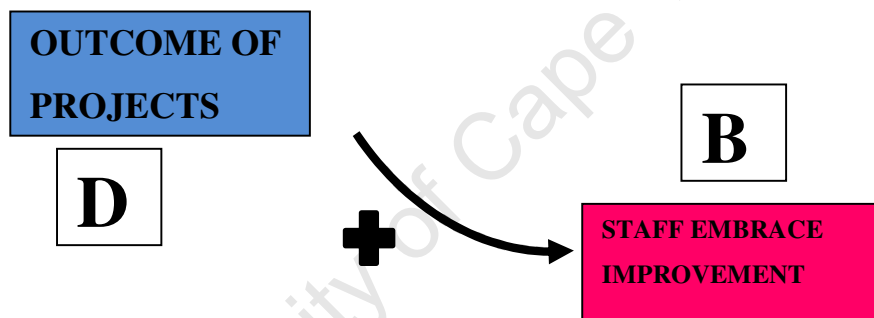
The direction of the arrow in this relationship is crucial as it goes counter to what is described as the typical 'Western approach' to change which involves getting people to think the right way will lead to good outcomes (Shook, 2010). The idea which is linked to Schein's thinking suggests that changing culture will change behaviour. Instead, Shook argues that if one changes how people behave this will change how they think and will impact the culture of the organisation – '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). In keeping with this, the study is suggesting that when one starts to get some positive results (D) it will stimulate staff engagement (B) and staff will feel safer about giving their input (C). This is also linked to the idea of 'small wins', when one gets more 'small wins', staff are more motivated to engage in improvements and will feel 'safer' about giving input and ideas.

This refers to the relationship between outcomes of projects and the willingness to engage in improvement projects. The outcomes of the project will affect the enthusiasm and sense of achievement amongst the team members. There may be a positive correlation between the levels of self esteem, perceived control, optimism and level of openness to change (Wanberg, Banas, 2000 citing Taylor and Brown, 1998).

A high level of openness to change is necessary for employee readiness to embrace organization change (Armenakis, Harris and Mossholder, 1993). High levels of openness to change will promote cooperation with management, limits hostility and resistance towards change (Coch and French, 1948). A supportive interpersonal climate promotes team learning and improvement (Tucker, Nembhard, Edmonson, 2007).

D-C
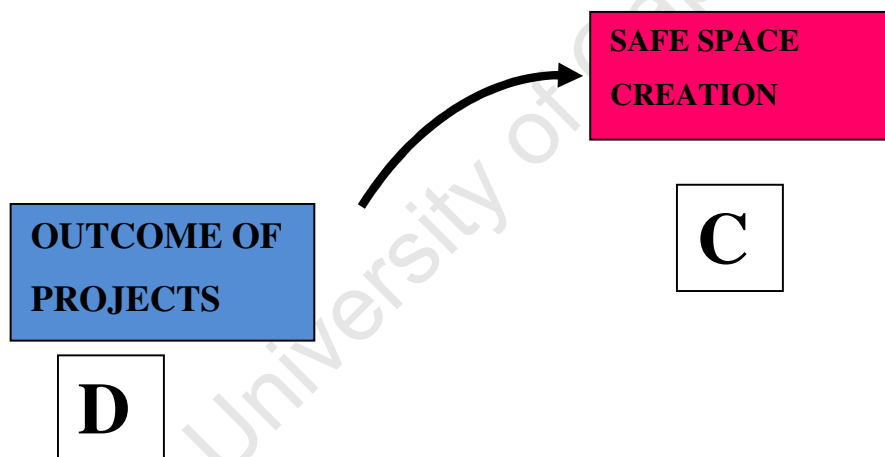
As was the case with levels of staff willingness to embrace improvement – the outcomes of Lean projects can drive the creation of safe spaces. If staff start identifying that their efforts are leading to improved outcomes and working conditions, they will feel more comfortable to volunteer more ideas to improve things. Much of this discussion is embedded in concept C, relating to the creation of safe spaces. In essence, what is important here is the role outcomes play in creating or maintaining the safe space. Essentially, it is about motivating people that are

doing the right thing yet, on the other hand it provides proof that people have made an improvement and the extent of that improvement.

C-E and B-E
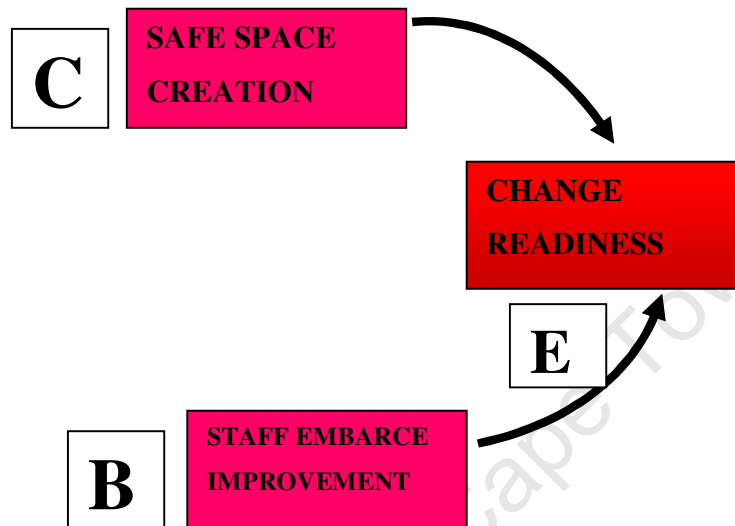
In this study the combination of two of the core concepts (safe space creation and disposition to engage in improvement projects) conveys a sense of the necessary antecedents before commencing a Lean project. In the theory testing phase of the research I will explore which specific antecedents are of importance, based on the evidence presented.

E-D
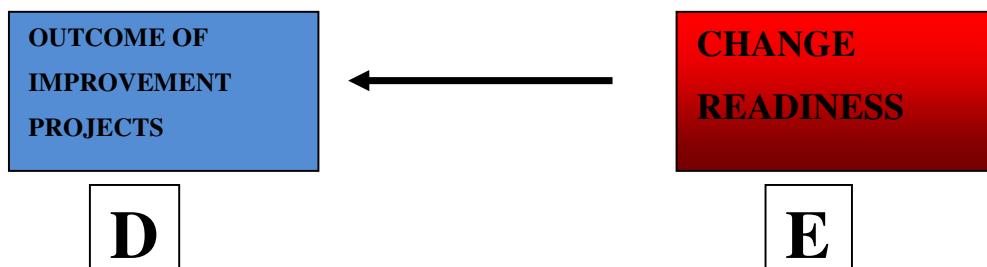
This relationship represents part of the study's findings that indicate there is a relationship between 'change readiness' and outcomes of an improvement project. Before one can

successfully start identifying problems and systematically start solving problems, there needs to be a degree of been 'change readiness'. This will be tested in the next phase of the research as detailed below. If a relationship is indeed established, the key tenets of that relationship will be explored in more depth, to offer practical and theoretical value.

The theory in Figure 3.10 demonstrates the crystallization of intense and systematic coding processes based on raw data collected over an 18 month period. In keeping with the research question this study aimed to identify some of the enablers and inhibitors of Lean implementation at SHH. The theory above illustrates how two variables (Staff embraces change and Safe space creation) can act as inhibitors of Lean readiness, which in turn affects the outcomes of the project. The outcome of Lean projects is also influenced by the extent to which fact finding and problem solving are used. Similarly, as the outcomes of Lean projects are more successful there will be an increased inclination to measure, use facts and problem solve in a structured way.

3.2 THE THEORY TESTING PROCESS

The theory testing process was used as a means to improve the theory and check its appropriateness in a real life setting. Christensen (2006) recommends that the usefulness of the theory should be tested . However, the identification of 'anomalies' should not be discarded or the theory discounted; rather these anomalies should be seen as opportunities to improve the theory (Christensen, 2006). The identification of anomalies gives researchers a chance to refine constructs or categories, in order to explain the anomaly better and include it in the theory.

It would be inappropriate to use the same data that was used to build the theory, to also test the theory. This would jeopardize the validity of the study by employing circular reasoning. For this reason I conducted interviews with relevant stakeholders, to test the theory developed above.

The interview protocol for these semi-structured interviews was based on the theory above and can be found in Appendix 2. All interviews were recorded and transcribed resulting in 220 pages of data. More detail on the interview process can be found in Section 3.6 and a discussion of researcher bias is covered in Section 2.6.4. The interviews were conducted towards the end of the study during the last 2 months. I interviewed 46 staff members at Southern Hemisphere Hospital who were involved in the various projects as depicted below:

PROJECT	TOTAL NUMBER	MEDICAL DOCTOR	HEAD OF UNIT	PHARMACISTS AND ASSISTANTS	CLERK	JUNIOR LEVEL NURSE	SENIOR LEVEL NURSE	MID LEVEL ADMINISTRATOR	SENIOR ADMINISTRATOR
OUTPATIENT PHARMACY	9	0	1	8	0	0	0	0	0
GENERAL MEDICAL WARD	6	0	0	0	1	3	1	1	0
EMERGENCY UNIT	8	2	2	0	1	1	2	0	0
NEONATAL ICU	6	2	1	0	0	1	1	1	0
INPATIENT PHARMACY	7	0	1	6	0	0	0	0	0
MANAGERS	10	0	0	0	0	0	0	4	6

Table 3.4 Semi-Structured Interviews conducted across projects and staff categories

The interviews allowed me the opportunity to reflect with participants on the Lean projects in their department or unit. This concept of respondent validation increases the credibility of the study as mentioned in Section 2.5 and Section 2.6. The interviews also allowed me to ask questions that would essentially test the theory developed above, across various projects. I had a sense that the projects that failed and succeeded had different areas of emphasis. However, I did not ask different questions to these respondents. If there was a demonstrable difference, it would guide us to develop a list of enablers and inhibitors for Lean implementation. All interviews were transcribed before undergoing a concept analysis as part of the testing phase, which led to the findings of this study.

The different projects and their characteristics are described in more detail so they can be put into perspective and the reader can relate their own project, to those of this study. These are compiled in Appendix 1 and will be relevant to those managers planning a Lean implementation. Each project involved a series of kaizen events over a period of time. They were done primarily by staff and facilitated by the researcher. Changes were planned at meetings and they were often guided by the sentiment of staff in combination with the clearly identified bottlenecks as identified by the value stream map. The value stream map was powerful in guiding interventions and measuring impact of interventions, and staff input on deciding which area to address was also carefully considered. In all projects, regular measurement was attempted but not always done (and eventually appeared to be an important enabler as this research demonstrated). The following criteria are described in Appendix 1 for each project: type of care offered, patient market served, annual throughput, staff compliment in unit, inception and impetus for project; specific problem area worked on; frequency of meetings; nature of meetings and role of facilitator.

In performing the concept analysis it is vital to know which projects were failures and which were successes. Since the focus of this study is not to look at the quantitative aspects of the projects, I will not go too deeply into this as there were many different measures across the projects. However, a simple criterion was used to determine success or failure of projects. All of the projects in this study evaluated a time aspect and if the waiting time at the end of the project exceeded the waiting time at the start of the project, the project was considered a failure. Waiting time could involve patients, results, forms or medication.

FAILURE= WAITING TIME AT END OF PROJECT >WAITING TIME AT START OF PROJECT

SUCCESS =WAITING TIME AT END OF PROJECT <WAITING TIME AT START OF PROJECT

PROJECT	TIME VARIABLE MEASURED	WAITING TIME AT START OF PROJECT	WAITING TIME AT END OF PROJECT	PERCENTAGE CHANGE	OUTCOME
OUTPATIENT PHARMACY	TIME DELAY FROM QUEUING FOR MEDICATION TO RECEIVING MEDICATION	4 HOURS 5 MINUTES	55 MINUTES	75% REDUCTION	SUCCESS
INPATIENT PHARMACY	TIME DELAY FROM SCRIPT BEING DROPPED OFF TILL MEDICATION LEAVES PHARMACY	2HOURS 8MINUTES	2HOURS 43MINUTES	27% INCREASE	FAILURE
EMERGENCY UNIT	TIME DELAY FROM DECISION TO ADMIT TO TIME PATIENT LEAVES UNIT FOR ADMISSION (MEDICAL PATIENTS)	13HOURS 30 MINUTES	10 HOURS	25% REDUCTION	SUCCESS
G5 MEDICAL WARD	TIME DELAY FROM DECISION TO DISCHARGE TILL PATIENT LEAVES WARD	5HOUR 52 MINUTES	6 HOURS 1 MINUTE	3% INCREASE	FAILURE
NEONATAL ICU*	TIME DELAY FROM TAKING BLOOD SPECIMEN FROM PATIENT IN THE WARD TILL RESULT RECEIVED IN THE WARD	5HOURS 36 MINUTES	5 HOURS 10 MINUTES	8% REDUCTION	PREMATURE ENDING

*This project seemed to be making good progress, but the manager of the area ordered an immediate stop to the project due a misunderstanding and the project was never restarted

Table 3.5 Summary of the projects and their outcomes

Table 3.5 provides an idea of what is being referred to when projects were deemed failures or successes. It will have more relevance as this chapter proceeds. This criterion of time was chosen carefully because Lean experts have recommended this as a starting point in healthcare process; and because it had practical implications. Womack and Jones (2003) advocated the use of Lean for the healthcare system and recommended that the first step is to put the patient at the forefront of the process and work on reducing time delays. Taiichi Ohno stressed the importance of reducing time by saying, "All we are doing is looking at the time-line, from the moment the customer gives us an order to the point when we collect the cash. And we are reducing the time-line by reducing the non-value adding wastes".

From a practical perspective, and because of increasing numbers of complaints from patients, the Provincial authorities put pressure on the hospital management to reduce waiting times. An additional reason for using time, enabled a 'hard' measure versus staff attitudes to Lean or management perception of Lean, which would be hard to measure reliably and easily. This study did not, however, focus on the statistical aspect of these values.

3.2.1 Analysis of the Interview Data Using Concept Analysis

Concept analysis is a formal process through which experiences are logically classified, relationships between concepts established, and a concept's attributes are defined (Walker and Avant, 1994). Defining a concept means identifying key characteristics of the concept which will include defining attributes, examples of the concept, antecedents of the concept, and consequences of the concept and empirical indicators of the concept. More details can be found in Section 3.5.

In this study the concept analysis was done in three consecutive steps. Firstly, each of the three core concepts of the theory was defined. Secondly, each of the five projects was evaluated and measured using the three core concepts. Finally, the outcomes of each project were then compared to each other, a meta-level analysis.

The first step constitutes a process of using concept analysis to define as completely as possible what a concept means, how it can be identified and how it can be measured. An example of this is shown below in Table 3.6 below:

ANTECEDENTS	ATTRIBUTES
• Managers are willing to engage the change process by being present and supporting where necessary • Staff are demoralized and disillusioned with their work • Staff believe that improvement is possible • Staff ideas are shot down • Silo mentality, where a unit only focuses on what they feel is their duty and nothing more. The patient's journey may be compromised by this thinking • Regards own unit as more important than other parts of the process • Environmental and organizational factors that inhibit change	• Motivating and encouraging staff to improve and generate ideas • Staff feel more comfortable offering their inputs and ideas • Ideas are seen as valuable and where possible tested • Looking at the whole patient journey rather than only the unit's part in it • Work together with other departments to improve • Ability to overcome some bureaucratic hurdles • Managers are actively involved in the change process

EMPIRICAL INDICTAORS	Satisfaction with clinical seniors	Staff engagement	Staff ideas are tested	Staffs ideas are recognised and acknowledged	Working with people outside of their own unit to improve patient journey	Instances of overcoming bureaucracy	Staff are comfortable giving their input	Regular meetings	Open discussions with a positive vibe & good communication	Taking a system view	Changes are not imposed	Presence of management	Management helps to make decisions and provides support	Improved working conditions
CODE USED IN ATLAS.ti	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14

CONSEQUEN-CES	• Encourages staff involvement • Feeling of being supported by management • Improved sense of collective purpose • Improved end-to end patient journey • Decreased staff frustration • Staff feel empowered to make changes and improvements

Table 3.6 Concept Analysis of 'Safe Space'

The concept of '**Creation of safe spaces influences willingness to engage in an improvement project**' is explored above. The antecedents, attributes, empirical indicators and consequences are outlined for this concept above. This was also done for the two other main concepts: 'Using hard facts to identify and solve problems' and 'Disposition of staff to embrace improvement initiatives', that emerged.

3.2.2 Evaluating Each Project Using Concept Analysis

Step 2 of the concept analysis process involved actually measuring the presence or absence of the empirical indicators in each project separately. At this stage it is important that the data from each project be kept separate and not pooled. I used Atlas.ti to assist with the measuring process by assigning each empirical indicator a code (e.g. C1, C2, C3, A1, B2). Using the empirical indicators above, each project was 'measured' using a coding technique. An empirical indicator (e.g. C7 - staff are comfortable giving their input) could have a positive and a negative aspect. Hence, each empirical indicator had a positive (C7) and a negative code (-C7). In some projects there would be more examples of where the staff was comfortable giving their input compared to others where they were not. In total there were 46 empirical indicators across the three core concepts from the interim theory (A, B, C). As mentioned, the data used for the concept analysis as mentioned was derived from a broad set of interviews with stakeholders involved with the respective projects as illustrated in Table 3.4. This reduced the risk that an individual's opinion would bias the concept analysis and improve the representivity of the sample. Below I have captured a screenshot of how coding was used as part of the concept analysis (Figure 3.11). I read every line of the interview responses and where applicable attached an empirical indicator (+1 or -1) to a phrase or sentence.

whereas you involved us with discussion and then you sort of came to an agreement: this is how we would like to do it.

0498

0499 **3** Was I sufficiently available to you and your team during the course of the project? All the time, all the time and also we could just pick up the phone - you were always available. If you didn't come down, we could get you on speed dial, or you were available. My speed dial does still work.

0500

0501 **4** When I assisted in making a case for change i.e. Getting the data to help you prove and change the way you did things, did you find this obtrusive or relevant? I think they found it relevant to improve the unit. It's just there were problems because sometimes the manpower was the problem. Like nursing felt it wasn't their responsibility to have been clerical and clerical felt visa versa, so that needs to be ironed out.

0502

0503 **5** When a facilitator, like me, comes to assist your team, what's important for me to know? Firstly to know who the people are, the managers. Get to know the people and then interacting with the staff and then to find out what the problems are, because if a person hasn't got knowledge and insight it's gonna be very difficult. I think you engaged with all of us. You knew exactly who was the operational manager; who was the deputy manager; who was the in charge here. So it was easy for you and you interacted with the Mr Helford and them; with security; the porters, so that person needs to have that insight.

0504

0505 **6** How important is it to build relationships with your team and understand the people dynamics before facilitating a change process? Absolutely because a person puts foot in the unit.

0506

0507 **7** Could you continue this project without a facilitator going forward? It is gonna be very difficult. I think we need a facilitator.

Figure 3.11 Screenshot of coding process for concept analysis.

This process bears some similarity to the Level I coding process as part of the theory building phase. The important difference between these two processes is that, one is searching for emerging patterns, and in this process, one is measuring the existence of predetermined indicators. Following on the process above, the preponderance of certain empirical indicators started to become apparent. I will show as an example some of the C7 quotes/comments from the Emergency unit project. There were 16 positive quotes for C7 (Staff are comfortable giving their ideas) and five negative (-C7) illustrated in Figures 3.12 and 3.13 below. This is interpreted as a positive dominance. There were instances where staff did not feel comfortable contributing but overall there were more quotes or comments that pointed to the fact that staff did feel comfortable contributing. This leads us to the numeric comparisons across indicators and projects.

[1:422][1244]
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no the team deffinately took ownership of it and the fact that everyone . We had very vocal meetings . That was the nice thing as well as having the nurses involved as well. You cannot have these sort of changes from a doctors perspective and form management and doctors perspective and not involve the nurses because they such a big part of the workforce and the good thing about it was they wer all onboard and that actually made a lot of the issues a lot easier.

[ ]

Ja, I think these meetings are very good; it does open us up to that, ja. Because everyone is giving their own opinion, but at the end of the day we can see that we need to try something. Ja, so it opens people up.

[1:81][173]

Ja I think they were, definitely. I think there was a reasonable amount of discussion around most points, which means you don't just come there, you say your thing and then it gets done,

[1:365][934]

Improvement; or just coping with what they have got, because the problem is if they keep improving things … it is not that they don't want to improve, it is just that why must we keep doing things: answering the phone; doing this, doing that; solving that problem; meanwhile management knows that we need a clerk; we need that. We keep solving the problem, but they don't know what. They don't know; they think everything is working hunky dory, don't worry about it

[1:374][964]

Ja, definitely, yes. Like what I said now, yes definitely.

[1:128][260]

And then at the end of the three months you need to have a debriefing session. So, you need to have from every single Registrar, in a format such as this, where it is anonymous, where people actually express their minds, in a very quick break down session as to what problems they encounter and how they think things need to be improved. I think you would learn a lot from that. I think the atmosphere needs to be appropriate; it must be an atmosphere of: we are here to learn; we are here to improve; we are not here to victimise; and the intention is to get your thought

[1:368][976]

You have a lot more interaction with us. You are here; you are quite visible; and you are very open; very approachable. These are the things I noticed, you know. So, we feel more comfortable.

[1:195][395]

Yeah, I would speak up about it. I mean, I have spoken to my unit manager; I have spoken to ___ about it - about some of the concerns that I have had. I still need to speak to ___ about it. I have no problems voicing those ideas on what I think needs to be done.

[1:371][959]
----
t has changed. Many respects it has changed, ja. It has still got a long way to go. From a junior point of view, a lot of young doctors want to make certain input, but there is no room for them to make input and to contribute to change. In that sense, not really. Most of the changes are being made by senior people, like ___ and you and maybe me and that, so as a department as a whole, for most of the people, they have very little say. That is my observation. But there has been some improvement and now I think we are listening to them more than before. We have made that incident case book and we are trying to respond to it.

[1:111][223]

I'll give you an example: when we worked in Oz, the nursing sisters packed the store carts. They get the stock in a box and they fill the stuff up. Because they go: this is the blood taking trolley; this is the LP trolley. So, if you wanted to do an LP you walk to one place and you put a sign there 'LP'; 'Bloods'; 'Drips'; and everything you get is in there. It will save you hours [and frustration as well]. And also, when things go missing, you can see there are no blood tubes. You don't have to go: maybe there are some in the other cart; and in the other side. So that is just an example of what I mean by the micro systems. So as the macro systems change, try and filter in one or two because you can easily map out what are all the micro systems the doctor does in the day: blood taking; drip taking; writing note

[1:391][1018]

___ s the power, you know. And then she listened to different suggestions and then she makes up her mind: okay this is what we do. If it doesn't happen, let me know; I will do the fight. That's how it works. So, I think ___ and you play a major role

[1:80][171]
----
ble putting these ideas forward or do you not get that opportunity? And would you in the project meetings?

[1:8][14]
----
n April 2009 Dr___ convened a workshop.

[1:415][1233]
----
ng in casualty to try to make it better. Not only they see the patients not getting ediquete care and they also see. and everyone want to improve their own working environment as well. so from a nursing staff, porters and cleaning staff and the doctors. yes everyone strives to make it better. the difficulty comes when you move beyond that and try to implement things.

[1:36][39]
----
best people on the ground, so we know exactly what is going on. People can always surmise looking from outside in, but I think we have probably got the best insight into what needs to happen from hereon forth. So, if they do ask us our opinions, I think we can give very valid and pertinent information.

[1:395][1039]
----
r has been stuck with the same senior clinicians for twenty-five odd years and there is now a new turnover of clinicians coming in and I think they are coming in with new ideas and innovations to start to shift things on. I think they were more encouraged.

C7

Figure 3.12 Codes/Quotes associated with C7 indicator for the Emergency Unit project

[1:219][439]

I have spoken to some of my colleagues before and I have said: look, it is pointless you as individuals going out there to ▓▓▓▓▓▓▓for example, saying that this is a problem, or that is a problem. It is an individual voice. Even Paul has written notes before and gotten people to sign but I think what has not been tried is a unified one voice from people working on a shift and having not one, not two, but continual meetings to put pressure on people like ▓▓▓▓▓▓▓ on the management to say: look, we are not happy; we are really, really not happy. I don't know if they really realise the magnitude of the problems that we face and the problems that we are going through. I think they might have an idea, but I don't think they fully realise it.

[1:84][178]

I think the tricky part in casualty and this is always something that I have had a problem with, is that you have got your people in charge that make the rulings and the policies and all the rest of it; and then you have got your workforce. The difficulty in casualty and it is different to any other department is, say I'm on the G Floor and I go and have a look and all the interns are having a meeting at one o'clock, you will get a 90/95 % attendance. You can deliver your message and people can raise their opinions and all the rest of it. But when you have a team that works in three shifts, one of which includes a night shift and another one that includes the afternoon shift, it is very difficult to stand in the middle of casualty and go like: everyone, we are going to have a meeting now just to quickly discuss how we are changing the bed policy. Technically you are going to land up having at least two meetings, if not three meetings to cover the person that is off; the person that is on night; the person … so in other words, I always find it difficult to get the message across to a casualty team, once they have started.

[1:148][280]

Let's look at clearly defined roles: the person who is evaluating and managing patients should be should be evaluating and managing patients. Realistically it should take twenty minutes to see a patient, institute orders and do that; you can do that routinely. However, it will take you at least forty minutes to do that in C15, because you are running around look for a drip; looking for venthons; looking for rescuscitation equipment; you are looking to find a trolley to put the patient on; the trolley doesn't work, it is broken. So, as a doctor, you are actually not performing your function. That is one of the greatest inefficiencies in C15 at the moment. So, you are paying people doctors' salaries, but you are requiring them to do stuff that is way below their job script. That is purely a reflection of the resistance of management to employ more staff.

[1:194][391]

One of the things that we were crying out for was a room for the clothes. Where we undress the psychs people, their clothes are around the corner. Psyches wakes up; he gets his clothes; he goes away. It has happened before. And we have been crying out: get us a room, get us a room, so that we can lock the stuff up and the clothes can be safe. What people didn't do is that before they didn't undress the psychs people, but what I am talking about as far as improvement is concerned and this is what I have been taught and it helped: when psychs people come in, you undress them. Anyone with strange behaviour coming in, you undress them and take their clothes away. There is that individual kind of improvement as far as the working nursing style is concerned and I can only speak from the nursing point of view. But as far as the managerial point of view is, we get the feeling that there is a lot of resistance. They keep on saying: we are going to get it; we are going to get the room for you; we are going to get the room, but we see nothing. But that is just one of many.

I think that individuals in the department, in an individual and isolated basis encouragement new things, but not as a collective, structured, unified system. I have spoken to people, I have spoken to ▓▓▓, a friend of mine; I have spoken to ▓▓▓▓▓; I have spoken to ▓▓▓▓▓; I have spoken to people and they've always given their opinions about what they believe should be done and what can be done and you know, encouragement to do better is there, but you need to get past a certain group of people to be able to see improvement. I believe from a management point of view, no, there is no encouragement. I am talking from the nursing management point of view: the head.

-C7

Figure 3.13 Codes/Quotes associated with -C7 indicator for the Emergency Unit project

Each project now has a list of empirical scores (positive and negative) for each indicator, as illustrated below in Table 3.7. Each quote or comment relating to an empirical indicator is scored +1 or -1. The net result is used the next stage of the concept analysis, where we look at the projects at a meta-level.

EMPIRICAL INDICATOR	EMPIRICAL INDICATOR LABEL	POSITIVE INDICATORS	NEGATIVE INDICATORS	NET RESULT
A1	Changes made on real fact versus gut feel	51	2	49
A2	Task with clear specification of who does what, when	21	5	16
A3	Focussed problem solving to find root causes	6	1	5
A4	Actively monitored interventions	17	1	16
A5	Recognising the need for change	28	3	25
A6	Reducing variability and standardising tasks	6	0	6
A7	Level of chaos	5	0	5
A8	Knowing the demand and the capacity	15	2	13
A9	Extent of improvement	15	0	15
A10	Structured plan for improvement using PDCA	33	4	29
B1	Participation by staff	29	2	27
B2	Time facilitator spends building relationships and observing	30	1	29
B3	Teams efforts are acknowledged and teams are thanked	2	0	2
B4	Impact of facilitator	39	1	38
B5	Spirit of working towards one goal	16	12	4
B6	Staff are optimistic about change	25	8	17
B7	Preparing and empowering staff to make improvements	13	4	9
B8	Sensitised to poor service delivery	8	1	7

B9	Facilitator support	27	0	27
B10	Relationship between project leader and staff	3	0	3
B11	Staff will continue to improve	4	9	-5
B12	Small wins	6	0	6
B13	Sense of urgency	5	14	-9
C1	Satisfaction with clinical seniors	11	3	8
C2	Staff engagement	0	0	0
C3	Staff ideas that are tested	9	7	2
C4	Staff ideas are recognised and acknowledged	16	1	15
C5	Working with people outside of their own unit to improve the patient's journey	7	19	-12
C6	Instances of overcoming bureaucracy	1	4	-3
C7	Staff are comfortable giving their input	18	5	13
C8	Regular meetings	10	1	9
C9	Open discussions with a positive meeting vibe and good communication	11	5	6
C10	Taking a systems view	21	2	19
C11	Changes are not imposed	13	2	11
C12	Presence of management	6	27	-21
C13	Management helps to make decisions and provides support	10	44	-34
C14	Improved working conditions	6	3	3

Table 3.7 Empiric scores of Emergency unit project

Each of the five projects was analysed in this manner and the outcomes of this are found in Table 3.8 below. This leads us to the final step of the concept analysis which is the outcome of the theory testing stage.

3.2.3 Outcomes of the Concept Analysis

The final step involves comparing the outcomes of each project, in the form of Table 3.8. The empirical indicators above facilitated a process through which projects could be compared and contrasted. In total there were 46 empirical indicators for the three concepts. Essentially the net result (positive less negative empirical indicators) of each project was compared to emphasise difference between projects (Table 3.8). Significant disparities were observed between successful projects and failed projects as illustrated below.

	GENERAL MEDICAL WARD	EMERGENCY UNIT	INPATIENT PHARMACY	OUTPATIENT PHARMACY	NEONATAL
A1	2	49	0	7	13
A2	-4	16	-1	6	3
A3	0	5	-3	7	7
A4	-3	16	-6	3	7
A5	-6	25	1	10	10
A6	0	6	-1	1	0
A7	-3	5	-1	1	0
A8	4	13	2	3	1
A9	0	15	4	7	8
A10	-7	29	-10	7	3
B1	-3	27	-6	7	1
B2	14	29	13	16	18
B3	0	2	0	2	0
B4	7	38	8	18	11
B5	-3	4	-3	3	4
B6	5	17	6	15	7
B7	-5	9	2	6	2
B8	-2	7	1	5	-3
B9	9	27	10	10	5

B10	0	3	0	0	1
B11	-11	-5	-5	-6	-3
B12	0	6	-4	2	6
B13	-9	-9	5	-5	-2
C1	-4	8	8	8	5
C2	0	0	0	0	0
C3	-3	2	-3	1	0
C4	-4	15	-5	9	1
C5	-15	-12	-5	-7	-12
C6	-2	-3	0	0	-1
C7	-4	13	-5	5	11
C8	0	9	1	5	-1
C9	-9	6	-3	1	-3
C10	0	19	6	7	10
C11	-2	11	10	4	13
C12	-12	-21	-3	-1	-4
C13	-18	-34	-2	2	-11
C14	-1	3	2	5	5

Table 3.8 Table of all projects having undergone concept analysis

This data was then translated into a line graph which illustrates disparities between the empirical indicators.
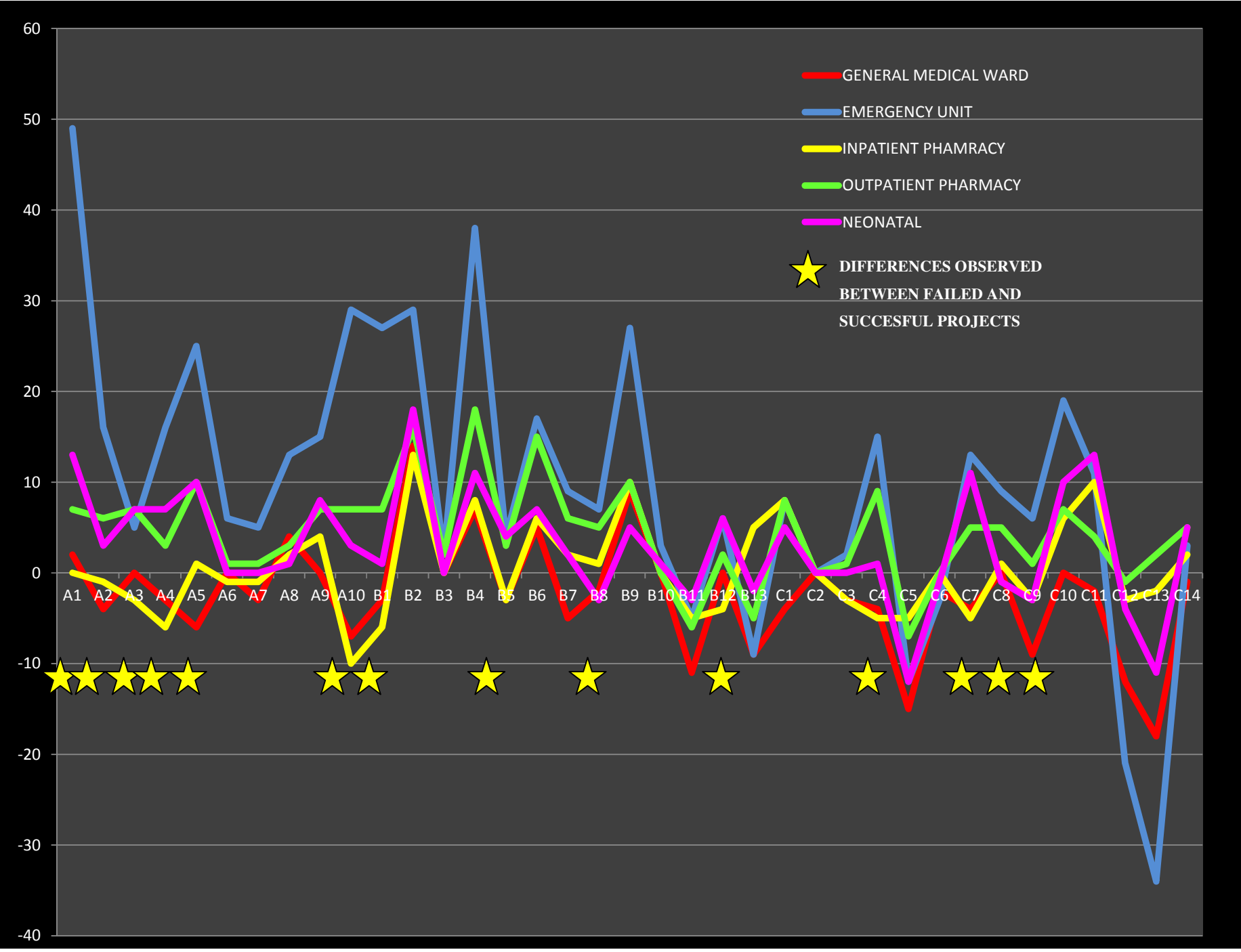
Figure 3.14 Outcomes of Concept Analysis
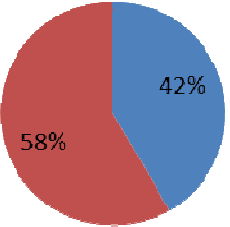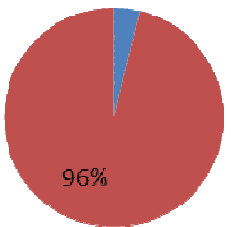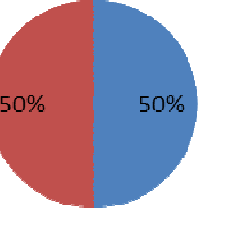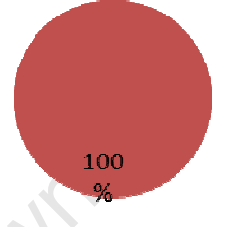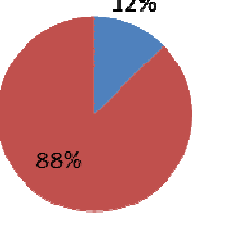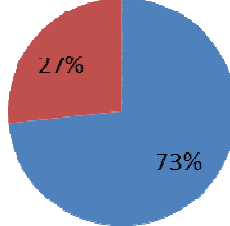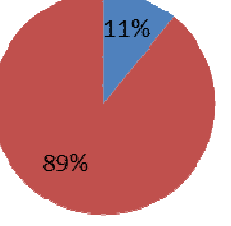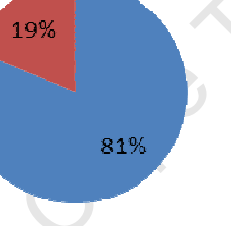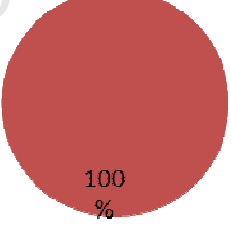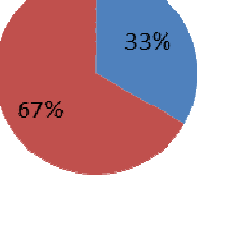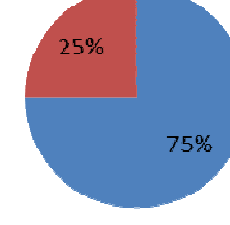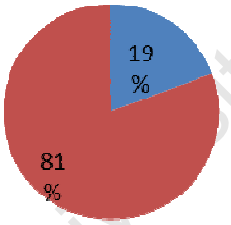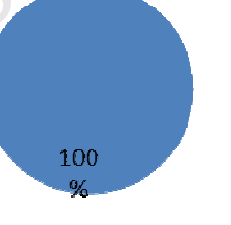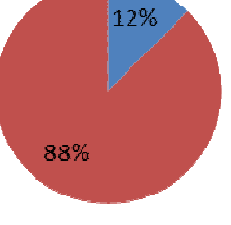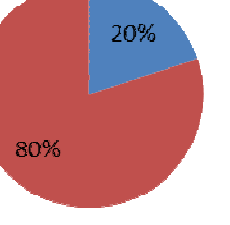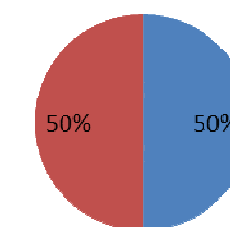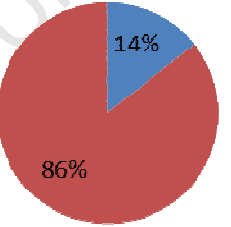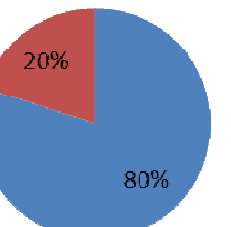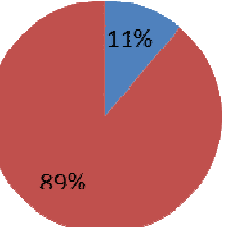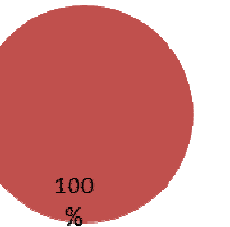
The projects shown in green and blue lines were successes; the yellow and red lines represent failures and the pink line represents a project that was prematurely terminated but up to that point was a successful project. When looking at Figure 3.14, 3.15 and 3.16, one can start to appreciate the disparities between the successful and unsuccessful projects. I have highlighted particular points of disparity with yellow stars and they include:

- A1, A2, A3, A4, A5, A10
- B1, B5, B8, B12
- C4, C7, C8, C9

However, the differences are not as obvious and so Figure 3.15 depicts the differences in a more illustrative way. The pie charts show the proportion of the negative to positive presence of the indicators across successful and unsuccessful projects. If one looks at A1, for example, by looking at the proportion of red to blue one can see how there are clear differences between the projects that failed and those that succeeded. In the ones that failed (Medical Ward and Inpatient Pharmacy), there is a much higher proportion of blue indicating that these projects had more of the Negative A1 indicator relative to those that succeeded. More examples are shown below for further illustration.

These differences represent significant steps forward towards understanding what enables and inhibits Lean implementation. The discussion on what this means will be completed in Section 3.3 and 3.4.

	MEDICAL WARD - FAIL	EMERGENCY UNIT - SUCCESS	INPATIENT PHARMACY- FAIL	OUTPATIENT PHARMACY - SUCCESS	NEONATAL ICU- PREMATURE ENDING
A1	42% / 58%	4% / 96%	50% / 50%	0% / 100%	12% / 88%
A10	27% / 73%	11% / 89%	19% / 81%	0% / 100%	33% / 67%
A2	25% / 75%	19% / 81%	0% / 100%	12% / 88%	20% / 80%
A3	50% / 50%	14% / 86%	20% / 80%	11% / 89%	0% / 100%

	MEDICAL WARD - FAIL	EMERGENCY UNIT - SUCCESS	INPATIENT PHARMACY- FAIL	OUTPATIENT PHARMACY - SUCCESS	NEONATAL ICU - PREMATURE ENDING
B5	36% / 64%	43% / 57%	38% / 62%	44% / 56%	30% / 70%
B8	40% / 60%	11% / 89%	33% / 67%	22% / 78%	29% / 71%
C	17% / 83%	6% / 94%	27% / 73%	24% / 76%	40% / 60%
C	38% / 62%	22% / 78%	35% / 65	31% / 69%	18% / 82%
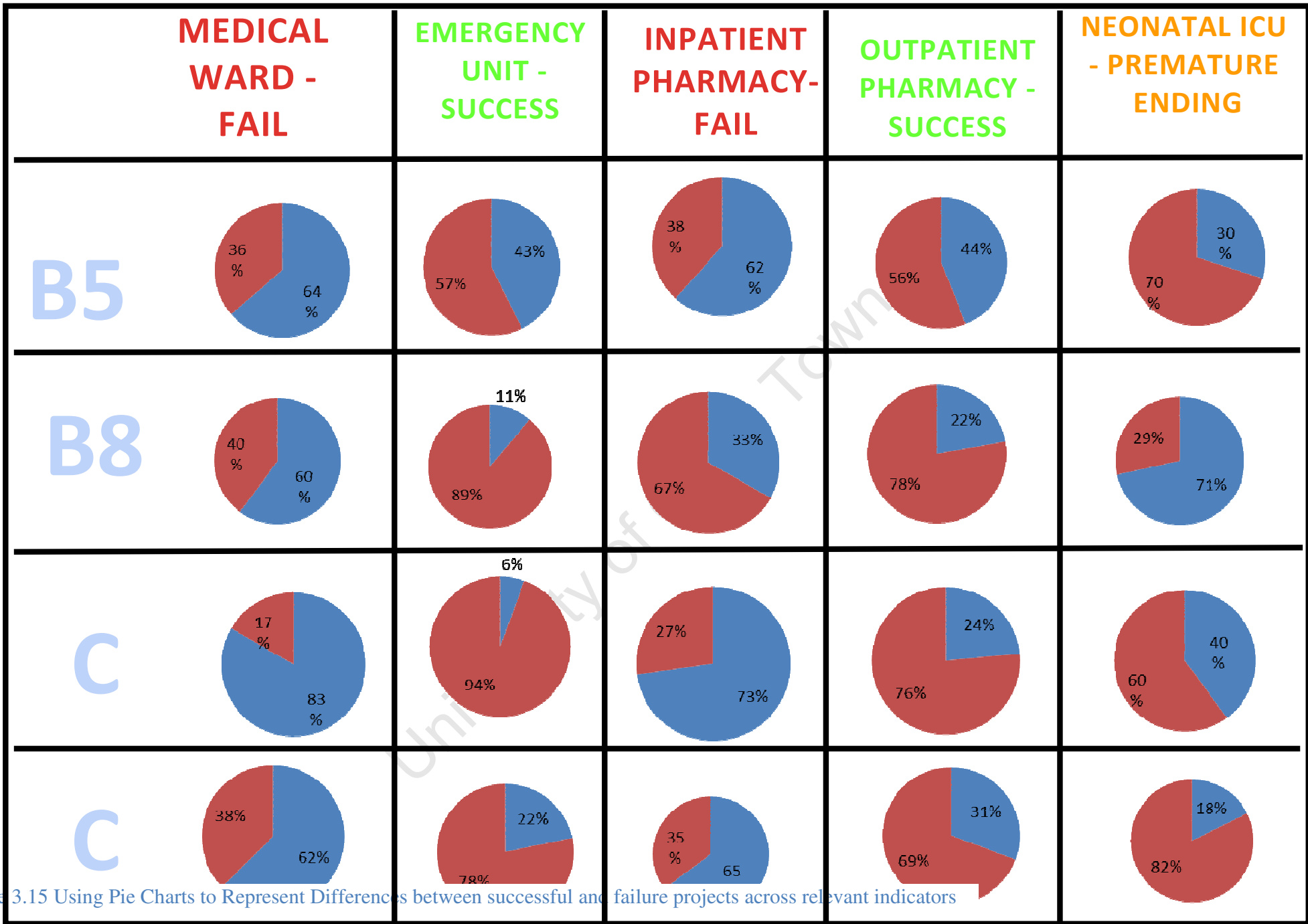
Figure 3.15 Using Pie Charts to Represent Differences between successful and failure projects across relevant indicators

When looking at Figures 3.13 to 3.15, an interesting pattern emerges. The projects that failed have lower levels of certain empirical indicators compared to those that succeeded, indicating some relationship between these empirical indicators and the outcome of Lean projects. The concept analysis provided an objective technique of determining the presence or absence of empirical indicators across the five projects. At the meta-level this has provided important clues about which components are important aspects to consider in Lean implementation (refer to Figure 3.14 and look for the starbursts). Figure 3.14 assisted me to identify the empirical indicators in which there seemed to be a noticeable difference. I used this to develop pie charts for these 13 indicators to better illustrate the differences between them across projects. In Figure 3.15, pie charts of the relevant empirical indicators have been drawn where blue indicates the negative level and red indicates the positive level of a given indicator in a given project. One can see that the projects that succeeded (Emergency Unit and Outpatient pharmacy) have visibly more red (positive indicators), as compared to the failures which have more blue.

3.3 THEORETICAL IMPLICATIONS OF THE THEORY

This chapter demonstrated a journey from raw data to final theory, using data collected using AR and analysis using grounded theory. The theory offered is rooted in data that was collected over an 18-month period at SHH. Between cycles of data collection, data was coded and analysed further refining codes and categories leading to the development of the theory (Figure 3.1). The theory was subsequently tested using concept analysis to highlight certain characteristic differences between projects (Figure 3.14).

In this section I wish to elaborate on the theory and discuss its theoretical implications. An integral part of this discussion is looking at how the theory that was built linked to the outcomes of the tests the theory underwent.

3.3.1 Explanation of the Theory

> **THE FINAL THEORY (Figure 3.19)**
>
> This study offers a theory to illustrate the relationship between concepts that affect the outcome of Lean Projects. Two concepts: 'The creation of Safe Space' and 'Disposition in staff to embrace improvement projects' directly influence the state of 'Lean Readiness'. 'Lean Readiness' can be seen as the antecedent for Lean implementation, the absence of which may result in unsuccessful projects. The state of 'Lean Readiness' is linked to the 'outcome of Lean projects', mediated by the effect of using 'Hard Facts to identify problems and develop solutions'. The concept of using 'Hard Facts to identify problems and develop solutions' is part of a reinforcing cycle with the 'outcomes of Lean projects', as more data is used to identify problems and develop solutions, the outcomes of Lean projects will improve, which will motivate them to continue improving.

The final theory alludes to important relationships and ideas about Lean implementation. It demonstrates the relationships between the core concepts of this study, showing how they positively or negatively influence each other. It is clear that the concept of 'Lean Readiness' is important in the outcome of Lean projects and that using hard measures and structured problem solving, allow a 'Lean Ready' site a better chance at success. Each of the concepts linked to safe space and staff embracing change are constituted by a range of empirical variables. This study aims to extract those empirical indicators that appear to enable or inhibit Lean implementation. The theory testing phase elicited those factors which appear to consistently be markers of success and failure.

I have tabulated the areas of difference between successful and unsuccessful projects with a view to incorporate this into the theory. Table 3.9 represents the areas where those projects that failed were outshone by those that succeeded. There were no areas where the projects that succeeded consistently scored lower than those that failed. This list can now be used to refine the original theory to incorporate the indicators below and provide propositions derived from this theory.

CODE	EMPIRICAL INDICATOR
A1	Changes made are based on real facts versus gut feel
A2	Tasks have clear specification of who does what, when and how
A3	Focused problem solving to find root causes
A4	Actively monitoring interventions
A5	Recognising the need for change
A10	Structured plan for improvements (using PDCA)
B1	Participation by staff in improvement initiatives
B5	Spirit of working towards one goal
B12	Many small wins were achieved during the project
C4	Staff ideas are recognised and acknowledged
C7	Staff are comfortable giving their input
C8	There are regular meetings focused on improvement
C9	Discussions are open with a positive vibe and good communication

Table 3.9 List of Empirical indicators showing differences between successful and unsuccessful projects

FINAL THEORY OF FACTORS AFFECTING OUTCOMES OF LEAN IMPLEMENTATION

DISCUSSIONS ARE OPEN AND POSITIVE, WITH GOOD COMMUNICATION

STAFF ARE COMFORTABLE GIVING THEIR INPUT

STAFF IDEAS ARE RECOGNISED & ACKNOWLEDGED

STRUCTURED PLAN FOR IMPROVEMENTS (USING PDCA)

RECOGNIZING THE NEED FOR CHANGE

SAFE SPACE IS NOT IMPORTANT

THERE ARE REGULAR MEETINGS FOCUSED ON IMPROVEMENT

FOCUSSED PROBLEM SOLVING

A

D

SAFE SPACE CREATION

HARD FACTS ABOUT PROBLEMS AND DEVELOPMENT OF SOLUTIONS

OUTCOME OF LEAN PROJECTS

LEAN READINESS

TASKS ARE CLEARLY SPECIFIED WHO DOES WHAT WHEN AND HOW

ACTIVELY MONITORING INTERVENTIONS

CHANGES MADE DURING THE PROJECTS ARE BASED ON REAL FACTS VERSUS GUT FEEL

STAFF EMBRACE IMPROVEMENT

SPIRIT OF WORKING TOWARDS ONE GOAL

CHANGE IS IMPOSED

PARTICIPATION BY STAFF IN IMPROVEMENT

MANY SMALL WINS ARE ACHIEVED

Figure 3.16 Final theory using system archetypes to identify relationships between concepts

3.3.2 Outcomes of the Theory

If there is some correlation between what is predicted and the outcome of the testing phase, the theory can be considered to be useful (Christensen, 2006). It is usual in a theory building study to develop hypotheses or propositions as an outcome of the study. This provides an opportunity for any future study that attempts to validate or refute the theory, add to the theory or refine the theory. In this study the aim was to understand the enablers and inhibitors of Lean implementation at SHH. The study has culminated in the final theory presented above. The theory sensitizes those implementing Lean in healthcare environments to high leverage areas in creating 'Lean Readiness' and in using facts to detect and solve problems. From this theory I have developed propositions in keeping with the outcome of a grounded theory study. Propositions are different to hypotheses in that propositions contain concepts and hypotheses contain measures (Whetten, 1989). Propositions are very useful when offering a new theoretical position (Whetten, 1989). Based on Figure 3.16 I had one central proposition, with four sub-propositions:

Central Proposition: **Outcomes of Lean projects at Southern Hemisphere Hospital are dependent on the degree of Lean readiness mediated by the focus on facts to identify and solve problems.**

Sub Proposition 1: **Lean readiness is dependent on the disposition of staff to embrace Lean and the creation of a safe space for Lean to be implemented**

Sub Proposition 2: **The disposition of staff to embrace Lean is dependent on:**
- The spirit amongst team members working towards one goal
- The degree to which staff participate in improvement initiatives
- The extent to which 'small wins' are achieved

Sub Proposition 3**: The creation of a safe space influences willingness to engage in improvement projects and is dependent on:**
- The nature of discussions being open, positive and with good communication between staff members
- Staff feeling comfortable giving their input
- The extent to which staff ideas are recognised and acknowledged
- The regularity of meetings focused on improvement

<u>Sub Proposition 4</u>**: Lean outcomes are mediated by the degree to which facts are used to identify problems and make improvements compared to gut feel and is dependent on:**

- Degree of focused problem solving
- The extent to which changes are made based on real data versus gut feel
- The degree to which tasks are clearly specified in terms of who does what, when and how
- The extent to which intervention are actively monitored
- The extent to which there is a recognition for the need to change
- The extent to which structured plans are used to improve (PDCA)

A 1989 Academy of Management Review issue presented several guiding articles for researchers who planned to build or contribute to theory. Among the contributors were well recognised scholars such as Weick, Whetten, Bacharach and Eisenhardt. Whetten (1989) provides an insightful description of what good theory should contain. He refers to four elements including 'what', 'how', 'why' and 'contextual boundaries'. I will briefly summarize the theory using this structure.

'What' refers to the important variables or concepts that are crucial in explaining the basic social process of the theory (Whetten, 1989). Researchers are warned to keep a balance between too much detail (loss of parsimony) and too little detail (lacks comprehensiveness). In this study the three concepts are explored in depth in Section 4.1.4 along with locating them in the literature. In addition to this, a clear path was followed and illustrated in this chapter, showing how these concepts were derived and what their components were. Based on the theory testing done in Section 3.2, Figure 3.16 offers an overview of the leverage points for each of the three concepts.

The 'how' of Whetten's (1989) framework speaks to the identification of relationships between the important concepts and variables. Whetten (1989) promotes the use of 'boxes' and 'arrows' to facilitate and conceptualise an otherwise potentially complex story. In this chapter I have made use of many diagrams and tables to explain relationships. Most notably amongst this was the use of theoretical coding and system archetypes to develop the final theory as depicted in Figure 3.16. This figure does not illustrate all the possible linkages between all the original categories and those depicted in Figure 3.16. The reason for this is that the linkages presented have been proven to have some causal relationship with the theory

and hence are included in the final theory. While other categories may well have some relationship, this study was not able to establish an evidence base for them.

The 'why' of Whetten's (1989) framework speaks to the relevance of the theory and the credibility of the theory. The extent to which rigorous, traceable procedures were followed in developing the theory relates to the 'why' of theory. In addition, the theory should not have validated all relationships between categories as this leaves little room for further experimentation (Whetten, 1989). Most of the first half of this chapter has detailed the process followed in developing this theory which was underpinned by grounded theory techniques. In Chapter 2, I detail the efforts made to increase credibility and repeatability of the process and thus manage the challenges this type of research poses. In the theory presented, one can appreciate that it has explained some of what was expected from the theory testing phase. Christensen (2006) mentions that good theories are those that are built and that some prediction is made about its value or outcomes. If the outcome of the testing process is in keeping with what was predicted, the theory is considered 'good'.

Finally, Whetten (1989) suggests that clear boundaries be placed on theories by defining the contextual and temporal limits. Asking who, where, and when are good leading questions for establishing these boundaries (Whetten, 1989). This research is likely to be more relevant in healthcare organizations where many of the same nuances are present. Even though the study focused on Lean implementation, there may be many lessons that could be shared with other improvement methodologies such as Total Quality Management, Six Sigma and Business Process Reengineering. Lastly, I think this theory is most relevant for those who wish to implement Lean and, or, for researchers who wish to further explore issues of Lean implementation in healthcare. Another important distinction that is worthy of mention is the fact that the study was based at a hospital in a developing country.

3.3.3 Elements of a good theory

In addition to some of the elements of good theory discussed above with Whetten's framework (1989), there is substantial literature guiding researchers towards quality criteria for theories. For example, Christensen (2006) reinforces one of Whetten's recommendations to define where the theory is applicable, in other words the importance of defining contextual boundaries of the theory.

Internal validity of theory building is the extent to which conclusions are logically drawn from the data; and other plausible explanations linking the data to the outcomes have been excluded (Christensen, 2006). One way to increase validity is to look at the same phenomenon from many different perspectives (Christensen, 2006), which grounded theory offers. External validity can be seen as the extent of generalisability, the degree to which outcomes in one context can be applied to another context (Christensen, 2006). External validity can be improved through a process of categorization: the more mutually exclusive the categories are, the more people in other contexts can relate to the theory (Christensen, 2006).

Pettigrew (1987) advised against abstract theories and rather called on theories to deal with practical and real problems that exist. Karl Weick (1989) also highlighted that orthodox theory building has led many times to theory that places its emphasis on validation rather than practical value or usefulness. This study was borne out of a practical dilemma on how to implement Lean in a particular healthcare organization. For this reason the study consciously addressed this which will be detailed in Section 4.4.

Wacker (1998) published an article concerning theory building in operations management. In this article he outlines four basic criteria a theory must include:

1) **Conceptual definitions** – this can be likened to the 'what' of Whetten's (1989) framework

2) **Domain limitations** – Similar to the contextual boundaries and limitations in Whetten's (1989) framework

3) **Relationship-building**: every variable should have a clear relationship to all other variables in the model. These relationships must be explicitly stated to demonstrate internal consistency. Whetten (1989) refers to this as the 'how' of theory building.

4) **Predictions** about what will work and where the theory will be best suited etc.

Wacker's (1998) suggestions strongly influenced my drafting of the final theory. Point 1 was covered during the concept analysis part of the study, while points 2 and 3 are covered in more depth in the Literature chapter below. Point 4, regarding the capacity of a theory to make predictions, is more suited to quantitative studies. This study aims to sensitize future Lean implementations to what works and what to be wary of when implementing Lean. A good theory is said to be plausible and its plausibility is related to how interesting it is, how

unexpected connections are defined, how aesthetically pleasing it is, and how well it is explained (Weick, 1989).

Bacharach (1989) points out that the utility of theory refers to the usefulness of the theory to predict and, or, explain phenomena. In this study the theory predicted some correlation between change readiness, outcomes of the change project and use of hard data to identify problems and solve them. Through concept analysis the study is able to bring those correlations to the surface in identifying which factors lead to change readiness; which factors influence the focus on hard facts and problem solving; and finally, how these in combination lead to the outcomes of change projects.

I have replicated Wacker's (1989) table of important virtues to consider, when building theory in the realm of operations management. Refer to Table 3.10 below which I have adapted to describe how these virtues were addressed in this study.

VIRTUE	KEY FEATURE	HOW THIS VIRTUE WAS ADDRESSED IN THIS STUDY
UNIQUENESS	Theories should be different from each other	Currently there is no formal theory around how to implement Lean in healthcare organizations. Secondly there is a paucity of studies based in developing contexts that allude to the enablers and inhibitors of Lean implementation in this context.
CONSERVATISM	The new theory cannot replace the older one, unless it's is superior in its virtues	Not really applicable as explained above
GENERALISABILITY	The more areas the theory can be applied to the better the theory	While this theory cannot be 'generalized' in the quantitative sense of the term; the theory offers both practical and theoretical value by sensitizing future Lean implantation efforts of the antecedents to watch out for.

FECUNDITY	The more hypotheses the theory generates the better	It is not clear how many is good from this virtue, but the study provides many options for further investigation both in depth and breadth.
THEORY SIMPLICITY AND PARSIMONY	The fewer assumptions the better	The assumptions of this study are discussed in Section 1.8
INTERNAL CONSISTENCY	The theory identifies all relationships and gives adequate explanation	The theory contained many relationships and most were discussed in significant detail in order to explain the appropriateness, evidence base and value offering of these relationships.
EMPIRICAL RISKINESS	A 'good' theory should be easily refuted	The theory offers the opportunity for empirical testing based on the propositions put forward in Section 3.3.2
ABSTRACTION	The more relationships that are found, the more abstract the theory will become and the more independent of time and space it is.	The grounded theory method was particularly constructive in addressing this virtue as it forced constant comparison and theoretical coding. This forced me to look at possible relationships between codes, categories and concept numerous times throughput the study.

Table 3.10 Virtues of good theory (Wacker, 1998) and how these were addressed in my study

In concluding the findings chapter, true to the grounded theory process, it is now necessary to locate these findings in the broader literature in order to determine the contribution of this study.

4. LITERATURE REVIEW

The purpose of this chapter is to locate and validate the theory this study offers in relation to the relevant aspects of the extant literature. In doing this, I found that the theory was linked to three broad areas in the literature including organisational change, Lean implementation and three specific concepts of problem solving, safe space creation and engaging staff in the change process. The literature review in grounded theory studies primarily assists the researcher to locate their theory, and hence is performed towards the latter part of the study in order to preserve the emergence of the theory (Stern and Allen 1984; Lincoln and Guba, 1985) and to locate the results within the literature.

Figure 4.1 below illustrates how I have conceptually linked the findings of this study to the broader literature. I see this as a funnelling process where I review the literature on organizational change, focusing specifically on innovation as a form of change. Lean is a form of process innovation. I have chosen the common 'threads' that can be traced from the very broad literature on organizational change, to the Lean healthcare literature and finally linking this up with the study's findings. This enabled the identification of the elements that are novel to the literature compared to those that reinforced by the literature.
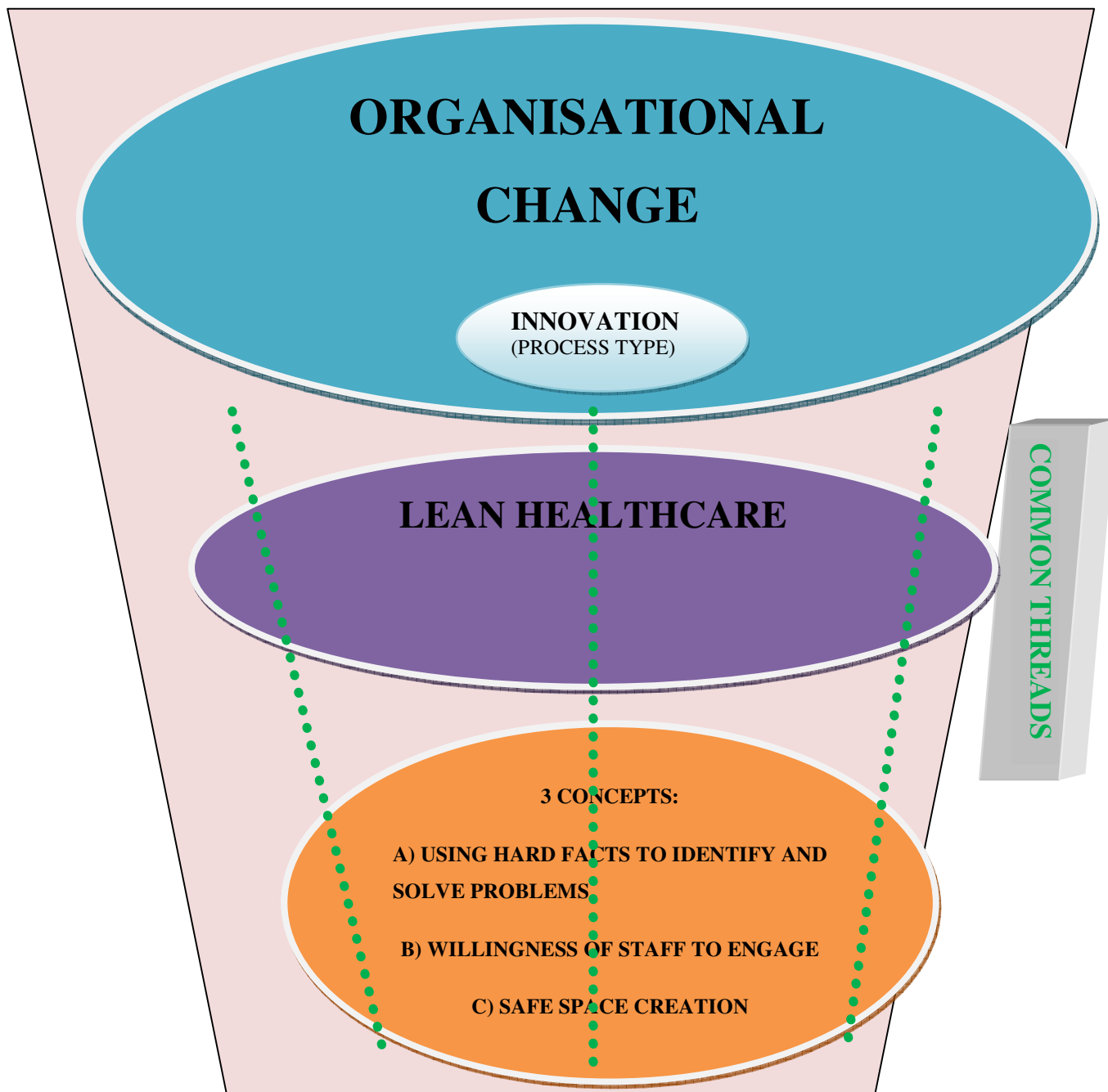
Figure 4.1 Framework for this chapter

4.1 ORGANIZATIONAL CHANGE

4.1.1 Introduction

Organizational change is increasingly necessary due to rapidly changing business climates involving technological advances, globalization, deregulation and labour migration (Daly, Teague & Kitchen, 2003). Organizations are also increasingly challenged with having to do more with less (Fryer, Antony and Douglas, 2007). However, despite compelling reasons to change, many organisations resist change (Argyris, 1993; Turner and Crawford, 1998), or simply fail with their best efforts at transformation.

This part of the literature review chapter is not intended to give a deep description of all change theories, models and frameworks rather, it will introduce the subject of organisational change and convey some of the relevant and leading concepts. Most importantly it will serve as a basis for locating the findings of this study in the broader literature.

4.1.2 What is Organizational Change

The literature on organisational change and change management is extensive (Bamford and Daniel, 2005). Despite the depth and breadth of this literature, some scholars have expressed their concerns that the literature on organisational change is atheoretical (Hendry, 1996) and fragmented (Mintzberg and Westley, 1992).The practitioner-based work is also tightly integrated with academic concepts in the field of organisational change. Pettigrew (1997) notes that authors in the field of organisational change, and change management, need to address the 'double hurdle' of academic quality and practical relevance.

Iles and Sutherland (2001) conducted a review of the literature on change management and organisational change and concluded that the literature, for six main reasons, is not easy to access which include the fact that the theory contains elements from multiple disciplines such as psychology and social policy. In addition, the change management literature has many sources that offers examples, methodologies and criteria for quality (Iles and Sutherland, 2001). The boundaries shift according to which definition of change management one uses, and there is a sense that despite many contributions over the last 50 years, the most recent additions do not add much value to the initial literature (Iles and Sutherland, 2001).

There is no single accepted definition of organisational change (Bamford and Daniel, 2005). The change literature is dominated by '… gurus who prescribe courses of action without any basis in evidence' (Iles and Sutherland, 2001). This further complicates agreement on definitions and efficacy of change programmes. Organizational change can be seen as a continuous process of 'experimentation and adaptation' to ensure that the organization's capabilities are matched with the uncertain and changing nature of the environment in which it operates (Bamford and Forrester, 2003). Customers expect to see improvements and better quality over time (Fryer, Antony and Douglas, 2007). Organizational learning occurs when processes are improved which lead to better outcomes (Fiol and Lyles, 1985).

There remains uncertainty as to the most appropriate approach to change in the literature, leaving many managers confused and sceptical of using the literature (Bamford and Daniel, 2005). Beer and Nohria (2000) noted that "Despite some individual successes ... change remains difficult to pull off, and few companies manage the process as well as they would like ...The brutal fact is that about 70 per cent of all change initiatives fail". Specific elements of the theories and models discussed in this section are drawn into Section 4.3, in relation to the study's findings.

4.1.3 Key concepts, models and frameworks in the organizational change literature

In keeping with the structure of this chapter, some of the key concepts are only introduced in this section. The relationships between these concepts and the findings of the study (common threads) are more fully explored in Section 4.3. The literature contains many different classifications of organizational change and change management. Some authors speak of planned change versus emergent; some refer to episodic versus continuous change; some speak of incremental versus transformational change while others refer to strategic models of change. In the realm of organizational change, practitioner based tools and models are common. Even though these are not discussed in depth in this thesis, it is important to relate some leading concepts to the findings of this study as recommended by Pettigrew (1997). Change can be addressed using an array of tools (Kotter, 1996; Burnes, 2004; Balogun and Hope Hailey, 2004). It is accepted that no single tool, framework or model will fit all scenarios and problems in

organizations (Iles and Sutherland, 2001).   Hammer and Champy (1993) emphasise the need to 'manage' change processes consciously and carefully by highlighting that up to 70 per cent of change initiatives fail outright.   Early literature on organisational change have suggested that change initiatives cannot be effective if they were constantly changing, as people need routine to effect change (Rieley and Clarkson, 2001; Luecke, 2003). This section will illustrate a trend detected in the literature, where there is a move away from pure planned change to a more emergent model, primarily due to rapidly changing business environments, and the need to develop more incremental, continuous and local changes (Burnes, 1996).

4.1.3.1 Planned versus emergent change

Kurt Lewin is seen as the originator of planned change from which the AR model developed. Planned change (Figure 2) involves a process of 'freezing' (clinging to the known), 'unfreezing' (exploring new ideas and ways to do things) and 'refreezing' (integrating the new way of doing business with past practices). Planned change is based on the premise that new or learned behaviour will only be established when old practices are discarded (Bamford and Forrester, 2003). Many authors have expanded Lewin's original ideologies including Bullock and Batten (1985), Nadler and Tushman (1989), Beckhard and Harris (1987) and Schein (1987).
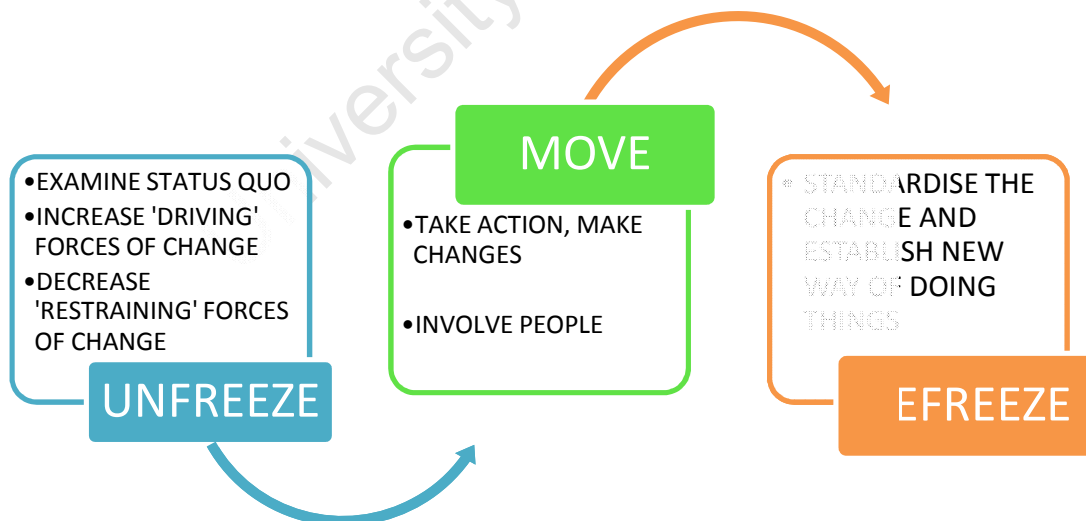
Figure 4.2 Adapted from Kurt Lewin (1951)

The planned model of change has come under criticism for three main reasons (Burnes, 1996). Planned change lacks the flexibility and adaptability necessary to respond rapidly to changing

business environments (Wilson, 1992; Dawson, 1994). It is not regarded as appropriate for radical and rapid change (Dunphy & Stace, 1993). The planned change model also seems to ignore the difficulties of getting agreement from all parties and willingness to partake in change processes, which are common today (Pettigrew and Whipp, 1993).

Kurt Lewin (1951) also developed the force field analysis, which is a diagnostic technique for determining the viability of an organizational change. In its simplest form there are 'driving forces' for change and 'restraining forces' for change. The driving forces are those that push change towards the intended outcome, while restraining forces mitigate the effects of the driving forces. Lewin's work has been widely applied, cited and adapted in the management literature (Iles and Sutherland, 2001). This concept of 'driving' and 'restraining' forces closely resembles the enablers and inhibitors of Lean implementation that this study aims to develop.

Beckhard and Harris (1987) have developed a tool to clarify the underlying forces for change and the sources of the change. They have also developed a change formula:

Change = [ABD]>X. Change will only occur when ABD>X

A is the level of dissatisfaction with the status quo, B is the desirability of the proposed change or future state, D is the practicality of the change and X is the cost of the change. Change will only occur when ABD combined is greater than the cost of the change.

Schein (1987) expanded on Lewin's original model (Figure 4.2) and asserted that 'unfreezing' involved disconfirming expectations, creating a sense of anxiety with the current state and provision of a 'safe space' to convert the anxiety into the need to change. Schein speaks about 'moving' which involves generating new ideas for improvement and identifying new roles (Schein, 1987). Refreezing involved standardizing the new behaviour and making it part of relationships and the concept itself. Lewin's work has been applied widely in practice and research contexts. I think the model's simplicity coupled with its conceptual power, make it easy to apply to different contexts as a planned form of change. An important conclusion on recent high quality management literature is that organizational change cannot be fully planned and will always contain an emergent element (Iles and Sutherland, 2001).

Unlike the planned models of change, the emergent change process leverages on a 'bottom-up' approach (Bamford & Forrester, 2003), where there is a focus on learning rather than simply organisational change (Dunphy and Stace, 1993; Dawson, 1994; Wilson, 1992). The success of change initiatives with the emergent model is less dependent on detailed pre-planning and more reliant on the ability to understand and cope with complexity that emerges over time (Burnes, 1996). In rapidly changing environments, senior managers are no longer best positioned to effect change (Kanter et al., 1992) and this is increasingly being devolved to lower levels of the organisation (Wilson, 1992).The emergent model of change is characterised by continuous improvement through experimentation; small scale incremental changes; managers create ideal environments for experimentation and improvement, and there is a strong emphasis on information gathering, assimilation and action (Burnes, 1996). The emergent model of change is relatively new and is said to lack coherence or rigour as compared to planned models of change (Burnes, 1996). Even though there are no 'one size fits all' change tools (Pettigrew and Whipp, 1993), some authors have offered step by step guidelines for implementing change initiatives. Todnem (2005) has combined three of the leading authors' guidelines to show the similarities and differences In Table 4.1 below:

KOTTER'S EIGHT STEP PROCESS (1996)	KANTER ET AL (1992) TEN COMMANDMENTS FOR EXECUTING CHANGE	LUECKE'S SEVEN STEPS (2003)	RELEVANCE TO THE THEORY IN THIS STUDY (discussed in more detail in Section 2.3)
	Analyze the organization and the need for change	Mobilize energy and commitment through identification of business problems and solutions	This is discussed in Relation to Concept A, the need to use data to identify problems and develop solutions
Develop a vision for the change	Create a vision and common direction	Develop a shared vision of how to organize and manage competitiveness	This is linked to Concept B and using teams to develop a shared spirit of working towards a goal
	Separate from the past		
Establish a sense of urgency	Create a sense of urgency		This is closely related to Concept A of using data to create a sense of urgency and kick start action
Support a strong leader role		Identify leadership	
Line up political sponsorship	Creating a guiding coalition		
Craft an implementation plan			This is linked to an aspect of Concept A: using a structured plan to improve
Develop an enabling structure	Empower broad based action		Concept B speaks to the element of participation by staff and Concept C speaks about creating the safe space that enables participation

Communicate, involve people and be honest	Communicate the change vision		A core component of Concept C (creating a safe space) relates to clear and frequent communication
Reinforce and institutionalize change	Anchor new approaches in the culture	Institutionalize success through formal policies. Systems and structures	
	Generate short term wins		This study has shown how small wins are a crucial part of getting staff to participate (concept B)
	Consolidate change and produce more changes		
		Focus on results not activities	This study in fact found that it was critical to focus on data and results in hard terms (concept A)
		Start change at the periphery and let it spread horizontally	All the projects in this study occurred at the unit level which is the smallest functional unit at the hospital
		Monitor and adjust change strategies in response to problems in the change process	Monitoring and PDCA were strong components of concept A- the use of data to identify problems and solutions

Table 4.1 A comparison of three emergent models of change (Todnem, 2005) and their relation to this study's theory

4.1.3.2 Episodic versus continuous change

Porras and Silvers (1991) differentiate between episodic or continuous change. Weick and Quinn (1999) have described episodic change as 'infrequent, discontinuous and intentional'. Sometimes this has been likened to radical or second order change. It usually involves larger change that affects the whole organization's systems or strategy. Change can be seen as disruptive or divergent from equilibrium (Weick and Quinn, 1999). It is usually slow because of its scope and is seldom fully implemented, with most of the change initiated at the top of the organization (Mintzberg & Westley, 1992). Episodic change also more often than not involves the replacement or substitution of current thinking/systems/polices, a concept that Beer et al. (1990) have demonstrated does not work. Beer at el. (1990) emphasised the high rate of relapse and failure of projects using the episodic change thinking. Lewin (1951) and Schein's (1996) work both have central linkages with the concept of episodic change.

In contrast, Weick and Quinn (1999) described continuous change as 'ongoing, evolving and cumulative', change that is sometimes referred to as first order or incremental change. Continuous change is better understood as a bottom up phenomenon, and the responsibility of ideas does not reside with the person who developed the new idea. It is disseminated by staff being able to relate with the idea, and understanding the relation of the idea to how they work, and how it would benefit the organization or themselves (Sevon, 1996). Continuous change can be seen as a series of fast episodes of small changes (Weick and Quinn, 1999). Staw and Sutton (1993) emphasise that the many small changes can lead to major organizational change over a period of time. I would include TQM, BPR and Lean management into the continuous change category as these methods usually take a process view with stepwise improvements. It is not uncommon for organizations to use elements of TQM, BPR and Lean synergistically. It is necessary to briefly discuss these techniques of change.

TQM can be seen as a systematic and integrated management method of attaining total customer satisfaction (internal and external). Quality is not seen as desirable; rather it is thought of as the key to survival. Hackman and Wageman (1995) found that over 80 per cent of the published literature on TQM was descriptions of what happened when TQM was implemented. There was little mention of systemic, broad reaching issues since most studies were case studies. Joss and Kogan (1995) studied the efficacy of TQM implementation in the NHS and concluded there was

little evidence of beneficial change and it was likely due to piecemeal implementation. Sitkins et al. (1994) assert that TQM is universally applicable and is capable of making significant change. Masters (1996) conducted an extensive literature review highlighting some of the barriers to TQM implementation. These included organizational structures that were incompatible with TQM, insufficient use of teamwork and individuals were not sufficiently empowered to make the changes.

With regards to BPR, Hammer and Champy (1993) defined it as "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance such as cost, quality, service and speed". BPR is underpinned by three core concepts (Iles and Sutherland, 2001). These include arranging the organization around processes not functions; shifting away from narrowly defined specialists towards multi-skilled workers and the direction for BPR programmes is unequivocally determined at the top levels of the organization. Strebel (1996) states that success rates of re-engineering projects in the Fortune 1000 companies are well below 50 per cent and some even suggest it may be as low as 20 per cent. Arndt and Bigelow (1998) highlight a concern that when BPR is applied to hospitals, the reports usually detail the steps taken and potential savings rather than the actual savings and effects. This makes it difficult to draw any correlations between BPR activities and their specific effects; this challenge was also encountered with TQM programmes. The pure top down approach associated with BPR has not proved successful in the NHS (Iles and Sutherland, 2001).

Lean is discussed more completely in Section 4.2 below.

4.1.3.3 Practice Based Models

As mentioned earlier this is not a focus of this section but it is relevant to discuss some of the leading practice based models. In particular I review Senge's concept of The Learning Organization (1990) and McGregor's Theory X and Y.

In his book, *The Fifth Discipline*, Senge (1990) details the five elements that contribute to achieving continuous cycles of learning and change which result in Learning Organizations:

1. **Personal mastery** - developing patience and seeing reality objectively

2. **Mental models** – understand how we perceive, what we perceive, and how this influences the action that needs to be taken. There needs to be a shift towards open inquiry where existing perceptions are tested objectively

3. **Building the shared vision** – this fosters genuine commitment rather than compliance

4. **Team learning** – team members enter into a pact of working and thinking together

5. **Systems thinking** – integrates the first four elements into a coherent theory.

A learning organization is one that continuously transforms itself and facilitates learning by its team members (Pedler et al., 1997). A learning organization is able to remain more competitive in the rapidly changing business environments as it continuously redefines itself (O'Keeffe, 2002). Senge's idea of mental models links closely to this study's concept of using data to create awareness of the need to change, and break currently held assumptions and perceptions. Senge's idea to build a shared vision is also linked to this study's concept of encouraging staff participation through teamwork.

In 1960, Douglas McGregor made famous Theory X and Theory Y in his book, *The Human Side of Change*. Theory X highlighted the need to control workers, motivate staff with threats, and manage workers using a strict hierarchy. In this theory the staff was thought to have little ambition and creativity, and they are only motivated by money. Instituting Theory X leads to mistrust and a punitive environment. Theory Y was the contrary, where staff were recognised and encouraged for their work. They were considered to be creative and innovative given the right climate. Managers who were able to display Theory Y traits and beliefs were more likely to be successful in getting their staff to perform well (Cameron and Green, 2009). Theory Y traits are closely linked to the 'Concept of Safe Space' and to the concept of 'small wins', that this study has found to be an important determinant of Lean implementation success.

4.1.3.5 Relationship between organizational change and innovation

One of the key aspects of organisational change is innovation, since without innovation organisations will struggle to remain competitive (March, 1991). Scholars have requested more work on the implementation aspects of innovation (Beyer, Trice, 1978). A number of authors (Bushe, 1988; Hackman and Wageman, 1995, Klein and Ralls, 1995) mention that TQM, quality

improvement initiatives and statistical process control projects yield little or no improvement in organisations, not due to failure of the innovation itself, but due to the failure of implementation. There are many single site qualitative studies that provide piecemeal descriptions of how innovations were implemented (Klein and Sorra, 1996). However, they neglect to develop integrated models to understand how to implement innovation.

The literature offers three classifications of innovation by Klein and Sorra (1996), Baker (2002), and Mulgan and Albury (2003). Klein and Sorra (1996) distinguish between two types of innovation, source-based stage models and user based stage models. The first looks at an innovation (new product or service) that an organisation/inventor has created for the market, and the second looks at how a technology or practice is adopted by an organisation's members for the first time (Klein and Sorra, 1996). Examples of this kind of innovation would include TQM, SPC, MRP (Klein and Sorra, 1996) and lean management. Cayer (1999) sees innovation as an outcome of organisational learning. Companies use organisational learning to solve existing problems and continually improve their standing in changing conditions (Vakola & Rezgui, 2000). Klein and Sorra (1996) posit that there are two key elements that determine the effectiveness of an innovation's implementation - the organisation's climate and the perceived fit of the innovation to the users' values. This is likely (but not certain) to lead to the intended consequence of the innovation. Innovation is regarded as one of the most important predictors of organisational failure or success (Gieskes & van der Heijden, 2004).

Baker (2002) offers a classification of types of innovation which include process; product/service and strategy/business concept innovation. The process aspect is most relevant in this study. A process can be defined as '… a specific ordering of work activities across time and place with a beginning, an end, and clearly identified inputs and outputs: a structure for action' (Davenport, 1993). Process improvement techniques are considered core competencies in manufacturing, but are seldom addressed with reference to healthcare (Dickson, Singh, Cheung, Wyatt, Nugent, 2008). Lean, a type of process improvement, is able to improve quality while reducing costs and is well suited to improving healthcare (Breyfogle and Salvekar, 2004).

Mulgan and Albury (2003) also provide a useful categorization of innovation. Incremental innovation refers to minor changes to existing services or processes. Radical innovation refers to new ways of doing things or new services. Finally, transformative or systemic innovation refers

to the creation of new workforce structures, organizational types and inter-organizational relationships. Further, Mulgan and Albury (2003) define successful innovation as "... the creation and implementation of new processes, products, services and methods of delivery which result in significant improvement in outcomes efficiency, effectiveness or quality".

To crystallise this section on innovation it is necessary to link the classifications of innovation to Lean methods. Lean, TQM, Six Sigma can be viewed as user-based, stage models according to Klein and Sorra's (1996) definition, and as process based innovation according to Baker's (2002) definition, and finally, according to Mulgan and Albury's (2003) classification they fit into the incremental innovation techniques involving many small improvements. In keeping with the overall structure of this chapter, process improvement techniques can be seen as a form of innovation, and innovation is a form of organisational change. The particular process improvement method under study is Lean implementation.

This section has given an overview of the organisational change landscape and some of the key models associated with organisational change. An important aspect of organisational change is innovation, which was also discussed and some classifications offered. Lean is a form of innovation, showing the link between organisational innovation and Lean thinking.

4.2 LEAN THINKING

This section discusses what Lean is, and how it is applied to healthcare settings.

4.2.1 What is Lean?

It is difficult to describe Lean concisely and completely (Graban, 2008). Shah and Ward (2007) attribute the confusion around as to what Lean is, to the fact that the concept has evolved over decades and because of its mistaken relation to other approaches. Despite its 'ambiguity' in practice Lean is widely used in business (Holweg, 2007). Lean is based on the Toyota Production System born in Japan during the 1950s. The term Lean was popularised by the seminal works of Womack, Jones and Roos (1990) – *The Machine that changed the World* and *Lean Thinking* (Womack, Jones, 1996).

There exists some confusion about what TPS entails. Liker (2004) offers a practical guideline of what the Toyota Production System (TPS) is, and what it is not, in the table below:

Myth- What TPS is Not	Reality- What TPS is
• A tangible recipe for success • A management project or program • A set of tools for implementation • A system for floor only • Implementation in a short – or mid-term period	• A consistent way of thinking • A total management philosophy • Focus on total customer satisfaction • An environment of teamwork and improvement • A never-ending search for a better way • Quality built-in process

Table 4.2 - Clarifying the concept of TPS (Liker, 2004)

Jimmerson et al. (2005) state how Lean can be described on an academic or practitioner level. At an academic level, it is described as a philosophy that works to drive out waste in all forms and pursues perfection (Womack and Jones, 1996). At the practitioner level there is a focus on an interrelated set of practices and tools to ensure flow, appropriate equipment design and high quality work (Monden, 1993; Rother and Shook, 2003). For a developing country with massive resource constraints, it is relevant to note the following from a study on the implementation of Lean in the UK's NHS: "It is [Lean is] about being able to do more with the resources available" (Westwood, Moore & Cooke, 2007).

Lean can be also regarded as a refinement of the TPS (Papadopoulos and Ozbayarak, 2005). Lean production aims to enhance customer value by streamlining the flow of production while continuously removing waste, and therefore reducing the resources required to produce a set of goods or services (Womack, Jones and Roos, 1990). Lean cannot be equated to a single concept or tool but instead encompass a number of tools that complement each other (Shah and Ward, 2007; Papadopoulos and Ozbayrak, 2005). It is a holistic approach that goes beyond operations and aligns the goals of managers and workers, changes behaviour and the perceptions of value. The JIT (just-in-time) system, the kanban method of pull production, respect and inclusion of employees are some of the products of Lean evolution (Hines, Holweg and Rich, 2004).

Womack and Jones (1996) have specified five rules of Lean thinking, which include specifying value through the eyes of the customer, identifying the value stream of the product or service, making the service flow by minimising delays and stoppages, supplying according to customer pull or demand, and, finally by pursuing perfection to ensure continuous improvement.

Spear and Bowen (1999) also defined four rules of Lean which include highly specified work; unambiguous customer-supplier relations, simple and direct pathways for every product and service, and all improvements should be made in line with the scientific method. The theory in this study has provided some evidence for the need to use the scientific method in Concept A which promotes the use of 'hard' data when making changes. The theory of this study also provides some evidence for the value of specify tasks as will be discussed in Section 2.3 in more detail.

Globally, Lean has become one of the top two performance improvements used in both manufacturing and service companies (Fine, Hanse and Roggenhofer, 2008). Lean is characterized by specific tools, techniques and practices, some of which are alluded to below.

4.2.1.1 What characterizes Lean?

Emiliani (2003) suggests the most important Lean values are continuous improvement and respect for people. Bozdogan et al. (2000) refer to 'leanness' as: "not being merely a set of practices usually found on the factory floor, but rather as a fundamental change in how the people within the organisation think and what they value, thus transforming how they behave". Lean is a 'way of giving people at all levels of the organisation the skills and a shared means of thinking to systematically drive out waste by designing better ways of working, improving connections and easing flows within supply chains' (Wood, 2004).

The basic philosophy of Lean, which is modelled on the TPS, is to produce the right number of goods, to the right specification, at the right time (Monden, 1983). Numerous tools are employed by Lean practitioners to both identify problems and effect change within a given process. Over time, Lean principles have become the standard by which newly pioneered approaches to operations management are compared (Papadopoulos and Ozbayrak, 2005). Lean is not a management fad, but rather a framework for continuous improvement.

4.2.1.2 The role of People in Lean projects

Many authors regard the respect for people as fundamental to Lean implementation and acknowledge the value of staff input in creating improvements (Liker, 2004; Emiliani, 2003).

Graban (2008) comments about the importance of people in delivering excellence: "It is often said that Toyota gets outstanding results with average people working in brilliant systems, while most other companies get mediocre results by hiring brilliant people to fight their way through broken systems. Which statement sounds more like hospitals? Imagine the potential of combining brilliant people with brilliant systems."

Lean empowers and encourages staff to continually make small improvements to the daily processes they are involved with (Westwood, Moore and Cooke, 2007). Liker (2004) stated that "the more I have studied TPS and the Toyota Way, the more I understand that it is a system designed to provide the tools for people to continually improve their work. The Toyota Way means more dependence on people, not less". People need to feel secure and valued in order to engage improvement processes (Liker, 2004).

Some organizations have found it hard to successfully implement and sustain Lean initiatives largely because they focussed on the Lean tools, rather than focussing on the broader organisational culture which should be geared towards creating value for customers, striving for perfection and eliminating waste (Morgan and Liker, 2006).

4.2.1.3 Lean Implementation

In the seminal book, *Lean Thinking,* Dan Jones and James Womack (1996) dedicate a chapter to the implementation of Lean. I will extract a few points from this chapter that seems relevant to this study:

- The most difficult thing is to get started, so they recommend starting as soon as possible
- The person leading the change should act as change agent and have some knowledge of Lean implementation.
- They advocate the identification of a 'crisis' in order to kick-start the process. This reinforces the literature on organizational change and is an important part of recognising the need to change, as part of concept A in this study.

- Start by mapping a value stream and tackle a visible problem to all involved. They will better relate to this and be motivated when it works.
- Create 'small wins' which also keep the momentum going. This idea is captured in the literature on organizational change and forms a central part of Concept B which looks at staff participation.

Womack and Jones (1996) then develop this plan further to involve more of the organization by reorganising the firm by product family and value stream, creating a Lean promotion function within the organization, and identify the resistors to Lean and relocate them if necessary. The chapter then deals further with developing Lean business systems (accounting, policy and human relations) and developing a Lean enterprise by working with suppliers, which go beyond the scope of this chapter.

Resistance to Lean by some is based on the perception that transformation within the public domain should be rooted in policy development and not operations. This notion fails to appreciate the need for policy that is both implementable and sustainable. Good policies without the appropriate guidelines on implementation are in essence weak. Lean can be successfully applied, with the aim of increasing efficiency and quality and lowering waste, to employment agencies, hospital laboratory testing, and airport checks - to mention a few (Bhatia and Drew, 2007).

Lucey, Bateman and Hines (2005) reported the top ten reasons Lean projects fail. They include lack of clear vision and leadership, ineffective communication, failure to communicate a sense of urgency, poor consultation with stakeholders, poor project management, failure to monitor and evaluate outcomes, failure to fully mobilize champions, failure to engage employees, absence of dedicated resources to effect the change, and lack of supportive HR policies.

4.2.2 Lean Healthcare

Up until the early 1990s Lean successes were concentrated in the automotive industry (Hines, Holweg and Rich, 2004). Today, most manufacturing companies have adopted some variation of a Lean initiative. The Lean methodologies later infiltrated service sectors such as the military, healthcare delivery and financial services, and to such an extent that most hospitals in the USA are already involved in Lean or actively considering its implementation (Morgan and Liker, 2006). However, it has been acknowledged that the application of Lean principles to the services sector is indeed more challenging.

There is increasing political pressure to improve service delivery and decrease healthcare expenditure (Patwardhan and Patwardhan, 2008; Bhatia and Drew, 2007). Womack and Jones (2003) advocate the use of Lean thinking for the healthcare system. They recommend that the first step is to put the patient at the forefront of the process and work on reducing time delays and increasing comfort for patients as a priority. There are many published studies of Lean implementation (Aherne, 2007) which report successes and magnify how patients benefit from improved quality and reduced waiting times (Balle and Regnier, 2007; Lodge and Bamford, 2007; Miller, 2005; Spear, 2005). There is, however, a paucity of research that studies the necessary local adaptations needed for successful Lean implementation and translation of Lean principles into healthcare (Papadopoulos, 2008).

Graban (2008) described some of the characteristics of Lean hospitals which include the fact that they recognise employees as the source of value for patients rather than as a cost burden. Lean hospitals support employees who want to provide the best possible care to patients by engaging in continuous improvement activities. This study offers some guidance on which factors promote staff engagement in improvement activities as part of Concept B in Section 4.3.

Graban (2008) surveyed fifty hospitals in trying to understand why these hospitals chose Lean management. Respondents were allowed to choose more than one reason (Fig 4.3 below).
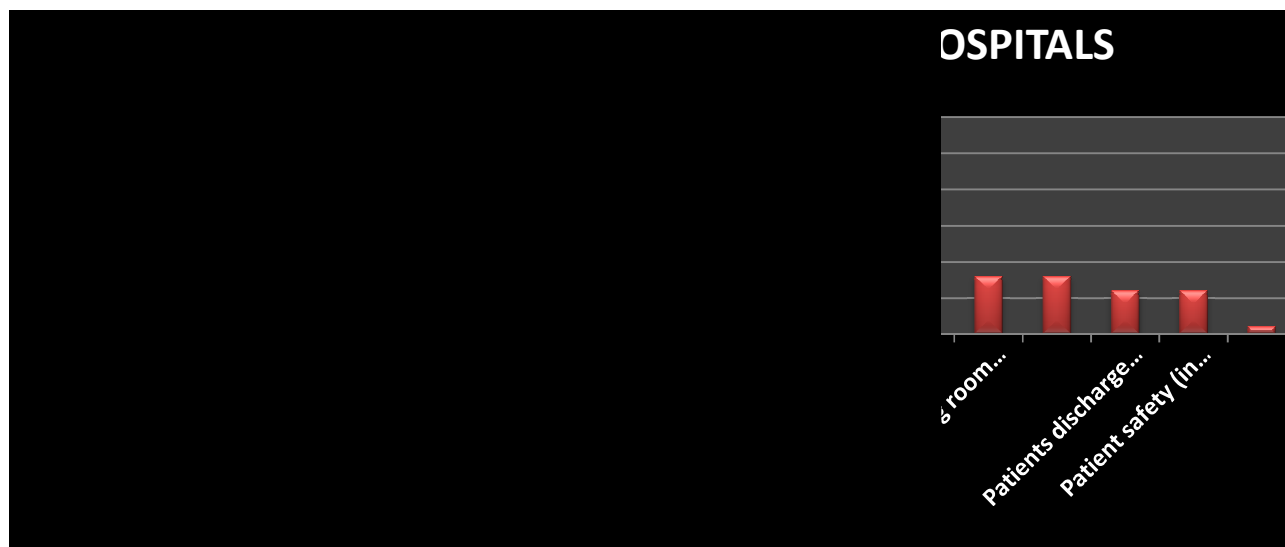
Figure 4.3 Reasons why hospitals embarked on using Lean (Graban, 2008)

It is interesting to note the strong focus on quality and patient and staff satisfaction. An important component of Lean, is removing waste on a continuous basis. Don Berwick (quoted by IHI Improvement Tip, 2008), president of the IHI (Institute for Healthcare Improvement) estimates that 30-40 per cent of all expenditure in healthcare is waste and amounts to half a trillion dollars annually in the USA alone. "Healthcare systems were never designed for efficiency and effectiveness the way modern manufacturing and service industries have been. As a result there's a tremendous amount of waste in healthcare" - Don Berwick cited by Krasner (2008). The healthcare industry is perceived to operate with massive amounts of waste and Lean provides a categorisation of eight types below:

TYPES OF WASTE	EXAMPLE IN HEALTHCARE
Stock	Uncontrolled inventory (too much/little or in wrong place)
Errors	Clinical, clerical and diagnostic errors
Waiting	Waiting for appointments, people, records, results
Transportation	Inappropriate transportation of patients and equipment
Under utilization of people	The waste of not tapping into the real potential of people
Movement	Unnecessary movement of staff (looking for equipment, records, or people)

Misallocation of resources	Unnecessary use of diagnostics, clinic time or bed days
Irregular processes	Misalignment of steps in the patient pathway

Table 4.3 Adapted from the Lean Healthcare Academy (http://www.leanhealthcareacademy.co.uk/what_is_lean)

4.2.2.1 Lean implementation in Healthcare environments

There is agreement that Lean management is well suited to healthcare (Karlsson et al., 1995; Young et al., 2004; Breyfogle and Salvekar, 2004) but there is a need for more clarity on implementation issues in healthcare as the literature does not address these (Kollberg, Dahlgaard and Brehmer, 2006). Specifically related to the public sector, Lean implementation has reduced waiting times and other forms of waste by up to 80 per cent (Papadopoulos, 2008). Papadopoulous (2008) quotes more than eight papers illustrating clear success stories when Lean is implemented. Process improvement in healthcare industries is difficult as few healthcare professionals are adequately trained and experienced to execute sustainable process improvement (Dickinson and Ham, 2008). Dickinson and Ham (2007) also raise an interesting misalignment in healthcare where the focus for efficiency gains is on making clinicians more important. The paradigm needs to be shifted to where the focus for efficiency is on improving the outcomes of the clinicians' work (i.e. the quality of care the physician is able to deliver).

Healthcare, like many other services depends highly on the input of people. The important role of people in Lean implementation was explored in Section 4.2.1.2. Lean reinforces the need for strong commitment from both managerial and operational personnel. This reinforces the concept of 'buy-in' and sustainability (Westwood, Moore & Cooke, 2007). 'Buy-in' is by no means restricted to operational categories of staff. It is recognised that senior executive involvement enables intervention implementation (Westwood & Silvester, 2007). Hierarchical organisations such as hospitals are often obstructive to successful Lean implementation (Westwood & Silvester, 2007).

Grabner (2008) points out there are no 'cookbook' methods to implement Lean and these should not be sought. There are some key elements such as problem solving, executive leadership and an enthusiasm amongst staff to improve the status quo (Grabner, 2008). Papadopoulous and Ozbayrak (2005) have stressed the importance of the human factor in Lean implementation and suggest that in order for Lean to succeed, there needs to be a focus on empowerment through

teamwork, job rotation and enrichment, clear communication channels, meetings and cooperation between workers and management.

This section has explored the concept of Lean, its application in healthcare and has detailed some of its key tenets. It builds on Section 4.1 that introduces organisational change and innovation, linking with Lean in this section. This discussion provides a good basis for moving onto the discussion of locating the theory this study has developed in the broader literature, and its links with organisational change, and Lean.

4.3 LOCATING THE THEORY OF THIS STUDY

This section aims to use specific aspects of the theories discussed in the preceding two sections in locating the contribution this study makes to the existing body of knowledge. In keeping with the structure of the chapter, this section links other sections of the chapter using the common threads identified during the literature review. It is logical to discuss these according to the concepts that have emerged in the study, labeled A, B and C. It is acknowledged that the factors below only represent some of the myriad of factors that may influence the success or failure of Lean implementation. Each of the three concepts below starts by crystallizing the contribution it makes to the body of literature, followed by a defense of this claim of contribution.

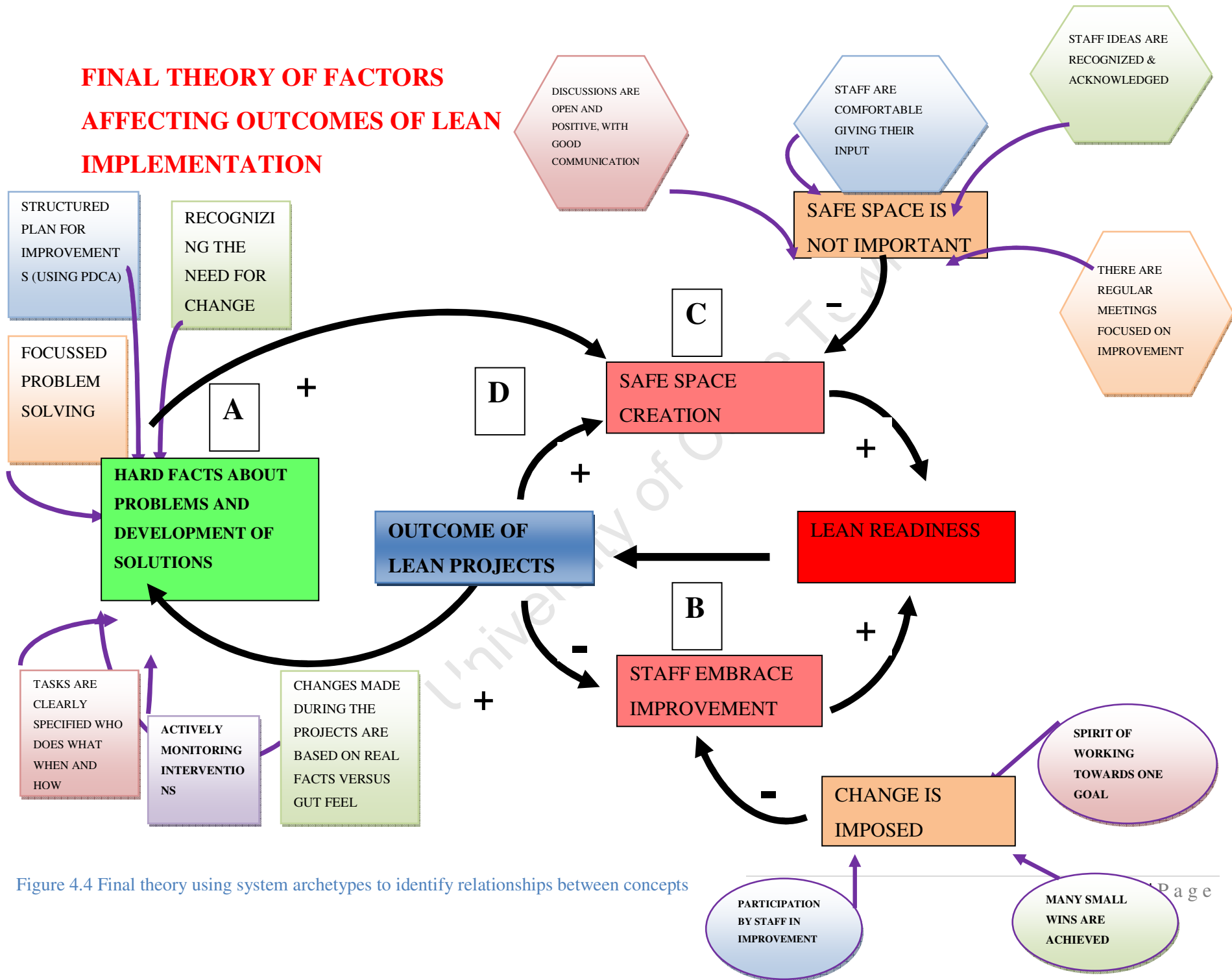# FINAL THEORY OF FACTORS AFFECTING OUTCOMES OF LEAN IMPLEMENTATION

DISCUSSIONS ARE OPEN AND POSITIVE, WITH GOOD COMMUNICATION

STAFF ARE COMFORTABLE GIVING THEIR INPUT

STAFF IDEAS ARE RECOGNIZED & ACKNOWLEDGED

STRUCTURED PLAN FOR IMPROVEMENTS (USING PDCA)

RECOGNIZING THE NEED FOR CHANGE

SAFE SPACE IS NOT IMPORTANT

THERE ARE REGULAR MEETINGS FOCUSED ON IMPROVEMENT

C

FOCUSSED PROBLEM SOLVING

SAFE SPACE CREATION

A

+

D

+

−

+

HARD FACTS ABOUT PROBLEMS AND DEVELOPMENT OF SOLUTIONS

OUTCOME OF LEAN PROJECTS

LEAN READINESS

+

B

+

−

STAFF EMBRACE IMPROVEMENT

TASKS ARE CLEARLY SPECIFIED WHO DOES WHAT WHEN AND HOW

ACTIVELY MONITORING INTERVENTIONS

CHANGES MADE DURING THE PROJECTS ARE BASED ON REAL FACTS VERSUS GUT FEEL

+

−

CHANGE IS IMPOSED

SPIRIT OF WORKING TOWARDS ONE GOAL

PARTICIPATION BY STAFF IN IMPROVEMENT

MANY SMALL WINS ARE ACHIEVED

Figure 4.4 Final theory using system archetypes to identify relationships between concepts

4.3.1 Concept A –Using hard facts to identify problems and solve problems

Each concept begins with an overview of the contribution this concept makes to the body of knowledge summarized in tabular form, followed by a more in-depth description of its contribution in narrative form.

CATEGORY AS PART OF CONCEPT A	CONTRIBUTION
1. Changes made are based on real facts and measurements	Reinforces existing literature on the importance of using data in change projects. However, this study also provides some empirical evidence for a relationship between measurement and outcomes. In projects where measurement was taken seriously and done regularly, those projects were more successful. This study demonstrates the critical importance of using data when making changes in Lean projects.
2.Tasks have clear specification of who does what, when and how	The literature encourages task specification but cautions against over specification. In this study, the successful projects had higher levels of task specification and thus provided some empirical evidence that task specification should be done consciously.
3. Focused problem solving to find root causes	Adds some empirical support for the current thinking about the power of root cause identification and problem solving. In this study, projects that succeeded had more structured approaches to problem solving and aimed to move beyond apparent superficial causes.
4. Recognising the need for change	The existing literature has covered the importance of 'recognising the need for change' to kick-start change. This study reinforced existing literature but also provides some evidence that where the need to change is recognised, the project was more successful. Recognizing the need for change is tightly linked in this study to measurement and the use of data to mobilize staff towards improvement.
5. Structured plan for improvements (using PDCA)	Adds empirical evidence to support using structured planning but proposes the need for an intermediate change model. This study points out that Lean uses an emergent approach to identify problems, but then uses a very structured PDCA model to work through problems.

Table 4.4 The contribution Concept A makes to the body of knowledge

Value of measuring and using data to plan and monitor change (Points 1 and 2)

This study demonstrated how the use of 'hard facts' to plan and monitor change had a mediating effect on the outcome of Lean projects. The relationship was positive in both directions as illustrated in Figure 4.4, implying that with more use of 'hard facts' there were better outcomes of Lean projects. In the opposite direction, positive outcomes of Lean projects would motivate staff to use 'hard facts' to plan and monitor Lean changes. Using evidence to guide management and policy decisions are rare in many countries (Ovretveit, 1998). Too often managers use gut feel, past experience, specialist decision making and dogma to guide decision making resulting in suboptimal outcomes and possibly even harm (Pfeffer and Sutton, 2006). Even though I was unable to locate this exact finding in the literature, the literature places much value on the need to use data to guide change initiatives; Kotter, 1996; Bateman, 2005; Rubin, Pronovost & Diette, 2001). Categories 1 and 2 can be linked for the discussion on the importance of using data. These points emphasise the importance of using data to first plan changes, and second to monitor the effects of solutions. In both Europe and America, there has been a serious move towards evidence based practice in healthcare (Brown, Crawford and Hicks, 2003). Pfeffer and Sutton have called for a movement of evidence based management (Pfeffer and Sutton, 2006). Without measurement, it is likely that people will lose focus and performance will decline (Bateman, 2005). This section will discuss what constitutes good data, how data is used to motivate staff, and the value of monitoring and feedback.

a. What is good data?

Beckett, Wainwright and Bance (2000) identify three elements that are prerequisites for continuous improvements: information, expertise and motivation.

Fryer, Antony and Douglas (2007) reviewed the continuous improvement literature and were able to extract some the factors that that seemed to be critical for success. High quality data, measurement and reporting coupled with ongoing evaluation seemed to be two important criteria. Information gathered from monitoring and evaluation can be used by decision makers to reduce uncertainties, improve effectiveness and identify specific reasons for failure and success of change initiatives (Caulley, 1993).Of relevance in this section, Kehoe et al. (1992) developed six criteria by which information should be judged:

1. It should be relevant to the users' requirements.

2. The recipient should be able to make sense of it.

3. It should arrive timeously.

4. It must be factually correct.

5. It must be accessible by the recipient.

6. It must be comprehensive enough to convey the relevant information.

b. Using data to motivate staff to take action

Schein (2004) stresses the value of data in refuting staff perceptions that the status quo is acceptable. Schein (2004) advises that data be used to highlight the gaps between the current and desired states, by using guilt and anxiety to motivate staff into action (Kotter, 1995). Bateman (2005) suggests that measurement also keeps people focussed and without it, performance will drop. This should occur in the presence of a 'safe space' to allow experimentation and efforts to solve the problems and fill the gaps (Schein, 2004). Erwin (2009) applied some of these concepts to a change initiative at a 200 bed hospital in order to get staff to recognise the need for change. Erwin (2009), however, asserts that Kotter (1995) and Schein's (2004) suggestions for creating a sense of urgency did not work to motivate staff leading the change.

With quality improvement initiatives, managers are encouraged to link measures to outcomes, so that staff can relate their efforts to the results (Rubin, Pronovost, Diette, 2001). Beckett, Wainwright and Bance (2000) also highlight that the motivation of individuals to act on information is linked to the relevance of the information to the individual. The more remote the individual is from the source of the data (organisationally) the less motivation they will have to act on the information.

Data for process improvement should be routinely collected by staff (Rubin, Pronovost, Diette, 2001). For process improvements, statistical significance is not of paramount importance - practical relevance and graphical representation (run charts) can aid decision making (Rubin, Pronovost, Diette, 2001). Pffefer and Sutton (2006) suggest a few steps to be taken in moving towards an evidence based company which include demanding evidence by making sure most (or all) decisions are guided by data, examine the logic of recommendations to ensure there is clear thought given, and be prepared to run trial and mini-experiments in-house to foster a culture of learning by doing.

c. Feedback, Evaluation and Monitoring using Data

Johnson (2002) affirms the use of measurement by stating that one cannot objectively report if the interventions are making a positive or negative difference, if there is no measurement. Lean and measurement cannot be separated. If an organization does not have clear measurable targets for improvement, it is difficult to ascertain whether or not things are getting better or worse (Moingeon and Edmonson, 1996). Evaluations and monitoring are also used as part of problem solving (Wholey et al., 1994).

Evaluation and monitoring is regarded as a valuable management tool (Vakola & Rezgui, 2000) and can be defined as a process of systematically and objectively determining the relevance, efficiency and efficacy of activities in terms of overall goals. Feedback can be seen as the link between organisational performance and change in knowledge (Vakola & Rezgui, 2000).

According to Spear and Bowen (1999), one of the rules of Lean is the use of scientific method in every change. One of the central tools of Lean, PDCA, also forces measurement both before and after every intervention. There need to be ongoing reviews of progress on a daily/weekly schedule (Massey and Williams, 2006). Change efforts, planned or emergent, often result in failure because performance is assumed but not measured (Haikonen, Savolainen, Jarvinen, 2004). The lack of performance feedback is seen as a barrier to organizational change and improvement (Edmonson and Moingeon, 1996; Van de Ven and Polley, 1992). Evaluation and monitoring should rather be centred on team performance as compared to individual performance (Beaumont, Hunter & Phayre, 1994).

Evaluation has a downside that cannot be ignored as Patton (1990) points out. Staff may fear blame and shame, uncertainty and unfair evaluation. There are also some authors who assert that, simply collecting data is not enough (McFadden, Stock, Gowen, 2006). Fitzgerald et al. (2007) add to this by saying targets alone do not lead to service improvements.

To summarize this section, it is clear that the literature places emphasis on the value of measurement in change initiatives. In this study, however, we observe an interesting relationship between using measurement and the outcomes of a change project. This concept is not

comprehensively covered in the literature. This study suggests that measurement may positively influence outcomes in a reinforcing pattern as illustrated in Figure 4.

Clarity of Tasks (category 3)

Traditional theory suggested that with new knowledge, behaviours will change to match the new knowledge (Beer and Eisenstat, 1990). However, more recent thinking suggests that if you define new roles for people this will 'force' new behaviours that will result in a new way of thinking (Beer et al., 1990). Choppin (1994) asserts that written procedures are good as they enable people to do their jobs correctly, but there should be some flexibility. Medical professionals are sometimes seen as the key obstacle to management standardizing their tasks (Doolin, 2002).

Tasks that involve clear sets of instructions are much better accepted than those involving tacit, more abstract concepts for improvement (Szulanksi, 1996). Ambiguous messages about the change process and purpose leads to frustration and uncertainty (Massey and Williams, 2006). According to Spear and Bowen (1999), the first rule of Lean is to ensure that all work is highly specified in terms of what is meant to be done, who is meant to do it, how it meant to be done, when it is meant to be done and by what outcome is expected. A barrier to successful change initiatives involves the lack of clear responsibilities concerning implementation (Beeby and Simpson, 1998). There is a need to balance the degree to which tasks are specified as Morgan (1986) points out since job descriptions that are too narrow will lead to the 'not my job phenomenon'. Another down side of having narrow job descriptions is that experimentation and improvement is not really anybody's role whereas it should be everybody's role (Morgan, 1986). This study provides some empirical evidence to support the concept of task specificity, since projects that succeeded had higher levels of specification than those that failed.

Problem Solving (category 4)

Unfortunately problem solving and root cause analysis are not frequently used to understand problems in healthcare (Tucker, and Edmonson, 2003). This often results in managers working in fire-fighting mode. Busy healthcare professionals seldom take the opportunity to engage in process improvements (Tucker and Edmonson, 2003). Front-line workers often resort to quick

fix problem solving that inhibits organisational learning and recognition of the root causes of problems (Tucker et al., 2002). Continuous improvement based on this 'superficial' problem solving often fails to progress into serious improvement initiatives (Hackman &Wageman, 1995; Zbaracki, 1998). Tucker et al. (2002) recommend six actions to encourage root cause analysis in healthcare environments:

1. Problem solving has to be an explicit part of workers' job descriptions (linked to clarity of tasks above)

2. There should be frequent opportunities to discuss problems experienced (linked to regular meetings as part of Concept C)

3. When a problem is raised, it should be taken seriously (linked to safe space in concept C)

4. There should be a dedicated systems improvement person to support front line workers

5. The organisation should encourage experimentation (linked to safe space in concept C)

6. Successful outcomes should be publicized

Problem solving has been classified into a number of categories including conceptual and operational learning, single and double loop learning, and first and second order problem solving. Lapre and Van Wassenhove (2002) studied 62 projects at the world's largest steel wire producer, with a view to understanding why some interventions worked and others failed. In their study, they were able to classify the 62 projects according to the degree of conceptual or operational learning present. Conceptual learning was defined as the 'process of acquiring a better understanding of cause and effect relationships using statistics and other scientific methods to develop theory', yielding 'know-why' knowledge (Lapre and Van Wassenhove, 2002). Operational learning was defined as, 'the process of implementing a theory and observing positive results', yielding 'know-how' knowledge. There were four classes of projects based on high/low levels of conceptual and operational learning. In projects where there were low levels of conceptual and operational learning, the projects were labelled 'fire-fighting' and teams simply tried to solve the problems at hand without using scientific methods (Lapre and Van Wassenhove, 2002). After some time the problems tended to resurface in these projects. Projects with low conceptual learning but high operational learning tended to produce 'real improvement' at the local level but were seldom transferred to other parts of the factory since there was not a deep understanding of why the problems occurred, only how the problem occurred. In projects

with high levels of conceptual learning and low levels of operational learning, teams tended to develop highly scientific solutions with little emphasis on implementation (Lapre and Van Wassenhove, 2002). The ideas generated from these projects, referred to invalidated theories, and generally had wide organizational acceptance despite the lack of implementation know how. This posed the risk of broadly implementing interventions that were not proven to be effective (Lapre and Van Wassenhove, 2002). Finally, there were projects in which there were high levels of both conceptual and operational learning. In these projects, the team used scientific methods to develop and test interventions leading to good outcomes with broad acceptance across the organisation (Lapre and Van Wassenhove, 2002). This categorization points to the importance of both root cause identification and testing implementation 'fit' before spreading ideas across the organization.

Argyris and Schon (1996) defined single and double loop learning. The most commonly used practice is that of single loop learning which involves superficial problem solving ('symptomatic' treatment) without addressing the root cause of the problem. Single loop learning involves small, incremental changes to an existing system. Double loop learning, on the other hand, questions the current way of doing things in order to establish new organizational norms and may involve policy or procedural changes (Vakola & Rezgui, 2000). This definition seems to pose a challenge of where to place Lean since it creates continuous, small change (single loop); but Lean also encourages root cause analysis which is part of double loop learning. Tolerance of mistakes and openness towards organizational criticism from staff members will cultivate a double loop learning culture (Schimmel & Muntslag, 2009).

A similar classification of problem solving includes first and second order problem solving. First order problem solving does not address the underlying cause and is characterized by doing what is necessary to continue a specified task (Tucker et al., 2002). First order problem solving becomes the default mode of operating where workers have very little slack time and where there is little coordination across work roles (Tucker et al., 2002). First order problem solving allows staff to continue to do their work, but inhibits organisational learning. It also gives the worker a sense of heroism by solving the problem alone and not having to wait for anybody else (Tucker et al., 2002).

Dynamics are important and the use of teamwork for problem solving is critical to change and sustaining change in healthcare (Massey and Williams, 2006). Problem solving is seen by some authors as the seeds of innovation and by harnessing tacit knowledge of employees teams can generate novel ideas (Dooley and O'Sullivan, 2001). Problem solving needs to be linked to broader organizational objectives to promote engagement (Dooley and O'Sullivan, 2001).

Recognise need for change (category 5)

Beer and Walton (1987) comment that organizational transformation will only occur when there is a general dissatisfaction with the status quo coupled with a vision of the future and a well managed changed process. Some leaders are unable to see the need for change and improvement, which has been noted as a significant obstacle to efforts (Hoag et al., 2002). These leaders believe what worked in the past will continue to work now, and in the future. In linking to Beckhard and Harris's change formula (change = ABD>X); A is the level of dissatisfaction with the status quo. Without this dissatisfaction, change will simply not occur. Vroom's Expectancy Valence Theory is also relevant to the discussion of recognising the need to change. The force acting on an individual to function at a certain level is said to be a function of the product of the valences (desirability of outcomes of working at that level); and the expectancies, the subjective probabilities that a given outcome will follow working at a specific level (Behling, Starker, 1973). Vroom therefore suggests that behaviour is guided by the expectancies and valences presented to an individual in a given work environment (Behling, Starker, 1973). Those outcomes desired by an individual are positive valances and those that they wish to avoid are negative valances. It is stressed by Vroom and other expectancy theorists that it is not the objective utilities associated with working at a particular level that is important, rather, it is the individuals' own subjective perception of potential outcomes of working at particular level that is critical (Behling, Starker, 1973).

In linking this to my study, individuals are more likely to engage a change process and recognise the need for change if they can identify with positive valences. Some of these may include recognition, acknowledgement and reward as part of Concept C of this study's theory. In other words staff will be more likely to engage a process of change when they can associate with it, a positive valence for themselves. This theory is powerful in explaining why a number of factors identified in this study may enable Lean implementation, through promoting certain behaviours

that staff perceive to be associated with positive outcomes. These may include staff participation in improvement initiatives, many small wins (as this demonstrates many short term successes accompanied by acknowledgements), staff recognition and acknowledgment and open communication.

Graban (2008) says that as a first step toward Lean implementation, staff need to be open to identifying problems openly and honestly. In addition, Graban (2010) emphasises the centrality of purpose in Lean implementation which also help staff to understand their individual roles and functions. Teams have to recognise the need for change by scanning their immediate environment and then agreeing on a plan of how to improve the situation (Massey and Williams, 2006). Kotter (1995) flags a 'sense of urgency' as one of the most important elements in starting a change programme. He asserts that the leadership needs to create a sense of urgency to enroll staff. Schein (1987) also stressed the need to create a sense of urgency that kick starts involvement. Edmonson (2004) adds that in healthcare leaders should create a vision and create the sense of urgency around a crisis. Failure to recognise the need for change is seen as a significant obstacle to improvement (Hoag, Ritschard and Cooper, 2002). Armenakis et al. (2007) assert that the degree to which staff recognises the need for change is linked to the preparedness of staff for change. In this study, identification of problems is linked to the outcomes of the Lean project (Fig 4). This may be linked to the degree to which staff will participate in change.

Structured plan for improvement (category 6)

Al-Mashari and Zairi (1999) argue that a lack of clear goals has led to many change projects failing. Many authors have detailed the importance of thorough planning of change programmes (Dooley and O'Sullivan, 2001).One of the key factors resulting in successful Six Sigma programmes is a clear plan that incorporates the DMAIC method (define, measure, analyse, improve and control) (Antony & Banuelas, 2001). Problems should be well defined with measurable objectives, even before teams are constituted.

Effective change programs should start with a well defined business problem coupled with a general direction for improvement (Beer and Eisenstat, 1990). This direction or 'vision' should be shared by different team members. Pugh and Hickson (1989) emphasise how targets should

be clearly defined down to what is expected from individuals in order to reach the target. It is true that Lean implementation projects have a large emergent aspect of change, as solutions are developed over time. Emergent models have a characteristically bottom up pattern of involvement. It is difficult to predict what problems will arise and how to address them. This category emphasizes the need to approach problems in a structured way using the PDCA model. This study found that projects which neglected to use this kind of process were more likely to fail. Burnes (1996) reinforces this by saying that with emergent models of change there is less focus on detailed pre-planning and more on being able to understand and deal with complexity as it arises. Luecke (2003) also stressed the importance of monitoring and adjusting the plan as required as part of change process, in his Seven Step model of change.

With regard to planning improvement there appear to be arguments for and against planned and emergent models of change. I feel there may be room for a hybrid model of change where the broader approach to change is emergent and problems are tackled according to how they arise. However, specific problems would be dealt with in an ordered way using PDCA or similar tools.

4.3.2 Concept B- Disposition in staff to embrace change for the better

This concept details the factors that affect how staff reacted to change initiatives. This study, in particular, found a correlation between the three factors detailed below, and success or failure of projects. Specifically, this study empirically illustrates that participation by staff in improvement initiatives, spirit of working towards one goal, and many small wins achieved during the project has a positive effect on the disposition of staff to embrace change, and is associated with successful projects.

These three concepts can be thought of as enablers of 'Lean Readiness' as this study suggests. This concept reinforces current thinking and adds concrete indicators that affect the success or failure of Lean implementation projects.

CATEGORY AS PART OF CONCEPT B	CONTRIBUTION
1. Participation by staff in improvement initiatives	Reinforces existing literature that staff participation is important to successful change initiatives. This study provides empirical evidence for its importance in implementing Lean successfully, as with the projects that succeeded staff actively participated more than in those that failed. On the contrary staff resistance and failure to engage the Lean implementation was associated with failure.
2. Spirit of working towards one goal	Supports existing literature that teamwork is associated with successful implementation of change projects.
3. Many 'small wins' were achieved during the project	'Small wins' are known in the literature to motivate staff and create hope for change. This study provided some empirical evidence for this – successful projects had more evidence of small wins than those that failed. In addition there may be a link between the PDCA cycle and 'small wins', since each PDCA cycle can be seen as a small achievement.

Table 4.5 The contribution Concept B makes to the body of knowledge

Staff participation in improvement initiatives

Resistance to change may lead to a lack of cooperation and participation by those involved in the change initiative (Burnes, 1992). Resistance to change has been frequently cited for project failure (Dooley and O'Sullivan, 2001). Resistance can take overt or covert forms (Dooley and O'Sullivan, 1995), and researchers agree that the most potent antidote to resistance is participation amongst employees (Kanter, 1983). Some companies report that they succeeded in overcoming resistance by extensive communication and by motivating staff (Antony & Banuelas, 2002). The higher the participation of staff in change initiatives, the happier the staff was, and the quicker they were able to reach targets for the change initiative (Coch and French,

1948). Kotter (1996) speaks about developing an enabling structure for the change to occur in. This also links to the creation of a safe space discussed in Concept C below. In keeping with Vroom's Expectancy Valence theory, staff would be keener to engage and be involved in an improvement initiative if they can associate the outcomes of the initiative with something positive for themselves. If their actions lead to an improved work environment, improved staff morale, increased recognition, etc., they are more likely to get involved.

Successful organizational change is reliant on employee support and enthusiasm for the change (Piderit, 2000). In the same vein, Zell (2001) has identified lack of staff participation as a significant barrier to improvement initiatives. Huczynski and Buchanan (2001) identified employee opposition as a critical barrier to effecting change programmes. Todnem (2007) identified a positive correlation between the level of change readiness and the successful management of change. Mastering Lean's 'softer' aspects is challenging as it requires all employees to engage the process and adopt new ways of thinking and behaving (Fine, Hansen and Roggenhofer, 2008). When change is imposed on teams they are less likely to participate and the project is less likely to be successful (Kettinger and Grover, 1995). It is important for team members to recognise the problem as something that needs improvement. People tend to support and champion what they themselves are involved in creating (Evans, 1994). Imposing changes in this research would refer to change where employees do not feel sufficiently engaged in a process; where they perceive an instruction or command to change regardless of their individual input into the change process; where they have psychologically not engaged the proposed change and where they may not recognise or appreciate the need to change. While it may argued that imposing change may work in some circumstances such as a crisis and where people are instructed to do a certain task, it is likely the individual performs it knowing and appreciating the need for it to be done.

By neglecting to address these 'soft' issues the success of Lean initiatives are substantially reduced and may contribute to 'initiative fatigue'. Aherne (2007) asserts that the most challenging part of promoting Lean in healthcare is "… to make staff members aware, and gain their approval, of its potential benefits". Graban (2008) suggest that 80-90 per cent of Lean implementation challenges are related to people and the acceptance of change. Only 10-20 per

cent of the challenge is related to the technical aspects of Lean implementation of technical tools and methods.

Spirit of working towards one goal

This category relates to the impact of teamwork or the lack thereof, on the disposition of staff to embrace improvement. In this study, and with reference to this category, there was a clear difference between projects that failed and those that succeeded. Teams are successful vehicles for organizational learning (Guzzo and Dickson, 1996) by improving work practices (Edmonson, 2002). Team learning is said to be effective when there is room for experimentation and collaborative problem solving (Edmonson, 1999), but on their own, teams are not sufficient for successful implementation (Tucker et al., 2007).

Kotter (1996), Kanter et al. (2002) and Luecke (2003) all confirm the importance of working together towards a shared goal in their respective models of change illustrated in Table 1. Hatch (1997) states that flatter organizations with less formal boundaries between teams are more responsive to change. Executives and senior managers can sometimes themselves be the barriers to working together, as one executive in Erwin's (2009) study admitted by saying it was too difficult and painful to adapt. Kotter (1996) cautions executives not to pay lip service to the change process while continuing to behave in the same ways. Fryer, Antony and Douglas (2007) identified all members of a team working together to improve processes as an enabler in process improvement initiatives. Glaser and Glaser (1992) had identified five aspects that should be clearly defined to improve team effectiveness:

1. Team planning and goal setting
2. Team roles
3. Team processes
4. Team interpersonal relationships
5. Inter-team relations

This study confirms points 1 and 2 (linked to Concept A). Point 4 relates to the category of 'Spirit of working toward one goal'. Despite the importance placed on teams in this study and by other authors (Dickson, 1996) - Tucker et al. (2007) assert that teams on their own are not sufficient for successful implementation. This study is able to augment this thinking by

suggesting that teamwork, good participation by staff and many 'small wins' constitute the concept of 'Disposition in staff to embrace change for the better'. This study thus creates the opportunity for empiric study of how these concepts relate to each other and to the idea of 'Lean Readiness'.

Many 'small wins'

'Small wins' focus staff and motivate them to continue improving (Reay, Golden-Biddle and Germann, 2006). They also have the impact of improving worker confidence in the change process and allow staff to recognise the new roles they would need to adopt (Reay, Golden-Biddle and Germann, 2006). The emergent model of change, to which Lean subscribes, is characterized by continuous improvement through experimentation and small incremental changes (Burnes, 1996).

Senge (1999) also advocates that change initiatives start small and grow with time. Douglas McGregor's theories of change (X and Y) were highlighted in Section 2.1. 3.3. Young and Rosen, have expanded this concept to include Theory O (Winther, 1999), which involves consensual engagement with workers, non-discriminative ownership of the change process and is based on many small scale improvements. 'Bottom- up' change is a cardinal feature of Theory O. Erwin (2009) recorded how staff were surprised and even sceptical that their actions had resulted in the results they were seeing. Being able to link their actions to the effects of small initiatives (e.g. gradual reduction of patient stay) raised their confidence in the change efforts. Kotter (1995) mentioned that failing to create short term wins is a barrier to successful change programmes. These 'small wins' keep staff focussed and motivated to continue improving.

Successful change programs seem to start with a 'bottom-up' approach far from the core of organisations, and they focus on solving real business problems (Beer and Eisenstat, 1990). Weick (2001) describes a strategy of 'small wins' as one which is characterized by a number of opportunities to implement modest changes that produce observable result. I propose that 'small wins' can be linked to the PDCA tool, where each successful PDCA cycle will result in a small achievement. Since PDCA was used to create the 'small wins' in this project, it would then be

acceptable to deduce that 'small wins' are related to PDCA and would be an extension of current thinking.

4.3.3 Concept C – Creation of Safe Spaces influences willingness to improve status quo

This concept is focused on creating the ideal 'space' that is conducive for staff to contribute their ideas for improvement and actively engage the change initiative. There is considerable literature available relating to this issue. However, as detailed below, this study was able to specifically define the characteristics or features of a 'safe space' with empirical evidence. Projects that failed had less evidence of a 'safe space' as compared to those that succeeded. This safe space enables wholesome discussion, experimentation, innovation and the solution of problems using Lean methods. Employees feel empowered to contribute to and in, this safe space. I recommend that this concept be viewed as an important enabling antecedent for Lean implementation. This too provides the opportunity for further empiric testing of the extent to which this 'Safe Space' contributes to 'Lean Readiness'. Concept B and C collectively influence the outcome of Lean projects, mediated by the influence of Concept A.

CATEGORY AS PART OF CONCEPT C	CONTRIBUTION
1. **Staff ideas are recognised and acknowledged**	Supports existing literature on the importance of recognising and acknowledging staff ideas. It also provides empirical evidence of what constitutes the concept of a 'safe space' for staff to experiment and improve.
2. **Staff are comfortable giving their input**	Supports existing literature and this study demonstrates its importance in creating a 'safe space' which is necessary for Lean implementation. This is linked to the idea of staff buy-in.
3. **There are regular meetings focused on improvement**	There is some literature to support this interesting finding that this study establishes empirically. Regular meetings were associated with the successful projects. Regular meetings are important for Lean implementation.
4. **Discussions are open with a positive vibe and good communication**	Reinforces existing literature about the need to communicate. Adds the implication that this aids the creation of 'safe spaces'

Table 4.6 The contribution Concept C makes to the body of knowledge

I also offer a new concept of 'Lean Readiness' which is a result of Concept B and Concept C combined as shown in Figure 4.4. Armenakis, Feild & Harris (2007) surveyed more than 9000 employees and developed the concept of change 'readiness' which is affected by individual capabilities to effect the change, alignment of the proposed change with organisational objectives, leadership commitment to the change and the proposed change is beneficial to employees of the organization (Armenakis, Feild & Harris, 2007). The concept of 'readiness' studied by Armenakis, Harris and Mossholder (1993), may be used as an assessment tool to determine how ready an organization is for a change and can assist leaders in identifying potential gaps. Indeed the concept of 'Lean readiness' can also be used to determine how ready an organization is to implement a Lean project. The assessment of readiness prior to the introduction of change has been studied by many authors who have developed tools (Armenakis, Feild & Harris, 2007). In this study I observed that higher levels of 'Lean Readiness' were associated with successful projects as compared to those that failed.

Staff ideas are valued (Categories 1 and 2)

I will discuss categories 1 and 2 together as these categories are closely linked. Graban (2008) advocates how mistakes should be used as opportunities to learn and punitive action should not be taken against individuals. In particular, healthcare organizations are quick to blame individuals for errors (Woodhouse et al., 2004) and human errors are commonly cited as a leading cause of medical errors (Leape, 1994). There has been an overwhelming focus on individuals rather than on systems failures leading to errors (McFadden, Stock, Gowen, 2006). The errors fixed at the system level are not improved by apprehending medical staff. There needs to be a systems level change in a process to effect real improvement (McFadden, Stock, Gowen, 2006). For example, it will not help to discipline nurses making errors on medication rounds, when the fundamental problem is that there are only half the numbers of nurses necessary to deliver good quality of care.

In their study, Fryer, Antony and Douglas (2007) emphasised how mangers blamed individuals for errors. A high, 62 per cent (85) of managers in their study pointed to individuals not effectively performing their job as the most common cause of quality problems.

Safe Space

Emiliani and Stec (1995) identified three important barriers to Lean implementation including a culture of blame, unclear purpose for Lean implementation and lack of cross functional participation. A blame culture was highlighted as a barrier to change initiatives by Vince and Saleem (2004) and Eliott, Smith and McGuinness (2000). Kanter (1983) points out that management interaction and listening during change initiatives is crucial to success of change projects. Continuous quality improvement requires a culture that empowers individuals to make decisions and take risks (Heilpern and Nadler, 1992).

Webb, Tour, Hurt and van Kammen (1992) urge managers to reward workers who excel but that rewards do not always have to be monetary in nature. Staff members responded positively to public recognition, peer reinforcement and senior management appreciation. Graham and Unruh (1990) found that staff valued verbal praise, personal notes and morale-building meetings initiated by their managers. In the field of health care, Kimmerle (1994) observed that on the job verbal feedback enhanced self confidence, was low cost and could easily be done. It is important to involve those being rewarded or recognised in designing the reward system (Cronin, Becherer, 1999).

Within the hospital setting, open discussion of errors has been shown to be effective in reducing errors (Edmonson, 1996; Klein et al. 1998). The purpose of these discussions is to create an environment where individuals can comfortably share knowledge and ideas about errors (McFadden, Stock, Gowen, 2006). Pettigrew and Whipp (1991) developed the notion of 'receptive contexts' for implementing change. Even though the concept was founded in private sector firms, it rapidly spread to healthcare (Fitzgerald et al., 2007). Theory X discussed previously would in all likelihood lead to 'unreceptive contexts' where it is difficult to speak openly, innovate or improve the status quo.

Learning and Innovation

Effective team learning occurs in an environment that encourages experimentation and collaborative problem solving (Edmonson, 1999). Psychological safety is positively linked to outcomes of process improvement efforts (Tucker et al., 2007). An environment that inhibits experimentation and punishes mistakes is seen as inhibitory towards implementing change

initiatives (Hoag, 2002, Mashari and Zairi, 1995). Graban (2008) highlights that identifying errors in hospitals can sometimes be a risky approach as people can take it personally, especially if they created the system under scrutiny. He cautions about being insensitive in approaching problems that people may have been involved in for protracted periods as they may react negatively to the opportunity to improve status quo. Sitkin (1992) states that high a level of resistance amongst healthcare professionals to conduct small experiments is unfortunate and limits their ability to learn from failures.

One way for organizations to continually innovate is to capitalise on their employees' creativity (de Jong & Hartog, 2007). A number of researchers agree that the ability to innovate results in organisational success (Van de Ven, 1986; Amabile, 1988). Employees' innovativeness is linked to the degree of cooperation with team members (Anderson, Dreu & Nijstad, 2004). The willingness of employees to contribute their ideas for improvement is dependent on the immediate feedback they receive from seniors (de Jong & Hartog, 2007). Positive, constructive feedback is seen as an enabler for staff input. The role of creativity and thinking when implementing change initiatives, such as Lean, is increasingly relevant. Graban (2008) notes how in recent years, some Toyota executives have started to refer to TPS as the Thinking Production System, reinforcing the focus on creating thinking people.

Recognition and Acknowledgement

An organization's climate is said to be suitable for innovation when efforts to implement the innovation are acknowledged and praised (Klein and Sorra, 1996). A learning environment is created to develop individuals, recognise and reward achievements (Nevis, Dibella and Gould, 1995). In contrast, the lack of recognition or even fear of punishment for the innovation can be viewed as a serious barrier to staff feeling comfortable to input their ideas (Sun and Scott, 2005). Staff are more likely to adopt an innovation or new behaviour if they can clearly see the benefits for themselves and the organizations (Rogers, 1995). While this is important, Dennis et al. (2002) highlight that it too is insufficient to guarantee adoption.

Dixon (1994) cautions managers that if organizations reward compliance with current practices, it is less likely that employees will experiment with new ideas or behaviours. Dixon (1998 p.103-4) actually describes some of the physical characteristics of a 'safe space'. It should not

resemble boardrooms but should be less formal, with comfortable couches and chairs, with natural lighting, readily available refreshments and items that will promote thinking (pictures, quotes and whiteboards). Waterman, Peters and Phillips (1982) also encourage the tolerance of failure and promote risk taking when it comes to organizational change. An obstructive climate to change is one where organizational 'silence' is preferred to idea generation and improvements (Morrison and Milliken (2000).

Regular Meetings

This category revealed a disparity between successful and unsuccessful projects in my study. With those that were successful, there were regular meetings specifically focussed on Lean implementation. Klein and Sorra (1996) identified specific meeting times for innovation implementation as an enabler of implementation. Glaser and Glaser (1992) report that team processes are more effective when there is agreement and clarity on meeting frequency and timing. This is further enhanced by the extent to which problem solving is incorporated and decisions are taken to improve the status quo.

Oakland (1998) suggests that change initiatives require two critical components for effective communication: general communication about the change, and dedicated, specific meetings that address the change initiative. There is little empirical evidence to date that associates regular improvement meetings with successful implementation, as this study does.

Open and Regular Communication

By implication, staff should not only be informed about the change and when their input or participation is needed. It is also necessary that communication about the change occurs regularly, clearly and widely (Tucker et al., 2001, Bashein, 1994, Davenport, 1993). A number of authors have identified the importance of communication in change projects (Kotter, 1995; Huczynski and Buchanan, 2001; Fryer, Antony and Douglas 2007; Erwin, 2009). It is also important to inform external stakeholders timeously, so that when required, they are willing to provide their input (Massey & Williams, 2006).

Few organizations know how to link what gets said, to what gets done (the saying-doing gap). Organizations should design communication plans based on the size and culture of the

organization, the type of business, financial resources and the staff of the organization (Daly, Teague and Kitchen, 2003). The smaller the organization, the easier it is to communicate a plan for change (Daly, Teague and Kitchen, 2003). When managers were open about the possible effects of change initiatives (even if there was bad news to be conveyed) there were improved levels of productivity and lower levels of staff absenteeism (Daly, Teague and Kitchen, 2003).

Erwin (2009) noted how the CEO leading a change initiative relayed the importance of the change initiative repeatedly to the point that staff realized that he was serious about the change and it was not going to fall off the institutional agenda. Managers that quickly achieved their objectives attributed their success to addressing individual staff members' fears and having open discussion about their anxieties. Open communication and information sharing promotes innovation within organizations (Guha, Grover, Kettinger, Teng, 1997).

Communication is seen as a tool for preparing employees for the positive and negative effects of change (Jick, 1993), and for the shift of staff's understanding of the change and thus reducing resistance to change (Kotter and Schlesinger, 1987). If team members are open to communication they are more likely to embrace change than resist it (April, 1999). Soltani, Lai and Mahmoudi (2007) identified ineffective vertical and horizontal communication as an obstacle to change initiatives. However, information overload can also lead to lower productivity (Thomas, 2005).

5. CONCLUSION

Lean implementation in healthcare contexts has resulted in many successes and few reported failures. However, there remains some uncertainty as to what inhibits and enables successful Lean implementation. While current implementation has been guided by broad principles provided by Lean experts, this study has offered some specific factors that seem to affect outcomes of lean projects. Using AR in five project sites at SHH, Lean was implemented with a view to improving outcomes in these five project sites. However, due to a number of factors, two projects succeeded, two failed and one was prematurely ended. This led to a careful evaluation of the varying outcomes. Through a rigorous data analysis process, using grounded theory techniques, the study was able to establish differences between successful and failed projects. This facilitated the development of enablers and inhibitors of Lean implementation at SHH. The outcome of this study has theoretical and practical implications that may positively affect future Lean implementation efforts. Many lessons were learnt about Lean implementation in practice, about the research process and about the value of reflection.

5.1 INTRODUCTION

The chapter serves to crystallize the study by highlighting the theoretically and practically relevant answers to the original research question. The study has been able to answer the original research question of: What are the enablers and inhibitors of Lean implementation at SHH?

Three core concepts (constituted by 13 factors) emerged from the study and formed a crucial part of the final theory in this study. The first concept which emerged related to 'Using hard data to identify and solve problems' seemed to mediate Lean outcomes. The two concepts of the 'Disposition of staff to embrace improvement' and 'Creating safe space to encourage staff to engage the improvement process' were combined to form the new concept of 'Lean Readiness'. The study ascertained that the level of 'Lean Readiness' and the degree to which 'Hard facts are used to identify and solve problems', will affect the outcome of a Lean implementation.

The enablers and inhibitors will be detailed in the section on research issues below.

This study has used empirical methods to identify concrete, specific factors that may affect Lean implementation success or failure. This study also builds a foundation for future empirical testing using positivist techniques to determine the strength of the relationship between factors as well as the extent to which the presence or absence of these factors influence the outcomes of a Lean project. The theoretical implications are discussed in more detail in Section 5.4 below. From a practical perspective, this study offers some guidance on how to improve the chance of successful implementation.

The chapter starts by locating this research in the extant literature before proceeding to discuss the conclusions about the research problem.   The theoretical, practical and methodological implications are then explored in more detail, specifically highlighting the contribution this study makes. In these three sections I included some of my reflections on what helped me as the researcher/practitioner during the process. This chapter concludes by discussing the validity of the study identifying opportunities for future research.

5.2 CONCLUSIONS ABOUT RESEARCH ISSUES

This study has produced a theory that emerged through an iterative process of data collection, analysis, synthesis and relationship building. In this section I briefly summarize the basic building blocks of the theory presented - the concepts. These four concepts are briefly discussed in relation to existing theory by reviewing the extent to which they reinforce existing literature, the extent to which they disprove existing literature or how they enhance current understanding. The table at the end of this section summarizes this section.

Figure 5.1 below depicts the final theory of the study and the research problems related to understanding Lean implementation. Essentially, this study offers a theory to illustrate the enablers and inhibitors of Lean implementation in a large hospital. The study also details relationships between concepts that affect the 'outcome of Lean Projects'.

Table 5.1 is a high level summary of how each aspect of each concept is linked to existing literature with the specific contribution being highlighted. The discussion of these concepts leads

one to understand the overall theory of the study better. This logically flows into a discussion of how this theory is relevant to answering the original research question.

In Table 5.1 below, the contribution this study makes is summarized indicating academic and practical relevance. I have found that the contribution components of the theory fall into one of four classes as highlighted in different colours below:

1. Reinforces existing literature and adds new possible relationship (pale blue)
2. Reinforces existing literature (peach)
3. Adds empirical evidence to current conceptual or theoretical literature (pink)

	CATEGORY AS PART OF CONCEPT	DEGREE COVERED IN LITERATURE	EVALUATION	ACADEMIC SIGNIFICANCE	PRACTICAL SIGNIFICANCE
USING HARD DATA TO IDENTIFY AND SOLVE PROBLEMS	1. Changes made are based on real facts and measurements	Supports existing literature and adds new possible relationship.	Supports existing literature but proposes a new relationship between measurement and outcomes of change project.	Quantitative testing of the extent to which measuring impact on outcomes.	Will be able to stress the importance of measurement when implementing any changes.
	2.Tasks have clear specification of who does what, when and how	Supports the literature that promotes task specification but unable to comment on narrow job descriptions that may hamper improvements.	Conceptually there is discussion about how clarity of tasks is necessary but needs to be managed as over specification leads to fewer improvements. This study provides empirical evidence that task specification was associated with successful projects. Specification is necessary but a balance needs to be reached between specifying tasks and ensuring everybody is involved in improvement.	Perhaps there is need to establish empirically the extent of specification necessary to ensure optimal productivity.	This stresses the importance of making sure all tasks have a level of specification that enables flow through a process. It also alludes to the need for quality improvement to be part of everybody's job description
	3.Focused problem solving to find root causes	Attempts to add empirical evidence to support current theoretical or conceptual thinking.	There is considerable conceptual and theoretical guidance from experts such as Argyris & Schon, Lapre and Van Wassenhove about problem solving. This study plans to provide a more concrete picture of the need for problem solving by illustrating that increased problem solving was observed in the successful projects.	There may be a need to establish a hybrid loop of learning which includes aspects of both single and double loop learning.	In projects where there was focused problems solving, the projects succeeded. Five Whys and Fish bone were used.

DISPOSITION OF STAFF TO EMBRACE	**4.Recognising the need for change**	Reinforces existing literature and adds new possible relationship.	This is broadly covered by a number of leading authors. However, in this study I recognise that there may be a link between the recognition of change and the use of data, and that data can be used as a tool to get people to see the reality of the problem.	Using quantitative techniques if there was a relationship between data and getting staff to recognise the need for change, then a case can be made for the regular use of data in managing the organisation.	If staff have not recognised the need to change, it is unlikely they will participate and engage fully. They may 'partake' or comply but this will be short-lived.
	5.Structured plan for improvements (using PDCA)	Attempts to add empirical evidence to support using structured planning but proposes the need for an intermediate change model.	Many articles have been written about forms of change, types of change and various other ways to classify change. Commonly authors distinguish between planned and emergent change. However this study may suggest that Lean uses an emergent approach to identify problems, but then uses a very structured PDCA model to work through problems.	This may suggest the need for a form of change which captures the best of both planned and emergent change.	In lean projects, when problems are dealt with using a structured plan such as PDCA, the project may be more likely to succeed.
	1.Participation by staff in improvement initiatives	Reinforces existing literature and adds new possible relationship.	Mostly reinforcing existing ideas that staff participation is a crucial part of any change initiative but provides some empirical evidence that it is positively associated with Lean success.	This study suggests that Lean outcomes are linked to Staff participation which can and should be further tested.	Like many other change initiatives, Lean is susceptible to staff resistance and failure of staff engagement.
	2.Spirit of working towards one goal	Reinforces existing literature about the value of teamwork in effecting change initiatives.	Teamwork in the projects that succeeded was more prevalent than in those that failed. This largely supports existing literature.	Provides some empirical evidence that teamwork is also important in Lean initiatives.	
	3. Many small wins were achieved during the project	Reinforces existing literature and adds new possible relationship.	Agrees with current practitioner based thinking that small wins motivate staff to continue and create hope for change. An addition to current thinking may be to link small wins to the lean concept of PDCA as each cycle can be seen as a small achievement.	PDCA can be seen as the 'small wins' within a Lean project	The 'small wins' seem to motivate staff and should be present early on in the project.

1.Staff ideas are recognised and acknowledged	Reinforces existing literature and adds new possible relationship.	The literature covers this concept conceptually and empirically. What this study adds is that this is a concrete part of 'Creating Safe Spaces'.	Adds some substance to suggest what a 'safe space' is made up of.	Practical things like regular meetings, communication plans, checking the extent to which staff are generating ideas and recognising staff can contribute to forming a safe space.
2.Staff are comfortable giving their input	Reinforces existing literature and provides empirical evidence of its importance in creating a 'safe space'	This is necessary in Lean projects and in this study is linked to how 'safe' staff feel and how engaged they are in the improvement projects. There is existing literature to support this, both in the form of theoretical and empirical studies.		This is necessary for buy-in and for sustainability. In this study I used Socratic questioning to get staff to take ownership of problems and their solutions.
3.There are regular meetings focused on improvement	Offers empirical evidence that regular meetings are associated with successful outcomes.	This was an interesting finding supported in some degree by suggestions in the literature. This study sees this as absolutely necessary to achieve successful lean implementations.	In the projects that succeeded there were more, regular meetings to focus on improvements.	If the institution cannot see the value of Lean by at least providing for weekly meetings, the concept of a 'safe space' will be compromised and therefore Lean outcomes too.
4. Discussions are open with a positive vibe, good communication	Reinforces existing literature about the need to communicate. Adds the implication that this aids the creation of 'safe spaces'	The literature has stressed the importance of communication. In this study we find it important, particular for the creation of 'safe spaces'.	Communication about the improvement is necessary and will improve the extent to which staff offer ideas for improvement.	When organizations embark on a Lean journey, like any change initiative, they need to have a communication plan that is multi pronged and effective.

Table 5.1 Exploring the Academic and Practical Contributions of the study
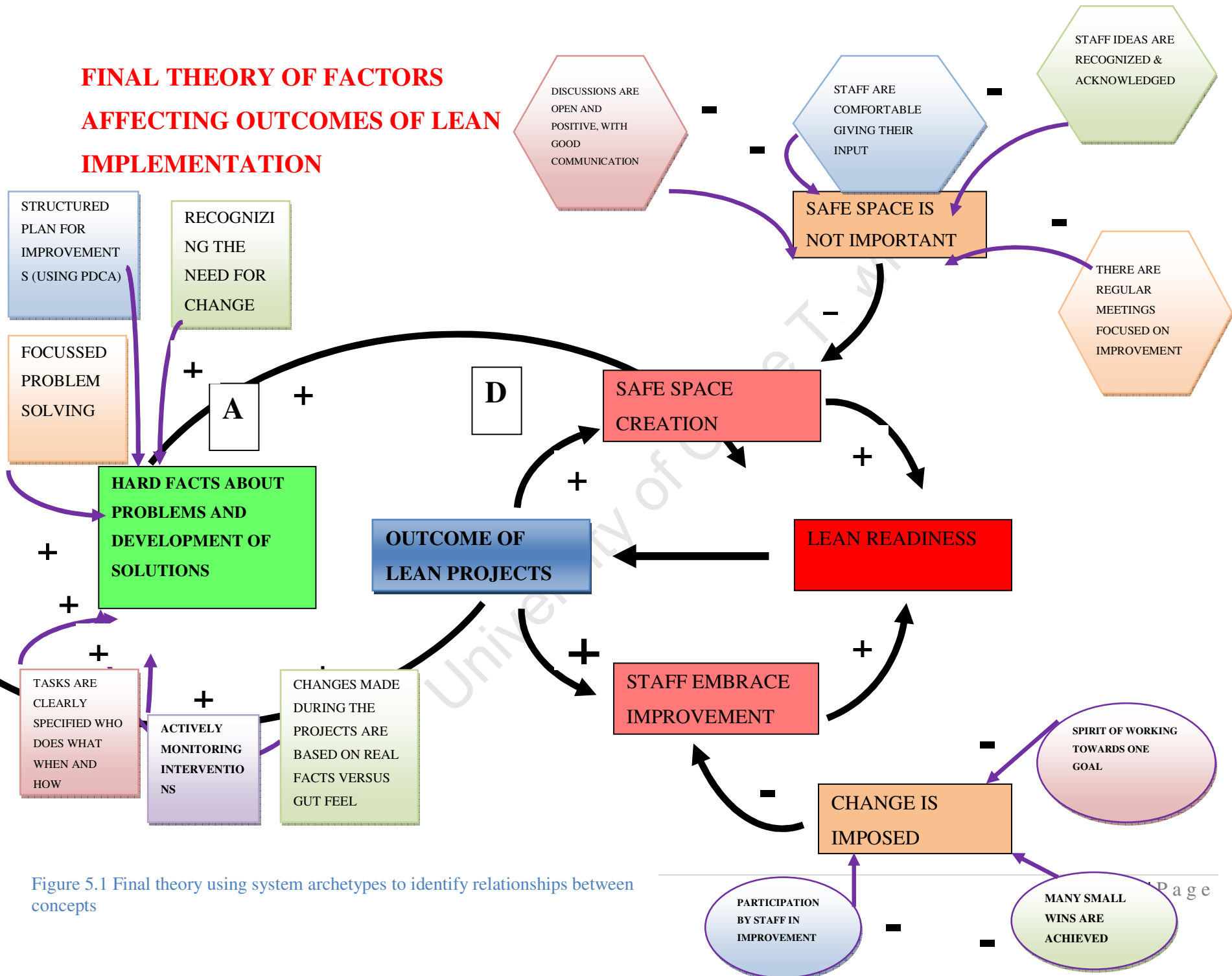
Figure 5.1 Final theory using system archetypes to identify relationships between concepts

Each concept is now discussed with a succinct mention of the relationship of the given concept to existing literature. 'Lean Readiness' can be seen as the antecedents for Lean implementation, the absence of which will likely result in unsuccessful projects. The state of 'Lean Readiness' influences the 'outcome of Lean projects', mediated by the effect of using 'Hard Facts to identify problems and develop solutions'. The concept of using 'Hard Facts to identify problems and develop solutions' is part of a reinforcing cycle with the 'outcomes of Lean projects', as more data is used to identify problems and develop solutions, the outcomes of Lean projects will improve, which will motivate them to continue improving.

1. 'Hard Facts to identify problems and develop solutions'

In this study, using 'hard facts to identify problems and develop solutions' is a concept that stresses the importance of measurements, task specification, focused problem solving, monitoring and feedback, recognising the need to change and structured problems solving. These six aspects will be briefly discussed below. In the projects that failed, there were lower levels of these factors compared to those that succeeded.

There is a considerable amount of literature on the importance of measurement and feedback during change initiatives, but this study provides some evidence that measurement is linked to the outcome of the project, an assertion that the literature did not cover comprehensively before (see Figure 1 A-D). In other words previous studies have cited the importance of using measurement as part of any change programme. This study reinforces these findings that measurements are in fact a crucial part of change initiatives, but also adds the possibility that measurement itself may be linked to the outcome of a Lean project.

There is a limited amount of literature on the role of task specification. This study was able to demonstrate its value, since with projects that succeeded there were higher levels of specification. Task specification in this study included a description of who does what, when, and how. The literature suggests that staff enjoy having a clear task to perform at the operator level, but it needs to be managed with the risk of having too narrow job descriptions that can actually decrease improvement efforts by not having the benefit of a multi-skilled work force. Ambiguity of tasks has been cited as a barrier to change initiatives. This study was able to empirically show that task specification was higher in the projects that succeeded compared to those that failed. This study did not however deal with over specification of tasks.

With regards to the element of focused problem solving, I discovered that Lean straddles two currently accepted types of problem solving – single and double loop learning. It is usually placed in the single loop category due to its emergent nature, quick response and low reliance on resources to effect the improvement. Lean does, however, try to emphasize solving root causes rather than quick fixes, which is a characteristic of double loop learning. This study found that where there was more root cause analysis, projects were more successful. This study also then challenges the existing definition of single and double loop learning, proposing that there may be an intermediate category of learning. Lean seems to have characteristics of both single and double loop learning as it is it single loop in nature but forces root cause identification which is within the double loop domain.

The literature provides sufficient evidence about the importance of staff realizing the need for change, which has been stressed by a number of authors in the organizational change arena. This study reinforces the importance of recognising the need to change. This study also posits a possible link between data collection and recognising the need for change. The two may be positively linked, as one uses data to disprove existing thinking and perceptions and thus kick start staff into action. Data may be able to break existing mental models about the 'lack of problems' in their respective departments. There is a suggestion in the literature that the extent to which staff recognises the need to change is linked to the level of readiness for change.

With regard to having a structured plan for improvement, the literature tends to suggest that there is a place for both planned and emergent change. It seems that emergent change models are becoming more popular due to the rapidly changing environment in which organizations function today. However, structured change plans appear to offer rigor and coherence which emergent change plans sometimes neglect. I believe there is room for a hybrid model of change where emergent and planned models of change are used synergistically during the change process. In this regard, as one analyses the process, the problem that needs to be tackled emerges. On the other hand once a problem is identified the use of structured plan (PDCA) is useful to make sure a rigorous and coherent process is followed to solve the problem at hand.

2. 'Disposition in staff to embrace improvement projects'

This concept relates to the willingness of staff to embrace change initiatives and looks at three previously identified aspects of 'participation of staff', 'spirit of working toward one goal' and many 'small wins'.

This study reinforces the idea that staff participation is crucial to the success of change initiatives, and more specifically provides empirical evidence that it is important in Lean implementation projects. Many organizational change studies have highlighted the importance of people but this study specifically looks at people and their involvement in the context of a Lean implementation. This study reinforces existing thinking on the value of teamwork and working towards one goal. Unfortunately, this study was not able to establish a link between the degree to which units worked in silos (neglecting to work with those outside their own unit) and the effectiveness of the Lean project. Lean projects are not designed to be done by an individual. It is likely that teamwork improves sustainability and the sense of ownership as well.

There is some literature to validate the importance of small wins in improving staff participation but this seems to stem mostly from practitioners including Peter Senge (*The Learning Organization*), John Kotter (*Leading Change*) and Douglas McGregor (*Theory Y*). This study showed higher levels of participation amongst staff in projects that achieved many small wins and eventually succeeded compared to those that failed. I propose that the concept of 'small wins' can be linked to the PDCA discussed in the section on structured plans for change. Each PDCA cycle can be viewed as a 'small win', since at the end of each successful cycle there is a positive outcome, no matter how small that may be. This would be an extension of current thinking in terms or concretizing the concept of small wins in the context of Lean implementation.

3. 'The creation of Safe Space to improve willingness to engage the change process'

The concept of a 'safe space' has been discussed in the literature using different terms, for example: psychological safety, a protected environment, or ideal conditions for improvement. In this study I found that the concept of a 'safe space' was constituted by four elements of staff recognition, staff comfort in sharing their ideas, regular meetings and positive, clear

communication. The literature currently has a few empirical studies that allude to what constitutes a 'safe space' This study looks to add to this by defining what the 'safe space' would look like, and feel like, for Lean implementations. The projects that succeeded in this study had a stronger presence of this 'safe space' than those that failed. This 'safe space' is characterized by a sense of openness to experiment, try new ideas and share best practices. Employees are comfortable to contribute to improving the situation while leaders encourage staff input, provide safety by ensuring each contribution is valued and respected.

This study reinforced the thinking that staff recognition and acknowledgement encourages learning and removes the fear often associated with innovation and new ideas. Staff are more likely to improve the current system if they can link their action to benefits for themselves or the organization. Recognition is regarded as necessary but not sufficient for adoption of new practices. Managers are warned not to reward compliance with current practice, but to reward innovation and improvement on current practice. Recognition does not necessarily have to take the form of monetary bonuses or material wealth; some authors encourage the use of verbal praise, public recognition and morale-building meetings to effectively reinforce innovative behaviours. In this study the concept of recognition was reinforced as important in effecting positive outcomes of change projects.

Staff are more comfortable experimenting in a culture of learning and not in a punitive culture. Staff are also less likely to innovate if they cannot relate the required action to individual or organizational benefits. Organizational success has been linked to the ability of an organization to harvest their staff's intellectual capital to innovate continually. The literature suggests there may be a link between this concept of 'safe space' and teamwork across conventional institutional boundaries. In this study I was able to demonstrate empirically that projects that succeeded had higher degrees of 'safe spaces' and therefore had staff more engaged and contributing to improvement initiatives.

Interestingly this study found that having regular, dedicated improvement meetings was associated with an increased likelihood of success of Lean implementation. The literature provides some support for this but at present there seems to be no empirical data to support this from the existing literature. This study may provide the basis for further quantitative testing of the hypothesis that regular meetings contribute to successful project outcomes.

Communication has been cited by many leading organizational change, and change management authors, as crucial to the successful launch of a change project as well

sustaining these changes. This study reinforces this, suggesting that open and positive communication will enhance the concept of a 'safe space' and will result in better staff engagement. In this study both internal and external communication in the successful projects was observed more than in those that failed.

4. 'Lean Readiness'

The concept of 'Lean Readiness' was a union of the two concepts of 'disposition of staff to embrace change' and the 'creation of safe space influences willingness to engage'. The literature speaks volumes about the need for change, how to plan change, how to monitor change, and how to sustain change. However, there seems to be a deficit of how to test the level of readiness for change initiatives. The concept of 'change readiness' is only discussed in small detail by the existing literature and is more conceptual than empirical. This is a further contribution from this study that provides empirical support for the concept of 'change readiness'. 'Readiness' can be regarded as the presence of enabling antecedents and the absence of inhibiting antecedents. This study, using empirical data, has made steps towards establishing what these antecedents are, and comparing successful and failed projects. Theoretically these concepts can be quantitatively tested to determine the relative impact each of these antecedents has on the outcome of a Lean project. This concept also has the potential to assist practitioners with future implementation where managers can test for these antecedents before starting a Lean project.

5.3 CONCLUSIONS ABOUT THE RESEARCH PROBLEM AND THE RELEVANCE OF THE STUDY'S THEORY

This section focuses on the relevance of the research by discussing the contribution it makes in relation to the research problem. The research problem under study involved the identification of enablers and inhibitors when implementing Lean in a healthcare context. The study successfully identified some factors that enable or inhibit Lean implementation projects.

Figure 5.1 above represents the final theory of this study on how to implement Lean in healthcare contexts. The theory suggests that with high levels of 'Lean Readiness' the outcomes of Lean projects will be good because of the use of 'hard facts to identify and solve problems'. 'Lean Readiness' itself is made up by two concepts: 'Disposition of staff to

participate' and 'Creation of Safe Spaces affects willingness to engage'. After rigorous analysis of data collected over a two year period, this study was able to establish the impact of 13 indicators on Lean implementation. The 13 indicators below are not conceptual or abstract and offer concrete clues as to what enables and inhibits Lean implementation in healthcare contexts.

CODE	EMPIRICAL INDICATOR
A1	Changes made are based on real facts versus gut feel
A2	Tasks have clear specification of who does what, when and how
A3	Focused problem solving to find root causes
A4	Actively monitoring interventions
A5	Recognising the need for change
A10	Structured plan for improvements (using PDCA)
B1	Participation by staff in improvement initiatives
B5	Spirit of working towards one goal
B12	Many small wins were achieved during the project
C4	Staff ideas are recognised and acknowledged
C7	Staff are comfortable giving their input
C8	There are regular meetings focused on improvement
C9	Discussions are open with a positive vibe and good communication

Table 5.2 List of enablers of Lean implementation developed from this study

In linking to the conceptual framework explicated in Section 1.4, it is necessary to discuss the evolution in thinking from before commencing the study until the completion of the study. Initially my experience, background and initial reading of the literature led me to accept a 'tool-based' view of Lean implementation. I felt that if one were to apply the Lean tools appropriately and correctly, many problematic processes would be improved and therefore in the context of Lean, service delivery would improve. This study has significantly changed this perspective which largely overlooked the critical 'soft' (human) components of Lean implementation. This study has highlighted the necessity to create 'safe spaces' for staff to experiment and improve, and to address the factors that increase engagement in improvement initiatives. The 'hard' aspects of Lean are also critical as illustrated by the concept of 'using hard data to identify and solve problems'. I have changed my view of Lean implementation to include both 'hard' and 'soft' aspects. In addition, I have recognised that there are things

that need to be in place before Lean implementation, in order to improve successful implementation (as addressed in this study), as well as those that sustain Lean implementation.

5.4 IMPLICATIONS FOR THEORY

There was a need to determine in more concrete terms, those factors that enable or inhibit Lean implementation in healthcare. Lean is firmly rooted in the operations management discipline where there is a preponderance of high quality quantitative studies. Since there is no existing 'formal theory' of Lean, it was not advisable to perform a quantitative study to identify enablers and inhibitors of Lean implementation. This study has successfully described some of the factors that enable or inhibit Lean implementation, in detail preparing for further theory development and quantitative testing. Lean implementation is more likely to be successful if there is a clearer sense of what needs to be in place before implementation commences, and what is needed to maintain implementation efforts. The sustainability of Lean implementation projects falls outside the scope of this study.

In terms of the broader discipline of innovation and organizational change, this study also creates some unique ideas. As mentioned above, the concept of 'readiness' is briefly covered in existing literature by some theorists, but their work tends to be located in the theoretical/conceptual paradigm. With this study I have worked to concretize some of this thinking and identify those factors which can be used by managers as indicators of readiness. Even though it is beyond the scope of this study, the next immediate step for this study would be develop an instrument or tool to determine the degree of 'readiness' before change initiatives are started. As the theory of this study illustrates in Figure 5.1, the extent of 'Readiness' impacts on the outcome of a project, mediated by the use of 'hard facts to identify and solve problems'. I do not think the concept of 'Readiness' is entirely unique as it has been linked appropriately to Kurt Lewin's model at the unfreezing stage. However, this study offers a clear description of what this 'Readiness' is composed of and therefore allows practitioners and theorists alike, to focus on these specific aspects in trying to test 'Readiness'. In addition, this concept can add clarity to Beckhard and Harris's (1987) formula for change:

Change = [ABD]>X. Change will only occur when ABD>X

A is the level of dissatisfaction with the status quo, B is the desirability of the proposed change or future state, D is the practicality of the change and X is the cost of the change. Change will only occur when ABD combined is greater than the cost of the change. The 'Readiness' may represent the combination of A and B to alter the formula:

Change = R (Readiness) x D (practicality of proposed change) > X (cost of change)

Even though Lean is considered to be a practice, its success can be improved and enhanced by the use of guiding theory on how to implement it. This study has detailed three important concepts ('Using hard data', 'Disposition of staff to engage the improvement process' and 'the creation of Safe Space influence willingness to improve') which also led to the development of a fourth concept of Lean Readiness. 'Lean Readiness' could be further broken down into the readiness of the 'people' (disposition of staff to engage in improvements), the 'practice' (the use of hard data to identify and solve problems) or the 'context' (the creation of safe spaces for staff to improve). These concepts will give academics and practitioners a better sense of how to implement Lean successfully and what to be wary of. In considering the duplication of this study at other hospitals in South Africa, one needs to consider possible organizational or environmental factors that may need to be taken into account. These may include having an on-site process analyst and researcher to conduct the study, a supportive management team, the relevance of the study in the broader health agenda at the time of the study, the possibility of replicating the study in the same department across numerous hospitals (e.g. Emergency Units) or including a non-clinical area such as supply chain management or human resources.

5.5 IMPLICATIONS FOR POLICY AND PRACTICE

Healthcare systems across the globe are looking to improve quality, improve patient and staff satisfaction and decrease expenditure. There has been increasing published evidence that Lean works in healthcare settings to achieve these objectives. The challenge faced by policy makers is how to allocate funding to Lean projects, and have a high level of confidence that the projects would succeed and thus be a good return on investment. While this study does not guarantee the success of projects, it sensitises policy makers to the concept of 'Lean Readiness' and enabling/inhibiting antecedents.

In 2010, the South African National Department of Health launched a national Lean project (Best Practice Workshops) as a 'pilot' at 18 hospitals across the country. The aim was to determine the extent to which Lean could improve quality, patient and staff satisfaction and reduce unnecessary expenditure. As this thesis is being written, an evaluation of these projects is being undertaken, with a view to deciding whether there will be a scale-up plan for these Lean projects. This study is well positioned to add value to the policy makers' task of designing the next phase of Lean projects for the South African health system. This study sensitises policy makers to the critical concept of 'readiness' which impacts on the outcomes of Lean projects. It is recommended that each potential site be 'tested' for the level of 'Lean Readiness' before any project commences since this study has shown its value across five projects in a South African hospital. At the implementation level, this study has shown the value of using 'hard facts' to initiate, support and evaluate changes being made. In addition, it has stressed the importance of involving staff and creating the 'safe space' for them to implement Lean.

At a practice level this study creates the foundation for the development of a tool or instrument that tests the 'Readiness' of an organization to implement a Lean project. In order to increase the likelihood of successful implementation, the proposed tool could evaluate the presence or absence of these factors before starting a Lean project. In addition to assessing the level of 'Lean Readiness'; the necessary actions can be taken to correct a low level of 'Readiness'. For example, if a site is 'tested' and found to have a low level of 'Readiness' using the tool, the specific aspect/s resulting in the low level can be targeted. For example, it may be a low level of staff participation or an absence of a safe space to experiment. These specific areas can then be tackled before implementing a Lean project and may take the form a two day assessment before any workshop is conducted. Between this assessment workshop and the actual improvement workshop there should ideally be a period to allow any correction of low levels of 'Readiness'.

5.6 IMPLICATIONS FOR METHODOLOGY

In this section I discuss the methodological implications of the study and particularly reflect on what aspects of the study were successful and what was not during the process, from a research and a practice perspective. My initial idea of 'how to' implement Lean in a hospital

was based on my own experience and reading on the topic of Lean implementation. This has been refined and improved considerably.

This study saw the synergistic combination of two distinct methodologies: AR and grounded theory. These methodologies have been applied singularly in many healthcare studies. This study offers some illustration of how the two methodologies work well together and what the challenges are that the researcher needs to guard against. Reflection is core to both AR and grounded theory; and in this section I will illustrate the benefits and challenges of using these two methodologies.

I first will look at what I would have done differently primarily related to the practice perspective of this study. The value of this is that it will give practitioners a sense of how to improve an approach to Lean implementation.

	WHAT I WOULD HAVE DONE DIFFERENTLY	WHY
PRE- PROJECT	More planning as to how to approach the projects	It would increase my confidence to manage these projects
	Every project started should have had a measurable target and not an abstract purpose. This should then be coupled with more frequent measurement, bi-weekly or monthly.	This would easily then highlight the extent to which things were improving or getting worse. In two projects things seemed to be getting better but at the end of the project when things were measured it was worse.
	Have a plan to communicate progress of the various projects and achievements in the projects	Staff tended to work in their usual silos and very few people outside these silos really knew what was happening and what the Lean project was about. When they were then asked to be involved it seemed like an afterthought and staff were thus reluctant.
INTRA PROJECT	Middle management should be more engaged and involved	There seemed to be little ownership at the middle management level and in fact at times there was frank resistance. They felt threatened, disregarded and left out of the process.
	Need to have improved structure with my day so that I was performing my 'job' duties from 8am to 4pm and I would use 2-3 hours of time in the evening for research.	I sometimes found myself working very hard over weekends since I didn't have a good structure during the week. I would mix job and research activities
	Workshops were very well received. More workshops should have been arranged.	The three workshops we had over the study period served to focus people, motivate them to continue by reinforcing their

		good work, equipping them with more skills.
	The CEO/COO should have communicated the launch of the lean projects and their intended effects along with monthly updates.	This would have sensitized staff to the importance of the project, the purpose of the project and their possible contribution to the project.
POST PROJECT	Rather than try to do many projects in parallel I should have focused on doing 2 at a time and do them in depth.	Over the course of 2 years, while employed at the hospital I tried to coordinate 8 projects, and 4 at one time in parallel; which made it difficult to keep track of everything.
	I should have used the opportunity to do more respondent validation exercises.	In the projects this served two purposes. Firstly, it kept staff informed about the change, and secondly, it made them feel empowered as they were involved and their input was valued.

Table 5.3 Practice based challenges encountered during the process

The table above summarises some of the practice related challenges encountered and how, upon reflection, I would approach this differently and why this would change things. I now want to discuss the particular challenges experienced from a research perspective, under the two research methodologies used in this study, AR and grounded theory; as well as the qualitative research approach.

Qualitative aspect

Strauss and Corbin (1990) suggest that qualitative studies are used to understand phenomena about which relatively little is known (Morrow, Rakhsha and Castaneda, 2001); or where deep interpretation of the social world is necessary (Bryman and Bell, 2007).

I found that the qualitative techniques made it easy for me to compare aspects across different projects and thus develop propositions about what enables and inhibits success. The qualitative technique allowed me to collect relevant data as part of my job. The qualitative technique allowed me to change trajectory slightly and track an interesting thread without diluting the rigour of my study. The purpose was to achieve depth, not breadth, so this was considered acceptable. The combination of AR and grounded theory is ideal for studying change in organizations, as this study aims to do (Baskerville and Heje, 1999).

Action Research

AR has also proved particularly useful in managing organizational changes (Remenyi, Williams, Money and Swartz, 2000).The AR method had its advantages and disadvantages and as such I have listed specific things I experienced in this study.

WHAT WORKED	WHAT DIDN'T WORK
Since the AR approach also focuses on delivering results to the host institution, I found this quite beneficial as it seemed to motivate staff.	Hospital management also did not fully appreciate the time it takes to implement a successful change program. There was often a feeling the work could have been done quicker, not recognising the need for people to change the way they think and perceive things, as a time consuming step.
Using the AR method I felt like there was always something for me to do. I never felt restrained by the time of day, week or month that I could not be doing something towards the projects, whether it was planning, doing or evaluating a particular solution.	I found the methodology time consuming and often draining since one needed to be focused and alert throughout the process. Possible sources of explanations would be offered when least expected and as the researcher one needs to take advantage of these opportunities. It was also important to stay motivated throughout the process despite sometimes dismal results.
I found that staff enjoyed the fact that they now had a platform through which to voice their ideas about current problems and potential solutions. One of the pharmacists who worked at SHH for many years in the unit came to me to say she really appreciated being able to talk freely in the presence of her colleagues and even the director.	Managing the data was quite a challenge as they were collected in different forms,at different times. I used a system where most of the data was in typed format but this often meant recording many brief interactions and then having this transcribed. Ensuring accurate dates, times, persons & content of discussions was challenging.
With AR I was able to treat many things as potential data bits – informal conversations, meetings, formal interviews, observations, documents. This triangulation is said to improve rigor and validity.	As the facilitator I had to be very careful not to upset or offend any individuals or groups as this would jeopardize my continued involvement. I did therefore choose a more conservative approach aimed at maximizing staff involvement.
AR encourages participants to reflect on what they were trying to achieve and think carefully	It was often very tempting to suggest the solutions that sometimes seem so obvious. One

	needs to exercise patience and get staff to recognise the problem and the solution rather than suggesting it to them.
about problems.	

Table 5.4 A Review of the Action Research Methodology

Grounded theory

Grounded theory can be described as a qualitative method that uses a systematic set of procedures to develop an emergent theory that accounts for a pattern of behaviour that is problematic and relevant (Strauss and Corbin, 1990; Tavakol, Torabi, Zeinaloo, 2006). Grounded theory has become one of the 'most established and respected qualitative methods' (Panterotto, 2005).Kennedy and Lingard (2006) describe grounded theory as "a research methodology that, through iterative cycles of data collection and constant comparative analysis from emergent themes, develops theoretical explanations of social phenomena that are grounded in practical experience". With grounded theory I also reflected on the things that helped me and those that made it difficult.

WHAT WORKED	WHAT DID NOT WORK
I was not sure what enabled or inhibited Lean implementation so grounded theory assisted me to develop a theory, where there was no existing theory to test.	I found the coding process valuable but it was very time consuming and mentally taxing as one needed to concentrate fully at all times.
I found the clearly detailed steps of grounded theory helpful to make sense of the masses of data I collected over time. The iterative process of data collection and analysis meant that I was constantly thinking of what was happening	I found it slightly challenging to balance the depth of literature search before the study. It's necessary to at least have an idea of the general discipline being studied but one does not want to be too embedded in the literature since this taints the emergent process as one has a mental model based on the literature.
Writing memos and diary entries helped me to recall key ideas or thoughts at the time, that otherwise would have been lost. When one is dealing with thousands of small events it becomes extremely difficult to keep track of what happened, why, etc…	During my study, I had an honest fear that my study would not be making a new contribution, but one needs to trust the process, which is sometimes difficult.

Constant comparison of 'new' data with existing analysis helped to keep me cognizant of not collecting unnecessary data and helped to saturate data.	
Being able to develop a theory helped to explain the otherwise complex relationships between concepts and existing literature.	

Table 5.5 A Review of the Grounded Theory Methodology

From a methodological stance, these two methods seemed to work quite well together, where the thrust of AR was to systematically generate data through action and the thrust of the grounded theory techniques were to systematically analyze data and generate theory. The qualitative approach was necessary since there is little existing theory on Lean implementation and the nature of the questions was more suitable to qualitative techniques. I would recommend for future studies of Lean implementation, a combination of AR and grounded theory due to the many benefits listed above and in Section 2.4.

5.7 LIMITATIONS

This study had four limitations that need brief discussion. Firstly, because this study did not attempt to develop highly generalisable findings as it did not use positivistic techniques, it is necessary to point out that these five projects do not provide broadly generalisable findings. The study aimed to develop theory where there was little empirically based understanding of what enables or inhibits Lean implementation.

Linked to this is the limitation that the study carefully looked at five projects in a single institution, which represents a small sample. Thus the findings of this study cannot be said to apply to all healthcare institutions or even other forms of change. For example, the organizational culture, size and staff composition may be important determinants of Lean implementation success. I also recognise as mentioned before, that this study has not identified all the factors that impact Lean implementation success, it has only begun to understand the relevant factors.

Using the grounded theory methodology I acknowledge that I am using a single perspective for this study. This overwhelmingly strong bias was managed by using multiples sources at multiple times and also using respondent validation to improve triangulation of findings.

Lastly, I have used a critical realism lens through which I view the world and this may clash with other ontologies that do not subscribe to the concept that we are only able to see a portion of reality, in trying to ascertain what the underlying mechanisms are that result in the picture that we see.

5.8 IMPLICATIONS FOR FURTHER RESEARCH

This study provides the opportunity for further research both on a methodological front and on the conceptual front. Methodologically, this study could be replicated focusing on the other aspects that impact on the success of Lean implementation, and that this study was unable to establish evidence for. For example, leadership, management presence, staff enthusiasm towards change and working conditions will likely have some influence but needs further research to prove their relationship to Lean implementation. The combination of grounded theory and AR would work well to identify more factors that influence Lean implementations success.

By removing some of the limitations above, one would also be able to build on this study. From an outcomes perspective, this study has identified 13 indicators that influence Lean implementation success or failure. A logical extension to this qualitative study would be to perform a quantitative study testing the relative strength of these factors to influence the success or failure of Lean implementation. As such it may appropriate to perform a regression or factor analysis with these 13 indicators at another site. It would also be valuable to perform this kind of study across a few institutions looking for the degree of variability across indicators to determine their reliability as indicators. As alluded to in Section 5.5 this study also creates the opportunity to develop a checklist or tool to determine the level of 'Lean Readiness' before implementing Lean. It would then be interesting to look at how the level of 'Lean Readiness' impacts the degree of sustainability of Lean project.

5.9 EVALUATION

The quality of this study can be investigated by understanding the validity, reliability and dependability, and transferability of the study. These criteria are discussed in relation to the discussion of research quality in Chapter 2, as this evaluation was done after the study was completed.

Validity

In this study a number of steps were taken to improve the validity of the study. These included:

- Triangulation of methods and research sites
- Using respondent validation and triangulation allowed findings to be checked against participants' understanding and between data sources
- Clear descriptions of methods chosen and how they were used in the study
- Use of purposive sampling meant that data collection was increasingly focused
- Extended duration of time (18 months) spent in the field allowed a deep understanding of the context
- Semi-structured interviews during the theory testing phase allowed exploration of issues that surfaced during the theory building phase of the research
- A broad group of stakeholders was interviewed
- Critical reflection as used throughout the research process to ensure cognizance and consciousness of the process

Reliability and Dependability

The reliability and dependability of this study was assured by keeping all records of data collected in the form of transcriptions, meeting minutes, memos, diary entries and photos. The research process was discussed in detail to allow the reader to understand at which point the relevant data was used and how this was analysed, inferences made and conclusions reached. In the methodology chapter, I took care to explain in considerable detail, the research process so as to disclose the process, its appropriateness and outcomes. If necessary, this should enable other researchers to be able to repeat the research and arrive at similar conclusions. It is, however, acknowledged that in qualitative studies, the researcher is considered a research tool and their perspective will influence how data is interpreted and understood.

Transferability

This study was conducted using a specific type of innovation, process innovation which can be considered part of broader organizational change. Some of the study's concepts can be applied to other forms of process innovation such as TQM, Six Sigma, and even to organizational change initiatives. This study presented detailed descriptions of context, process and findings in order to enable other researchers/practitioners to relate this study to their own sites. The purpose of this is to allow them to identify the similarities and differences between this study and their own.

Appendix 1- Project Overviews

Details of the 5 projects are tabulated here in order to give clarity for readers as to what the projects entailed and how closely they resemble their own research sites or sites under their management.

CASUALTY PROJECT

INDICATOR		FACILITATORS COMMENT WHERE RELEVANT
STRUCTURE OF UNIT	The Unit has a floor space of approximately $300m^2$ across 4 different spaces/rooms. The unit was not designed for purpose. There are many corners, walls and other things that limit visibility across different sections of the unit. This makes it difficult for staff to know where anybody is. In addition it hampers flow of patients.	The unit was not designed for purpose and had outgrown the demand placed on it, resulting in bottlenecks, sluggish flow and inefficiencies.
NUMBER OF BEDS / CAPACITY	The casualty unit has a capacity for 55 patients with 30 stretchers and 25 chairs.	However it usually operates at 150-200% of its capacity. This often meant that ill patients waited on chairs or the floor to see a doctor or nurse.

TYPE OF CARE OFFERED	The unit is located at the entrance of SSH, which is a tertiary hospital. These are patients who have an acute medical or surgical (non-trauma) problem. It is meant to provide specialist care but often ends up providing generalist care as well.	
PATIENT MARKET SERVED	The unit is meant to cater for severely ill patients that are either referred from other hospitals or from the patients' private doctors. Unfortunately many other patients also arrive seeking medical attention with less urgent things, resulting in long waiting times and frustrated staff.	
THROUGHPUT PER ANNUM	On average the unit sees 40 000 patients per annum. Patients on average wait for 9 hours to see a doctor and wait up to 108 hours for a bed in a ward thereafter.	
STAFF COMPLIMENT IN UNIT	There are 22 doctors in this unit with 30 nursing staff. There 4 clerks and six porters allocated to this unit. All operational staff work in shifts.	This staff complement appeared significantly insufficient to allow for a quality service to be delivered.
MANAGEMENT STRUCTURE FOR UNIT	This sub-unit is essentially headed up by the clinical leadership and by a Clinical Executive (administrative leadership). In addition with his project the deputy HOD for the whole department was instrumental.	
INCEPTION OF PROJECT	I was invited by the clinical leadership to help them in the unit, after he had seen my presentation on Lean thinking	The clinician was well aware there were major problems in his unit but did not know how to address them.

DURATION OF PROJECT WITH FACILITATOR	14 months	
REASON TEAM WANTS TO WORK ON PROJECT	Many patient complaints, medical errors and most crippling was the slow flow of patients resulting in very long waits. They staff felt they needed to do something	
CHOICE OF SPECIFIC PROBLEM AREA TO WORK ON	3 major problem areas were identified: long waiting times, chaos movement through the unit, and poor quality of care. The key process used in this research was the movement of patients from the emergency unit to the ward beds that was problematic.	A difficulty being this department was complex with many stakeholders involved. In a single day there were 120 patients in the unit, many with relatives; about 100 medical staff, (nurses and doctors) passed through the unit each day. It was overwhelming. So we started by measuring the delays in seeing patients and admitting them to the ward. These measures became the focus for the project.
NATURE OF PROBLEM CHOSEN	This unit had come under fire for many problems. We worked on reducing the delay to move patients to ward beds as this would decongest the unit. We also focused visual cues, good information flows and	
FREQUENCY AND ATTENDANCE OF PROJECT MEETINGS (First part of project)	In the first 6 months we had project meetings every three weeks. They were attended by the head clinician, the matron of the unit, the head nurse, chief clerk and the clinical executive. They were chaired by the clinical executive. After this there was a period of	

	three months when nothing really happened as the clinical executive was moved to another department.	
NATURE OF MEETINGS(First part of project)	These meetings were like many other management type meetings in the hospitals. Lots of chatter and little action. Very little change occurred from these meetings. We were able to do understand our baseline during this time as we measured a number of things.	
FREQUENCY AND ATTENDANCE OF PROJECT MEETINGS (second part of project)	In the last 5 months things improved dramatically. The meetings were held weekly. Importantly the deputy head of department for the department of medicine joined and chaired meetings, alternating with myself. She made a big difference. 3 of the other senior doctors in the unit also joined the meetings.	
NATURE OF MEETINGS (second part of project)	They were much more action orientated. We closely monitored all interventions weekly. The meetings were dynamic and people were comfortable offering their inputs.	
INFORMAL DISCUSSIONS WITH INVOLVED STAFF	During the first part of the project, I visited the unit weekly. With the second part of the project I visited the unit twice weekly.	I established good relationships with all the staff in the unit, especially the clinical head and the matron. I spent in excess of 150 hours on the floor in this project
TOTAL NUMBER OF MEETINGS	I had 110 meetings with the staff in this unit, half of them informal in nature.	
ROLE OF FACILITATOR (RESEARCHER)	• Facilitator • Data collection and entry	The team develop most of their own countermeasures.

	• Data analysis with team • Monitoring of countermeasures	
OVERALL OUTCOME	SUCCESS	Waiting times to admit a patient to a ward had decreased from 13 hours 30 minutes to 10 hours on average, a 25% reduction overall.

GENERAL MEDICAL WARD PROJECT

INDICATOR		FACILITATOR COMMENT WHERE RELEVANT
STRUCTURE OF UNIT	This is one of 3 general medical wards at the hospital.	
NUMBER OF BEDS / CAPACITY	There are 30 beds in total, 15 for male patients and 15 for female patients.	This ward was usually pressurised for beds and the work atmosphere could be described as tense and frustrating at times.
TYPE OF CARE OFFERED	This is general medical ward as compared to other specialist wards (e.g. cardiology).	
PATIENT MARKET SERVED	This unit caters for adult patients suffering with general medical conditions such as pneumonia, TB, HIV related illnesses, Autoimmune diseases, chronic diarrhoea, stroke and heart attacks. Basically they require specialist treatment but not sub-specialists (e.g. cardiologist or rheumatologists).	
THROUGHPUT PER ANNUM	2300 Patients are admitted with Average Length of Stay 5.0 days (2008/09)	
STAFF COMPLIMENT IN UNIT	There are 18 doctors and 32 nursing staff working in this unit. Some of the doctors, however, serve other wards as well.	

MANAGEMENT STRUCTURE FOR UNIT	The unit is led by a senior clinician and a head nurse. However, they report to the head of the department of medicine and matron for medicine.	
DURATION OF PROJECT WITH FACILIATOR	8 months	This project fizzled out. It was very difficult to maintain the momentum and the team would often postpone/cancel meetings
REASON TEAM WANTS TO WORK ON PROJECT	The team saw they had problems but did not perceive that Lean could improve the situation. They felt the problems would only be solved by resources.	I felt that I needed to convince the staff, that Lean could make an impact.
CHOICE OF SPECIFIC PROBLEM AREA TO WORK ON	At the outset, the group brainstormed a number of problems. However, they chose to look at the problem of delays in discharging patients.	It was useful to have a focused problem to work on especially when there seemed to be 'semi buy-in' for this project.
NATURE OF PROBLEM CHOSEN	The problem chosen involved multiple steps and stakeholders (doctor, nurse, pharmacist, clerk and sometimes porter).	It was a relatively simple, yet inefficient process with room for improvement
FREQUENCY AND ATTENDANCE OF PROJECT MEETINGS	Weekly for the first two months, thereafter ad hoc dependant on findings or need to change tact. Meetings were attended by nursing staff and the ward clerk, occasionally the matron also joined. With the last few meetings the clinical executive joined the, meetings too which was helpful.	The senior clinician did not attend any of the meetings unfortunately
NATURE OF MEETINGS	Fortunately they were quite focused on the problem of delays in discharging patients. We had done some measurements in this	The difficulty in these meetings was getting team input; they were quite withdrawn and often pointed to the sources of

	project but not enough. There was little emphasis on PDCA	problems outside their unit.
INFORMAL DISCUSSIONS WITH INVOLVED STAFF	I would try to meet the head nurse weekly and check how things were going.	I got the sense they had not really taken ownership of this project. A simple indicator of this was when the forms we were using to track patients had run out the team did not call me to say it was finished. They said they were waiting for me to come again. For a few days they simply did not track patients.
TOTAL NUMBER OF MEETINGS	30 meetings through the course of the project	
ROLE OF FACILITATOR (RESEARCHER)	• Facilitate Lean meetings • Guide data collection • Assist with analyzing data • Get team to develop countermeasures • Motivate staff	
OVERALL OUTCOME	FAILURE	Unfortunately the average delay in discharging a patient (time from decision to discharge to time patient leaves) increased from 5 hours 52 minutes to 6 hours 1 minute.

OUTPATIENT PHARMACY PROJECT

INDICATOR		FACILITATOR COMMENT WHERE RELEVANT
STRUCTURE OF UNIT	This unit is one of 5 pharmacies in the hospital.	Others include an inpatient pharmacy, a bulk store, a chemotherapy pharmacy and a mixing unit.
CAPACITY	The unit serves 450 patients daily.	
TYPE OF CARE OFFERED	This unit is reserved for outpatients receiving medication to take home after having seen their doctor	This was certainly one of the hospitals hotspots with many many patient complaints about the long waits.
PATIENT MARKET SERVED	Outpatients attending the hospital	The pharmacy, like many other functions in this outpatient department functioned in silos making patient journeys both inefficient and frustrating.
THROUGHPUT PER ANNUM	11 000 prescriptions are filled annually	
STAFF COMPLIMENT IN UNIT	There are 5 pharmacists, 7 pharmacy assistants and one clerk	
MANAGEMENT STRUCTURE FOR UNIT	There is one manager who reports to the pharmacy director (who is in charge of all 5 pharmacies)	

INCEPTION OF PROJECT	The hospital management asked if I could start a project here. It was a 'hotspot' for them since there were many patient complaints about long waiting times. The pharmacy director then agreed we need to start a project here and added that the staff frustration levels were becoming unbearable.	Even though the decision to have a project in this unit came from hospital management the pharmacy director and her deputy were very keen to start a project in this unit.
REASON TEAM WANTS TO WORK ON PROJECT	The team felt they were trying so hard but the waiting times remained high. They were also frustrated that patients kept complaining and screaming at them.	There was some reluctance from 2 or 3 people that the Lean project would make a difference. These people also felt 'victimised' why was pharmacy being targeted. Fortunately this feeling was in the minority.
CHOICE OF SPECIFIC PROBLEM AREA TO WORK ON	The team wanted to focus on reducing waiting times.	
NATURE OF PROBLEM CHOSEN	This was a highly relevant problem. This turned out to be a good problem to work on since the process was quite simple and easy to identify bottlenecks.	
FREQUENCY AND ATTENDANCE OF PROJECT MEETINGS (first phase)	Weekly for the first the first six months, every Friday at 8am. Waiting times were reduced substantially. The whole staff complement was involved in these meetings or her deputy,	This was disappointing as after months of effort, the team had major challenges in maintaining the low waiting times. This was further compounded by staff rotation which meant many of the staff in this pharmacy were not familiar with the system and why/how it worked.

	including the pharmacy direct. Then for 6 months the project lost some momentum. Meetings were not held regularly, as I was kept busy with other projects, there was new leadership and the waiting times actually increased.	
NATURE OF MEETINGS (first phase)	Quite well structured, we started meetings by reviewing the previous week's interventions and their effects, before starting with new ones. The team used to tag every 50th folder to get an idea of the waiting times.	
FREQUENCY AND ATTENDANCE OF PROJECT MEETINGS (second phase)	After things had taken a dip for the worse, waiting times rose again. During this phase meetings were re-established, structured and led by the same manager that was involved in the initial turnaround. Meetings were held regularly.	
NATURE OF MEETINGS (second phase)	There was conscious effort to try and standardize activities by documenting them and orientating staff based on the previous six months'	

	regression. Meetings were well structured and there were always measurements used.	
INFORMAL DISCUSSIONS WITH INVOLVED STAFF	I met informally with staff at least weekly and chatted to various team members in the pharmacy.	It helped establish relationships and improved my understanding of the process. I recall even assisting in the process a few times just to get a feel for what needed to be done.
TOTAL NUMBER OF MEETINGS	90 meetings through the course of the project	
ROLE OF FACILITATOR (researcher)	• Guide lean meetings, they were chaired by the pharmacy manager • Guide data collection • Assist with analyzing data • Get team to develop countermeasures and ensure monitoring using PDCA • Motivate staff	
OVERALL OUTCOME	SUCCESS	Waiting times had dropped from 4 hours 5 minutes to 55 minutes.

INPATIENT PHARMACY PROJECT

INDICATOR		FACILITATOR COMMENT
STRUCTURE OF UNIT	This is the inpatient pharmacy, one of 5 pharmacies at the hospital	
CAPACITY	This pharmacy fills 300 prescriptions daily.	
TYPE OF CARE OFFERED	This pharmacy caters for inpatients in all the wards of the hospital. The hospital has 850 inpatient beds.	
PATIENT MARKET SERVED	This unit fulfils prescriptions to give patients their drugs in the wards and on discharge to take home.	
THROUGHPUT PER ANNUM	This pharmacy fills 80 000 prescriptions per annum.	
STAFF COMPLIMENT IN UNIT	There are 6 pharmacists and 6 pharmacy assistants in this unit.	
MANAGEMENT STRUCTURE FOR UNIT	There is one inpatient pharmacy manager who reports to the pharmacy director (who is in charge of all 5 pharmacies)	

INCEPTION OF PROJECT	This project was inspired by the success of the outpatient pharmacy.	Initially I had approached the staff in this unit but there was too much reluctance to start a project. When the outpatient pharmacy had made such a dramatic improvement by reducing the waiting times, this team approached me and asked if they could also start a Lean project.
REASON TEAM WANTS TO WORK ON PROJECT	They wanted to improve the delay in processing a prescription.	
CHOICE OF SPECIFIC PROBLEM AREA TO WORK ON	This team wanted to look at reducing the delays in processing a prescription. They did start looking at this but also tackled some other smaller interventions like getting rid of returned stock, 5s exercise, visual cues, etc.	
NATURE OF PROBLEM CHOSEN	There was a great effort to measure baseline times which were confirmed to be too high and resulting in frustrated staff in the wards, delayed treatments for patients and even errors. As interventions were implemented there was no measurement and this was particularly problematic.	
FREQUENCY AND ATTENDANCE OF	The team held weekly meetings for 6 of the 8 months. They were attended by the whole staff complement of	.

PROJECT MEETINGS	the inpatient pharmacy. The pharmacy director or her deputy attended most meetings.	
NATURE OF MEETINGS	Initially they were relatively unstructured, but still problem based. Little attention to using PDCA and measurements	
INFORMAL DISCUSSIONS WITH INVOLVED STAFF	I met with the staff one-on-one or in small groups 20 times during the course of the project. These were usually informal and held in the pharmacy.	These were extremely useful to me as facilitator to understand what was really happening and establish rapport with the staff in the unit.
TOTAL NUMBER OF MEETINGS	40 through the course of the project	
ROLE OF FACILITATOR (RESEARCHER)	• Facilitate Lean meetings but they were chaired by the inpatient pharmacy manager • Guide data collection • Assist with analyzing data • Get team to develop countermeasures • Motivate staff	
OVERALL OUTCOME	FAILURE	Unfortunately this project failed as waiting times increased from 2 hours 8 minutes to 2 hours 43 minutes, a 27% increase in waiting times.

NEONATAL UNIT PROJECT

INDICATOR		Facilitator comment
STRUCTURE OF UNIT	The unit has 5 different areas for different levels of care starting at intensive care stepping down to end with kangaroo mother care.	In theory the concept made good sense and seemed to be functioning quite well. Different areas would have different staffing ratios and therefore intensity of observation too.
CAPACITY	The unit caters for about 85 neonates	This unit often struggles with too little capacity and crowding in neonatal units poses serious and sometimes fatal infection risks.
TYPE OF CARE OFFERED	Intensive, high, general, step down and kangaroo mother care.	
PATIENT MARKET SERVED	The unit is linked to an obstetric unit at the hospital. Some of its patients thus come from here and other patients are transferred in from secondary or primary care facilities for tertiary management.	
THROUGHPUT PER ANNUM	2 300 neonates are treated in this unit per annum	
STAFF COMPLIMENT IN UNIT	15 doctors, 50 nursing staff and one clerk	
MANAGEMENT STRUCTURE FOR UNIT	The unit is led by a senior clinician and nurse along with a clinical executive.	

INCEPTION OF PROJECT	The project was started when I had a discussion with the HOD of the unit who was really keen to improve the functioning of her unit.	
REASON TEAM WANTS TO WORK ON PROJECT	They have trying to improve quality of care and efficiency for some time but have never had a good structure to work with. They saw Lean as an opportunity to have structured approach to improving the quality of care and reducing the unnecessary expenditure in the unit.	I got a sense from the team they were serious about improvement and sincerely wanted to make a difference to the quality of care being delivered, more than any of the other projects.
CHOICE OF SPECIFIC PROBLEM AREA TO WORK ON	The team were quite slow to choose specific areas to work on and this may have contributed to a sense of 'slow progress'. Eventually the team decided to look at the delay in getting urgent blood results for the neonates that had serious consequences if unduly delayed. They also looked at cleaning up parts of the unit and trying to improve the layout of the unit.	The leadership of this unit were very keen to get things done and improved. To this effect I witnessed how on a number of occasions there was a short discussion about what to do and then suddenly we would just do it and make the improvement. This included the 5s exercise, the clean-up of the ward admin sheets, planning to improve the layout and reallocating rooms.

NATURE OF PROBLEM CHOSEN	This was a relatively simple process where blood specimens were collected early in the morning, collected by a porter and taken to the lab. However, a number of delays were identified and addressed. The last intervention actually involved the installation of a chute mechanism from the neonatal unit directly to the lab mitigating most of the process delays.	
FREQUENCY AND ATTENDANCE OF PROJECT MEETINGS	Meetings were held every fortnight although it was not as regular as it should have been.	
NATURE OF MEETINGS	I found all team members engaging wholesomely in the discussions. I was particularly encouraged by the HOD and other senior clinicians in the unit that tried to attend most of the meetings indicating their willingness to be involved in the improvements.	I often found myself quite encouraged by these meetings and felt hopeful that we would make good progress with the interventions planned.

TOTAL NUMBER OF MEETINGS	I had 15 formal meetings with this team and about 40 informal discussions with staff during the course of this project.	
ROLE OF FACILITATOR (RESEARCHER)	• Facilitate Lean meetings • Guide data collection • Assist with analyzing data • Get team to develop countermeasures	
OVERALL OUTCOME	PREMATURE EDNIDNG	Unfortunately this project was showing some progress having reduced the waiting time for blood results from 5 hours 36 minutes to 5 hours 10 minutes, however, this project came to an abrupt ending as the manager of the area ask for it to be stopped.

Appendix 2- Interview Protocol

Dear Colleague

Your participation is valued as part of the success of this research project. It will enable us to understand how to improve operations management in healthcare, in particular the implementation of Lean principles. I thank you sincerely for allowing me to take up some of your valuable time.

This study is bound by ethics rules and regulations and the approval of this study was granted on the premise of protection of participants. To ensure this, you can be assured that all information shared is strictly confidential and your identity will be protected as well as that of the institution. For this reason, I encourage you to be open, honest and transparent in your comments.

Kind Regards and sincere thanks to you

Zameer Brey

Introduction to the specific project's storyboard- 5minutes

Questions- 30 minutes

Demographic details:

Number of years with Southern Hemisphere Hospital:
Age:
Position:
Lean project worked on:
Project Driver:

Enabling the creation of thinking people

- As a facilitator I have been assisting your team for......months. Do you think my involvement has made you more aware of :

  A. Systems in the hospital

  B. The potential improvement you can make in your own departments with a facilitator?

- Do you feel like the department you work in encourages experimenting with new ways of working in your department? Did this change at all? If so, how?

- Is it important for a team like yours, when faced with a problem, to have a clear plan to deal with the problem?

o What are all the things you would think about when I told you the unit became overwhelmed with X number of patients today (maybe I should use a major incident like a bus crash)? What are your ideas to deal with that?

o Would you feel safe putting these ideas forward in the project meetings? Or in other department meetings?

- In the project were ideas put forward by the team sufficiently acknowledged?

- Do you think change was imposed on you or your team, or did the team take ownership of the problems and solutions?

- Do you think that before staff embrace change or an improvement they must be shown the proof that it works in their own unit? Or will they try on they own to improve?

Facilitator Characteristics that enable the creation of thinking people

In this section we are asking you to reflect on my role as facilitator in the project. I am really here to learn how to do things better so appeal humbly for your open and honest responses.

- How did you experience my style of engagement? Is this any different to your managers? How did you experience my style of engagement with you and your team?

- How do you find engagement with your line manager, departmental manager and the hospital management?

- Was I sufficiently available to you and your team during the course of the project?

- When I assisted in making a case for change i.e. Getting the data to help you prove and change the way you did things, did you find this obtrusive or relevant?

- When a facilitator, like me, comes to assist your team, what's important for me to know?

- How important is it to build relationships with your team and understand the people dynamics before facilitating a change process?

- Could you continue this project without a facilitator going forward?

Organizational Inhibitors to creating thinking people

- If we walked out of the office now and found (SCENARIO CREATED DEPEDNING ON UNIT), what support and presence would you expect from your department managers?

    - Realistically what would you receive in terms of support?

    - What do you feel would make it difficult for you and your team to improve in this situation?

- a. Do you sometimes experience that despite signals of distress and urgency, your management does not respond?

    b. If they respond, what is the response?

    c. Does this help you and the team deal with the problem?

    d. If you started improving things as a team on your own, do you think this would increase management's support? What do you think you and your team could do to get more management support and presence in this unit?

- Looking at the storyboard, do you think we could have done this better? If so, how?

- A. Would you say that at this hospital people are protecting their piece of 'turf'?

    b. What impact does this have on the broader hospital systems?

General

- What were the things you think were :

        o   positively affected by this project (in terms of both patients and staff)

        o   negatively affected by this project

- Would recommend that this institution continue to recruit facilitators for change projects? And scale this up for the whole province?

Appendix 3 – Categories

A sense of being valued	The presence of enabling antecedents	Socio political sensitivity of facilitator	Ability to deal with variety and its effects	Presence of a champion role (or process)	The breadth of zone of safety/ culture that allows constructive critique and experimentation	Degree of silo thinking
Staff are verbally saluted for their efforts	Will encourage further engagement from staff	Relationship building between facilitator and staff at operational and management level	Variety and ambiguity in tasks	Training staff about lean techniques	Anti- safe space stuff that impedes change	I don't care about him/her and I will treat him/her as such
Outsiders' look and see staffs efforts to improve	Yes you can make the improvement	Strategic for facilitator to be sensitive to people dynamics	Spelling out what is expected from staff	Facilitator coaching staff through change	Safe space to speak and try out new ideas	This is my island so get off!
I feel supported and valued in making improvements	Home grown examples that resonate with individuals	Paying attention to the informal, camouflaged relationships	Attempts to change the way people do tasks day-to-day	Identifying and listening to project champions; and noting their characteristics		An appreciation of the whole
We just want to be heard here on the frontline	What the facilitator did or said to lubricate the change process	What I think about what's happening, influences what I feel and what I do	To use PDCA or not	Facilitator reflections that improve understanding of problems and behaviours		What's mine is mine and what's yours is yours!
Applauding staff efforts and fresh ideas	Factors that seem to support change	'Soft' problems relating to people and organization have 'hard' impact	We need a plan to check progress on planning	Lean being implemented, taught or promoted		Whole system implication
	Good, bad and learning feedback		Different managers have different approaches to change	An eye for quality		I forgot how to talk to my fellow colleagues

Disposition of management to stand surety for the process	Evidence based management	Presence of stifling antecedents	Degree to which there is spiritual congruence about change, amongst team members
Why don't the managers come see what we are doing?	Finding important facts that influence plans to change	How can staff be punished for being efficient?	Fuelling the fire of team spirit
What managers do (or don't do)to hinder change	Making a case for change	Improvement initiatives wrapped up in red tape	This is our project-we want to improve things here
Im sick and tired of this-management doesn't understand	'real' data chosen over gut feel as guide	My span of control determines which decisions I can take	We share a sense of loyalty to this department
I can't understand why there's so much management resistance	Will this data help to change management		Why and what are we improving together?
We need managers to support us on the frontline	Visual cues using lean/ monitoring		
Top level support (hod and tmm)	Actively observing effects of efforts to improve		
Supporting operational staff through change	Progress on improvements made		
	Lean being implemented, taught or promoted		
	Facilitator asking incisive questions to get staff thinking		

Appendix 4

The purpose of this appendix is to take a closer, more thorough look at the Lean literature in the context of this study. Specifically, it serves to look at enablers and inhibitors that commonly quoted projects in healthcare and well known authors have reported on. The projects reviewed include Bolton Hospital, Flinders Institute, Vermont Lean Healthcare Transformation, to mention a few. Many of these factors acquired from the literature do not have empirical basis but rather have been carefully observed by researchers. To make this appendix more relevant to the thesis and easily accessible to the reader, the numerous factors identified have been clustered, according to the theory this study has developed.

It is important to reiterate the role of literature in a grounded theory and action research study. The literature review in grounded theory studies primarily assists the researcher to locate his/her theory, and hence is performed towards the latter part of the study in order to preserve the emergence of the theory (Stern and Allen 1984; Lincoln and Guba, 1985) and to locate the results within the literature. Stern and Allen (1984); Lincoln and Guba (1985) suggest the researcher should avoid reviewing the literature early on as this decreases the likelihood of emergent theory development as the researcher uses 'predefined' categories, concepts and themes resulting in little addition to the body of knowledge (Kennedy and Lingard, 2006). More detail of this approach is provided in Section 2.4.3

The theory developed in the study below illustrates the various factors which were empirically found to have an impact on Lean implementation. Since the thesis has established enablers and inhibitors, logically the tables below have been separated in that manner too.

Enablers of Lean Implementation found in the literature

The enablers were clustered and sorted into 10 factors, some of which are congruent with the findings of the study, while others are not.

FACTOR	ASSOCIATED WITH FACTOR DESCRIBED	SUPPORTED BY AUTHORS	EMPIRICALLY SUPPORTED IN THIS STUDY?
Staff Participation at all levels	David Ben-Tovim mentions that it was not until the whole emergency department started working together and mapping the patients experience, from the HOD to the clerical staff, that they realised the chaos it created and how it needed to be corrected using Lean- Flinders, Australia	Bisset (2008)	YES Part of staff embracing improvement concept in this thesis.
	Participation of staff in process improvement activities led to reduced mortality, contrasted with participation in everyday management duties had no effect on mortality.	Nembhardt, Tucker, Horbar and Carpenter (2007).	
	Frontline staff should be engaged and empowered to make improvements.	Dickson et al. (2009)	

	In implementing Lean, focus and recognise the value of people and involve them extensively in decision making and understand their concerns.	Holden (2010)	
	Engage clinicians to improve sustainability. Clinical staff should be integrally involved in the Lean implementation process.	BICS (2010), Ben Tovim et al (2008)	
Working together to achieve one goal	When the conventional silos hospitals operate in are broken, it is much easier to facilitate a seamless transition for the patient from one caregiver to the next. Pharmacy is often unfortunately regarded as one of these 'independent' providers and hence hampers the smooth flow of patients.	Bisset (2008)	YES Part of staff embracing improvement concept in this thesis.
	Almost all professionals in healthcare concur that the delivery of quality services is dependent on staff working as a collaborative.	(Maddock and Morgan, 1998)	
Correct Indicators of quality and good service delivery	As part of an IHI Improvement study in a pharmacy, the team measured 'unconventional' items such as number of steps taken to dispense medication, distance walked per day and error rate. These were useful in measuring service delivery and quality.	IHI Improvement Report, 2003	YES Part of Concept A- using facts to solve problems and develop solutions.
	The usual indicators used in the hospital (Bolton Care) were inadequate and new measures to implement Lean success were adopted	BICS (2010)	

	Targets are sometimes conflicting in organizations implementing Lean where some focus on the financial wellbeing of the organization while others focus on the quality of service being rendered.	Emiliani and Stec (2005)	
	Goals and targets should be clear to all involved and should be easily measurable	Upton (1996)	
	Measurement of indicators helps to raise the importance of what is being improved and raises the morale of those improving and keeps them focussed.	Bateman (2005)	
Regular and clear Communication	Clear communication between staff and patients is necessary for successful implementation.	IHI Improvement Report, 2003; BICS (2010)	YES Part of Concept D- Safe Space Creation in this thesis.
	Good communication by ward staff to caregivers in the emergency department about bed availability increases productivity and reduces length of stay ('pull' system rather than 'push' system)	Westwood, Moore and Cooke, 2007	
	Communication with staff during a Lean implementation is necessary.	Leraci et al (2008)	
Regular meetings to discuss improvements and progress of Lean projects	The regular meetings held to discuss improvements and the way forward were incredibly valuable and also improved sustainability of the Lean project.	IHI Improvement Report, 2003	YES Part of Concept D- Safe Space Creation in this thesis.

	Problems should be solved on the work floor not in the boardroom.	BICS (2010)	
Presence and Support of management	The presence of senior and middle management at the start and end of a Lean project were 'strikingly effective' in raising staff morale.	Burgess and Radnor (2010)	NO Even though the researcher had a sense this was critical and observed it during the study he was not able to empirically identify its significance in this study.
	Lean should be implemented with direct input from managers as part of the improvement process.	Emiliani and Stec (2004)	
	If Toyota managers did not wash their hands 3 times a day they were too distant from the shop floor and hence out of touch with reality.	Bodek (2008)	
	Middle level management (anybody two levels down from the CEO) are the most valuable source of support during a Lean implementation since they connect ideas from the front line staff to top management. However, in the 2004 Lean Enterprise report middle management resistance was cited as the fifth most commonly cited obstacle in implementing Lean.	Found and Harvey (2006); Lean Enterprise Institute (2004)	
	A high rate of management turnover is implicated in multiple failed Lean attempts	Emiliani and Stec (2005)	

	Toyota managers instinctively motivate their staff which has given Lean implemented in Japan an edge over those Lean projects in the West.	Bodek (2008)	
	Leaders of the organization must be seen to support the implementation. This support should be in the material and non-material form.	Dickson et al. (2009); Holden (2010)	
Problem solving	Focused problem solving involving both the front line staff and managers is key to successful Lean implementation	Graban (2008)	YES Part of Concept A- using facts to solve problems and develop solutions (problem solving)
	Managers should allow their employees to make mistakes as part of improving process in their Lean journey.	Hall (2006)	
	Create an environment where staff feel comfortable experimenting with new ways of doing business and where experiments 'fail' there is a no blame culture.	Emiliani and Stec (2005)	
Start with 'small wins'	Multiple small process enhancements are necessary not large breakthroughs.	Dickson et al (2009 (2))	YES Part of concept on Staff Embracing Improvement ('small wins')
	Choose manageable projects to start with as they are easier to sustain. Celebrate the small victories.	BICS (2010)	

Lean should be part of an organization's strategy, not just an add on.	Lean should not be seen as the 'flavor of the month' but should be weaved into the hospital's vision and strategy.	Graban (2008)	NO Not tested in this study, but clearly the literature demonstrates its importance.
	Managers should ensure that process improvement becomes part and parcel of daily work to ensure that its essence is not lost soon after the commencement of a project. In addition, improvement team functioning is enhanced where they know and understand how their improvement work fits into a broader improvement agenda within an organization.	Bateman (2005)	
	It is absolutely critical to balance the 'softer' cultural elements of change with the 'harder' technical aspects of change. Neglect of the 'softer' aspects will affect sustainability and increase resistance to change.	BICS (2010)	
	Lean should be linked to the overall business strategy of an organization in order for employees to recognise its importance and engage with it sufficiently.	Coronado and Antony (2000); Radnor and Walley (2008); Pedersen and Huniche (2010)	
	Lean should be linked to daily work across all levels of staff and thus a core part of corporate strategy in order to be implemented effectively.	Emiliani and Stec (2005)	

Facilitator's role	Every organization undertaking a Lean project should have a facilitator who is able to coordinate training, illustrate the appropriate use of Lean tools and address sustainability.	Aherne, 2007	Nothing conclusively identified in this study.
	A coordinator of Lean projects is ideally somebody from within the organization who at least has 30% of his/her time available to dedicate to process improvement, in order to be effective.	Bateman (2005)	
	The facilitator can find it difficult to be effective in highly bureaucratic organizations such as those in healthcare.	Massey and Williams (2006)	
Understanding the need for change	Readiness and acknowledgement that change is necessary	Ben Tovim et al (2008)	YES Part of Concept A- using facts to solve problems and develop solutions (Recognising the need for change). It was noted that when collecting data about the problem, it provides a catalyst for change using a factual springboard.
	There should be a shared recognition that problems exist and that improvements are necessary. Without this	Holden, 2010; Pedersen and Huniche (2010)	

	recognition staff may question the need and motive for improvement.		
	The third most commonly cited reason that Lean failed, according to the Lean Enterprise Institute's report of 2004, was the lack of a sense of urgency to improve	Lean Enterprise Institute, 2004	

Inhibitors of Lean Implementation found in the literature

The inhibitors were clustered and sorted into 4 factors, some of which are congruent with the findings of the study, while others are not.

FACTOR	ASSOCIATED WITH FACTOR DESRCIBED	SUPPORTED BY AUTHORS	EMPIRICALLY SUPPORTED IN THIS STUDY?
Hospitals work in Silos rather than according to patient pathways	A fundamental problem with hospitals is that they do not manage end-to-end processes for the patient but rather work in isolated silos. "Each hospital department is working on its own but no one is looking at the whole" "Where change has worked is where the people delivering the care have stood back and looked at all the steps involved"	Bisset (2008)- Flinders Institute Australia	YES Can be linked to concept of Staff Embracing Improvement (Spirit of working towards one goal)

	"We have the very best pharmacy sitting right next to the very best laboratory, sitting right next to the very best x-ray department, sitting right next to the very best nursing department…and the hospital doesn't work" Dr Batalden , former President of the IHI	Graban (2008)	
	Functional silos in hospitals are a source of dysfunction. Employees often only know the people and processes of their own department resulting in poor handoffs of patients and weak interdepartmental cooperation. Lean assists in breaking down these barriers that exist between silos.	Graban (2008); Aherne (2007); Pedersen and Huniche (2010)	
	The need for cross departmental negotiation is underpinned by the reality that fixing a process in a hospital will almost always involve several departments.	Massey and Williams (2006)	
Role Clarity	Nursing staff often feel disempowered as a result of doing things they are not trained to do nor want to do such as administrative or clerical duties. Nurses spend up to 75% of their time doing non nursing activities which obviously hampers quality of care	Wind (2007)	YES Part of Concept A- using facts to solve problems and develop solutions (task specification).

	Specifying sufficiently what people should do is of 'paramount importance'	Radnor and Boaden (2008)	
	The use of tick lists amongst nursing staff at Nord Hospital (France) was particularly helpful in understanding the root cause of problems and improving quality of care.	Balle and Regnier (2007)	YES Part of Concept A- using facts to solve problems and develop solutions (task specification)
	There is a need for more role specification and education about what various role players do in a hospital. Interestingly in this study middle management perceived their decision space to be the biggest and more senior than most others in the hospital, which conflicted with the perception that senior clinicians held of their own role.	Burgess and Radnor (2010)	
	As part of a 5-day kaizen event in an emergency unit, clarifying roles and responsibilities assisted in reducing congestion and improved waiting times- Massachusetts Hospital	(Dickson, 2007)	YES Part of Concept A- using facts to solve problems and develop solutions (task specification)
	Front Line staff should be involved in the design and implementation process.	Schooley (2008)	
	Each member of the team should know what their purpose, role And responsibility is. This should be communicated explicitly, not by deduction.	BICS (2010)	

Multiple customers make defining value a challenge	Lack of a customer focus is one of 5 challenges noted by Radnor and Walley (2008) in addition to too many targets and lack of a strategic direction.	Radnor and Walley (2008)	
	The process being improved should be relevant for the patient, the caregivers and the institution	Ben Tovim et al. (2008)	
Understand Demand patterns and smooth workloads	By smoothing out workloads it became easier to visualize the process and identify bottlenecks – Lean in the UK National Health service	Westwood, Moore and Cooke, 2007	YES Part of Concept A- using facts to solve problems and develop solutions
	Process variation in complex service industries such as healthcare pose significant challenges to improving quality of care.	Tsikriktsis and Heineke (2007)	

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