The Efficacy and Maturity of Quality Improvement Approaches in the New Zealand Healthcare System

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Abstract

Purpose

The purpose of this research is to critically evaluate the quality improvement (QI) phenomenon in healthcare providing organisations (clinics, hospitals, etc.) and propose an agenda for system-wide continuous improvement for their care delivery processes, using New Zealand's healthcare sector as a case study.

Design/methodology/approach

A systematic literature review (SLR) highlighted multiple gaps regarding quality improvement methodologies and the scope of their implementation in healthcare providing organisations across the world. Based on the SLR, a quality improvement maturity model was developed and used to analyse the use of QI methodologies and their scope of implementation within the District Health Boards (DHBs) operating in the New Zealand.

In-depth interviews with quality improvement managers from 15 DHBs were conducted. In addition to the interviews, internal documents and operational data detailing the quality improvement activities and initiatives undertaken by DHBs were analysed using qualitative methods. This provided basis for a sector-wide analysis of QI implementation in New Zealand DHBs.

Findings

While healthcare providing organisations strongly portray inclination towards different quality improvement methodologies, their overall understanding and use of quality tools is very similar to each other. This inclination towards different QI methodologies is primarily based on the personal preferences of quality improvement managers, who are assigned with leading, supporting and managing quality improvement activities. Similarly, the majority of the proposed benefits and criticisms of different methodologies are based on their origin from outside of the healthcare sector. Second, the quality improvement managers and their teams are rarely given the appropriate authority and resources to fully offer change, i.e., manpower, power, influence and commitment from staff and senior leadership towards quality improvement. Finally, the scope of quality improvement in healthcare tends to be narrow and siloed—within singular value-streams or wards—and the concept and benefit of linking internal and external supply chains with quality improvement activities is missing in the care delivery processes.
Research limitations

This research is located within the New Zealand healthcare system. While, the healthcare delivery processes are largely similar to Australia and the UK, there can still be many inbuilt cultural and policy-related features that may limit the research findings to the New Zealand's healthcare context.

Research implications

This research findings highlight a need to move forward from obtuse discussions about seeking the best quality improvement methods in healthcare sector. Selection of a specific QI methodology does not guarantee success or failure of QI initiatives. Instead, healthcare providing organisations need to realise the true meaning of QI, its principles, and implement them in their wider supply networks, to remove operational waste and increase value for the end-users – the patients, each and every one of us.

Originality/value

QI phenomenon in the healthcare sector is less mature compared to the manufacturing industries. Partly because, the institutional logics of healthcare environment are not aligned with the institutional logics associated with quality improvement. This mismatch arises from multiple factors, ranging from simple misunderstandings regarding quality improvement methods to the use of inappropriate jargon and complications in conducting QI work, which has created resistance in the healthcare workforce. However, pressure from government and public, healthcare organisations and their employees perform quality improvement initiatives that are narrow in scope and the implementation of quality tools and techniques. This narrow focus was observed not only in singular interviews, but also in the maturity analysis of participating District Health Boards.
Acknowledgements

I thank the University of Otago for rejecting my scholarship application, twice. It was super cool. That extra pressure made me take my PhD seriously, in case I want to get funding for a Post-doc.

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Notice of Publication of Related Work

Some of the research described in this dissertation has undergone peer review and has been published in conferences and symposiums. This notice serves to indicate that certain parts of the material presented here have already been described by the author in the literature, and some parts are therefore subject to copyright by either publishers or the author outside this dissertation.


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<td>Citation Network Analysis</td>
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<tr>
<td>DHB</td>
<td>District Health Board</td>
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<td>DMAIC</td>
<td>Define, Measure, Analyse, Improve, Control</td>
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<td>HPO</td>
<td>Healthcare Providing Organisation</td>
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<td>HQSC</td>
<td>Health Quality Safety Commission</td>
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<td>HSCM</td>
<td>Healthcare Supply Chain Management</td>
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<td>IHI</td>
<td>Institute of Healthcare Improvement</td>
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<td>JIT</td>
<td>Just in Time</td>
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<td>Plan-Do-Study-Act</td>
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<td>Radio Frequency Identification</td>
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<td>Releasing Time to Care</td>
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<td>Systematic Literature Review</td>
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<td>Total Quality Management</td>
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Chapter 1 Introduction

Introduction
1 Research Motivation

Healthcare is one of the most important services present in the modern world, and the population expects a high-quality service experience – timely, safe, efficient and effective (Afy-Shararah & Rich, 2018; Ballé & Régnier, 2007; Lynn et al., 2007). However, the reality of healthcare is nothing close to this ideal state. Literature has documented several critical problems surrounding the healthcare system, including patient safety (Kaplan et al., 2017), avoidable exacerbation of resource scarcity (Waters, Morlock & Hatt, 2004), mismanagement of care delivery services (Nayar et al., 2016; Strumpf et al., 2017), long delays and waiting times (Allaudeen et al., 2017; Gijo & Antony, 2014).

Healthcare research and innovation has for decades delivered amazing advances in discovering cures for diseases, even eradicating them from the face of the planet (e.g., smallpox), and prolonging the average lifespan of human beings. However, healthcare delivery and its constituent operations have received much less attention. Consequently, even with the significant advances in medical science, the overall quality of healthcare delivery systems has gradually declined and is still beset with problems (Mauger et al., 2014).

This counterintuitive state of affairs was highlighted in the famous report “To Err is Human” published by the Institute of Medicine in 1999, which determined that at least 98,000 patients lose their lives each year due to medical errors and poor quality of healthcare in the United States alone; the annual costs associated with such errors were estimated to be between $17 and $29 billion (Institute of Medicine, 1999). Unfortunately, these statistics have worsened over time. An updated estimate published in 2013 indicates that the annual death toll in the USA from medical errors rose from 98,000 in 1999 to 210,000-440,000, with similar circumstances deemed to apply globally (James, 2013). An examination of medical care systems found that one in every three patients admitted to hospital suffers from a medical error (Classen et al., 2011). Such clinical errors occur largely due to poor management, even mismanagement, of healthcare delivery operations and processes (Blumenthal & Kilo, 1998), and not only cost billions of dollars but are often fatal.

Complementing difficulties in the delivery system, the vast majority of OECD countries feature socialist healthcare systems where healthcare is provided to citizens free of charge, and is considered a right of each and every citizen (Böhm et al., 2013). Such healthcare systems are largely funded by government. The principles of economics suggest that socialist healthcare systems are more prone to misutilisation and inefficient use of services...
simply because of the notion that healthcare is free (Levitt & Dubner, 2014). This results in an increased burden on the healthcare system. Therefore, improving healthcare delivery operations and removing inefficiencies from the system becomes even more important, as it helps to accommodate this increased burden on the system. Other population factors (ageing population and population growth, etc.), environmental factors (air and water quality, etc.), social and behavioural factors (stress and isolation, etc.) that also contribute to the burden put on healthcare systems (de Meijer et al., 2013; Institute of Medicine, 2002; Kinney, 2008; McGinnis, Williams-Russo & Knickman, 2002).

In light of the effects of a multitude of inefficiencies in healthcare systems, healthcare providing organisations (HPOs) are under constant pressure from politicians, governments, and funding providers (including insurance firms) as well as the general public to improve their operations (Moraros, Lemstra & Nwankwo, 2016; Morrow, Robert & Maben, 2014). In response, HPOs are exploring various quality improvement (QI) methodologies originating from the manufacturing sector (Andrea & Emidia, 2017; Blumenthal & Kilo, 1998; Fillingham, 2007) that could improve their clinical and managerial processes (Lynn et al., 2007). However, the multitude of QI methodologies being used and trialled in healthcare begs the question of their appropriateness, efficacy and effectiveness in that context (Moraros et al., 2016; Radin & Coffee, 1993; Waring & Bishop, 2010). Consequent to this uncertainty, the uptake of these methodologies is mostly superficial (Hasle, Nielsen & Edwards, 2016; McCann et al., 2015). As Young and McClean (2008, p. 383) concluded, “The historical experience of improvement methods in industry and healthcare raises some concerns about the extent to which what is hailed as Lean is genuinely Lean in practice”.

This crisis of QI implementation in the healthcare sector requires attention from researchers and practitioners alike (Blumenthal & Kilo, 1998; Sinioris, 1990; Steiner & Walsworth, 2010; Varkey, Reller & Resar, 2007; Weiner et al., 2006; Young & McClean, 2008). The research presented here answers this call by identifying a set of research gaps vis-à-vis QI methodologies and their implementation (through an extensive literature review, presented in Chapter 2), and subsequently explores the application of QI methodologies in the New Zealand healthcare sector to understand multiple elements of their dissemination process including their scope and principles.

The overall aim of this research is to examine the state-of-the-art of quality improvement activities in the healthcare providing organisations, District Health Boards (DHBs), and frame an agenda to support continuous improvement of healthcare delivery processes in the future. This has been achieved by analysing the implementation of QI approaches in
15 New Zealand DHBs—a quality improvement maturity model was developed specifically for this purpose (see Chapter 3).

### 1.1 New Zealand Healthcare System

As this research is set in New Zealand, it was deemed important to provide readers with a brief introduction to the New Zealand healthcare system. New Zealand has a publicly funded healthcare system that is comprised of 20 DHBs (figure 1.1). According to the Ministry of Health (2018b), each DHB is responsible for delivering and funding health services to their constituents. The DHBs were created by the *New Zealand Public Health and Disability Act 2000* with the following set of objectives:

- Improving, promoting and protecting the health of people and communities
- Promoting the integration of health services, especially primary and secondary care services
- Seeking the optimum arrangement for the most effective and efficient delivery of health services in order to meet local, regional, and national needs
- Promoting effective care or support of those in need of personal health services or disability support.

![Figure 1.1: New Zealand DHBs location boundaries map](image)

1 Adopted from Ministry of Health (2018b).
Other than the 20 DHBs, New Zealand’s healthcare system features six Crown agencies. These Crown agencies assist the DHBs to fulfil their objectives (mentioned above). The most relevant Crown agency regarding QI is the Health Quality Safety Commission (HQSC). The HQSC’s primary objective is to lead and coordinate projects and assist the DHBs to improve the quality and safety of their health services and care processes (Ministry of Health, 2018a). HQSC staff were interviewed as part of this research to ensure accurate portrayal of their role in QI in the New Zealand healthcare system.

The reason for selecting the New Zealand healthcare system as a case study for this research is that, unlike other national systems, New Zealand encourages different DHBs to experiment with their own selection of QI methodologies for healthcare delivery and operations-related improvements, but evidence of relative superiority of results is either missing or mostly anecdotal. The Ministry of Health is also involved in conducting and supporting QI in individual DHBs; therefore, the New Zealand government’s involvement in QI and its effectiveness could also be observed.

1.2 Defining Quality

As this dissertation investigates QI, it was deemed crucial to define quality to provide the readers with the brief conceptual development of quality in the literature. One of the earliest definitions of quality comes from Greek philosophers including Socrates, Plato and Aristotle, who defined it in a seemingly simple way, and called it ‘the ideal state’ or ‘excellence’ (Reeves & Bednar, 1994). This made quality context-specific: it could be differently defined or interpreted for different things. Many centuries later, the concept of quality is still based on this philosophical definition. Crosby (1996) defined it as conformance to requirements, while Levitt (1972) defined it as conformance to specifications. Deming (1982) defined quality as degree of uniformity and dependability taking into account the needs of the customer. In these cases, quality delivers on pre-specified (exact) requirements. Juran (1986) defined quality as fitness for use; Womack, Jones and Roos (1990) defined it as value for customers; and Grönroos (1984) defined it as meeting or exceeding customers’ expectations. These definitions stress the importance of the customers and end-users in defining quality.

These and many other definitions of quality present in the literature are based on a similar philosophy, but this range of definitions arising from diverse environments (Reeves & Bednar, 1994) has led to a ‘conceptual confusion’ which has hindered QI from obtaining wider application and recognition (Hansen, 2001, p. 203). For this research, a classical,
broad, yet seemingly simple definition of quality that incorporates the essence of the above-mentioned definitions, written in lay terms, has been adopted:

“Quality is achieving or reaching for the highest standard as against being satisfied with the sloppy or fraudulent” (Tuchman, 1980, p. 38)

At the same time, the researcher also agrees with another philosophical interpretation of quality provided by Pirsig (1999) in his seminal book *Zen and the art of motorcycle maintenance*, that quality cannot be defined because defining it makes it static or habitual. In a business context, to overcome the idea of static quality, continuous improvement was considered a critical facet of quality by the gurus of quality management (Deming, 1982; Juran, 1986; Kobayashi, 2018; Ohno, 1988; Shingo, 1989; Womack et al., 1990), designating QI a dynamic, never ending process towards seeking excellence.

QI's origin is generally traced back to the Total Quality Management (TQM) philosophy (Dale, 2015). TQM in itself is not a QI methodology, nor a framework, but is seen more as a management philosophy (Dahlgaard, Kristensen & Kanji, 1998). However, many advocates of TQM have attempted to establish implementation guidelines (Hansen, 2001). The classical literature on TQM agrees that at its core, TQM consists of three principles: customer focus, continuous improvement and teamwork (Dean & Bowen, 1994; Sprouster, 1987). The success of TQM implementation thus depends on how an organisation conceptualizes the idea of quality (Dean & Bowen, 1994).

Over time, more components have been added to QI, including employee empowerment (respect for people) (Liker, 2004), just-in-time management (Sugimori et al., 1977), supplier development and involvement (Liker & Choi, 2004), organisational culture (Juran, 1986) and systems thinking (Conti, 2010).

### 1.3 Outline of the Dissertation

This dissertation is comprised of nine chapters. Chapter 1 briefly explained the research motivation and presented the research objective, followed by an introduction to the New Zealand healthcare system and the key entities relating to QI activities within the system.

Chapter 2 focuses on the development of research questions after a thorough systematic literature review of 299 papers from relevant healthcare literature.
Chapter 3 provides details regarding the development of the Quality Improvement Maturity Model. Although, the model itself is developed after analysing the application of QI in various industries, in this research, it is only used to examine the state-of-the-art of QI in the New Zealand healthcare system—DHBs to be more precise.

Chapter 4 presents the research methods used to conduct this research. The first half of the chapter includes details regarding the philosophical suppositions adopted by the researcher, while the second half provides specifics of the data collection and analysis methods adopted to answer the research questions. At the end of chapter 4, strategies used to ensure validity, reliability and the accuracy of the findings and participant responses is also presented in great detail.

Chapters 5, 6 and 7 present the findings of this research, each answering a specific research question (see section 2.7). Chapter 5 covers the findings related to research question 1, highlighting detailed of QI methodologies being used in the New Zealand healthcare system. Chapter 6 focuses on research question 2, exploring the characteristics of quality improvement managers and their role in QI initiatives in their respective DHBs. Chapter 7 examines the state-of-the-art of QI in New Zealand DHBs using the Quality Improvement Maturity Model developed in Chapter 3. Altogether, Chapters 5, 6 and 7 explore multiple dimensions of QI and aid in developing a better understanding of the QI phenomenon in healthcare environments for researchers and practitioners.

Chapter 8 discusses the findings and their relationship with each other and the literature, highlighting a need to transform the QI landscape in the healthcare industry. Institutional logics related to the healthcare industry and QI, and their coexistence, are explored, followed by analysis of limits to the scope and principles of QI, and how this inhibits QI in healthcare. Based on the findings of this research, the future of QI in the healthcare industry, specifically in New Zealand, is then discussed.

Finally, Chapter 9 provides a conclusion and implications of this research for policy and practice, followed by some limitations and a future research agenda.
2

Literature Review
2 Introduction to the Chapter

Literature reviews are conducted to present a thorough investigation for a research; and describe how that investigation is used to develop the research questions. For the same purpose, an enhanced version of systematic literature review methodology was developed to conduct an analysis of QI literature in healthcare. This methodology is called *systematic literature network and bibliometric analysis* that combined the positive elements of a systematic literature review, citation network analysis and a bibliometric analysis to highlight the development of this respective field of research. Figure 2.1 illustrates.

![Systematic literature network and bibliometric analysis](image)

**Figure 2.1: Systematic literature network and bibliometric analysis**

2.1 Background

The classic literature on quality improvement (QI) focuses almost exclusively on manufacturing, prompting numerous publications in the production and operations management literature (Dahlgaard & Dahlgaard-Park, 2006; Ghobadian, Speller & Jones, 1994; Suárez-Barraza, Smith & Dahlgaard-Park, 2012). However, service sector growth stimulated organisations to transfer the concepts of QI into service operations resulting in a transition of QI from a pure production focus into services (Boyer & Pronovost, 2010), and has burgeoned into a new arena for research.

Of all the service sectors where QI methodologies have been implemented, research studies in healthcare are the most numerous (Danese, Romano & Vinelli, 2006; Kaplan et
al., 2010), which corroborates that QI is becoming more relevant in healthcare sector than ever before (Branco, Wicks & Visich, 2017). The earliest papers mentioning QI in healthcare retrieved during the literature search were from late 1980s. These papers highlighted the use of continuous improvement concepts such as Just-In-Time (JIT) inventory system in hospitals (Lynch, 1991) from the manufacturing world and their applicability in healthcare operations (Berwick, 1989;1996). Although these were mostly conceptual papers, they initiated a research trend, which was followed by similar papers by Dennison, Kathawala and Elmuti (1994), Jacobs and Pelfrey (1995) and Heinbuch (1995) leading to a key practice-focused report by the UK’s National Health Service (NHS) advocating the use of lean thinking (LT) to drive QI in healthcare operations (NHS Modernisation Agency, 2001).

In summary, these publications proposed adopting manufacturing-based QI methodologies such as LT, which originated in the late 20th century from the Toyota Production System (Ohno, 1988) with a purpose to remove waste and maximise the value of the whole system (Bicheno & Holweg, 2008; Womack et al., 1990); Six Sigma, also a QI philosophy developed by Motorola to reduce process variation (Dahlgaard & Dahlgaard-Park, 2006); and Total Quality Management (TQM), developed in the early 1980s (Giroux & Landry, 1998). These methodologies implore organisations to take a system-wide approach to QI, rather than implementing its principles in small pockets of their operations (Bortolotti et al., 2016; Fearne & Fowler, 2006; Kannan & Tan, 2005; Michaels, 1999).

This system-wide approach to QI demands elimination of silo-mentality in organisations, a point highlighted in Deming’s famous 14 principles for QI (Anderson, Rungtusanatham & Schroeder, 1994; Latzko & Saunders, 1995). This pursuit to seek system-wide operational excellence gave birth to the field of supply chain management (SCM) (Bayraktar et al., 2007), and like manufacturing, SCM strategies also play a fundamental role in QI and deliver better patient care (Aronsson, Abrahamsson & Spens, 2011; Everard, 2000; Kumar, Ozdamar & Ning Zhang, 2008).

Similar to QI, the number of research publications in the field of healthcare supply chain management (HSCM) has steadily increased since 1995 (Dobrzykowski et al., 2014). Whilst QI and HSCM are sub-fields of operations management (Bayraktar et al., 2007), a preliminary literature review showed QI and SCM are quite separate as research fields in healthcare: De Vries and Huijsman (2011, p. 159) noted that the HSCM literature is still quite “fragmented”, i.e., it does not incorporate the multidisciplinary nature of supply chain management (Croom, Romano & Giannakis, 2000). Consequently, D’Andreamatteo et al.
(2015) highlighted the need to integrate and introduce QI throughout healthcare supply chains, beyond a single HPO and its internal operations, otherwise, the operational waste is transferred to other value-streams instead of being eliminated from the system, leaving overall efficiency of the system virtually unchanged.

Considering the current lack of synthesis regarding QI and HSCM, there is utility in conducting a Systematic Literature Network and Bibliometric Analysis (SLNBA) of the field of QI in relationship to HSCM, identifying the key themes shared by the two fields and highlighting gaps in the literature for future research.

2.1.1 Clarifying Quality Improvement terminology

QI methodologies and their purpose/objectives, appearing in the operations management literature tend to overlap (Dahlgaard & Dahlgaard-Park, 2006; Dahlgaard et al., 1998), and so it goes with their respective titles. For example, the term ‘lean’ was coined by Krafcik (1988), appearing in the literature starting in 1996 (Womack & Jones, 1996); prior to this date, lean was mostly referred to as JIT approach (Akmal et al., 2018). Similarly, TQM used to be known as total quality control. There is some overlap between LT and TQM as well, partly because they are both strongly linked in the Japanese culture and management practices (Dahlgaard & Dahlgaard-Park, 2006). This overlap is also because of some of the quality tools shared by these methodologies.

QI methodologies preach a somewhat similar message of continuous improvement by eliminating waste from any given system to improve flow and increase the value delivered to customers. Womack and Jones (1996, p. 311) defined waste as “any human activity which absorbs resources but creates no value”, and value as “a capability provided to a customer at the right time at an appropriate price, as defined in each case by the customer”. Another significant aspect of QI is its scope, focusing on improvement of a complete system or supply chain/supply network as mentioned above.

A supply chain, unlike QI methodologies, is a set of organisations and the relationships among them. SCM as a field and as an approach describes how these relationships should be managed, under the aegis of a guiding methodology. In specifying the nature of SCM, Mentzer et al. (2001) dissected and contrasted multiple definitions of SCM, noting the presence of high variability in both scope and description. This research adopts their considered (and currently dominant) definition of SCM: “supply chain management is defined as the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses

11
within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole” (Mentzer et al., 2001, p. 18).

From a wider operations management perspective, QI methodologies and SCM share similar foundations and principles (Bayraktar et al., 2007)—they are mutually compatible—and in this sense they should engage synergistically to help minimise organisational waste (Philip & Seuring, 2014; Womack & Jones, 1996). For example, within the automotive roots of the TPS, LT (a famous QI methodology) and SCM are synchronised and interdependent—a situation that does not exist in healthcare.

Consequently, the central expectation of this review is that QI and SCM will have a close and interdependent relationship within the healthcare context, as evidenced in the literature from manufacturing industry. Such close relationship would indicate higher level of maturity of QI. That is why, HSCM literature was included in this literature review, to ensure a better understanding of the scope and maturity of QI in healthcare. This chapter tests this idea through a SLNBA, believing that if such a close relationship exists, the discussed themes within these bodies of literature will highly overlap along with citation networks overlapping with each other too. Finally, the authors and organisations conducting research in these two fields (QI and HSCM) will be mostly similar too.

Such a multi-levelled literature review will not only provide a true picture of the state-of-the-art of QI and its development in healthcare industry, it will also be the basis for identifying significant gaps that will be later explored in this dissertation.

### 2.2 Methodology

Literature reviews provide an appropriate vantage point to understand the current state of research and practice in a given field; they are often considered to be “a key research objective for the respective academic and practitioner communities” (Tranfield, Denyer & Smart, 2003, p. 207). Easterby-Smith, Thorpe and Jackson (2012) indicated that literature reviews are a crucial part of research and play a fundamental role in theory building (Meredith, 1993).

Tranfield et al. (2003) stated that conventional “narrative” literature reviews lack rigor and thoroughness, and hence may contain an element of researcher bias. Instead, a systematic literature review (SLR) should be conducted to minimise such bias (as well as to address other shortcomings of conventional literature reviews). In their leading textbook on
conducting SLRs, Gough, Oliver and Thomas (2012, p. 12) defined SLR as “a review of research literature using systematic and explicit, accountable methods.”

For this study, an enhanced version of the SLR methodology was developed and applied called systematic literature network and bibliometric analysis (SLNBA). It is an extended version of systematic literature network analysis (Colicchia & Strozzi, 2012), which is an amalgamation of SLR and citation network analysis (CNA). Colicchia and Strozzi (2012, p. 404) stated: “The adoption of these two existing methodologies combined together is aimed at maximizing the advantages related to each of them; SLR offers a solid and reliable technique that can be easily applied to broad fields of research to select the most relevant contributions; CNA allows for a dynamic analysis to identify the papers that most contributed to theory-building in the field.” In the extended SLNBA version, a bibliometric analysis of the retrieved literature was added to further test the relationship between QI and HSCM literature. SLNBA was selected as the principal methodology for this review as it identifies connections between literature sets discussing QI and HSCM, allowing the researchers to visualise and quantify the interrelatedness of the two fields by examining multiple parameters.

SLR was used to identify and analyse the common themes in the QI and HSCM literatures to investigate whether their content intersects. CNA was used to explore connections among these themes. The objective was to establish if, or the degree to which, these bodies of knowledge have overlapped through cross-citation. As Colicchia and Strozzi (2012, p. 404) suggested, “The underpinning assumption of the CNA is that fields of research are not just formless sets of articles in terms of citations”. They serve as channels that provide crucial information about how a field of research develops over time and highlight the key publications within it.

Finally, a bibliometric analysis was conducted to recognise the growth of these two academic fields; journals where the research is being published; the most productive authors, organisations, and geographic affiliations; and to determine whether there were any entities published in both QI and HSCM fields, to further the understanding of the distance between these developing bodies of literature. The bibliometric analysis can also provide researchers a vantage point to identify which authors, organisations, and geographic affiliations are generating more research to enable future collaborations and work opportunities (Akmal et al., 2018).
2.2.1 Search Criteria

A search string was constructed based on the keywords identified by means of brainstorming by the researcher and analysing the keywords in articles from QI and HSCM literature. Common keywords were identified and inserted into the following search string:

(“Quality Improvement” OR “Process Improvement” OR “Supply Chain”) AND (Lean OR ‘Lean Thinking” OR “Six Sigma” OR “Total Quality Management” OR “Model for Improvement”) AND (Healthcare OR “Health Care” OR “Health Services” OR “Healthcare Services” OR Hospital OR Clinics OR Pharmacy OR “Primary Care"

2.2.2 Article Databases

Articles matching the above search string were retrieved from the following databases:

- Emerald Insight
- Business Source Complete (EBSCOhost)
- ScienceDirect (Elsevier)
- PsycINFO (Ovid)
- Wiley Online Library (WOL)
- PubMed

These databases covered both management studies journals and healthcare-specific journals and hence were considered appropriate for this research. Taylor and Francis® was not included directly because the website did not allow the downloading of multiple citations at the same time, which inhibited an efficient literature search. However, most of their relevant literature was included in the EBSCOhost database.

2.2.3 Selection Process

Peer-reviewed, English language papers published from 1995 to December 2017 were considered because, as mentioned earlier, the majority of the papers before 1995 were mostly conceptual, and explored the possibilities of using QI principles in healthcare. The inclusion of only peer-reviewed journals was relevant as the process of peer review assures the quality of research (Crossan & Apaydin, 2010), which is not otherwise checked in the conventional literature review approach. For QI, the data sample was restricted to only
empirical case study research articles to maintain focus on the application and evaluation of QI initiatives in healthcare (rather than on theoretical/conceptual work), in line with the guidelines the Campbell Collaboration Library of Systematic Reviews, which suggests researchers “gather, summarise and integrate empirical research so as to help readers understand the evidence that bears on the review topic” (The Steering Group of the Campbell Collaboration, 2015, p. 25).

The defined search string was applied to each of the indicated databases and publisher websites. All the citation records were then imported into the Endnote® Reference Manager Software. After removing duplicates, 2333 articles in total were identified. A total of 53 articles (2.3%) were inaccessible from University of Otago library services, and hence were excluded. The remaining 2280 (97.7% of the total) accessible articles were screened initially by reading the title and abstract of each of them. In this round, a total of 1766 articles were excluded from the total. The large number of excluded articles in this section was primarily because of irrelevant articles that were retrieved in the initial dataset due to of some of the overlapping words in the field of QI and medical healthcare profession. For example, the word lean, has different meanings and attracted different types of studies in QI and medical literature².

At the end of the selection process exercise, 299 articles were deemed useful for analysis; of these, 103 articles focused on QI (internal operations) and 196 on HSCM (external operations). A breakdown of the selection process is provided in figure 2.2. The articles included in the analysis represent a nearly complete population of the research literature on the focal topic till the end of 2017.

² A copy of the endnote library with all the publications, both included and excluded ones can be provided to the readers upon request.
2.2.4 Limitations of Systematic Literature Reviews

Multiple issues were faced during the process, and it was deemed important to highlight those issues for fellow researchers as well as explain the practices adopted to minimise the impact of said issues.

2.2.4.1 Database Issues

Ideally, SLRs require using the same search string to retrieve articles from selected databases. However, there is a major flaw in this process, i.e., database search algorithms. Each database uses a different algorithm and search operations, which means the search
strings may require tailoring for each database; potentially adding an element of bias into the article selection process. The databases also have a certain precedence for each of the operations (OR, AND, and NOT etc.). For example, Elsevier’s (ScienceDirect) order of precedence for operations in Boolean searches is OR, AND, then NOT, whereas in EBSCO, AND and NOT are given priority over the OR operation.

To overcome this limitation in this research, if and when it was impossible to use the same precise string in a particular database, the alterations to the string were made in a way to ensure higher return of resulting articles, which increased the workload related to subsequent manual filtering but helped to ensure that fewer articles would be overlooked. In summary, the search string operations (OR and AND) were tailored for each of the databases.

To further ensure the quality of this crucial part of SLR process, EBSCO was added to the databases list as it is not a publisher but a collection of academic articles from multiple publishers including ScienceDirect, Emerald, and Wiley. Using the search string on EBSCO helped to identify and include some articles that were not caught in the search results provided by the separate publishers.

2.2.4.2 Articles are Not Written with the Purpose to be Systematically Reviewed

The academic articles analysed, although considering the same themes and topics, were written with different purposes in mind and with very different foci of research. When the SLR concept was introduced, it was focused on a very specific range of articles (primarily research of the same type or researchers with the same objectives in mind (e.g. the influence of a certain medicine on a certain group of people).

However, with the introduction of SLR in social and organisational sciences, the scope of SLR extended to include quite different articles reflecting a common theme. This is especially true for an SLR that aims to understand the state of research in and to map a given field. Due to the variety of objectives for which articles included in this analysis were written, categorization and identification of the key themes was not straightforward and required qualitative analysis, which were revisited and refined in the process of review with the addition of new material.
2.2.4.3 Advisability of Cross-Checking

Related to the issue of multiple objectives and perspectives, it is advisable to have several researchers working on an SLR to enhance the likelihood of accurate interpretation and categorization of key themes. As a search often returns a large quantity of papers, requiring further manual filtering, having several researchers participating in SLRs will help to ensure that relevant articles are not overlooked during screening based on titles and abstracts.

As this review is presented as a requirement for the PhD dissertation of the researcher, cross-checking would have meant involvement of other researchers, and would defeat the above-stated purpose. Hence, instead of cross-checking with tools such as inter-rater reliability, the preliminary (updated till 2016) themes and findings of this research were presented in two different conferences (Akmal, 2017; Akmal, Everett & Greatbanks, 2017), and feedback was used to minimise the chances of personal bias as well as misinterpretation of the data.

2.2.4.4 Need for Preliminary Non-Systematic Literature Review

A preliminary literature review is advisable to inform the initial search for articles and identification of categories based on which articles could be analysed. Authors in the field note that while conducting SLR categories may be changed and refined (Voegtiin & Greenwood, 2016), it is a traditional literature review that permits initial categorization and posits initial questions from which the search starts. Additionally, a traditional literature review permits identification of search terms that should be included to generate the most appropriate return.

2.3 Literature Synthesis of Quality Improvement Literature

A total of 103 empirical articles using a case study approach were found that described QI initiatives and their implementations in HPOs. Some of these articles reported on multiple case studies (Costa et al., 2017; Dickson, Anguelov, et al., 2009), and hence, the unit of analysis for this section of the literature review was selected to be separate cases rather than articles. The most prominent QI methodologies used in the analysed cases were LT (n=86) followed by lean six sigma (n=18)—a combination of LT and six sigma methodology (Pepper & Spedding, 2010) and finally, six sigma (n=3) (Liberatore, 2013; Lifvergren et al., 2010; Van Den Heuvel, Does & Verver, 2005).

Table 2.1: provides a summary of QI methodologies being used in the respective literature.
Multiple papers were retrieved that promoted the use of other QI methodologies in healthcare such as TQM (Jarrett, 2016) and Institute of Healthcare Improvement’s (IHI) Model for Improvement (MFI) (American Diabetes Association, 2004). However, as these papers were mostly conceptual and theoretical work, or they did not showcase the complete implementation process, they were excluded from this review. As the number of such papers was very small, it is believed that excluding them has not skewed the results in any way.

2.3.1 Geographic Location Analysis

The country or territory hosting the largest number of case study organisations was the USA (39) followed by the UK (9) and the Netherlands (8) as shown in Table 2.2. Overall, most locations with organisations engaging in QI in health environments were in Europe. The UK’s National Health Service was one of the first government organisations to study the benefits of QI practices such as LT (NHS Modernisation Agency, 2001).

<table>
<thead>
<tr>
<th>Geographic location</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>39</td>
</tr>
<tr>
<td>UK</td>
<td>12</td>
</tr>
<tr>
<td>Netherlands</td>
<td>8</td>
</tr>
<tr>
<td>Brazil</td>
<td>6</td>
</tr>
<tr>
<td>Canada</td>
<td>5</td>
</tr>
<tr>
<td>Sweden</td>
<td>4</td>
</tr>
<tr>
<td>India</td>
<td>3</td>
</tr>
<tr>
<td>Australia</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td></td>
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<tr>
<td>Italy</td>
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<tr>
<td>Lebanon</td>
<td></td>
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<tr>
<td>Turkey</td>
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<tr>
<td>Spain</td>
<td>2</td>
</tr>
<tr>
<td>China</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td></td>
</tr>
<tr>
<td>Ghana</td>
<td></td>
</tr>
<tr>
<td>Hong Kong</td>
<td>1</td>
</tr>
<tr>
<td>Ireland</td>
<td></td>
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<tr>
<td>Jordan</td>
<td></td>
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<tr>
<td>New Zealand</td>
<td></td>
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<tr>
<td>Norway</td>
<td></td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td></td>
</tr>
<tr>
<td>Not mentioned</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2.2: Geographic location of case study organisations
2.3.2 Unit of Implementation

The majority of QI initiatives were based in individual departments rather than the full organisation or the whole supply network (Table 2.3), implying that the organisations adopted a partial or locality-based approach to QI, corroborating the findings of D'Andreamatteo et al. (2015) and Costa and Filho (2016), who highlighted that LT is being implemented in singular functional silos rather than as a system-wide philosophy.

<table>
<thead>
<tr>
<th>Unit of implementation</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department/functions</td>
<td>79</td>
</tr>
<tr>
<td>Hospital</td>
<td>13</td>
</tr>
<tr>
<td>Multiple departments</td>
<td>7</td>
</tr>
<tr>
<td>Clinic</td>
<td>4</td>
</tr>
<tr>
<td>Supply network</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 2.3: Unit of implementations

This locality-based focus of QI and especially LT (as most of the case studies used LT) contradicts the notion showcased by key publications (Liker, 2004; Womack & Jones, 1996; Womack et al., 1990) that LT is a system-wide approach used to drive QI. This absence of certain key elements of QI in healthcare posits a negative effect on the overall healthcare system (Towill & Christopher, 2005). Effective QI requires better communication and the elimination of departmental silos (Andrea & Emidia, 2017; Coronado & Antony, 2002); QI should be integrated throughout the organisational system and beyond, into the supply network, or waste may not be removed from the system but merely transferred to other operations (Costa & Filho, 2016; Fearne & Fowler, 2006).

Further analysis of the departmental/functional QI initiatives indicated that the majority studied the emergency department and other medical functions such as cancer care departments and surgery rather than non-medical or highly decoupled functions. Departments/functions that mimic manufacturing value streams, such as radiology, pharmacy, endoscopy, inventory management, and scheduling of operating theatres, were chosen more for QI initiatives. Applying QI tools and techniques to standardise work flow in such functions is considered easier than in purely medical and clinical functions such as cardiology and otolaryngology (Costa & Filho, 2016). Department/function focus details are presented in Table 2.4.
<table>
<thead>
<tr>
<th>Department/function name</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency department</td>
<td>27</td>
</tr>
<tr>
<td>Cancer care</td>
<td>9</td>
</tr>
<tr>
<td>Surgery</td>
<td>7</td>
</tr>
<tr>
<td>Admin/medical records</td>
<td></td>
</tr>
<tr>
<td>Laboratories</td>
<td>5</td>
</tr>
<tr>
<td>Endoscopy</td>
<td></td>
</tr>
<tr>
<td>Laboratories</td>
<td>5</td>
</tr>
<tr>
<td>Endoscopy</td>
<td></td>
</tr>
<tr>
<td>Pharmacy</td>
<td></td>
</tr>
<tr>
<td>Radiology</td>
<td>4</td>
</tr>
<tr>
<td>Outpatient ward</td>
<td></td>
</tr>
<tr>
<td>Paediatrics</td>
<td></td>
</tr>
<tr>
<td>Pathology</td>
<td></td>
</tr>
<tr>
<td>Operations theatre</td>
<td>3</td>
</tr>
<tr>
<td>Otolaryngology</td>
<td></td>
</tr>
<tr>
<td>Scheduling</td>
<td></td>
</tr>
<tr>
<td>Inpatient Ward</td>
<td></td>
</tr>
<tr>
<td>Sterile services unit</td>
<td>2</td>
</tr>
<tr>
<td>Drug administration and delivery</td>
<td></td>
</tr>
<tr>
<td>Ophthalmology</td>
<td></td>
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<tr>
<td>Gynaecology</td>
<td></td>
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<tr>
<td>Inventory management</td>
<td></td>
</tr>
<tr>
<td>ICU</td>
<td></td>
</tr>
<tr>
<td>Mental health</td>
<td></td>
</tr>
<tr>
<td>Traumatology</td>
<td></td>
</tr>
<tr>
<td>Postanaesthesia care unit</td>
<td></td>
</tr>
<tr>
<td>Haematology</td>
<td></td>
</tr>
<tr>
<td>Ambulatory emergency services</td>
<td>1</td>
</tr>
<tr>
<td>Chronic disease management</td>
<td></td>
</tr>
<tr>
<td>Physical therapy and rehabilitation</td>
<td></td>
</tr>
<tr>
<td>Orthopaedics</td>
<td></td>
</tr>
<tr>
<td>Internal medicine</td>
<td></td>
</tr>
<tr>
<td>X-ray</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.4: Departmental/functional implementations

### 2.3.3 Components of Quality Improvement Initiatives

Various QI implementation frameworks/methods have been presented for manufacturing (Wanitwattanakosol & Sopadang, 2012), services, (Bortolotti & Romano, 2012) and healthcare (Chalice, 2007). However, these frameworks often lack critical information regarding QI implementation, as supported by Anand and Kodali (2009), who analysed several LT-based implementation frameworks for QI, observing that their focus is mainly on the “what” part of the implementation rather than the “how”, usually not mentioning the steps to implementing QI methodologies.

With this in mind, the researcher designed and developed a list of measures to evaluate whether HPOs were reporting on the ‘how’ part of the implementation providing descriptive analysis of the QI implementation process, including:

- Did the case study HPO undertake any **prerequisites** (training or introduction to QI)?
- Did the case study HPO mention **how and why** they implemented QI?
- Did the case study HPO seek any **external support** for implementing QI?
• Did the case study HPO develop any measures to ensure long-term sustainability of QI implementations?

• Was the focus of the QI initiatives on QI tools (hard practices) or on philosophy (soft practices)?

<table>
<thead>
<tr>
<th>Prerequisites</th>
<th>Why</th>
<th>How</th>
<th>External support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explained</td>
<td>43</td>
<td>95</td>
<td>48</td>
</tr>
<tr>
<td>Partially explained</td>
<td>1</td>
<td>8</td>
<td>14</td>
</tr>
</tbody>
</table>

Table 2.5: Components of QI initiatives

All of the cases mentioned the reasons “why” QI initiatives were being implemented (Table 2.5) (the reasons are discussed later). Fewer cases specified “how” or the QI implementation process, i.e., what implementation strategy/plan was used and how it was justified (Table 2.6). The most prominent implementation strategy was DMAIC (Improt, Balato, Romano, Carpintieri, Bifulco, Alessandro Russo, Rosa, Triassi, & Cesarelli, 2015; Laureani, Brady, & Antony, 2013), but DMAIC was mainly used when organisations tried to implement Lean Six Sigma for driving QI. When LT was being used for QI, strategies such as Value Stream Mapping (VSM) (Hydes, Hansi & Treble, 2012), Rapid Process Improvement (RPI) (Nelson-Peterson & Leppa, 2007), Plan Do Study Act (PDSA) (van Lent, Goedbloed, & van Harten, 2009; Youssef, Kistin, Parasher, & Ma, 2013), and A3 thinking (Kimsey, 2010; Roemeling, Land & Ahaus, 2017) were used for assisting the implementation process.

<table>
<thead>
<tr>
<th>Implementation strategy</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMAIC</td>
<td>18</td>
</tr>
<tr>
<td>VSM</td>
<td>8</td>
</tr>
<tr>
<td>Rapid process improvement events</td>
<td>8</td>
</tr>
<tr>
<td>PDSA / PDCA</td>
<td>7</td>
</tr>
<tr>
<td>A3</td>
<td>4</td>
</tr>
<tr>
<td>SS</td>
<td>2</td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 2.6: Process improvement methodology & implementation strategy

Some cases described fulfilling “prerequisites” to QI initiatives (n=44), including introducing QI methodologies to staff and employee training. Educating people about QI methodologies is very important (Abdelhadi, 2015) to reduce stress and avoid potential misunderstandings. Fawcett and Magnan (2001, p. 13) noted that “Supply chain education and training is one of the singular requirements for implementation success,” highlighting the importance of operations management skills for the effectiveness and improvement of the whole system. Successful implementation depends on guidance from people who thoroughly understand the process (Bicheno & Holweg, 2008). Fewer cases reported “external support” (such as consultants) to facilitate QI initiatives and their implementation,
implying that most either relied on internal support or lacked skilled facilitation. Hence, HPOs should emphasise hiring people trained in QI principles and understand the fundamentals of operations management.

2.3.4 Long-Term Sustainability

There is a consensus in the literature that QI should be considered a long-term philosophy or a journey towards continuous improvement (Bhasin, 2011; Quarterman, 2007) rather than a short-term fix or fad for organisational issues. This literature analysis uncovered references to the sustainability of QI initiatives in 40 of the 107 cases. It is acknowledged that empirically demonstrating the sustainability of QI implementations would require detailed longitudinal study and measurable definitions of QI and sustainability. As a surrogate, any evidence suggesting that a QI initiative was sustained, or certain criteria were put in place to sustain it, was considered a sufficient indicator of intended sustainability. Papers typically mentioned documenting process changes (Gijo & Antony, 2014) and improving the internal auditing system (Bhat, Gijo & Jnanesh, 2014; Gijo & Antony, 2014) for continuous data recording and checking, and conducting periodic review meetings (Improta et al., 2015). Related but less frequently mentioned activities include poka-yoke (error proofing) (Laureani, Brady & Antony, 2013) and standardization of processes (Serrano et al., 2010).

Sustaining change is critical as new practices can be easily abandoned in organisations, a phenomenon termed the “improvement evaporations effect” (NHS Modernisation Agency, 2002). In two cases (both using LT as the core QI methodology) that were unable to sustain lean implementations (Hasle et al., 2016; McCann et al., 2015), implemented QI practices did not become part of the modus operandi because it was not properly communicated to staff. As mentioned by Hasle et al. (2016, p. 8), “lean activities were not institutionalized in the cancer ward. Doctors also felt that lean had little relevance for the achievement of their clinical goals and outcomes”. A somewhat similar experience was reported by McCann et al. (2015), who mentioned that lean adoption was often ‘superficial’ and clinical staff were ‘sceptical’ about LT and its outcomes related to QI.

Despite practitioner advice that it takes three to five years to become a lean organisation (Sheridan, 2004), distilling experience from the cases examined here leads toward the conclusion that “lean should be seen as a direction, rather than as a state to be reached after a certain time” (Karlsson & Åhlström, 1996, p. 41). The objective here is not to judge the leanness of an organisation as “leanness is a relative measure” (Clare & Dennis, 2003, p. 314), but to understand the QI best practices for sustaining and continuously improving
system-wide processes. In all, 26 cases fulfilled the basic tenet of QI, i.e., continuous improvement; they worked to continuously improve the system rather than having a single intervention.

### 2.3.5 Resistance towards Quality Improvement

However, QI initiatives in healthcare providing organisations (HPOs) show varying results from substantial (King, Ben-Tovim & Bassham, 2006) to modest (Al-Araidah et al., 2010) to no improvements (Hasle et al., 2016), and in some cases, improvements are not sustained (Kaplan et al., 2014; McCann et al., 2015). One of the primary reasons behind such variance of outcomes is associated with resistance towards QI initiatives shown by clinical staff. A total of 31 papers explicitly mentioned resistance and scepticism from clinical staff, who challenged the legitimacy of QI, and more specifically LT (Waring & Bishop, 2010), its applicability in healthcare (Hasle et al., 2016; Mazzocato et al., 2014) and the manufacturing-specific jargon of QI (McCann et al., 2015). LT is “highly contested” (Waring & Bishop, 2010, p. 1339) due to the “deeply embedded norms” and “entrenched practices” (Carson et al., 2000, p. 1143) of healthcare industry.

With the aid of the layers of resistance model from Goldratt and Cox (2016), which highlights various layers of resistance an organisation faces during a change process starting from disagreeing there is even a problem and the need for change (layer 0) to agreeing on the problem and its prescribed solution, however, suggesting there are risks associated with it, and hence, resisting the implementation (layer 8) or simply rejecting the change due to social or psychological barriers (layer 9). Figure 2.3, adopted from Goldratt-Ashlag (2010, p. 578) presents the layers of resistance model.
The analysed literature agreed on QI being a critical part of healthcare, and started working on developing models for QI and exploring the use of QI methodologies in healthcare (Jacobs & Pelfrey, 1995; Schyve & Prevost, 1990; Sinioris, 1990). The literature analysed in this chapter is from solution stage, with papers disagreeing on the direction or details of the solution (layer 3 and layer 4) (Crema & Verbano, 2016; McCann et al., 2015; Ulhassan et al., 2014) or solutions having negative ramifications (layer 5) such as work intensification described by (Stanton et al., 2014). This stage is associated with the search for the relevant QI techniques and methodologies in healthcare settings such as LT (Nelson-Peterson & Leppa, 2007; Scott & Huntington, 2017), six sigma (Liberatore, 2013; Lifvergren et al., 2010; Van Den Heuvel et al., 2005), and TQM (Jarrett, 2016), which can address the healthcare sector’s QI concerns and needs, and at the same time, can be embedded in the already established norms and practices of the sector.

### 2.3.6 Focus of Implementation

QI methodologies comprise of two fundamental elements. Some authors have referred to them as the tools and the philosophy of QI (Pullin, 2002), whereas others called them the ‘hard’ and ‘soft’ practices of QI (Bortolotti, Boscari & Danese, 2015; Giroux & Landry, 1998). The tools or hard practices are based on the systematic control of business processes with the help of statistical tools, whereas the philosophy or the soft practices tend to focus on qualitative human and cultural aspects (Hill, 1995).
To succeed at QI, organisations need to implement both key elements – tools and philosophy, a notion advocated by Womack and Jones (1996) and Liker (2004). However, some organisations appear to only focus on one facet of QI, thereby failing to successfully implement it (Henderson & Larco, 2002). Nevertheless, it can be difficult to distinguish between an organisation implementing only the tools from an organisation implementing QI in its entirety, i.e., tools and philosophy.

As most of the papers used LT as their core QI methodology (see table 2.1), it was necessary to distinguish lean philosophy from lean tools. For that purpose, the breadth of lean philosophy provided by Bhasin and Burcher (2006, p. 67) was used for this research:

- Simultaneously apply five or more of the technical tools.
- View lean as a long-term journey.
- Install a continuous improvement viewpoint.
- Make numerous cultural changes embracing empowerment and sponsor the lean principles throughout the value chain.

Although nearly all of the cases focused on using and implementing lean tools, only three discussed a wider appreciation of the lean philosophy (Dannapfel, Poksinska & Thomas, 2014; Fillingham, 2007; Stanton et al., 2014). Additionally, six cases did not provide sufficient detail and were categorised as partially adopting the philosophy (Dickson, Anguelov, et al., 2009; Dickson, Singh, et al., 2009; Kimsey, 2010; Laing & Geno, 2005; Mazzocato et al., 2014; Melanson et al., 2009).

### 2.3.7 QI Tools and Techniques

An initial examination of QI tools and techniques applied in primarily Lean implementations from the literature was provided by Poksinska (2010). Updating that review, this research considers only empirical case studies, providing a better vantage point to identify the most popular tools and techniques being used in QI initiatives in healthcare (Table 2.7).
Table 2.7: Quality improvement tools and techniques

<table>
<thead>
<tr>
<th>Lean tools</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>VSM</td>
<td>64</td>
</tr>
<tr>
<td>5S</td>
<td>30</td>
</tr>
<tr>
<td>VM</td>
<td>16</td>
</tr>
<tr>
<td>Ishikawa diagram</td>
<td>15</td>
</tr>
<tr>
<td>Kanban</td>
<td>13</td>
</tr>
<tr>
<td>Standardization</td>
<td>12</td>
</tr>
<tr>
<td>Kaizen</td>
<td></td>
</tr>
<tr>
<td>Process map</td>
<td>11</td>
</tr>
<tr>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>Gemba</td>
<td>10</td>
</tr>
<tr>
<td>5 Whys</td>
<td>9</td>
</tr>
<tr>
<td>A3</td>
<td>8</td>
</tr>
<tr>
<td>SIPOC</td>
<td></td>
</tr>
<tr>
<td>SPC</td>
<td>7</td>
</tr>
<tr>
<td>Spaghetti maps</td>
<td></td>
</tr>
<tr>
<td>Swimlane diagram</td>
<td>6</td>
</tr>
<tr>
<td>Poka-yoke</td>
<td></td>
</tr>
<tr>
<td>Voice of customer</td>
<td>5</td>
</tr>
<tr>
<td>TAKT</td>
<td></td>
</tr>
<tr>
<td>Standard flow</td>
<td></td>
</tr>
<tr>
<td>Heijunka</td>
<td>4</td>
</tr>
<tr>
<td>JIT</td>
<td></td>
</tr>
<tr>
<td>CTQ</td>
<td>3</td>
</tr>
<tr>
<td>Cellular layout</td>
<td></td>
</tr>
<tr>
<td>SMED</td>
<td></td>
</tr>
<tr>
<td>Balanced scoreboards</td>
<td>2</td>
</tr>
<tr>
<td>7 wastes</td>
<td></td>
</tr>
<tr>
<td>Andon</td>
<td></td>
</tr>
<tr>
<td>GANTT</td>
<td>1</td>
</tr>
<tr>
<td>Genji genbotsu</td>
<td></td>
</tr>
</tbody>
</table>

A much greater range of QI tools and techniques is currently being employed in healthcare than in the previous report (see Poksinska, 2010). VSM and 5S are still two of the most popular QI tools; they are generally considered to be a good starting point, are simple to explain and understand, and help organisations reduce employee resistance towards QI by providing quick positive results.

2.3.8 Reasons for QI Implementation

As organisations adopt QI methodologies for many different reasons, from reducing expenses to improving processes, it was considered essential to understand the motivations of HPOs to implement QI initiatives. Therefore, each QI implementation in the reviewed cases was judged on having a transactional focus (finances, reducing operating costs, etc.), process focus (improving value-streams, removing waste from the system, etc.), process variation reduction focus (to create standardised flow), and finally, patient experience focus (improving patient safety and the quality of the care provided to patients).

The majority of the cases articulated process improvement as the primary motivation for QI, followed by patient experience as shown in table 2.8. (Multiple foci were possible in this analysis, and the categories can overlap in reality.)
Exploring further details identified that the two most important reasons for QI were (1) to improve delivery performance (turnaround time) and (2) to reduce waiting times and length of stay in the HPOs. A complete list of reasons for QI in the examined cases is presented in Table 2.9. No case mentioned improving the external or overall supply chain, but five cases did discuss improving inventory management in small units, although without providing any evidence of linking that improvement with external suppliers.

<table>
<thead>
<tr>
<th>Reasons for QI</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery performance / turnaround time</td>
<td>50</td>
</tr>
<tr>
<td>Waiting times / length of stay</td>
<td>48</td>
</tr>
<tr>
<td>Quality</td>
<td>22</td>
</tr>
<tr>
<td>Financial benefits</td>
<td>18</td>
</tr>
<tr>
<td>Patient satisfaction</td>
<td>17</td>
</tr>
<tr>
<td>Others</td>
<td>11</td>
</tr>
<tr>
<td>Capacity</td>
<td>9</td>
</tr>
<tr>
<td>Staff satisfaction</td>
<td>7</td>
</tr>
<tr>
<td>Flow</td>
<td>6</td>
</tr>
<tr>
<td>Patient safety</td>
<td>5</td>
</tr>
<tr>
<td>Variation</td>
<td>4</td>
</tr>
<tr>
<td>Reducing movement</td>
<td>3</td>
</tr>
<tr>
<td>Inventory management</td>
<td>2</td>
</tr>
<tr>
<td>Space creation / overcrowding</td>
<td>1</td>
</tr>
<tr>
<td>Standardization</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 2.9: Reasons for QI implementations

### 2.3.9 Impact of Quality Improvement Initiatives

The observed impact of QI initiatives within each case can be divided into primary and secondary impacts where these were reported. Secondary impacts are unintentional benefits of QI recognised by the case study HPOs. Table 2.10 summarises the impact of QI initiatives in the reviewed cases.
<table>
<thead>
<tr>
<th>Impact of QI initiatives</th>
<th>Primary impact</th>
<th>Secondary impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waiting times / length of stay</td>
<td>49</td>
<td>15</td>
</tr>
<tr>
<td>Delivery performance / turnaround time</td>
<td>47</td>
<td>13</td>
</tr>
<tr>
<td>Quality</td>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>Financial benefits</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Flow</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>Capacity</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Variation</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Standardization</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Reducing movement</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Patient satisfaction</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Patient safety</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Staff satisfaction</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Inventory management</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Space creation / overcrowding</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Communication</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Waste elimination</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Access to service</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Scheduling</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Staff safety</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Productivity</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Others</td>
<td>16</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 2.10: Impact of QI initiatives

### 2.3.10 Summary of Literature Synthesis of Quality Improvement Literature

This section presented a synopsis of QI literature. To summarise, healthcare literature highlights LT to be the almost exclusive choice for QI. However, it is implemented in functional silos, which echoes the findings of Spear (2005, p. 91), who stated that “in healthcare, no organisation has fully institutionalised to Toyota’s level, the ability to continuously and systematically eliminate waste”. Key characteristics of QI (and even LT), such as the philosophy, reducing process variation, and standardisation require more attention from HPOs. A wide range of QI tools and techniques are in use, with a few dominating. However, tools such as SMED and JIT, described by Ohno (1988) as an important prerequisite to successful QI implementation, are not being adopted in healthcare.

On the other hand, QI and the use of methodologies in manufacturing industry has been very different. System-wide QI is becoming a norm, and functional silos are eradicated as a prerequisite to QI (Taj, 2008). Components of QI missing in healthcare are almost always present in manufacturing industry, or they are part of the continuous improvement agenda of organisations and their respective supply networks (Liker & Choi, 2004; Sim & Rogers, 2008).

The next section identifies the QI methodologies and principles in HSCM literature to identify links between these two bodies of literature.
To fully investigate QI and its integration in healthcare supply chains, a thorough analysis of HSCM literature was conducted to identify the key themes and research trends. Non-empirical papers were included as they can provide information regarding trends within the field, resulting in a population of 196 HSCM papers.

LT was mentioned in only 28 of the papers, as opposed to 104 cases in the previous section of the literature review, emphasizing the earlier highlighting of a gap and lack of crossover between QI methodologies like LT and HSCM literatures. Table 2.11 groups the HSCM papers into five major themes and nineteen sub-themes, indicating the number of papers mentioning each.

<table>
<thead>
<tr>
<th>Themes</th>
<th>Number of observed cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory and procurement management</td>
<td>107</td>
</tr>
<tr>
<td>Inventory management</td>
<td>50</td>
</tr>
<tr>
<td>Procurement</td>
<td>26</td>
</tr>
<tr>
<td>Use of RFID</td>
<td>14</td>
</tr>
<tr>
<td>Group purchasing</td>
<td>13</td>
</tr>
<tr>
<td>Vendor-managed-inventory</td>
<td>4</td>
</tr>
<tr>
<td>Stakeholder relationship management</td>
<td>69</td>
</tr>
<tr>
<td>Collaboration and integration</td>
<td>40</td>
</tr>
<tr>
<td>Inter and intra-organisational</td>
<td>17</td>
</tr>
<tr>
<td>Supplier relationship management</td>
<td>12</td>
</tr>
<tr>
<td>SCM and logistics innovations</td>
<td>63</td>
</tr>
<tr>
<td>General SCM innovations</td>
<td>21</td>
</tr>
<tr>
<td>Logistics innovations</td>
<td>17</td>
</tr>
<tr>
<td>Outsourcing</td>
<td>13</td>
</tr>
<tr>
<td>Electronic medical records</td>
<td>6</td>
</tr>
<tr>
<td>Process management innovations</td>
<td>8</td>
</tr>
<tr>
<td>Lean thinking</td>
<td>28</td>
</tr>
<tr>
<td>Just-in-time (JIT)</td>
<td>15</td>
</tr>
<tr>
<td>Lean / agile thinking</td>
<td>13</td>
</tr>
<tr>
<td>Others</td>
<td>18</td>
</tr>
<tr>
<td>E-business model</td>
<td>8</td>
</tr>
<tr>
<td>Decision making</td>
<td>6</td>
</tr>
<tr>
<td>Risk management</td>
<td>3</td>
</tr>
<tr>
<td>Enterprise resource planning</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2.11: Literature synthesis of HSCM

Inventory and procurement management was the most common theme identified in HSCM papers, followed by stakeholder relationship management (which includes all forms of inter- and intra-organisational collaboration and integration), and then SCM and logistics innovations. LT was the fourth most researched theme in the HSCM literature. However, LT is closely related to other researched themes as LT is a management system that encompasses various themes and spreads across multiple organisational functions and departments. For example, effective inventory management in LT is achieved by
implementing just-in-time (JIT) systems (Holweg, 2007) and its adoption in healthcare has shown positive results (Guedon et al., 2016).

HPOs have a highly complex inventory system holding a wide array of items in significantly high volumes (De Vries, 2011). Jarrett (1998) suggested inventory makes up about 10 to 18 percent of the total costs of individual HPOs. Health supply chains are inefficient because HPOs are not fully aware of the importance of SCM (Lauer, 2004). The literature analysis showed that the majority of the research in HSCM is devoted to inventory and procurement management, indicating it is among HPOs’ biggest concerns. Various techniques and instruments have been designed and adapted for effective inventory management in healthcare, including the use of Radio Frequency Identification (RFID) (Bendavid & Boeck, 2011; Bendavid, Boeck & Philippe, 2012), outsourcing of inventory operations (Nicholson, Vakharia & Erenguc, 2004), vendor-managed inventory systems (Bhakoo, Singh & Sohal, 2012), and JIT inventory systems (Mustaffa & Potter, 2009).

RFID as a potential contributor to better asset management, as well as patient management in HPOs, was advocated by Bendavid and Boeck (2011) and Revere, Black and Zalila (2010), suggesting it would improve delivery performance, resulting in financial benefits. Using RFID should improve SC performance, increasing coordination among stakeholders and collecting information related to equipment and inventory (Chan et al., 2015; Kumar, Livermont & McKewan, 2010). Other benefits of RFID included increased safety of inventory through tracking, reducing inventory errors, and increasing patient safety and satisfaction (Franklin, 2007; Revere et al., 2010; Roark & Miguel, 2006). However, implementation of RFID in healthcare supply chains is quite challenging (Bendavid, Boeck & Philippe, 2010), with managerial issues outweighing technical ones (Bendavid & Boeck, 2011).

A prominent underlying thread in inventory and procurement management is outsourcing, crossing the tabulated sub-themes. Nicholson et al. (2004) addressed the rising costs of healthcare systems and underlined the benefits of outsourcing over in-house inventory management. However, some negative effects of outsourcing were also identified, including in a comparative study of French and US hospitals by Aptel, Pomberg and Pourjalal (2009), where French hospitals that reduced outsourcing enhanced their logistic operations performance.

References to JIT focused on its benefits and risks when deployed in healthcare. The two earliest studies in the sample stated that healthcare can learn useful lessons from JIT systems in manufacturing (Jacobs & Pelfrey, 1995) and presented a case where adopting
the JIT philosophy for inventory and materials management helped to increase the performance of the whole hospital (Heinbuch, 1995). Both studies stressed leadership’s commitment to the change and employee empowerment as key instruments in the success of JIT. Several studies suggested the use of automation and information technology (IT) to permit JIT to increase the efficiency of healthcare supply chains (Adler, 2006; De Vries & Huijsman, 2011; Guedon et al., 2016).

One of the major issues with implementation of JIT systems in HPOs is stock outs, which can have drastic implications for the quality of healthcare (Jarrett, 1998; Kumar, DeGroot & Daewon, 2008; Mustaffa & Potter, 2009); having suppliers in close proximity can help to mitigate such incidents. Guedon et al. (2016) concluded that implementing JIT inventory management in healthcare supply chains increases safety and helps instantly detect bottlenecks. The many barriers HPOs face in implementing JIT systems (Jadhav, Mantha & Rane, 2014) can be addressed through computer automation and IT (Adler, 2006; De Vries & Huijsman, 2011) and through SC collaboration and partnership targeting waste reduction (Chan, Choi & Hui, 2012).

Stakeholder relationship management was identified as another important theme in the HSCM literature. As not all healthcare-providing staff are employed by the HPOs (Nyaga, Young & Zepeda, 2015), practices relating to their collaboration and relationship management were included in this theme. There is a general lack of buyer-supplier cooperation in the healthcare sector (Kumar et al., 2008), although it is viewed as important (Bhakoo et al., 2012). HPOs need to develop strong SC relationships by collaborating and integrating operations (Kalisch, Aman & Buchele, 1998; Mascia, Di Vincenzo & Cicchetti, 2012) because essential equipment, medicine and other items come from outside suppliers. Collaboration among stakeholders within a supply chain helps organisations to become more competitive, reduces procurement-related issues, increases the overall value generated in the SC (Chakraborty, Bhattacharya & Dobrzykowski, 2014; Handfield & Bechtel, 2002), and minimises risks through sharing (Kogut, 1988).

Along with collaboration, increasing integration of services within healthcare systems has shown positive results (Heenan & Birrell, 2006), affirming the importance of adopting the systems approach (Ibrahim, 2000). Similarly, Bhandari and Snowdon (2012) advocate the clustering of HPOs in service delivery networks to increase the level and quality of care by providing better patient access.
2.5 Citation Network Analysis (CNA)

The findings of SLR ascertained that LT is by far the most used QI methodology in healthcare; and that it is poorly integrated in healthcare supply chains (see section 2.3.2). Consequently, there is a massive gulf between QI and HSCM in the literature. Organisations invoke QI at a departmental level using LT instead of throughout their supply chains; consequently, HSCM studies lack the elements of both QI and LT.

To further develop this argument, it was considered appropriate to expand the research laterally, i.e., using the same initial literature dataset to uncover additional patterns and themes, which can be best accomplished through CNA (Colicchia & Strozzi, 2012). CNA was created to tie scientific developments to their origin (Garfield & Merton, 1979) and to study specialist research fields and subjects (Griffith et al., 1974; Jo et al., 2009); in this study, CNA supports and analyses the findings of the SLR through the medium of citation networks.

Citations are unidirectional links (Garfield & Merton, 1979) between different texts; they should bear “cognitive significance” (Lucio-Arias & Leydesdorff, 2008). Here, CNA analysis is applied to two fields to determine their influence on each other, focusing on interchange of ideas and concepts. It was assumed that a high level of cross citations would indicate an intimate relationship between QI and HSCM, demonstrating that QI in healthcare is inclined to be considered at a holistic level.

Each article was given a serial number for classification. A citation network of the articles was then constructed from their individual reference lists presented in Figure 2.3. The red coloured boxes represent QI articles whereas the green coloured boxes represent articles from HSCM. Similarly, the red vectors represent a citation from QI articles whereas a green vector represents a citation from HSCM articles. For the ease of understanding, the non-cited boxes (articles) were moved to the extreme right in each subsequent year.

The findings of the CNA will be presented in two parts – deductive findings and inductive findings.
Figure 2.4: Citation network analysis
2.5.1 Deductive Findings

The intra-disciplinary relationship between the two sets of articles (QI and HSCM) were analysed; 176 links were found within the QI themed papers, whereas 259 links were found within HSCM papers, indicating that the field of HSCM research appears to be more developed—a finding corroborated by the greater number of HSCM articles (n=196) than QI (n=103) between 1996 and 2017.

However, when the inter-disciplinary relationship was considered, only two (Kriegel et al., 2016; Teichgräber & de Bucourt, 2012) HSCM papers were found to have cited QI papers (six) (Grove et al., 2010; King et al., 2006; Melanson et al., 2009; Ng et al., 2010; Niemeijer et al., 2010; Serrano et al., 2010). Similarly, five QI papers cited HSCM literature.

This minimal cross-citation between QI and HSCM disciplines strengthens the argument that these fields are relatively independent. Three of the QI papers (Papadopoulos, Radnor & Merali, 2011; Rahimnia & Moghadasian, 2010; Setijono, Naraghi & Ravipati, 2011) cited the same paper from HSCM, making it an important bridge between the fields; the content of this paper (Towill & Christopher, 2005) was analysed to ascertain the nature of the link. Towill and Christopher (2005) focused on "pipeline differentiation", indicating that organisations with differing demands and markets should design unique supply chain strategies (or pipelines) for each to meet their respective requirements. They suggested moving from a single multi-faceted “one size fits all” healthcare pipeline to alternative pipelines for different activities, emphasizing that they be designed to ensure patient needs are met. When interpreted as just-in-time service operations for distinct pipelines, this notion is also relevant for QI case studies.

2.5.2 Inductive Findings

Several interesting findings arose inductively during the CNA, apart from the expected outcomes of the designed research. Just as a highly-cited article is more influential than a minimally-cited one, in CNA an article with more citation links is deemed more influential in building up the field of knowledge. Only 12% of the articles in the QI database had four or more citation links, while only 10% in HSCM met that criterion. The QI papers had a lower number of references overall with some papers having fewer than ten in total, implying that the QI research is not fully utilizing available data, information, and findings. The number of references in a paper illuminates how the researchers constructed their theoretical and practical understanding of the phenomenon and, in general, fewer references imply a less thorough grounding in HSCM literature.
Authors of QI research focused more on findings and outcomes in the automotive industry (where QI and especially LT has matured through more rigorous and intensive research) than the healthcare industry, repeatedly citing several classic LT books (Liker, 2004; Ohno, 1988; Womack & Jones, 1996; Womack et al., 1990). Figure 2.4 shows the citation network analysis of the QI papers and the above-mentioned books.

While these books are highly credible and have laid the foundation for QI using LT, they focus on automobile manufacturing, specifically on Toyota Motor Corporation®. They were cited far more than any journal article in the QI papers, implying once again that LT is the dominant QI methodology in healthcare and, that LT in healthcare continues to be adopted from the automotive industry rather than adapted (or recreated) to suit healthcare needs. However, LT in healthcare has its specific features as illuminated in SLR (see section 2.3). Critical knowledge from even these highly cited books is not being fully transferred as they all emphasise integrating an organisation’s LT activities with its supply network but, this notion has not been adopted by the QI literature yet (as demonstrated in section 2.3).

HSCM papers did not cite QI papers from the dataset used in this research, further supporting the notion that HSCM is also not including the principles of QI in the respective research field. A wide range of manufacturing industries (including automotive, aerospace, construction, and food processing) have successfully incorporated and integrated QI principles (Bortolotti & Romano, 2012; Boscari, Danese & Romano, 2016; Fearne & Fowler, 2006; Michaels, 1999; Taylor, 2006; Wee & Wu, 2009) in their respective supply chains. However, in the case of the healthcare industry (and perhaps services in general), such integration is still some way off.
Figure 2.5: Citation network analysis (with LT books)
2.6 Bibliometric Analysis

A bibliometric analysis of the reviewed QI and HSCM articles was conducted for two reasons: to provide bibliometric information to interested readers and researchers, and to further test the proposition that there is a significant and unexpected gulf between the two fields. Hence, corroborating the fact that system-wide approach to QI is missing in the healthcare.

Bibliometric analysis is part of the wider field of scientometrics used to measure scientific performance of a set of documents (Godin, 2006) through analysis of “physical published units, or of bibliographic units, or of the surrogates for either” (Broadus, 1987, p. 376). Bibliometric analysis is widely used to quantitatively measure and showcase the development of a field of research (Ramos-Rodríguez & Ruíz-Navarro, 2004).

In this research, a bibliometric analysis was conducted on both sets of papers (QI and HSCM), examining 5 dimensions:

1. **Papers** – number of papers published per year and most cited papers in each field.
2. **Journals** – which journals publish most of the papers in each field, and whether there are journals that publish research in both fields.
3. **Authors** – top publishing and cited authors in each field, and whether there are authors that publish research in both fields.
4. **Organisations** – top publishing and cited organisations, and whether there are organisations that publish research in both fields.
5. **Geographic affiliation** – top publishing and cited countries and territories, and whether there are geographic affiliations that publish research in both fields.

Using Scopus®, the bibliometric information of all the articles related to both QI and HSCM was downloaded in February 2018. However, some articles were not available in the Scopus® database and were therefore excluded from the bibliometric analysis (6 QI papers and 13 HSCM papers). All the information was imported into Microsoft Excel® to clean the data for consistency and accuracy (Weingart, 2005) prior to analysis.

Bibliometric data including author names, their affiliations and the country, article titles, year of publication and total citations February 2018 from Scopus®, which is owned and operated by Elsevier. The reasons for choosing Scopus® as the primary source of data for this research were twofold. First, Scopus® is considered a highly credible source of accurate bibliometric and citation information in the wider research community as it adheres
to the highest quality standards. Secondly, it is also recommended as a reliable source for information related to operations, quality and supply chain management journals (Akmal et al., 2018; Chicksand et al., 2012). All the data were imported into Microsoft Excel®.

2.6.1 Analysis by paper

Year of publication was charted for all 299 items (103 QI and 196 HSCM) to highlight the increasing trend in both fields (Figure 2.5). This long-term rise in publications helps validate that both fields have been growing, but may also reflect the “bandwagon effect” mentioned by D'Andreamatteo et al. (2015).

![Publication Trend](image)

**Figure 2.6: Publication trends**

Table 2.12 lists the top 5 most cited QI and HSCM publications; none of them promoted cross-citation with the other field.
Top 5 cited QI publications

<table>
<thead>
<tr>
<th>Publication</th>
<th>Citations</th>
</tr>
</thead>
</table>

Top 5 cited HSCM publications

<table>
<thead>
<tr>
<th>Publication</th>
<th>Citations</th>
</tr>
</thead>
</table>

Table 2.12: Top cited publications

2.6.2 Analysis by journals

Research in healthcare operations (QI + HSCM) is predominantly published in specialist healthcare journals, indicating it is a highly specialised field of research, where the managerial implications are not considered to be generalizable to other industries or operational settings. Based on the content of the papers presented in the previous sections, the field of healthcare management is still developing, borrowing the principles of operations management from manufacturing rather than inventing new practices and theories which can be shared with other industries. Innovations are still being drawn from a manufacturing context and the healthcare industry appears to be primarily focused on finding ways to transfer operational innovations into healthcare settings, rather than designing innovations – observations of relevance to both health practitioners and academic researchers.

A total of 164 journals were identified as having published the 299 articles reviewed in this study. The top 5 publishing journals in each field are listed in Table 2.13.
Top 5 publishers in QI | Publications | Top 5 publishers in HSCM | Publications
---|---|---|---
Quality Management in Health Care | 8 | European Journal of Operational Research | 7
International Journal of Health Care Quality Assurance | 5 | Supply Chain Management | 6
Journal for Healthcare Quality | 5 | Health Policy | 6
BMC Health Services Research | 4 | Production and Operations Management | 5
Leadership in Health Services | 4 | International Journal of Operations and Production Management | 5

Table 2.13: Top publishing journals

Out of the 164, only 15 journals were found to have published research in both the QI and HSCM fields (Table 2.14), which supports the underlying proposition of this literature review that both disciplines have developed separately and are largely and unexpectedly unrelated.

Table 2.14: Journals publishing in both QI and HSCM

<table>
<thead>
<tr>
<th>Journal name</th>
<th>QI Publications</th>
<th>HSCM Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Process Management Journal</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Engineering Management Journal</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>International Journal of Health Care Quality Assurance</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>International Journal of Health Planning and Management</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>International Journal of Health Policy and Management</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>International Journal of Healthcare Management</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>International Journal of Operations and Production Management</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>International Journal of Production Economics</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>International Journal of Production Research</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>International Journal of Public Sector Management</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Journal of Health Organisation and Management</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Journal of Nursing Administration</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Journal of Operations Management</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Leadership in Health Services</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Quality Management in Health Care</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

2.6.3 Analysis by Author

A list of authors was created to analyse the top publishing and cited authors in each field. Given the small (albeit comprehensive) data set, the maximum number of publications by any author was only 3, with the vast majority of authors credited with only one paper. A total of 869 authors were identified to have published in QI and HSCM combined; however, out of that total, only 3 authors (Aronsson H. 2011, 2012; Sohal A. 2012, 2014; and Williams S.J. 2014, 2016, 2017) published in both fields. This division indicates that the two fields developed independently – authors appear not to be sharing expertise across the fields, and editors appear not to see value in greater integration.

2.6.4 Analysis by Organisation

A total of 144 organisational affiliations were named in the QI publications and 259 in HSCM; these numbers echo the 103/196 totals for publications in the two fields. However,
in QI literature, around 30% of the organisations were actual HPOs compared to only 11% in the HSCM publications. The majority of the organisations were universities and research centres. Out of the total 403 organisations (144 + 259), only 27 published research in both fields – a finding similar to that in the preceding sections.

2.6.5 Analysis by Geographic Affiliation

Researchers affiliated with a total of 21 countries or territories published research in QI compared to 43 in HSCM, again reflecting the higher number of HSCM publications. Appendix 2 provides information about geographic affiliations credited with research in QI and HSCM.

In terms of number of publications, the USA and UK led in both fields, accounting for about half of the total (QI: USA 41.2%, UK 10.3%; HSCM: USA 35.5%, UK 12.1%). A further 6 countries were credited with at least 3 articles in each field (Australia, Canada, India, Italy, the Netherlands, Sweden). A single publication was credited to each of 9 countries in QI and 21 in HSCM.

In terms of number of citations, the USA and UK again led in both fields, again accounting for about half of the total (QI: USA 46.9%, UK 15.7%; HSCM: USA 32.5%, UK 17.2%). An additional 5 countries were credited with at least 50 citations in each field (Australia, Canada, France, the Netherlands, Sweden). Additionally, achieving over 50 citations in QI alone was India, while in HSCM this was accomplished by Finland, Italy, Singapore, and Spain. In QI, the single most cited publication was credited to Australia, second most to the USA, and third with the UK. In HSCM, the single most cited publication was affiliated with Italy, second with the UK, and third with the USA.

Both international and local collaborations were relatively sparse. In the QI literature, 10 of the 21 countries and territories (under 50%) had at least one international collaborative publication, while in the HSCM, 34 of 43 (79%) did. Internationally, the UK led collaborations in QI followed by the USA; this was reversed in HSCM. Local collaboration was equally prevalent in QI (11 of 21), but far less common in HSCM (13 of 43, or 30%). The leaders in local collaboration in QI were the USA, the UK, and the Netherlands, while in HSCM it was the USA, Australia, and the UK.
2.7 Discussion

The underlying purpose of this SLNBA is to summarise accumulated knowledge as a launchpad for future research endeavours. Concurrently employing a range of methodologies helped to create ‘order from chaos’, facilitating analysis of the current state of QI research in healthcare and delineate its key features and scope of implementation in the respective field. In turn, this highlighted gaps in the literature that guided development of research questions for this dissertation.

2.7.1 QI Methodologies

QI papers, being case studies, clearly depicted the implementation process of QI initiatives and provided an excellent vantage point to analyse the state-of-the-art of QI in healthcare. One of the primary findings of the SLNBA was that LT is the QI methodology most frequently employed to drive QI initiatives in healthcare. However, its roots in engineering and manufacturing systems could create issues for its implementation in healthcare, as some articles highlighted staff resistance in case study organisations precisely due to LT’s origins outside healthcare (Bhat, Gijo & Jnanesh, 2016; Crema & Verbano, 2015; 2013; Timmons, Coffey & Vezyridis, 2014).

The SLNBA findings provided sufficient evidence to investigate whether QI has any specific features in healthcare settings and whether organisations should keep those features in mind while choosing the QI methodologies and implementation strategies most appropriate for their needs and best suited to their organisational context. This notion was surfaced by Mazzocato et al. (2014, p. 284): “Practitioners, managers, coaches, and researchers should therefore consider the specific characteristics of their healthcare delivery systems when they begin to design, implement, and evaluate process improvements”.

Consequently, it was considered important to explore these organisational alignment phenomena by investigating first, the core QI methodologies being used in the New Zealand healthcare system; second, the reasons behind selection of various QI methodologies; and third, whether those QI methodologies are perceived differently by the respective HPOs. This would help to answer which features of QI are kept in mind while selecting appropriate QI methodologies and whether QI methodologies developed for manufacturing are suited for, or adaptable to, those features and needs. Therefore, the following research questions were developed:

*RQ1: How are different QI methodologies perceived by HPOs?*
RQ1.1: What are the key characteristics and criticisms of these QI methodologies, as perceived by HPOs?

2.7.2 Quality Improvement Managers

Top leadership and frontline employees play a crucial role in QI. This strong emphasis on the people side (leadership and employees) of QI features prominently in the teachings of quality gurus (Anderson et al., 1994; Crosby, 1996; Deming, 1982; Juran, 1986; Kobayashi, 2018; Latzko & Saunders, 1995) as well as in specific QI methodologies/philosophies including LT (Womack & Jones, 1996), TQM (Andrea & Emidia, 2017; Dahlgaard et al., 1998), six sigma (Hendry & Nonthaleerak, 2008), and several healthcare-specific QI methodologies including Model for Improvement (Scoville & Little, 2014) and experience-based codesign (Bate & Robert, 2006).

In healthcare, the relatively new QI logic (Branco et al., 2017) has changed the job structures and characteristics of healthcare employees (Drotz & Poksinska, 2014). Clinical staff tend to resist QI mostly because it requires them to change their work practices significantly (McCann et al., 2015). In this regard, the role of quality improvement managers (QIMs) has been recently highlighted in the literature to minimise and manage such resistance (Poksinska, Swartling & Drotz, 2013). Cases analysed for this SLNBA as well as in other published studies (Rees & Gauld, 2017; Stanton et al., 2014) have typically taken an organisational view while studying the effect of QI methodologies. Such publications do not go in depth to explore and observe the roles, characteristics and challenges faced by QIMs—employees assigned with leading, supporting, and managing QI initiatives—in HPOs. QIMs are generally associated with QI departments, and due to their administrative position in between the leadership and frontline staff (figure 2.7) were termed as the *inbetweeners* by the participants of this research. For the purposes of this research, they are referred to as Quality Improvement Managers (QIM).
This study addresses this research gap by adopting a micro-level view of the HPOs in New Zealand, designated District Health Boards (DHBs), and exploring the roles, characteristics, and challenges faced by QIMs in their respective DHBs. To fulfil this goal, the following research questions were developed:

**Q2**: How do QIMs play a **significant role in supporting, promoting, and disseminating QI in their respective HPOs**?

**Q2.1**: What are the key perceived characteristics of successful QIMs?

**Q2.2**: What are the key perceived challenges faced by QIMs in HPOs?

### 2.7.3 Quality Improvement Frameworks

The SLNBA highlighted that the scope of QI in healthcare is highly siloed in nature, i.e., focusing on singular departments or functions rather than taking a system-wide or supply network perspective (see table 2.3). As suggested by Parveen and Rao (2009), implementing QI best practices in their supply chain can help organisations achieve operational excellence. Consequently, supply chain operations should be included under the realm of QI because they provide the much-needed backend support to ensure the seamless delivery of care processes.
At the same time, the literature indicated that case study organisations primarily focused on hard features, i.e., tools and techniques and ignored the soft features, i.e., QI philosophy and organisational culture (see section 2.3.5). If QI is based solely on tools, it does not fulfil its purpose of providing a better “value proposition” to organisations (Guimarães & Carvalho, 2013) as QI tools (such as JIT, 5S, A3 thinking etc) alone do not make up QI—they are just individual instruments in the arsenal of QI tools.

Finally, the wide variety of approaches for incorporating QI techniques into organisations signifies the lack of a generally accepted practical model. Concurrently, the majority of QI interventions were one-off, contradicting a crucial facet of QI – continuous improvement (see section 2.3.4). Therefore, there is a dire need to develop a QI framework or a maturity model that includes multiple facets of QI and that, at the same time, highlights multiple levels of scope of QI, which could be used to assess organisations and their QI initiatives as well as guide them to incorporate QI in their systems.

To create such a model, it is crucial to identify various facets of QI and the stages of maturity an organisation goes through in its QI journey. Hence, the next chapter is dedicated to the development of a QI maturity model, with the following chapter assessing New Zealand HPOs and their QI initiatives using the newly-created maturity model to answer the following research questions:

Q3: What is the state-of-the-art of QI in the New Zealand healthcare system?

Q3.1: What are the core features absent from QI initiatives in the New Zealand healthcare system?

2.8 Summary of the Chapter

This chapter provided a thorough summary of QI literature in healthcare using an SLNBA methodology, highlighting the methodologies and their scope of implementation in HPOs along with some of the crucial gaps and the need to conduct research to address them (see section 2.7). All of these gaps were related to the QI implementations and different aspects of them including the preference and resistance towards different QI methodologies; QIMs and their role in implementing and sustaining QI; and finally, the isolated and siloed approach to QI in HPOs. Therefore, three research questions were developed to better understand the reasons behind them and provide HPOs tools to analyse and improve their scope and breadth of QI initiatives. In this regard, it was deemed necessary to develop a
quality improvement maturity model and test its applicability in HPOs. The next chapter is
dedicated to the development of said quality improvement maturity model.
Chapter 3 Quality Improvement Maturity Model
3 Introduction to the Chapter

The diverse quality improvement (QI) frameworks and maturity models disseminated in the literature each consider some aspects of QI while excluding others. This chapter presents a concerted attempt to create a quality improvement maturity model (QIMM) derived from holistic principles underlying the successful implementation of a system-wide QI programme. The maturity model presented in this chapter was designed and proposed after analysis of a wide array of topically relevant publications, with an intentional focus on case studies within the literature that provide a longitudinal view of the detailed processes within an organisation and links to its external supply network. These case studies were collected from both manufacturing and service sector, and various industries in order to capture the many facets of QI that were not observed in healthcare settings.

This QIMM consists of four dimensions of organisational maturity: strategic capabilities, process, supply chain and philosophical maturity. These dimensions are presented as progressing through six sequential stages: identification, ad-hoc, formal, process driven, optimised enterprise and finally a way of life.

The maturity model was intentionally created to avoid a reliance on any single QI methodology. Organisations—in this case, DHBs—have full control over the process of selecting any QI methodology or may even cherry-pick principles to suit their needs as long as they understand and appreciate the true nature and scope of quality.
3.1 Background

Organisations continuously focus on improving their business/operational process quality to achieve a commercial advantage over their competitors (Anderson et al., 1994; Benner & Tushman, 2003). Bambenger (1989) concluded after conducting 1135 interviews that quality is considered to be the most important factor for competitive advantage by organisations. Similar conclusions regarding the importance of quality have been proposed by many other researches (Kuratko, Goodale & Hornsby, 2001; Lakhal, 2009; Powell, 1995; Reed, Lemak & Mero, 2000; Womack et al., 1990). For that purpose, organisations use different QI philosophies such as project management (Jung & Wang, 2006), lean thinking (LT) (Boscari et al., 2016) or six sigma (Ravi & Sanjay, 2012), and while these (and other) QI philosophies (Martin, 2013; Martin, 2009) have shown to improve organisational processes, organisations seek to find a step-by-step diagnostic and prescriptive guide that can help them in the implementation of their adopted improvement philosophies.

Maturity models have gained popularity both in academia and practice alike (Bucher & Winter, 2010; Lockamy & McCormack, 2004; Röglinger, Pöppelbuß & Becker, 2012; Tontini et al., 2016). Within quality, perhaps the most popular maturity model was presented by Crosby (1996). While the researcher acknowledges its contribution to research and practice, it has been around for over three decades and, arguably, has seen a decline in its applicability to the ever-changing world of business management and its compatibility with service organisations (Albliwi, Antony & Arshed, 2014).

Apart from that, research and practice in the field of QI maturity is highly ‘siloed’, potentially neglecting aspects of wider organisational management, such as organisational capabilities and vision (Software Engineering Institute, 2002), process improvement (Röglinger et al., 2012), supply chain (Reyes & Giachetti, 2010), procurement (Tontini et al., 2016) and culture and philosophy (Wilson, 2015). This wide variety of maturity models concentrating on singular functions of organisational maturity can leave organisations overwhelmed and make it difficult for them to choose from multiple options for the best system-wide output (Reyes & Giachetti, 2010). To address this situation, there is an overarching need to have a generic, system-wide QIMM that addresses the shortcomings of narrow-scope maturity models.

In this chapter, a quality improvement maturity model (QIMM) is designed and proposed after the analysis of a wide array of publications on QI, particularly case studies which provide a longitudinal view of the micro-details of QI process within an organisation and its
external supply chain. It should be stressed that the intention of presenting a new QIMM is not to compete with or replace any of the existing frameworks and maturity models.

3.2 Maturity Models

There are different QI frameworks and maturity models available in the literature (Kobayashi, 2018; Lockamy & McCormack, 2004; Maasouman & Demirli, 2016; Röglinger et al., 2012; Wilson, 2015). However, all present a partial view of QI emphasising some aspects of QI while ignoring others. In this chapter, a conscious attempt was made to create a QIMM that considers holistic QI principles required to implement a system-wide QI programme.

A maturity grid/model is used to “provide a means of identifying key steps, the tasks that need to accomplish, and the sequence of events needed to realise meaningful and measurable results” (Khoshgoftar & Osman, 2009, p. 297). They are widely used in organisational management and improvement literature (Röglinger et al., 2012) and they serve as a roadmap to provide direction to organisations who want to achieve a respective goal. Maturity models typically comprise of a series of stages/levels that create a logical path for attaining maturity and provide organisations with a diagnostic tool that can clearly outline all the levels of maturation path for any given task or project. Used as a self-assessment tool, they can serve a descriptive purpose if they are used for a current state assessment; a prescriptive purpose if they are used as a guide to achieve a desirable future state of maturity; or a comparative purpose if they are used for benchmarking (Röglinger et al., 2012).

Overall, the number of publications related to maturity models is increasing (Wendler, 2012). This holds true in the field of operations management as well (Rosemann & vom Brocke, 2010). However, they are all subject to somewhat similar criticism, as discussed below.

3.2.1 Criticisms of Maturity Models

Maturity models are mostly criticised for consciously supporting the notion of a recipe for success by oversimplifying the maturity process without empirical evidence to back them up (King & Kraemer, 1984). In response to this criticism, within this research empirical case studies were reviewed and analysed as the primary source of literature as they provide a longitudinal view of the micro-details of QI process within a unit of analysis.
Another criticism around maturity models is that they neglect the fact that there can be multiple paths to success and maturation (Teo & King, 1997). It is because maturity models and frameworks are generally linear in nature, they demonstrate a step-by-step guide to maturation. To overcome this criticism, the QIMM presented in this research was designed to be dynamic in nature. It consists of multiple principles which may or may not be interdependent. This provides an organisation with the ability to diagnose which department/function requires their attention, and similarly, which QI principle is required. Consequently, organisations can simply use the QIMM as a self-assessment tool to develop a profile of their current state and define alternative pathways to a desired future state, thereby, not using QIMM as a step-by-step linear guide to QI.

Finally, QIMMs are known to prescribe the use of only one methodology like lean thinking, six sigma, project management (and many others) instead of providing the organisation with the ability (or choice) to mix and match components of multiple QI philosophies. Such QIMMs are tailored for a single QI methodology, and hence organisations are required to fully commit to that respective QI methodology. While commitment to a single QI methodology may work in some organisations, in others, adopting it can be problematic, especially organisations that are very big in size, and single units/directorates within them can be using different QI methodologies. Keeping in mind, that all of these QI philosophies share a common goal, i.e., continuous QI by elimination of waste.\(^3\)

Therefore, a more generic QIMM was intentionally created without relying on a single QI philosophy or approach. Those organisations that may choose to use this QIMM are given control over the process of selecting any QI philosophy or even cherry-pick principles from each of them to suit their needs as long as they understand the definition and scope of quality presented earlier (see section 1.2).

### 3.3 Quality Improvement Maturity Model

#### 3.3.1 Stages of Maturity

Maturity models share a standard set of design principles, of which the most prominent is often the levels/stages of maturity (Röglinger et al., 2012). These stages depict the organisation’s journey throughout the process of maturation; each stage having a set of principles or components that the organisation is expected to meet to either champion that

\(^3\) Womack and Jones (1996, pp. 15, 311) defined waste as “any human activity which absorbs resources but creates no value”.

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level or be capable to move to the next stage. The QIMM presented in this research presents six stages of QI maturation in a system. A brief description of each stage is given below:

### 3.3.1.1 Stage 0: Identification

The first stage of QI maturity is called *identification*. It is characterised by the lack of attention given to QI. Each organisation goes through this stage at some point where they recognise the importance or need to engage in QI. This stage is when the organisation is not working on any QI initiative or supporting activities (training and development etc.). There is no QI or continuous improvement visible anywhere in the system and most of the organisation lacks the necessary knowledge to begin or sustain the implementation of QI process (Antony & Banuelas, 2002).

Organisations at this stage are not familiar with the tools and principles of QI and therefore do not use them. Similarly, there is no problem-solving strategy methodology in place. The supply chain relationships are also poorly managed and largely based on a ‘bullying mentality’, i.e., suppliers who provide the cheapest option are constantly given contracts (Iyer, Seshadri & Vasher, 2009; Liker & Choi, 2004). Focal Organisations are unfamiliar with suppliers and their processes and vice versa. There is virtually no communication among inter and intra-organisational supply chain partners.

Organisational culture also prohibits the development of QI strategy (Maull, Brown & Cliffe, 2001). Employees lack autonomy and authority to run any improvements; they do not want to run any QI initiatives themselves (Drotz & Poksinska, 2014). The ‘respect for people’ component (Liker, 2004) is missing from the organisational culture. Organisations think of QI as capital inducive and largely based on technology and machinery rather than processes. Hence, they do not invest in QI.

However, there are one/two key leadership roles in the organisation which realise the need for QI and decide to take the first step towards QI and continuous improvement—hence, it is called the *identification* stage.

### 3.3.1.2 Stage 1: Ad hoc

In this stage, the organisation actually starts to develop its QI portfolio albeit small in scope and lacking many qualifications and tenets of QI. The organisation begins QI initiatives on an ad-hoc basic (single function/department), i.e., where they feel that they are needed the
most (Deblois & Lepanto, 2016; Sanders & Karr, 2015). The QI activities are reactive rather than proactive. The organisation realises the need for building human resource and strategic capabilities to initiate and promote and QI initiatives in the organisation (Schattenkirk, 2012). External experts in QI implementation are hired to conduct introductory training in sections of the organisation (Papadopoulos et al., 2011).

The use of standard QI tools and principles is also adopted in parts of the organisations. However, as the organisation starts implementing and using QI tools and principles, some unintentional benefits are realised in various value-streams and functions. While the use of said tools and principles help in waste elimination, it is removed from very small sections leading to undesirable consequences such as waste transference rather than waste elimination.

QI efforts are internally focused, and an appreciation of the importance of connecting supply chains and multiple processes is missing. Small scale activities are conducted to improve and link the organisational culture to the one needed for QI. Most of the employees in the organisation are reluctant and resistant to change (Furst & Cable, 2008). Employees are given more autonomy and are asked to be more engaged and conscious of waste in their work (Losonci, Demeter & Jenei, 2011). However, most employees are still cautious and feel that they still are not fully authorised to conduct QI activities themselves and hence, QI is mostly directed by a central or top leadership team.

3.3.1.3 Stage 2: Formal

This stage involves actions that primarily help organisations to formalise their QI implementation—QI is actively supported by the majority (or all) of the management (White, Wells & Butterworth, 2013). In terms of capabilities, organisations tend to create a designated department/team for QI. The team starts to develop new QI initiatives and provide training and development support to the organisation. There can still be an external entity contracted to do that job but not necessarily. QI initiatives are selected through a formalised processes that involves the use of a standard problem-solving methodologies such as A3 reporting (Roemeling et al., 2017) or PDCA/PDSA improvement cycles (Allaudeen et al., 2017).

Process maturity is starting to be achieved by using various QI tools together. Production planning and levelling, and just-in-time principles are piloted in single value-streams so that the wider organisation becomes familiar with the benefits of such combined approaches. Mistake-proofing devices and simple visual management techniques are also used at
visible parts of a process, thus starting a journey towards approaching QI proactively (Saurin, Ribeiro & Vidor, 2012; Ulhassan et al., 2015).

Organisations still have a predominantly internal view of QI and hence do not engage with the external supply chain partners for QI (Taj, 2008). However, organisations start to understand that to move further with QI, the support from the external supply chain will be required and they start to develop strategies to engage with the suppliers. However, Suppliers are reluctant to engage with the focal organisation mainly because of the previous tactics of supplier relationship management of the focal organisation (Bortolotti et al., 2016; Liker & Choi, 2004; Michaels, 1999).

As QI is formalised in the organisation, the reluctance and resistance of employees starts to diminish and a QI culture starts to show prominence in the organisation (Fillingham, 2007). Departments/functions start to collaborate with each other and functional walls start to breakdown in the organisation (Krogstie & Martinsen, 2013). Employee empowerment is also an important part of this stage; employees start to use the newly given autonomy in their work and begin using QI tools and problem-solving methods to improve their work with the help and support of the central QI team (Vidal, 2007). QI is understood by the majority of the organisational employees at this stage allowing the organisation to move above and beyond the formalisation stage (Simons et al., 2015).

3.3.1.4 Stage 3: Process Driven

Once the organisation has formalised its QI implementation, it starts to seek excellence in the internal processes. Hence, this stage is called process driven. Both the leadership and the employees regularly take part in QI activities and change resistance appears to be minimal (Bortolotti et al., 2015). New QI projects are selected to improve entire value-streams rather than small sections of them. QI methods and error-proofing methods are built right into each value-stream (Saurin et al., 2012). Training and development is led by the internal QI department and continuous self-learning is supported in each job (Sim & Rogers, 2008).

Employees are trained in root cause analysis for problem solving rather than firefighting, ensuring the problems are eliminated from the root and do not appear again anywhere in the value-stream (Liker & Hoseus, 2008; Simons et al., 2015). Customer satisfaction increases due to improved quality and employee empowerment (Anderson et al., 1994). JIT and production levelling mechanisms are used to match supply with demand and overall capacity (Vokurka & Davis, 1996). System-level measures are created to increase the
The organisation’s focus expands from internal QI to external supply chains development (Tier-1). Tier-1 or critical suppliers for better product/service development and delivery are highlighted; they are invited to provide their input into the product/service development and their input is taken into consideration (Iyer et al., 2009; Wee & Wu, 2009). New communication channels are formed to have a closer relationship with the suppliers and the organisations tries to move from bullying tactics to more long-term relationships based on mutual respect and benefits (Liker & Choi, 2004).

3.3.1.5 Stage 4: Optimised Enterprise

Optimised Enterprise stage depicts the state of an organisation who has championed QI internally and is expanding its QI plan outwards to its external supply chains, and the majority of the organisation’s Tier-1 or critical suppliers are trained by the focal organisation to implement QI methods and principles in their internal processes and at the interfaces between them and the focal organisation (Bortolotti et al., 2016). There is two-way open communication in the supply chains ensuring better supply chain performance (Taylor, 2006). All the organisations implementing QI initiatives work as partners rather than having the conventional ‘customer-supplier’ relationship; they assist each other in QI activities regularly (Anderson et al., 1994; Liker & Choi, 2004). Regular meetings are held to discuss improvements in product/service development and delivery as well as supply chain performance and resilience.

Extended value-streams are used as a primary mode for visualising workflow and waste (Perez et al., 2010; Wee & Wu, 2009). The waste is removed systematically from the extended value-streams using a common A3 reporting methodology (Roemeling et al., 2017) and other problem-solving techniques and methodologies (SIPOC, PDSA) are used across the supply chain organisations. Kanban and JIT are implemented in the supply chain to create pull; customer demand is pulled rather than product/service being pushed to the customers (Kannan & Tan, 2005; Liker, 2004). All the QI initiatives are sustained; anomalies are visible in the reporting and dealt with quickly by the respective staff.
### 3.3.1.6 Stage 5: A (Philosophical) Way of Life

The final stage in QIMM is when the focal organisation and its extended upstream (Tier-1, Tier-2 and Tier3) and downstream supply network lives by QI philosophy (Anderson et al., 1994). All (or majority) of the organisations (in the supply network) implement common QI methods and principles in their internal processes and in the interfaces between organisations (Bortolotti et al., 2016). The supply network partners are all fully convinced that QI and continuous improvement is the ultimate way to success (Dyer & Nobeoka, 2000; Liker & Choi, 2004). Organisations and employees are self-motivated to conduct QI activities regularly and remove waste from the supply network. Decisions are based on the systems level; truly removing waste from the system rather than transferring waste other parts of the supply chain (Liker & Hoseus, 2009). JIT is implemented in extended value-streams and the supply network strives to be a zero-inventory system. QI is embedded in the supply network as a social practice.

The maturity reaches a philosophical level where continuous improvement, respect for people, relentless self-reflection and a drive to keep moving forward is ingrained in the supply network on a personal level (Liker & Hoseus, 2008). Financial incentives of QI become secondary and are seen as an outcome of QI rather than the primary objective or driver if QI.

An overview of the stages of maturity is provided in table 3.1.

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
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<tbody>
<tr>
<td>Identification</td>
<td>Ad hoc</td>
<td>Formal</td>
<td>Process driven</td>
<td>Optimised Enterprise</td>
<td>Way of Life</td>
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<tr>
<td>There is no QI visible</td>
<td>QI initiative starts to</td>
<td>A formal approach is</td>
<td>QI becomes a company-wide</td>
<td>QI starts to move out</td>
<td>QI mentality is present</td>
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<td>anywhere</td>
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<td>established regarding QI</td>
<td>approach and the focus of</td>
<td>into external supply</td>
<td>across supply network;</td>
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<td>QI implementation</td>
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Table 3.1: Overview of the maturity stages
3.3.2 Dimensions of Maturities

This section explains the multiple dimensions of quality, and how they mature from stage 0 to stage 5. These dimensions are divided into four main categories: strategic capabilities maturity, process maturity, supply chain maturity and philosophical maturity.

3.3.2.1 Strategic Capabilities Maturity

Strategic capabilities maturity refers to an organisation’s ability to conduct QI initiatives. The seminal work by Software Engineering Institute (2002) of Carnegie Mellon University dubbed as “The rational unified process and the capability maturity model” is widely used across the business world and has allowed organisations to access their abilities. These strategic capabilities include:

3.3.2.1.1 Vision/Scope

Vision/Scope refers to how an organisation understands and views quality and QI. QI is a never-ending journey (Deming, 1982) and the relevant literature supports that when organisations start their QI journey, their viewpoint of quality also develops over time. In the beginning, organisations have a nascent view of QI; it is done in a more reactive manner (firefighting) (van Lent, Goedbloed & van Harten, 2009). QI is seen as a short-term goal and is not part of the organisational strategy. However, as the organisation develops its capabilities, they realise that QI should be done proactively; it becomes part of the long-term organisational strategy (Womack et al., 1990). The organisational vision of QI grows into a system-wide approach that surpasses organisational boundaries and moves into external supply chains and finally the supply network (Bortolotti et al., 2016; Perez et al., 2010).

3.3.2.1.2 Training

Training is considered a vital part of capability development in organisational studies. There is a significant volume of literature present that mentions the role of training in building human resource capabilities in organisations that leads to competitive advantage (Simons et al., 2015). QI also requires the support from training and development because the underlying idea in QI is that the people who are actually doing the work are the only ones who can improve it (Ohno, 1988). However, they need skills and understanding of various QI tools and principles and for that purpose, they require training and development.
On a maturity scale, organisations may not initially have any training activities designed for QI but develop them as needed and as they progress. Through this process they start to pay more attention to training and development, initially hiring external consultants and entities to conduct training as they do not have the internal capacity or skills (Fillingham, 2007). The training material also develops from being standard and sporadic to fully customised training in each and every part of the organisation (McCann et al., 2015). Once the organisation has developed its internal capabilities in terms of QI, it expands the scope of training to direct suppliers and then finally, the complete supply network (Bortolotti et al., 2016; Michaels, 1999).

3.3.2.1.3 Leadership Support

There is a long-standing view in QI that it always starts from the top (Dahlgaard et al., 1998). However, it does not undermine the support and commitment of the employees (Dahlgaard & Dahlgaard-Park, 2006) but the policy and strategy development is mainly done by the leadership and hence having their approval on board is necessary for successful QI (Andrea & Emidia, 2017; Coronado & Antony, 2002).

Initially leadership support might only be restricted to one/two key people in the organisation. This support can be a result of them having a direct/indirect experience or training in QI. However, as the organisational starts its continuous QI journey, the leadership support starts to build within the organisational to a point where all (or the majority) of the leaders fully support the QI agenda. At this point, the organisation can be considered fully process driven, i.e., QI is built into all the internal processes, after which the organisation starts to seek the support of external supply chain members (Bortolotti et al., 2016). This is usually initiated with the direct suppliers, i.e., Tier-1 suppliers and then moved to Tier-2 and Tier-3 suppliers to a point when majority of the supply network supports and is involved in QI.

3.3.2.1.4 Project Selection

QI is generally associated with the elimination of waste in the organisational functions/processes (Kaynak, 2003). However, many organisations either do not recognise the waste or live under the notion that they do not have any waste. Therefore, said organisations do not invest in QI initiatives. An organisation seeking to initiate QI, tends to start with smaller projects that are based within a single department/function (Dickson, Anguelov, et al., 2009). These projects are chosen usually on an ad-hoc basis, i.e., where the management believes it is needed and where it is easy to recognise and eliminate
waste. Once the organisation has experience of these ad-hoc projects, it creates a formal standardised process for project selection. This can be accompanied by employee feedback system; a central QI management authority carefully analyses the feedback and decides where to initiate QI projects in the organisation.

As QI matures the organisation starts to implement QI initiatives in complete value-streams rather than in small silos to ensure the waste is eliminated from the system rather than being transferred to other value-streams (Holweg, 2007). This selection of value-streams is then further expanded to inter-organisational value-streams which requires the direct supplier's involvement as well (Taylor, 2006). The last stage in project selection maturity includes value-streams that are part of the supply network and requires involvement of multiple supplier entities. The supply network at that point can be considered fully mature and conducts QI without any involvement or guidance from the focal organisation.

### 3.3.2.1.5 Financial Objectives

The conventional view of quality posits that QI is a cost-adding activity rather than a value-adding activity—a perspective which reflects the organisation's view of quality. However, when organisations start to develop their QI strategy, they try to move past this view and promote QI as a cost-saving activity. QI projects have short-term financial objectives attached to them and their success is measured by the success of said objective (Papadopoulos et al., 2011). Six Sigma programmes target specific activities where cost savings are likely to ensue from reduced variation (Lizzarelli & Alliprandini, 2018). Further maturation of the organisation allows it to move from developing short-term financial objectives to long-term and strategic objectives that may have system-wide implications on the supply network. However, the philosophical viewpoint of QI advocated by the gurus of ‘quality’ posits that financial advantages are to be seen as outcomes of QI instead of QI being driven by financial objectives in the system (Deming, 1982; Womack & Jones, 1996).

Table 3.2 highlights the components of strategic capabilities maturity and their description in different stages of maturity.
Training

Organisational training activities do not contain any QI modules.

QI trainings are provided by external entities and are sporadic in nature.

Customised QI trainings are provided to majority of the department with feedback support.

QI trainings are internally provided by QI department and continuous self-learning is designed into majority of the job descriptions.

QI training and support is provided to direct suppliers.

QI training/support is provided by supply chain partners to all the members of the supply network to ingrain QI in the supply network.

Financial Objective

QI is seen as a cost-adding feature rather than cost-cutting feature.

Short-term financial objectives peripheral in nature are linked to QI activities.

Short-term financial objectives are optimised into the QI activities.

Financial objectives linked to QI are long-term and strategic in nature.

Financial objectives of the direct supply chain partners are aligned and facilitated by the focal organisation.

Irrelevant, the benefits are seen as an outcome of QI rather than a direct objective for everyone across the supply network.

Project Selection

There are no QI projects going on in the organisation.

QI is primarily done on reactive and ad hoc basis.

There is a formal process for selecting projects for QI. Visual controls are mostly used to ensure identification of problems.

Projects are selected to improve entire value-streams rather than on ad hoc or siloed mentality.

Inter-organisational projects are selected across direct supply chain members.

Projects are selected to be continuously improved across entire supply network.

Leadership support

One/Two key leaders support QI. However, they don’t have any experience with key QI methodologies/philosophies.

The majority of organisational leadership team sees potential benefits of QI.

QI is validated by the complete leadership team.

Leaders across the organisation regularly participate in QI activities.

Majority of the supply chain partners thoroughly understand and validate QI and teach it to others.

QI is ingrained across the entire supply network.

Vision/Scope

Organisation has a very nascent view of QI.

Quality improvement is done in a reactive manager; implemented in places where quality needs to be improved, with short-term goals.

QI starts to be seen as a long-term approach for organisational improvement by majority of the organisation.

QI methods are built into majority of the value-streams across the organisation.

QI becomes systems improvement approach rather than focusing on singular value-streams moving further out to direct suppliers.

QI is seen as a continuous improvement state by the entire supply network and is measured by true value for the customers.

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Table 3.2: Overview of components and stages of strategic capabilities maturity
3.3.2.2 Process Maturity

Lockamy and McCormack (2004, p. 273) mentioned that “a process has a lifecycle that is assessed by the extent to which the process is explicitly defined, managed, measured and controlled”. Process maturity refers to an organisation’s ability to conduct process improvements based on these four spectrums using various QI tools and principles described below.

3.3.2.2.1 Quality Improvement Tools

There are many different QI philosophies such as lean thinking, six sigma and project management, and they all consist of a set of tools such as 5S (Bayo-Moriones, Bello-Pintado & Merino-Díaz de Cerio, 2010), Andon, process mapping, affinity diagrams (Bakar, Subaru & Daril, 2015), critical to quality (Tague, 2005) and fishbone diagrams (Vassilakis & Besseris, 2009).

Organisations not determined to improve quality usually do not use any of these (and others) tools from the quality tool box. However, once they decide to implement QI, they start using QI tools. In the beginning, they use only a very limited number of tools that are easy to use and implement and provide quick results but as organisations get better at QI, i.e., move up the levels, they tend to use more and more QI tools and in a much more systematic and sophisticated way (Poksinska, 2010).

3.3.2.2.2 Value-Stream Mapping

Value-stream mapping (VSM) is a highly useful tool from the quality toolbox (Bicheno & Holweg, 2008), and provides organisations with the required support to visualise their processes and the waste in them, thus providing a basis for process redesign, eliminating the shortcomings of the process (Rother & Shook, 1998), and creating improved flow (Lasa, Laburu & Vila, 2008). The scope of the use of this tool depends on an organisation’s capability to conduct QI. Organisations starting to adopt QI tend to use it in its most basic form; creating standard VSMs of single processes.

However, as the organisation becomes more mature, they tend to design more complex value-streams of multiple inter- and intra-departmental/functional processes and even going further into the external supply chain to create flow between multiple organisations (Taylor, 2006). VSM also helps in documenting processes which leads to greater standardisation of processes.
3.3.2.2.3 Problem Solving

Problem solving is a critical aspect of QI and many tools have been designed to help organisations in problem solving such as A3 reporting (Roemeling et al., 2017), PDSA (Allaudeen et al., 2017), SIPOC (Bhat et al., 2014), and fishbone diagrams (Vassilakis & Besseris, 2009). However, such tools are only to assist in problem solving—the actual part of problem-solving lies in an organisation’s capability and willingness to resolve issues. Organisations at the beginning of their QI journey tend to resolve problems in a reactive product focused way, rather than in a root-cause focus process-based way, typical of a more mature QI organisation (Bortolotti et al., 2015; Repenning & Sterman, 2001). However, as they move on with their QI journey, they tend to create a common standard process for problem solving throughout the supply network that consists of a systematic and comprehensive root cause analysis. This way, the root cause of problems is addressed and eliminated ideally preventing them from appearing again.

3.3.2.2.4 Reporting

Reporting within organisations tends to be minimal, generally sufficient to satisfy legal requirements and meet internal process needs (Elg, Palmberg Broryd & Kollberg, 2013; Stolle & Parrott, 2007). However, QI is driven by data; organisations rely on their data to conduct and ensure sustainability of QI (Juran & Godfrey, 1999; Latzko & Saunders, 1995). Hence, organisations undergoing a quality revolution design and install reporting mechanisms everywhere within and even outside their organisation in their supply network. Visual management, feedback system and data charts are used as reporting mechanisms and are analysed to understand an organisation’s processes and highlighting places where quality can be improved (Fillingham, 2007; Hines, 2001).

3.3.2.2.5 Standardisation

Juran referred to standardisation as mechanisms to ‘hold the gains’ (Bicheno, 2000, p. 114). The underlying principle behind standardisation is that organisations can improve processes or performance but if those improvements do not become part of the *modus operandi*, those improvements can be lost as well (Hines, 2010).

There may be organisations who create plenty of standard operating procedures, but they are not followed or institutionalised. Organisations undergoing a quality change must standardise each change as soon as its positive effects are visible and reported to institutionalise it. This way they start standardising workflows. Standardisation also applies
to problem solving procedures and the overall continuous improvement principle, i.e., there is a standardised way to solve quality related problems and lead QI initiatives. Mature organisations or supply chains tend to have standardisation visible across organisations and at the interfaces between functions and organisations as well.

### 3.3.2.6 Error-Proofing

Error-proofing or fail-safing devices prevent organisations from making defects. Fail-safing devices react to abnormalities only. Every time there is an abnormality in the process, these fail-safing devices signal the related parties that an error has occurred (Bicheno & Holweg, 2008). A common example is a mould in which each of the product will have to fit perfectly to be labelled as perfect, if a product does not fit in it, then it is not up to the standards and should be held instead of being sent to the customers.

Organisations new to QI tend not to have any particular error-proofing mechanisms or devices as a part of their system. However, the more mature they get at QI, more of such devices start to appear in the system starting from the visible and obvious parts of a value-stream and moving onto even the non-visible and obvious parts (Saurin et al., 2012). The focus of error-proofing in the beginning is solely on reacting to defects\(^4\) rather than proactively stopping them from occurring in the first place.

### 3.3.2.7 Production Planning and Levelling

Although the title suggests it to be a production specific property but, it is also applicable in service management. It includes demand smoothing, load levelling and line balancing (see Bicheno, 2000).

Organisations usually do not adopt this principle in the beginning of their QI journey as it requires them to link various functions of the system. However, once they are ready to do so, they tend to pilot production planning and levelling in a single value-stream. This way the organisations can get familiar with the deployment of this principle and document the issues and challenges they faced during the deployment. Once it is fully deployed in a value-stream and the organisation is trained and comfortable to implement it in other value-streams, they start deploying it throughout the organisation. Effective system-wide production planning and levelling may require the involvement of suppliers; therefore,

\(^4\) Shingo (1989) described ‘mistakes’ as inevitable and a ‘defect’ as when a mistake reaches a customer. The goal is to eliminate the chances of defects occurring.
organisations install mechanisms between the interfaces between them and the supply chain partners to create a seamless system (Amasaka, 2014; Vokurka & Davis, 1996). This includes development and involvement of suppliers in the product/service design and delivery. More details on this are provided in the supply chain maturity section below.

Table 3.3 highlights the components of process maturity and their description in different stages of maturity.
### Value stream mapping (VSM)

| Value stream mapping (VSM) | Evidence of flow is not present anywhere in the organisation | Unintentional and unrecognised traces of flow appear because of basic QI tools being implemented in piecemeal around the organisation | VSM is used for individual processes to understand the process flow | Complex value-stream maps are made for individual departments with multiple interacting processes | Inter-organisational VSMs are made to understand and support flow between direct suppliers | Flow is supported throughout the supply network with the use of extended VSMs that provide a bird's eye of flow in the supply network |

### Standardisation

| Standardisation | Majority of the workforce do their jobs in their own preferred way. | There are SOPs for majority of the jobs. However, they are not followed or institutionalised by anyone. | Organisation begins to develop standardised work flows | Majority of the organisation understands that standardised tasks are the foundation for continuous improvement | Standardised processes become a common practice in internal and external supply chains and different entities start kaizen events when standards are not adhered to | Standardisation becomes the lifeblood of supply network; every entity starts to follow standard protocols, making continuous kaizen improvements and adding them into standards automatically |

### Problem Solving

| Problem Solving | No systematic approach is used to deal with problems | Problems are solved after they occur (firefighting) | Employees are trained to use a standardise methodology like A3 thinking or PDSA to tackle problems | The emphasis of problem solving is moved from firefighting to 'root-cause analysis'; problems are eliminated in a systematic way from the root cause | Supply chain partners are encouraged and trained to systematically eliminate waste using problem solving methodologies; focal organisation assists in this endeavour | Systematic problem solving using a standardised methodology (A3 thinking) becomes the way individuals in the supply network deal with problems |

### Production Levelling

| Production Levelling | Production levelling and planning is not used anywhere in the organisations | Unintentional and unrecognised traces of production levelling are present in the organisation | Production levelling is initiated in individual processes to align capacity and minimise bottlenecks. However, their impact on other processes is not recognised | Production levelling is introduced to align capacity and minimise bottlenecks in multiple value-streams throughout the system putting foundations of a JIT system | Focus on direct suppliers to facilitate production levelling is placed; direct suppliers’ role and development is recognised as crucial to production levelling | Focus on both direct and indirect suppliers to facilitate production levelling is placed. Thus, creating a just-in-time supply network |

### Reporting

| Reporting | Minimal to no reporting is done in the organisation other than what is officially and legally necessary | The role of reporting is neglected in the QI interventions | Reporting mechanisms are created but not necessarily observed or managed properly. | Reporting mechanisms are placed in all the QI interventions and are used to sustain and drive continuous improvement initiatives | Use of reporting is extended to the inter-organisational supply chain; data highlights the abnormalities in the supply chain | Majority of stakeholders in the supply network use fully established reporting mechanisms to drive continuous improvement and to highlight intra/inter-organisational abnormalities |

### Error Proofing

| Error-Proofing | There are no error-proofing mechanisms present in any job | Mistakes are dealt with after they occur and are considered a consequence of a process | Mistake-proofing mechanisms are designed and placed at visible areas in processes | Focus of error-proofing devices and instruments is moved from detection to prevention. | Inter and intra-organisational supply chain mistake-proofing devices are placed to ensure the prevention of errors with focus on the interfaces between entities. | Root-cause analysis is used across the supply network with the goal of detecting abnormal conditions before they create a harm down in the supply network |

### QI Tools

| QI Tools | No QI tools are used in the organisation | Basic QI tools such as 5S and VSM are used to improve individual small-scale problems | Multiple tools are implemented to resolve quality issues and to support QI vision | Standardised methods are used to decide which QI tools and methodologies should be used | QI tools are implemented in multiple organisations (direct suppliers) and their interfaces | Philosophy driven use of QI tools across the supply network |

<table>
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Table 3.3: Overview of components and stages of process maturity
3.3.2.3 Supply Chain Maturity

Without incorporating supply network partners in QI activities, focal organisations run a risk of transferring waste to others rather than eliminating it from the root cause. Hence, Parveen and Rao (2009) concluded that conducting QI activities in the supply network allows focal organisations to improve their internal operations.

Supply chain operations offer the required back end support to guarantee continuous delivery of products and services and ensuring their performance is equally important as of focal organisations. Hence, this section of the QIMM mentions the details around the supply chain function and its role and how it is related to the overall QIMM. Supply chain maturity tends to start after the organisation has formalised their internal QI initiatives.

3.3.2.3.1 Involvement in QI

Involvement in QI refers to the engagement of organisational and its supply network members in QI. When the organisations start their QI journey, very few people within the organisation are involved in any explicit QI initiatives. However, as the organisation develops its QI initiatives, more and more people start to understand, believe and regularly participate QI activities (Culig et al., 2011). For a successful QI implementation, both top management and employee’s commitment and involvement is necessary (Coronado & Antony, 2002). Once the organisation has successfully achieved high rates of involvement from their staff, they (should) start to move to their wider supply network as QI is never limited to a single organisation, it can and should move to larger supply chains and ultimately to the complete supply network (Bortolotti et al., 2016). In such a case, it is necessary for every organisation and its staff to believe and be involved in QI for successful implementation and sustainability of the change (McCann et al., 2015).

3.3.2.3.2 Supplier Development

Supplier development is a key component and supporting element of QI in supply chains. Highly developed organisations with strong emphasis on QI such as Honda® and Toyota® have created strategies around supplier development which helped to improve their products and services for the customers (see Liker & Choi, 2004).

Once the focal organisation has formalised their internal QI initiative, their vision and scope of QI strategy increases to add external supply chain into it (Iyer et al., 2009). This generally includes Tier-1 suppliers (and sometimes Tier-1 customers). The focal organisation pays...
critical attention to developing supplier relationships and investing in the development of both their capabilities and processes—this is an essential strategy—investing in the supplier base will help to improve the supply chain performance leading to better product/service delivery ultimately to the customers. Focal organisations apply continuous improvement principles and move on to Tier-2 and Tier-3 suppliers after they have developed the Tier-1 suppliers to create a leaner and more resilient supply network (Bortolotti et al., 2016).

### 3.3.2.3 Supplier Involvement

Supplier involvement refers to the focal organisation’s tendency to involve the supplier in product/service design and delivery stage (Womack et al., 1990). Toyota famously invited its suppliers to its facilities during the design phase of its cars and asked suppliers to provide their feedback and input in the whole process, allowing them to create better quality products for their customers.

Similar to supplier development, supplier involvement also tends to start when the organisation has formalised and validated its internal QI initiative. Tier-1 suppliers are encouraged and invited to be involved before the focal organisation can move on to Tier-2 and Tier-3 suppliers (Liker, 2004; Liker & Choi, 2004).

### 3.3.2.4 Just-In-Time

Just-In-Time is a part of a wider Toyota Production System and has been widely praised by researchers and practitioners alike (Kim & Takeda, 1996; Lea & Parker, 1989; Sugimori et al., 1977). Kannan and Tan (2005, p. 153) comment “The JIT philosophy advocates the elimination of waste by simplifying production processes. Reductions in setup times, controlling material flows, and emphasizing preventive maintenance are seen as ways by which excess inventories can be reduced or eliminated, and resources utilised more efficiently”. However, it is not easy to implement JIT in organisational processes (Jadhav et al., 2014).

Organisations require a set of different capabilities to initiate and implement a JIT system. Employee training in this regard is very critical; JIT principles are required to be taught to the people involved in JIT. Once the organisation has ensured that JIT is understood in the organisation, they can initiate a pilot project. This helps them to gain more acceptance of JIT both in the internal and external supply chains and it helps the organisation to get familiar and comfortable with the implementation process. Once the organisation has
successfully run a pilot programme and the customer demand is ‘pulled’ rather being ‘pushed’, they expand the JIT system to external supply chain slowly starting from Tier-1 suppliers and then expanding it more and more till they have a complete JIT system in the supply network (Iyer et al., 2009).

3.3.2.3.5 Communication

Effective communication plays a key role in QI initiative implementations (Coronado & Antony, 2002). Organisations actively involved in QI tend to have clear and effective communication channels that allow transparent two-way communication instead of conforming to silo-mentality where each function/department works in their own silo and do not communicate or know what other department/functions are doing (Dyer & Nobeoka, 2000).

Organisations beginning their QI journey focus primarily on creating, developing and maintaining communication channels within the organisational boundary (Boscari et al., 2016). This includes the breaking of functional/departmental walls, allowing them to sustain the QI initiative internally – a process that varies widely in terms of time and effort required. Only once this objective has been successfully implemented and reflects business-as-usual will the organisation begin to focus on the Tier-1 supplier base. This can include creating or increasing the number of employees in the procurement department or creating a new team which focuses solely on supplier relationship management. The similar approach is taken towards Tier-2 and Tier-3 suppliers as well afterwards to promote effective and transparent two-way communication in the supply network; everyone in the supply network understands QI’s importance as well and fully participates to sustain it.

Table 3.4 highlights the components of supply chain maturity and their description in different stages of maturity.
## Open and Transparent Communication

There is virtually no communication among supply chain members. Supply chain members believe in keeping their work practices and ideas a secret as sharing them might affect their position in the supply chain.

Organisation is more focused on internal communications and do not pay much attention to creating channels for communication in the external supply chain.

New channels of communication are established in the supply chain to promote open and transparent communication between supply chain members. However, they are still not used.

Majority of the direct supply chain partners practice two-way open and transparent communication with a shared goal of increasing the overall supply chain's performance.

Open and transparent communication becomes an integral part of the supply network; all the members share resources with each other and believe it is the only way to move forward.

## Just-In-Time (JIT)

There are no signs of JIT in the organisation.

JIT principles are taught to employees but are not implemented by anyone.

JIT is fully established within the organisation. Customer demand is pulled rather products being pushed to the customers.

Direct suppliers also become part of the JIT philosophy. Majority of the raw materials and inventory management is done using JIT principles. Almost no excess inventories are present in the wider supply network at any time.

## Supplier Involvement

Supply chain relationships tend to be of 'bullying' nature; focal firm tends to go with the suppliers with the lowest bid.

Supplier's involvement in product design and development is not seen as a reason for competitive advantage.

There is no supplier involvement present in product/service design and development.

Some of the most crucial suppliers are invited to be involved in the development of new products and their inputs are taken into consideration during product/service development.

Majority of the direct suppliers provide their inputs during product/service development stage and work closely with the focal firm to ensure success.

Majority of the supply network partners are intrinsically motivated to provide feedback and support each other keeping in mind the end goal to be a better and resilient supply network.

## Supplier Development

Supplier development practices do not exist at all.

Organisational focus regarding QI lies more towards developing internal functions rather than focusing on external supply chain.

Supplier development strategy is created but it is not functionalised; suppliers are also reluctant to be involved in development activities and tend to rely on their own expertise.

Suppliers crucial for delivering more direct value to customers are recognised and the need for their development is recognised. Some development activities like training and collaboration are initiated with minimal success in most cases.

Supplier involvement in the internal processes becomes more apparent and suppliers are also trained to use QI methods in their internal processes. A JIT system is established to minimise inventory by creating a resilient Kanban system to increase flow.

Indirect supplier (Tier 2 and Tier 3) are also involved in product/service development. The supply network partners help each other to develop and thus creating a more resilient system overall.

## Involvement in QI

QI is not understood within the organisation.

One/Two key positions with QI experience are present in the organisation.

QI awareness is present in few departments; a designated team is formed to support and promote QI in the organisation.

Majority of the organisation is aware and involved in QI.

Direct suppliers are motivated to be part of the QI vision; focal organisation provides necessary support during the process.

Majority of the supply network partners are expected and attracted to be part of the QI vision.

<table>
<thead>
<tr>
<th>Stage 0</th>
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</tbody>
</table>

Table 3.4: Overview of components and stages of supply chain maturity
3.3.2.4 Philosophical Maturity

The last section of QIMM deals with the philosophical maturity of quality improvement initiatives in an organisation. Quality improvement methodologies have two components: tools (discussed previously) and philosophy (Coronado & Antony, 2002; Pool, 2000; Pullin, 2002). Organisations need to be able to incorporate both elements in the system to maximise the benefits (Bugdol, 2005; Womack & Jones, 1996). This section considers details of the critically important elements of philosophical maturity below:

3.3.2.4.1 Waste Elimination

Waste elimination is at the core of each of the QI methodology because the removal of wastes within a system directly increases value for the customers. For an organisation to fully understand and identify the waste requires a level of philosophical maturity (Rother & Shook, 1998). Womack and Jones (1996, pp. 15, 311) defined waste as “any human activity which absorbs resources but creates no value” value as “a capability provided to a customer at the right time at an appropriate price, as defined in each case by the customer”.

Organisations early in their maturity journey tend to only be able to identify and eliminate direct and unnecessary waste and therefore tend to remove it from individual value-streams without acknowledging their potential to transfer to other value-streams (Fearne & Fowler, 2006). There is no standardised process used for waste elimination as well but as the organisation matures, it starts to see waste differently, addressing root cause using a standardised process. Slowly, waste elimination becomes a shared responsibility across the supply network; with everyone practicing it voluntarily.

3.3.2.4.2 Respect for People & Empowerment

Respect for people & empowerment are also a part of QI philosophy (Kobayashi, 2018; Liker, 2004; Seaker & Waller, 1996). Ohno (1988) also talked about the importance of this principle with the use of Gemba walks, i.e., going to the place of work, as people who are doing the actual work on the production/service floor best understand the process and are therefore the only ones who can improve it and sustain the improved processes. For that purpose, employees need to have more autonomy and be empowered and supported by the top management.

Employees in the organisations following a QI philosophy are more vigilant of waste in their daily work and they work as partners with each other and the top management providing
suggestions and feedback on QI activities. The same principle is followed as the organisation increases the scope of its QI activities to the external supply chain. Suppliers are given the same respect and empowered to work together and improve the supply chain performance (Bortolotti et al., 2016).

### 3.3.2.4.3 Continuous Improvement

*Continuous improvement* (Kaizen) refers to the regular, sometimes daily use of small incremental steps to keep moving forward in terms of QI. Organisations which lack a mature QI perspective generally tend to only improve their processes when some kind of fault or crisis is recognised, whereas mature QI organisations live by a QI philosophy, continuously seeking to improve their processes no matter what. This kind of commitment towards QI is only achieved when the philosophy of QI is embedded in the organisational culture and every job description. As previously mentioned, it is the employees who improve their work. Therefore, continuous improvement is not possible without the respect for people and empowerment element (Emiliani, 2006).

### 3.3.2.4.4 QI Culture

Organisational culture is considered to play a significant role in successful implementation of QI initiatives (Atkinson, 2010; Maull et al., 2001). According to Davis (1990), organisational culture is a pattern of shared values and a belief system that offers everyone meaning and provides them with guide for their behaviour the organisation—Toyota’s belief system is referred to as ‘True North’. Literature has highlighted various significant elements of organisational culture that are needed to have successful QI implementation. Employee training (Shah & Ward, 2007), effective communication, leadership support (Halling & Wijk, 2013; Matsui, 2007), collaboration (Manville et al., 2012), respect for people (Liker, 2004).

Without a cultural of QI and continuous improvement, it is not only difficult to implement QI initiatives, but it is also virtually impossible to sustain them. Appropriate behavioural changes are required to be introduced to reduce change resistance and create a culture of QI both internally and in external supply chains.

### 3.3.2.4.5 Sustaining Improvements

Sustaining QI changes requires both procedural and cultural changes in the organisation (Hines, 2010). QI implementation can revert back to a pre-QI position if improvements are
not standardised and embedded in the organisation. Every element of each type of maturity plays its role in helping an organisation to make QI changes a part of its *modus operandi*.

### 3.3.2.4.6 Systems Thinking

Systems thinking refers to "the ability to analyse systems as a whole, including the recognition of essential interrelationships within the system and between subsystems, and any changes and patterns that arise out of the networks of relationships and interactions" (Colbert et al., 2011, p. 180). Systems thinking is a critical part of QI (Jambekar, 2000) as it entails organisations to think of the *big picture* instead of working on smaller and siloed problems without realising their consequences on other parts of the system. As mentioned by Costa and Filho (2016), QI initiatives in one department can sometimes lead to waste transference to other departments rather than true waste elimination. This is why, QI requires systems thinking as an underlying theory for looking at waste and is part of the philosophical maturity. For that purpose, organisations create system-level measures to ensure waste is removed from the system and include both their direct supply chain partners and wider supply network partners in the systems thinking.

Table 3.5 highlights the components of philosophical capabilities maturity and their description in different stages of maturity.
<table>
<thead>
<tr>
<th>Systems thinking (ST)</th>
<th>Continuous improvement (CI)</th>
<th>Sustaining improvements</th>
<th>QI Culture</th>
<th>Respect for People and Empowerment</th>
<th>Waste Elimination</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ST concept is virtually missing in the organisational strategy and mentality</td>
<td>There are no signs of CI present in the organisation</td>
<td>No improvements happen in the organisation</td>
<td>There are no elements of QI culture present in the organisation</td>
<td>Majority of the employees virtually have no autonomy or authority to run any improvement project; all the actions and orders come from the senior management</td>
<td>Wastes are not fully understood and recognised; they are generally identified in small sections with no or minimal overlap</td>
</tr>
<tr>
<td>ST is mostly done on reactive levels.</td>
<td>Organisation tends to improve processes only after any kind of fault is recognised in the process</td>
<td>Improvements are hardly sustained, if any.</td>
<td>QI culture starts to develop from the top; middle managers and frontline staff are still sceptical about QI and do not want to invest their time in implementing it</td>
<td>Employees are empowered to be more engaged in the organisation. However, most of them feel they still don’t have any autonomy in their work</td>
<td>Wastes are not identified and removed by section, without acknowledging their potential transfer to other sections</td>
</tr>
<tr>
<td>Traces of ST start to appear in continuous improvement strategy; organisation starts to recognise patterns throughout the organisational processes that add inefficiencies</td>
<td>CI is built into each and every job description in the organisation; employees are asked to be vigilant of waste. However, it is not followed all across the organisation</td>
<td>Improvements are sustained but only with the help well placed audits and controlling mechanisms.</td>
<td>Basic elements i.e., collaboration and autonomy are introduced to the organisation; a priority for long-term vision, even at the expense of short-term goals is presented to the people</td>
<td>Employees began to feel empowered; they become more vigilant of waste in their daily work; they start working as partners providing feedback and suggestions on how to improve organisational processes</td>
<td>Waste identification and removal goes through a standard process</td>
</tr>
<tr>
<td>System-level measures created to create systems improvements rather than small scale siloed improvement; however, they are still based on organisational rather than supply chain performance</td>
<td>Incremental improvements become a company-wide practice to reduce bottlenecks</td>
<td>Process designs support sustaining improvements</td>
<td>A culture embedded in QI philosophy is present in the organisation that encourages empowered employees to identify waste and eliminate them; continuously improving processes</td>
<td>Employees play a crucial role in organisational decision making and their inputs are considered to be of great value.</td>
<td>Waste is seen as inadvertently generated by the way the process is designed, resulting in process redesign to systematically remove it</td>
</tr>
<tr>
<td>Systemic structures between the organisation and its direct suppliers are designed in a way that they help supply chain partners to fulfil their vision of creating a leaner supply chain</td>
<td>Close supply chain partners are encouraged to be involved in CI initiatives.</td>
<td>Supply chains work collectively to sustain improvements and understand the importance of them</td>
<td>Behavioural changes are introduced in external supply chains encouraging entities in supply chains to be more proactive in waste elimination and continuous improvement</td>
<td>The same principles of respect and empowerment are transferred to the direct suppliers; they are considered partners rather than suppliers and organisations tend to collaborate rather than compete for better deals among themselves</td>
<td>Waste elimination becomes a responsibility across individual supply chains, with majority of participants involved in it voluntarily</td>
</tr>
<tr>
<td>ST is preached and understood by the majority of the supply network partners; every QI intervention is judged on its impact on the complete system</td>
<td>CI become a part of the supply network, it is practiced by all tier suppliers making it a system-wide programme</td>
<td>Entities across supply network achieve 100% sustainability of QI initiatives on their own and also have a system based on collaboration and knowledge sharing system to help others</td>
<td>A learning supply network culture through relentless reflection and continuous improvement</td>
<td>Respect for people is the guiding principle in the supply network extending to all the stakeholders of the organisation</td>
<td>Waste is eliminated from the entire supply network rather than being transferred elsewhere</td>
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Table 3.5: Overview of components and stages of philosophical maturity
3.4 Summary of the Chapter

Maturity models provide organisations with a toolset to diagnose internal capabilities and identify existing and potential issues, providing suggestions for changes that will help the organisation to evolve and grow. However, maturity models do not adhere to any international standards and they follow a wide variety of divergent frameworks. The QIMM presented in this chapter (table 3.6) reflects a strong theoretical base achieved by a thorough literature review of various QI methodologies, underpinning philosophies, practices-based implementations, and prescriptive guides targeting operations and supply chain managers. The QIMM is not industry specific and includes various maturity elements required for organisations to implement QI initiatives both internally and externally, linking their efforts into their supply chains. This chapter thus provides a consolidated, theoretically-grounded model useful to organisations considering quality improvement initiatives, or more generally those seeking change in their operational strategy and activities; it provides a multidimensional initial assessment and highlights key developments indicative of progression to higher levels of QI maturity.

Chapter 7 further tests the applicability and utility of this QIMM, including testing of the significance and specificity of each element and maturity level in an organisation’s QI journey by comparing 15 District Health Boards in New Zealand.
4

Research Methodology
4 Introduction to the Chapter

This chapter provides a detailed description of the research methodology and research methods used to conduct this research. This chapter is divided into two sections: the first section provides information about the methodological approach used by the researcher to conduct this study including research design, research approach and the justification for each of them. The second section provides details of the research method used to collect and analyse the data.

4.1 Research Questions

The core objective of this research is to examine the state-of-the-art of quality improvement activities in the healthcare providing organisations, District Health Boards (DHBs), and frame an agenda to support continuous improvement of healthcare delivery processes in the future.

Before explaining the methodology adopted for this research, the research questions developed at the end of chapter 2 (see section 2.7) are presented below as an aide-memoire.

RQ1: How are different QI methodologies perceived by HPOs?

RQ1.1: What are the key characteristics and criticisms of these QI methodologies, as perceived by HPOs?

Q2: How do QIMs play a significant role in supporting, promoting, and disseminating QI in their respective HPOs?

Q2.1: What are the key perceived characteristics of successful QIMs?

Q2.2: What are the key perceived challenges faced by QIMs in HPOs?

Q3: What is the state-of-the-art of QI in the New Zealand healthcare system?

Q3.1: What are the core features absent from QI initiatives in the New Zealand healthcare system?
4.2 Research Methodology

It is imperative to acknowledge the distinction between research methodology and research method. According to Greener (2008), research methodology refers to the understanding of the research itself and the selected approach to answer the research questions. Fellows and Liu (2008, p. 30) defined it as “the principles and procedures of logical thought processes which are applied to a specific investigation”. In a nutshell, it is a scheme of rules and guidelines upon which knowledge is evaluated and research study is based upon (Frankfort-Nachmia & Nachimias, 1996). Research method on the other hand refers to the explicit activities designed to generate and collect data. For example, observations, surveys, interviews and focus groups etc (Greener, 2008).

Various examples of both research methodologies and research methods used to conduct research of similar nature in healthcare were discovered throughout the literature review. For example, Lin et al. (2013) conducted a time stamp observation study; LaGanga (2011) and McCann et al. (2015) used action research approach; Fillingham (2007) and Laureani et al. (2013) utilised a case study approach; Dobrzykowski, McFadden and Vonderembse (2016) adopted a quantitative methodology and Morrow et al. (2012) used a mixed method approach to study quality improvement (QI) initiatives and their implementation in healthcare.

The decision for choosing the most applicable research methodology should be driven by the respective research objective and questions, type of data accessible by the researcher and the body of knowledge being researched (Reiter, Stewart & Bruce, 2011) rather than a researcher’s personal preferences. It cannot be over-emphasised that no matter which methodological approach and strategy is chosen, it must be appropriate to fulfil the research objectives and answer the research questions in the best possible way. Hence, it was considered necessary to explain the methodological approach as well as the research methods used to collect and analyse the data to achieve the aims of this research in relation to the chosen research paradigm.

4.3 Methodological Approach

Before selecting a methodological approach for this research, it was deemed crucial to explore various research paradigms used in management and social sciences to select the one that best fits the objective of this research. Kuhn (1970, p. viii) described a research paradigm as “universally recognized scientific achievements that for a time provide model
problems and solutions to a community of practitioners”. In other words, it is a philosophical stance based on set beliefs adopted by researchers to guide their action (Denzin & Lincoln, 2000). As mentioned by Weaver and Olson (2006, p. 460), “Paradigms are patterns of beliefs and practices that regulate inquiry within a discipline by providing lenses, frames and processes through which investigation is accomplished”.

Throughout the history of research, research paradigms have been classified and embodied based on different views. Research paradigms have also been referred as research methodology, and adhering to different paradigms can create the borders between qualitative and quantitative methodologies (Neuman, 2013). In summary, a paradigm is a belief system based on certain epistemological and ontological assumptions.

*Epistemology refers to “the study of the criteria by which we can know what does and does not constitute warranted, or scientific, knowledge” (Symon & Cassell, 2012, p. 16) and positivism and interpretivism are two opposing views in it (Silverman, 2011). On the other hand, *Ontology refers to the “normative commitments about the nature of reality, human nature, and the nature of human experience” (Patterson & Williams, 1998, p. 287), which in turn starts a debate on the very existence of social reality and how it should be represented. For that purpose, the three most common unique positions that are taken in literature are; *realism, materialism and idealism. Ritchie and Lewis (2003, p. 11) gave a brief explanation of the three most common unique ontological positions that are taken in literature provided in the table 4.1 (adopted from Ritchie & Lewis, 2003, p. 11) below:

<table>
<thead>
<tr>
<th>Paradigm</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Realism</td>
<td>There is an external reality which exists independently of peoples’ beliefs or understanding about it. In other words, there is a distinction between the way the world is, and the meaning and interpretation of that world held by individuals</td>
</tr>
<tr>
<td>Materialism</td>
<td>There is a real world but that only material features, such as economic relations or physical features of that world hold realist. Values, beliefs or experiences are ‘epiphenomena’ – that is features that arise from, but do not shape, the material world</td>
</tr>
<tr>
<td>Idealism</td>
<td>Reality is only knowable through the human mind and through socially constructed meanings</td>
</tr>
</tbody>
</table>

Table 4.1: Realism, materialism and idealism

The four most commonly accepted paradigms in business and management research are positivism, interpretivism, realism and pragmatism (Saunders, Lewis & Thornhill, 2011). A brief description of each of them is provided below before explaining researcher’s own chosen paradigm for this research.

### 4.3.1 Positivism

Positivism is one of the oldest and dominantly held paradigms in the management sciences (Johnson & Duberley, 2000). According to Easterby-Smith et al. (2012, p. 22), “The key
idea of positivism is that the social world exists externally, and that its properties should be measured through objective methods, rather than inferred subjectively through sensation, reflection or intuition”. Positivist researchers assume that the nature of knowledge is \textit{objective}, i.e., it can be observed and measured, it is possible to test \textit{hypotheses}, i.e., testing of empirical data through the principle of falsification, and as a researcher, one does not have any impact on the data (Creswell, 2013; Moses & Knutsen, 2007). Hence, positivism is closely associated with data-oriented methodologies where a researcher’s primary job is to collect and systemise the data. Because of that, positivist researchers tend to choose quantitative methods using deductive logic and carefully designed experiments where numerical data is collected through surveys (Neuman, 2013; Teddlie & Tashakkori, 2009). However, qualitative positivist research has also been recognised in the literature (Alvesson & Sköldberg, 2009).

\begin{section}{Realism}

Realists believe that there is a reality which is independent of the observer’s mind. Saunders et al. (2011, p. 114) stated “The essence of realism is that what the senses show us as reality is the truth: that objects have an existence independent of the human mind”. For social scientists, the understanding of realism becomes clearer by contrasting two different types of realism: Direct Realism and Critical Realism.

\textit{Direct Realism} refers to the philosophy suggesting what one sees is what one gets, i.e., everything you experience with your senses depicts the world accurately whereas \textit{critical realism} refers to the philosophy assuming one’s experience as sensations, i.e., we see the images of objects, not the objects themselves and senses can deceive us. These deceptions are simply illusions. In response to this, direct realists suggest the depictions seem like illusions when one has insufficient information about such objects and phenomenon.

Saunders et al. (2011) advocated that the critical realist’s assumptions about the social world are more aligned with research in business and management studies. The same notion is somewhat shared by Bhaskar (1989) who assumed the position of critical realist and argued that it is crucial to understand the social structures that give rise to the phenomenon under observation to fully comprehend the social world around us. He also argued that it is possible to identify phenomenon one cannot see by theoretical and practical processes—a very important part of business and management research.
4.3.3 Pragmatism

The idea of choosing one research paradigm or philosophy might appear unrealistic to some researchers. Those who agree with this statement adopt pragmatism. Saunders et al. (2011, p. 109) stated “Pragmatism argues that the most important determinant of the epistemology, ontology and axiology you adopt is the research question – one may be more appropriate than the other for answering particular questions”. Hence, when a research question does not clearly highlight which epistemological and ontological assumptions will be best suited for the research, one adopts pragmatist approach and works with different variations of epistemology, ontology and axiology.

A pragmatist approach sounds appealing to many researchers because it allows researchers to avoid the debate on how one sees the world, and helps them to focus on what they are interested in. As stated by (Tashakkori & Teddlie, 1998, p. 30), “study what interests you and is of value to you, study in the different ways in which you deem appropriate, and use the results in ways that can bring about positive consequences within your value system”.

4.3.4 Interpretivism

Interpretivism lies on the opposite side of the epistemological continuum. It has been referred to as constructivism as well (Moses & Knutsen, 2007). According to Creswell (2013), the ideas that constitute interpretivism originated from two writings; The Social Construction of Reality (Berger & Luckmann, 1967) and Naturalistic Inquiry (Lincoln & Guba, 1985). It is also referred to as social constructivist paradigm because it posits that the reality is socially constructed, and it can be understood through subjective meanings and sensemaking (Lopez & Potter, 2005). In terms of research, Blaikie (2007, p. 90) stated that for an interpretivist, “the social world is the world perceived and experienced by its members, from the ‘inside’. The social scientist’s task is to discover and describe this ‘insider’ view, not to impose an ‘outsider’ view on it”. Researchers adhering to an interpretivist paradigm consider social world to be principally different from the natural world, as social actors process information, actively interpret and make sense of reality, individuals do not get the idea of the reality directly, but rather through one’s own interpretation.

Consequently, different social actors construct, perceive and operate in different realities. The behaviour of social actors is influenced by how they observe and interpret reality by using a sense-making process in which they attach meaning to objects, events and
processes (Lewis-Beck, Bryman & Liao, 2003). Furthermore, the society also plays a role in this process as some meanings are shared within the society due to the use of language and common experience. These shared meanings and shared cultures create specific context in which social actors operate thus again influencing their sense-making, interpretation and behaviour, their view of reality (King, Keohane & Verba, 1994).

Unlike positivists, interpretivists assume that there could be multiple realities depending on different contexts and meanings. The reality itself could be different for two different persons depending on their cultural and historical context and their personal experience. Discussing the philosophical bases of interpretivism Yanow (2014, p. 13) states: “The social world we inhabit and experience is potentially a world of multiple realities, multiple interpretations. Discovery of some external, singular reality, a requisite of methodological positivism, is not possible in this view”. Consequently, from an interpretivist perspective it is impossible to discover the general or universal social laws, but rather it is possible to see some patterns. Such view on the social reality requires different approaches to the study – approaches, which seek to understand rather than explain (King et al., 1994; Yanow, 2014).

Moreover, interpretivist paradigm is closely related to hermeneutics, i.e., theory of meaning (Neuman, 2013). Willis, Jost and Nilakanta (2007, p. 96) stated that “interpretivists assert that all research is influenced and shaped by pre-existing theories and world views of the researchers” meaning that research is a socially constructed activity, as it is based on the agreed views and meaning of phenomenon among the scientists. Reality is not considered independent from the observer and the stress is placed on understanding context and particular situation.

Research undertaken from the interpretivist perspective is: interested in the personal meanings of participants; how they experience and make sense of their reality; how these meanings are constructed; and how they in turn construct reality. Thus, interpretivist research looks for both meaning and explanation (Silverman, 2011). Interpretivists collect data based on how individuals interpret the social world around them which enables researchers to investigate different perspectives (Mathews & Ross, 2010). Commonly used data collection methods by interpretivist researchers include observations, interviews and field research (Creswell, 2013; Denzin & Lincoln, 2000). Interpretivist methods are often qualitative as researcher is trying to grasp individual meanings building relationships with participants, trying to understand and share the context in which participants live and operate. These tasks require higher involvement with the field and social actors and often intensive verbal communication to collect rich data (Aspers, 2009).
In summary, interpretivist view is completely opposite from positivist view, where it is important that the studied phenomena should be observable, measurable and hence, knowable by the researcher. Interpretivism on the other hand requires one to see human action as a variable and focuses on how a phenomenon is experienced. This research is carried from the interpretivist perspective. It is interested in how QI phenomenon is constructed and experienced by the HPOs and the QIMs. It sees adoption and implementation of QI methodologies as a process based on the interpretations and sensemaking of the social actors involved in it.

Table 4.2 (adopted from Saunders et al., 2011, p. 119) presents a brief summary and comparison of the four paradigms discussed above.

<table>
<thead>
<tr>
<th>Ontology: the researcher’s view of the nature of reality or being</th>
<th>Positivism</th>
<th>Interpretivism</th>
<th>Realism</th>
<th>Pragmatism</th>
</tr>
</thead>
<tbody>
<tr>
<td>External, objective and independent of social actors</td>
<td>Is objective. Exists independently of human thoughts and beliefs or knowledge of their existence (realist), but is interpreted through social conditioning (critical realist)</td>
<td>Socially constructed, subjective, may change, multiple</td>
<td>External, multiple, view chosen to best enable answering of research question</td>
<td></td>
</tr>
</tbody>
</table>

| Epistemology: the researcher’s view regarding what constitutes acceptable knowledge | Only observable phenomena can provide credible data, facts. Focus on causality and law like generalisations, reducing phenomena to simplest elements | Observable phenomena provide credible data, facts. Insufficient data means inaccuracies in sensations (direct realism). Alternatively, phenomena create sensations which are open to misinterpretation (critical realism). Focus on explaining within a context or contexts | Subjective meanings and social phenomena. Focus upon the details of situation, a reality behind these details, subjective meanings motivating actions | Either or both observable phenomena and subjective meanings can provide acceptable knowledge dependent upon the research question. Focus on practical applied research, integrating different perspectives to help interpret the data |

| Axiology: the researcher’s view of the role of values in research | Research is undertaken in a value-free way, the researcher is independent of the data and maintains an objective stance | Research is value laden; the researcher is biased by world views, cultural experiences and upbringing. These will impact on the research | Research is value bound, the researcher is part of what is being researched, cannot be separated and so will be subjective | Values play a large role in interpreting results, the researcher adopting both objective and subjective points of view |

| Data collection techniques (most often used) | Highly structured, large samples, measurement, quantitative, but can use qualitative | Methods chosen must fit the subject matter, quantitative or qualitative | Small samples, in-depth investigations, qualitative | Mixed or multiple method designs, quantitative and qualitative |

Table 4.2: Comparison of research philosophies
4.3.5 The Chosen Methodological Approach: Interpretivism

The chosen philosophical stance for any given research should commensurate with the research objective and questions; and should potentially help in understanding and answering the research concerns (Johnson & Duberley, 2000). Therefore, the paradigm chosen for this research is *interpretivism* as it is the most suitable approach to extract information regarding QI and its many facets in New Zealand healthcare system. QI is a management initiative based on various methodologies/philosophies (such as lean thinking, six sigma and total quality management), and how employees make sense of the teachings of these methodologies and take part in their implementation. As an interpretivist, the researcher sees it as a social phenomenon.

Studying and simulating decision making situations in organisations with human participants is challenging (Galliers & Land, 1987). However, the interpretivist paradigm helps to investigate an accurate perspective of people and their environment as it is associated with methodologies that provide research participant’s voice and concerns to be heard (Weaver & Olson, 2006).

Under the umbrella of interpretivism, there are many different schools of thought including phenomenology, hermeneutics, symbolic interactionism, critical theory. For this research, the *phenomenological approach* to interpretive research was adopted. According to Aspers (2009), *phenomenology* focuses on “that which appears”. Further explanation of this notion is presented by Gill (2014, p. 130) who stated that “In particular, phenomenology can enable researchers to examine how others ascribe meaning to, or make sense of, their particular experiences”.

The literature review (chapter 2) suggested that the existing literature on QI in healthcare does not provide rational insights on the adoption of different QI methodologies and their integration in healthcare supply chains, nor does it provide details regarding employees interaction and organisational maturity in QI initiatives. The depiction of the problem domain, i.e., why organisations choose one QI methodology over the other; and the difference of focus of these respective methodologies on organisational improvement is yet to be comprehended. Therefore, it was considered wise to follow the rules of empirical phenomenology (cf. Aspers, 2009) to ensure valid and useful outcomes of the research. *Empirical phenomenology* refers to direct examination of the phenomenon in its reality using field investigation (Mueller & Strzelczak, 2015) and it has been considered a very useful approach in social sciences. It is based on the *phenomenology* of Edmund Husserl, Martin Heidegger and Alfred Schütz and considers the use of their theoretical and
philosophical insights in empirical investigations (Aspers, 2009). However, the researcher’s assumptions are more closely aligned with Schütz’s brand of phenomenology—that the starting point of research in social sciences should be the social life of the research participants and as a researcher, one should work with the mental content of his research participants (cf. Schutz, 1966).

### 4.3.6 The Chosen Research Approach: Induction and Deduction

For this research, both inductive and deductive approaches were chosen as combining these opposite approaches within a same research can be highly advantageous (Saunders et al., 2011). An *inductive* approach to finding logic and answers to research questions where observation of certain events leads to building a theory was deemed appropriate for research questions 2 and 3. The inductive approach was developed after the social sciences emerged in the 20th century and researchers became wary of the deductive approach that was the basis of the natural sciences research (Saunders et al., 2011). Table 4.3 (adopted from Saunders et al., 2011, p. 127) below highlights the major characteristics of inductive research approach:

<table>
<thead>
<tr>
<th>Induction emphasises:</th>
</tr>
</thead>
<tbody>
<tr>
<td>gaining an understanding of the meanings humans attach to events</td>
</tr>
<tr>
<td>a close understanding of the research context</td>
</tr>
<tr>
<td>the collection of qualitative data</td>
</tr>
<tr>
<td>a more flexible structure to permit changes of research emphasis as the research progresses</td>
</tr>
<tr>
<td>a realisation that the researcher is part of the research process</td>
</tr>
<tr>
<td>less concern with the need to generalise</td>
</tr>
</tbody>
</table>

Table 4.3: Characteristics of inductive approach

A *deductive* approach is where a dataset is subjected to rigorous tests to analyse whether a theory holds true. This approach is an absolute opposite of *induction*, i.e., unlike inductive approach, which moves from data to theory, deductive approach starts with theory, which is then used to analyse data. When researchers work with the qualitative data, the usual approach is the development of preliminary theoretically-based constructs or a template, which is used to analyse the data. In this research, the deductive approach was used to answer the RQ3, and the QIMM developed and presented in chapter 3 was employed as the template for data analysis.

Table 4.4 (adopted from Saunders et al., 2011, p. 127) below highlights the major characteristics of deductive research approach:
Deduction emphasises:
- scientific principles
- moving from theory to data
- the need to explain causal relationships between variables
- the collection of quantitative data
- the application of controls to ensure validity of data
- the operationalisation of concepts to ensure clarity of definition
- a highly structured approach
- researcher independence of what is being researched
- the necessity to select samples of sufficient size in order to generalise conclusions

Table 4.4: Characteristics of deductive approach

4.3.7 Research Strategy: Multiple-Case Study

In QI, a wide array of research strategies has been used to drive research. However, case study is by far the most used research strategy as found in the literature review chapter.

Yin (2014, p. 4) stated “As a research method, the case study is used in many situations, to contribute to our knowledge of individual, group, organisational, social, political, and related phenomena”. Although, no research strategy should be considered inferior or superior to the other but, based on the nature of research questions, a multiple-case study strategy was deemed appropriate for this research (Woodside, 2017). A multiple-case study strategy is always favoured over single case study as it provide researchers with more analytic benefits from their data and it also increases the overall validity and reliability of the research (Eisenhardt, 1989; Yin, 2014).

As this research is focused on investigating QI in the New Zealand healthcare system, a multiple-case study strategy provided the researcher with unique insights into investigating and understanding the QI phenomenon in New Zealand healthcare system. It also allowed the researcher to compare and contrast QI initiatives between various HPOs also known as District Health Boards in New Zealand.

QI in healthcare is a relatively new field of research and in such cases, a qualitative research using case studies for further investigation of the topic and theory building is recommended (Eisenhardt, 1989). According to Yin (2014), case study approach is appropriate when a single entity is being analysed, data is collected from multiple means and the complexity of the entities is high. Hence, it deserves intensive investigation. The case study approach allowed the researcher to study and investigate QI phenomenon in very specific context and circumstances (Meredith, 1998), i.e., the New Zealand healthcare system. Moreover, the research questions also justify the use of a case-study approach as they are based on the ‘how’ and ‘why’ of the phenomenon in an exploratory study.
As the research took place in New Zealand, individual DHBs were considered as an appropriate unit of analysis. There are 20 DHBs in New Zealand, data was collected from 15 of them. One of the primary reasons for not collecting data from all the DHBs was because some of them collaborate with each other in terms of QI and share both staff and resources with each other. For example, one of the DHBs in this research in fact represents two DHBs, who have shared resources and QI teams, and hence, only one interview was conducted with such shared staff members and questions regarding their work with other DHBs were also recorded. Therefore, all the data tables in chapter 5, 6 and 7 showcase data from only 14 DHBs, instead of 15.

Another reason for not collecting data from all the DHBs was that three out of 20 DHBs declined to participate in the research and two of them did not reply to any of the participation requests. However, as the data is still collected from the majority of the DHBs, it is deemed that this research provides an valid assessment of QI in New Zealand’s healthcare system.

4.4 Research Method

The first section of this chapter ‘methodological approach’ explained the philosophical approach that was used to collect and analyse data providing a framework for undertaking this research. This section continues the discussion and focuses on explaining the research method used to accomplish the research aim. There are two common research methodologies; qualitative and quantitative method within the above-mentioned research paradigms. Their combination can also be used as a research methodology called mixed method approach. However, for this research a mono-method approach using qualitative methodology was considered more suitable. A brief description of qualitative methodology and the rationale behind choosing this approach is provided below.

4.4.1 Qualitative Research

Kaplan and Maxwell (2005, p. 30) stated that “The goal of qualitative research is understanding issues or particular situations by investigating the perspectives and behaviour of the people in these situations and the context within which they act”. To achieve this, natural settings are studied in qualitative research and instead of numbers, words are used as the primary form of data (Saunders et al., 2011). That is why, Shank (2002, p. 4) defined qualitative research as “a form of systematic empirical inquiry into meaning”. Qualitative research is grounded in the experience of the participants. Hence, the word ‘empirical was used in the definition stated before.
The researcher’s interpretive paradigm fits perfectly with qualitative research approach (Latzko & Saunders, 1995) and case study strategy (Yin, 2014). As mentioned by Thorne (2000, p. 68), “qualitative researchers are often more concerned about uncovering knowledge about how people think and feel about the circumstances in which they find themselves than they are in making judgements about whether those thoughts and feelings are valid”.

4.4.2 Data Collection Methods

Having presented the research design and method of analysis upon which this research is based, two types of data were collected from participating organisations.

4.4.3 Primary Data: Semi-Structured Interviews

The research mostly relied on primary data from interviews conducted with employees of participating DHBs. The research participants were generally from quality directorate or quality improvement/assurance departments in the DHBs. The goal was to seek participants who were responsible for implementing and supporting QI initiatives in DHBs.

Gill (2014, p. 128) stated that “Phenomenological studies utilize homogenous and purposive samples. They recruit participants who can offer a meaningful perspective of the phenomenon of interest and who share a certain lived experience”. Therefore, preliminary interviews with five senior managers of DHBs and Health Quality Safety Commission – a Crown agency in the New Zealand healthcare system were arranged to identify key people associated with QI within DHBs. Table 4.5 contains a list of DHBs and the number of participants interviewed from each of them excluding the preliminary interviews. All the interviews were recorded and transcribed by the researcher for analysis.

<table>
<thead>
<tr>
<th>DHB</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHB1</td>
<td>4</td>
</tr>
<tr>
<td>DHB2</td>
<td>3</td>
</tr>
<tr>
<td>DHB3</td>
<td>3</td>
</tr>
<tr>
<td>DHB4</td>
<td>3</td>
</tr>
<tr>
<td>DHB5</td>
<td>4</td>
</tr>
<tr>
<td>DHB6</td>
<td>3</td>
</tr>
<tr>
<td>DHB7</td>
<td>2</td>
</tr>
<tr>
<td>DHB8</td>
<td>2</td>
</tr>
<tr>
<td>DHB9</td>
<td>3</td>
</tr>
<tr>
<td>DHB10</td>
<td>3</td>
</tr>
<tr>
<td>DHB11</td>
<td>3</td>
</tr>
<tr>
<td>DHB12</td>
<td>3</td>
</tr>
<tr>
<td>DHB13</td>
<td>3</td>
</tr>
<tr>
<td>DHB14</td>
<td>4</td>
</tr>
<tr>
<td>HQSC</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 4.5: DHB names and number of participants
The interviews were semi-structured in nature and revolved around integration and composition of QI initiatives within the participating DHBs. Semi-structured interviews align very well with phenomenological approach because they help to reveal the interviewee’s meaning (Aspers, 2009), and minimises the chances of researcher’s possible influence on data (Lewis-Beck et al., 2003). An interview schedule was developed and used by the researcher, which outlined the key topics and key questions related to said topics. However, the semi-structured nature of interviews allowed the researcher to stay open to the participants’ answers, and develop new questions to pursue new themes emerging in the interview (Myers, 2013). Figure 4.1 provides the finalised interview schedule with key topics and questions related to each of them.

All the interviews were from 70 to 110 minutes long with the exception of one interview of 43 minutes in length. The interviews were conducted either face-to-face or through teleconferencing.
Figure 4.1: Interview schedule flowchart
4.4.4 Secondary Data

Secondary data included organisational documents such as training materials, pamphlets, information from organisation’s website and other organisational publications such as Quality accounts, magazines and newsletters highlighting the achievements of QI initiatives were also considered. The primary reason for using secondary data was to increase the validity of research design using a data triangulation technique (Saunders et al., 2011; Silverman, 2011; Symon & Cassell, 2012).

4.5 Data Analysis Techniques

Pattern-finding is at the core of research (Hanson, 1958), and a researcher’s job is to ensure they use every tool at their disposal to find these patterns and do not fall into the void of false pattern-recognition. In this particular enquiry, each research question required to recognise patterns and connections between various QI methodologies and their use in the DHBs adopting them. For this reason, the collected data was analysed using Nvivo® - an industry standard software package for qualitative data analysis. Interviews were coded carefully to answer the research questions. To reduce researcher bias, some interviews were given to other researchers as well to independently code them and the outcomes were compared.

The duality of research approaches posits content analysis and grounded analysis are at the opposing ends of the spectrum. On the deductive end, there is content analysis that is used when the researcher “interrogates the data for constructs and ideas that have been decided in advance” (Easterby-Smith et al., 2012, p. 163) whereas on the inductive end, grounded analysis is present which lets the data speak for itself. Template analysis is present somewhat in between the content analysis, i.e., using predetermined codes and grounded analysis, i.e., codes emerge during and from the analysis (Easterby-Smith et al., 2012). Template analysis is conducted by coding the data against an initial set of codes that represent certain themes to reveal patterns in the qualitative data. As mentioned by King (1998), a template has to be decided before starting the actual analysis. However, it can be changed and adapted throughout the analysis exercise. For this research, both inductive and deductive research approach and their supplemented analysis methods were used.

For research questions 1 and 2, an inductive approach using thematic analysis was used. Therefore, the steps prescribed by Braun and Clarke (2006, p. 87) were followed. These six steps are presented below in table 4.6.
<table>
<thead>
<tr>
<th>Phase</th>
<th>Description of the process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Familiarizing yourself with your data</td>
<td>Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.</td>
</tr>
<tr>
<td>Generating initial codes</td>
<td>Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.</td>
</tr>
<tr>
<td>Searching for themes</td>
<td>Collating codes into potential themes, gathering all data relevant to each potential theme.</td>
</tr>
<tr>
<td>Reviewing themes</td>
<td>Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic ‘map’ of the analysis.</td>
</tr>
<tr>
<td>Defining and naming themes</td>
<td>Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme.</td>
</tr>
<tr>
<td>Producing the report</td>
<td>The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.</td>
</tr>
</tbody>
</table>

Table 4.6: Phases of thematic analysis

The data from research question 3 was analysed using a deductive content analysis technique. In this case, the template was the result of chapter 3, i.e., the quality improvement maturity model (QIMM) (see table 3.6). Template analysis was favoured to answer this research question as it allows researchers who use the findings and propositions of already developed literature as a starting point for their research (King, 2012). The interviews were coded using themes from the QIMM. At the same time, research participants were asked to use the same QIMM to analyse the maturity of their organisation’s QI practices. Their results were compared with the researcher’s analysis. After incorporating these maturity analyses, an updated copy was sent to the participants for final approval. These finalised QIMMs from each DHB are attached as appendix 3.

First, the interview data were transcribed by the researcher. This allowed the researcher to familiarise himself with the data. Notes were made during the transcription process regarding the research questions; and they were used later to create initial codes. The coding schemes are presented in the findings’ chapters. After the initial coding, an in-depth analysis was conducted where different themes regarding the respective research questions were then defined. In the end, the themes were finalised, and a report was written and is presented in the findings’ chapters of this research. Table 4.7 provides details of the research method and approach used for each of the research question.
### Table 4.7: Summary of chosen research method and approach

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Scope</th>
<th>Accompanying Chapter</th>
<th>Method</th>
<th>Approach</th>
<th>Analysis Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ 1</td>
<td>Comparison of QI methodologies in New Zealand healthcare system</td>
<td>Chapter 5</td>
<td>Qualitative research</td>
<td>Inductive</td>
<td>Thematic analysis</td>
</tr>
<tr>
<td>RQ 2</td>
<td>Characteristics and Challenges of QIMs</td>
<td>Chapter 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RQ 3</td>
<td>Maturity of DHBs</td>
<td>Chapter 7</td>
<td></td>
<td>Deductive</td>
<td>Template Analysis</td>
</tr>
</tbody>
</table>

### 4.6 Validity and Reliability in Research

The quality of research depends on the validity and reliability measures incorporated in its research methods. As mentioned by Eisner (1991, p. 58), good qualitative research helps to “understand a situation that would otherwise be enigmatic or confusing”. Therefore, in qualitative research, quality is based around “generating understanding” (Stenbacka, 2001, p. 551), and the concepts of validity and reliability help to achieve this purpose (Patton, 2002) by ensuring the accuracy and truthfulness of the findings (Neuman, 2013). The concept of validity posits how well a research concept fits with the reality, and whether the research is measuring what it claims to measure. On the other hand, reliability is based on dependability and reliability of research, i.e., same results can be obtained if micro and macro-environmental factors are identical.

Approaches and mechanisms used to ensure quality of research depend on the philosophical stance and assumptions underpinning the research (see section 4.3) as well as the research methods used to conduct it (see section 4.4). Accordingly, approaches to establishing validity and reliability in positivist and non-positivist research are different from each other (Creswell, 2013).

The literature has identified various strategies to ensure validity, i.e., credibility of research, by demonstrating that the findings reflect the reality. Creswell (2013) recommended researchers to incorporate at least two different strategies to ensure the validity of research. In this research, several strategies were used to increase the validity.

The first strategy used to ensure validity in this research was based on the use of *purposeful sampling* (Gill, 2014). This was done by recruiting participants from quality directorates or quality departments of the respective DHBs as they had appropriate knowledge about the QI initiatives in their DHBs, and they were also familiar with the long-term QI agenda of their respective DHBs. Furthermore, *prolonged engagement* with these participants helped to
further increase the validity of this research. Indeed some researchers view prolonged engagement as one of the key strategies to achieve validity in qualitative research (Lincoln & Guba, 1985; Whittemore, Chase & Mandle, 2001), as it helps researchers to improve their understanding of the context of research and avoid bringing their own inferences instead of comprehending participant’s reality (Houghton et al., 2013; Lincoln & Guba, 1985). As the data collection was based on single interview with each participant, some measures were taken as a proxy for prolonged engagement. These measures included reading about each participant’s organisations (DHB), and their Quality Account publications from past three years. Moreover, recent and publically available DHB newsletters and other documents were analysed for QI initiatives being conducted in DHBs.

**Member checks**, a highly dependable mechanism to ensure validity in qualitative research (Koelsch, 2013; Lincoln & Guba, 1985) was also incorporated in the research design. This was done by providing the research findings and results related to each participant’s DHB, i.e., DHB’s QI maturity (see chapter 7) and the QI methodology being used to conduct QI initiatives in the DHB (see chapter 5). If the participants disagreed with the the researcher’s interpretation of the interviews data or the DHB’s overall QI agenda, a further short interview could be arranged for the researcher and the participants to explain their position. A total of 6 such interviews were arranged with the primary goal of reaching an agreement on the QIMMs of the respective DHBs. Rest of the participants did not show any concerns regarding the findings of this research. Finally, after the completion of the data analysis, five interviews were arranged with top management of HQSC to debrief them, and include their viewpoint on the findings of this research. These interviews confirmed the accuracy of the researcher’s interpretation of the respective maturity of individual DHBs.

**Peer debriefing** approach was also used throughout this research to achieve validity (Morse, 2015). The researcher presented his work multiple times to multiple independent researchers engaged in the same field of research but not in this research particularly. Such approaches have been suggested to establish credibility of research as well as to catalyse its progress and completion (Creswell, 2013; Lincoln & Guba, 1985).

First, discussions with independent colleagues from the same field of research helped to clarify the definitions of different conceptual elements of QI used in the research, and it helped to clarify assumptions and hypotheses formed in the researcher’s mind throughout the research process. Second, these independent researchers highlighted some methodological issues present in the research and proposed some techniques to minimise said issues. For example, the researcher presented his QIMM in multiple
conferences/symposiums and to multiple independent individual researchers and QI professionals, and received feedback that was later incorporated into the finalised version of QIMM presented in Chapter 3. Finally, peer debriefing also helped in the data analysis section of this research. The researcher presented his coding schemes to independent colleagues familiar with thematic analysis and template analysis strategies; and with the respective field of research, i.e., QI, to ensure appropriate procedures were followed in the development themes present in the data.

In summary, all these methods and strategies were incorporated into the research design and methodology to improve trustworthiness of the findings of this research.

Reliability, described as “the same thing is repeated or recurs under the identical or very similar conditions” (Neuman, 2013, p. 212), was primarily achieved through consistency in the data collection, i.e., interviews, and data analysis, i.e., coding process, throughout this research. In the data collection period, the reliability was achieved through several strategies. First, the use of interview schedule (see figure 4.1) in every interview helped to achieve consistency and to ensure all the key themes pertaining to the respective research questions were discussed. Pilot interviews also helped to achieve consistency as they trained the researcher to ask questions and develop probing questions, enabling consistency in how interviews were conducted.

In the data analysis period, the consistency was achieved by transcribing interviews verbatim (Whittemore et al., 2001). The use of Nvivo 11® helped to improve the consistency in the analysis and making the process trackable (Bazeley & Jackson, 2013). All the versions of coding were kept to track down the development of coding and data analysis period. All the secondary codes were later checked to ensure data ascribed to them matched the themes and sub-themes in the coding categories (Saldaña, 2015). Such approaches and strategies helped to establish and improve the consistency of this research by making all the steps in the data collection and data analysis period available for trial, therefore increasing the confirmability and reliability of the research.

4.7 Ethical Considerations

Ethical considerations are a crucial part of qualitative research primarily because of the quest for rich data in qualitative research compels researchers to have a substantial engagement with their research participants on a personal level (Lewis, 2003). To address the potential issues related to ethics, an ethics proposal D17/033 was submitted to the Human Ethics Committee of the University of Otago for approval. The proposal was
approved on 7-March-2017, and the data collection started after this period. A copy of the approval along with the information sheet emailed to each participant prior to the interviews is provided in Appendix 1.

A formal written consent was sought from each participant before the interviews. To ensure participants were fully informed about the objectives of the research, the researcher emailed them detailed information about the research, and provided them with the opportunity to ask further questions. Majority of the participants pursued this opportunity, and a short telephone conversation was arranged before the interviews just to go through the purpose and the objectives of this research. This helped to ensure that the desired participants were appropriate for this research. On a number of occasions (n=11), the desired participants refused to participate in the research after the telephone conversation because they thought they were not the right fit for this research, but they highlighted people who would be more appropriate, and would have answers to the questions regarding the state of QI initiatives in their respective DHB. Furthermore, all participants were informed that they could withdraw from the research at any stage, however, no one availed this opportunity.

The researcher also assured participants of the confidentiality of research, i.e., all efforts were applied to ensure participant names remained unknown to third parties and none of their quotations used in this research could be traced or attributed back to them. QI directorates and departments in New Zealand DHBs tend to be small and comprised of only a few people. Employees in these departments tend to know each other well, and even know others working in other DHBs. Therefore, all the DHB names as well as the participants from these respective DHBs were anonymised. The job titles or designations of participants were never mentioned in the research anywhere, and were only used to ensure the effectiveness of purposeful sampling. Sometimes, participants shared some confidential information during the interviews for the researcher to understand the QI agenda and initiatives in more depth. In such cases, the information was both recorded and transcribed as well as analysed, but it was not included in illustrative quotes in the findings chapters (chapter 5, 6 and 7) anywhere.

4.8 Summary of the Chapter

This chapter provided detailed explanation of the research design and research methods adopted to conduct this research and the rationale behind choosing them. The researcher aligns to an interpretivist perspective, and for this research adopted an empirical
phenomenological approach—a decision made after analysing different research paradigms and the philosophical structure behind them. Qualitative research methods using both inductive and deductive approach were adopted based on the research questions. This research follows a multiple-case study approach where data were collected from 15 DHBs in New Zealand. Both primary and secondary data was used for analysis to increase the overall validity and reliability of the research along with multiple other strategies.

A brief summary of the overall research method is provided in the Figure 4.2 (adopted from Saunders et al., 2011).

Figure 4.2: The research onion
5

Findings 1
Quality Improvement Methods
5 Introduction to the Chapter

This chapter of the dissertation strictly presents the findings related to research question 1.

*RQ1: How are different quality improvement methodologies perceived by healthcare providing organisation employees?*

*RQ1.1: What are the key characteristics and criticisms of these quality improvement methodologies?*

To answer these research questions, the QI methodologies being used by the participating DHBs were thoroughly analysed. Using grounded analysis, the multiple reasons behind selection of different QI methodologies were recognised.

As mentioned in the previous chapter, a total of 15 DHBs were interviewed for this research instead of all 20 of them (see table 4.4 for the number of participants from each of these DHBs)

Interviews started by discussing the QI methodologies being used in each participant’s DHB, and the extent to which they were used to understand the scope of QI. This was very useful especially when the participants admitted to using multiple QI methodologies and how they differentiated between them. The rest of the interview questions were based on various aspects of QI as presented in the interview schedule (see figure 4.1) showcasing the relevance of each interview question to the research questions and research objective of this research. The interview data therefore, provided the researcher with insights regarding why DHBs preferred one QI methodology over other; why some DHBs use multiple QI methodologies; and the benefits and criticisms of each of the premier QI methodologies.

In summary, this chapter represents a snapshot of the state-of-the-art of QI infrastructure in New Zealand healthcare system; and is comprised of multiple sections. First, a brief overview of the New Zealand healthcare system is provided including the basic structure of the healthcare system and the role of Crown agencies in supporting the DHBs to deliver better care to its local population. Participants are given a unique ID that cannot be linked with their respective DHB to provide them with confidentiality and maintain their anonymity with the readers of this research as some of the information provided by the participants was confidential and if they were to be recognised, it could negatively affect their employment status.
5.1 QI Methodologies Being Used in New Zealand

To me, you need to understand what the problem is and then see which methodology can help more and help in a better way.

*Participant 26*

This section provides the readers with a unique vantage point to observe the current state of the QI in New Zealand’s healthcare system as it includes intimate details regarding the QI methodologies being currently used in the participating DHBs and the reasons mentioned by the participating DHBs for adopting said methodologies. Overall, two different QI methodologies are generally being used in the New Zealand DHBs:

- Lean thinking (LT)
- Institute of Healthcare Improvement (IHI’s) Model for improvement (MFI)

Both of these methodologies were considered very different from each other, and the participants from different DHBs, depending on their respective DHB’s approved methodology, registered their bias towards LT or MFI by criticising it.

Other than LT and MFI, some participants recognised six sigma and experience-based co-design also being used, but as complementing the core QI methodology (LT or MFI), instead of being used for driving QI in DHBs. Participants from only four DHBs described using some tools from six sigma whereas, co-design was cited as a systems design methodology, rather than a QI methodology by the participants.

Table 5.1 provides an overview of the DHBs and the QI methodologies being used by them.

<table>
<thead>
<tr>
<th>DHB</th>
<th>LT</th>
<th>IHI MFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHB1</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>DHB2</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>DHB3</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>DHB4</td>
<td>Partial</td>
<td>Yes</td>
</tr>
<tr>
<td>DHB5</td>
<td>Partial</td>
<td>Yes</td>
</tr>
<tr>
<td>DHB6</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>DHB7</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>DHB8</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>DHB9</td>
<td>Yes</td>
<td></td>
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<td>DHB10</td>
<td>Partial</td>
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</tr>
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<td>DHB11</td>
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<td>DHB12</td>
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<td>DHB13</td>
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<td>DHB14</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>HQSC</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.1: Overview of the QI methodologies being used in DHBs
5.2 Lean Thinking

LT is one of the most widely used process and QI philosophy (Stone, 2012) with a corresponding set of tools and principles that have their origins in the Toyota Production System. LT aims to remove waste while maximising value of the complete system (Womack & Jones, 1996). As mentioned in the literature review section, LT is being widely used in healthcare organisations around the world. However, in New Zealand, only five DHBs are using LT as their primary QI methodology, while two DHBs understated using some tools and techniques from the lean tool box (Bicheno & Holweg, 2008) on an ad-hoc basis and hence were coded as ‘partial’ LT users.

5.2.1 Essence of Lean Thinking

LT, originally from the Toyota Production System, is mostly recognised as a QI philosophy rather than a methodology or a toolset as it includes both hard elements also known as lean tools (5S, VSM, Kanban etc) and soft elements such as respect for people, lean culture etc:

In healthcare, people think LT is a toolbox, which to you and me [people with operations management background] is just an insult to the ideology of LT. I mean we read it as a philosophy for process and organisational improvement which focuses on eliminating waste and continuous improvement. Maybe that's why, for a very long time, Toyota's slogan was 'moving forward'.

Participant 4

All the participants from DHBs using LT were asked to explain the essence of LT and the key features of this respective QI methodology that were a key deciding factor in their decision to adopt it for QI in their respective DHBs.

5.2.1.1 Systematic and Developed QI Methodology

One of the top reasons for DHBs to use LT as their primary QI methodology was its robust and systematic approach to waste elimination; it has shown positive results in healthcare settings; it has had decades of development under its name; and it is a continuous improvement philosophy. Participants praised LT for having a long history of development in different industries and environments, and this increased its credibility. Other methodologies in healthcare did not have that credibility and hence, they were not considered appropriate by DHBs using LT as their core QI methodology:
Lean thinking is a fully developed philosophy for QI. It is not a new thing, it's tested over time and went through the process of continuous improvement itself first. I don’t think other [new] methodologies in healthcare have gone through this.

Participant 3

The evidence internationally is that lean is the most effective form of improvement in healthcare and [our DHB] has a number of issues to do with performance, financial viability, meeting targets and I think that using a robust QI like LT is the best way to achieve that.

Participant 2

Participants also commended LT’s soft practices, i.e., it being a ‘way of life’ and a philosophy. LT is not just a set of tools that could be used for process improvement, it is an organisational philosophy that implores all the organisational stakeholders to think differently; it makes QI a part of everyone’s job and responsibility; and it requires everyone to be vigilant of unnecessary waste all the time and eliminate it from the system:

Lean is a quality tool but not just that, it is far more than that. It is about continuous improvement. It is a way of life, a philosophy.

Participant 1

5.2.1.2 Problem-Solving

Problem-solving is considered to be a crucial part of QI; and methodologies like LT use highly organised tools and techniques to deal with it. Hence, LT is most optimum choice for problem-solving because root cause problem-solving is at the core of LT:

I see lean as a problem solving [methodology].

Participant 5

LT not only has tools and techniques that specifically equip organisations to eliminate problems from their root-cause, it also implores organisational stakeholders to ensure that problems are eliminated from their root cause so that, they are not transferred to a further process in the extended value-stream. Participants acknowledged that DHBs tend to work for ‘point optimisation’ rather than ‘system optimisation’ when they are improving their healthcare delivery processes, partly because of the tools and techniques they use and the scope limited of their QI initiative. Majority of the QI initiatives in DHBs are based on ‘point optimisation’, i.e., they seek improvement in certain departments/functions and neglect the effects of improvements on other functions/departments in the extended value-streams. However, LT is focused on ‘system optimisation’ and its tools (when used accurately) allow
organisations to eliminate problems from their root cause or observe the effects of a
designed improvement on other entities/processes in extended value-streams:

I think for us the key is actually we talk about lean being a quality improvement technique because we
focus very much on problem-solving … I think the biggest failure in healthcare generally is that we don't
do the problem-solving in the analysis, we jump to solutions and we see this in every [training] cohort,
people turn up and they already know what the solution is that they're going to implement but when
you ask them what it is that they're trying to fix, what is the problem they are trying to fix, they often
can't tell you what it is.

Participant 2

Participants also noted the many different LT tools, which are used to recognise problems
and inefficiencies in the everyday processes. The DHBs using LT were all recognised to be
training their staff to be familiar with these tools to equip the staff with skills to improve the
care delivery processes by incorporating problem-solving in their everyday jobs:

I love that every tool in LT’s toolbelt works on multiple levels. Something as simple as 5S, allows you
to eliminate waste and provides you the discipline to conduct improvements or at least not waste
time looking for things everywhere. It is standardisation at its simplest and best. Lots of staff are also
working on A3 to solve problems in their own workplace. Lots of improvement work is going on that
wasn’t going on before. We have got a lot of GEMBA walks going on with managers which weren’t
taking place before. We have had some visual management up and running. Although, we are doing a
drive at the moment to improve that. So, overall, we have had really good QI work happening within
different services because of the training we are providing our staff. So, that’s the difference between
when it [QI] started and now. People are trained more, they are trained more, they know more about it,
you know what to expect, they see the benefits of it.

Participant 7

Even the DHBs not using LT as their primary QI methodology acknowledged using LT tools
in their everyday work for problem solving and training their staff in them. This came as a
surprise to the researcher as in most cases, a significant divide was seen in the participants
regarding which methodology was better and more effective in healthcare for QI:

Lots of the training and principles especially like 5S were used or considered even in the planning stage
of our new hospital building. There was work done during that time. 5S was everywhere in organisation.
I certainly trained others with some lean tools like VSM and process mapping. So we didn’t use it as
much as a project methodology but more as a tool within a project. For example, I particularly like using
5S and VSM and some of the activities around observations and Gemba etc. I ask people to go to the
site and validate what is happening and ensure our actual problem is there. We pick and choose bits
and pieces from LT.

Participant 6

5.2.1.3 Systems Thinking

Another positive characteristic of LT identified by the participants was its focus on ‘systems
thinking’. Generally, in healthcare, QI is conducted autonomously in small functions and
processes without considering its effect on the complete system as mentioned above as well:

There is a lot of point optimisation in many aspects in healthcare but not supply chain optimisation.

Participant 4

To ensure waste is eliminated rather than transferred to another part of the value-stream, LT provides tools and techniques that help to identify the root cause of a problem, Therefore, by eliminating waste and problems, they do not appear again anywhere in the system:

Quality improvement plan is not about transferring cost or work. That is probably a result of the way the organisation has managed to do the quality improvement. People tend to work in departments rather than actually walking through the process. As part of the [LT] program, we ask people to do an end-to-end Gemba walk as part of that process. You have to see the whole process in order to improve it instead of transferring your waste to someone else.

Participant 2

Two DHBs [DHB9 and DHB13] in particular mentioned using design thinking and LT in conjunction while designing new wards to ensure that the design of these wards facilitates the implementation of the principles of LT. These DHBs were seen as more mature in terms of QI than many others (explained later in chapter 6). The idea that design thinking, and the production/service floor layout can facilitate the use and application of LT principles can be found in the literature (Grunden & Hagood, 2012). However, the consideration of design thinking and the facilitation of QI processes particularly in New Zealand healthcare system was not identified anywhere in the literature:

Our thinking has already gone into the thinking of the DHB. Every new ward, every new building that we are building, automatically involves new methods like Kanban into the place. So, every new ward that we build or every ward that we renovate, Kanban is the default part of that.

Participant 8

With the exception of DHB4, all the DHBs using LT mentioned using LT for both small-scale and large-scale projects respectively. DHB4 described using LT partially but admitted to rely more on MFI. When asked about the use of LT, all the participants (from DHB4) said they see LT as a set of tools and use only some of its tools in their QI initiatives rather than using LT as a methodology. The same DHB also admitted that they are more focused on small-scale projects (departmental or point optimisation):
...we are not invested well in a systems type change. So, the use of LT is specific to projects rather than a systemic way to work. We cherry-pick the tools that we are familiar with and can be easily installed in certain places in our organisation.

Participant 9

Our DHB has gone through a lot of changes recently. After the changes, the previous QI work was kinda thrown out completely. The new team is working but it is trying to fix small things right now, and that is why, we are not doing any big or large-scale projects currently other than the ones that come from upstairs [HQSC].

Participant 37

Upon further investigation, DHB4’s use of LT as a set of tools rather than a complete QI methodology was because they had moved to many different QI methodologies in the past that created ‘change fatigue’ in the organisation, its employees lost faith in QI programme and the associated methodologies. This notion was reiterated by all the participants from DHB4.

As a result, each directorate (in DHB4) started using different QI methodologies and every time, a system’s level or cross-directorate initiative was designed or put forward, the employees would get confused because, the language and jargon of different QI methodologies is not complimentary with each other. So, on an organisational level, the DHB is not committed to a single or even multiple methodologies and cherry-pick tools form different methodologies that the key people (who facilitate QI in different directorates) are familiar with:

The problem is we have gone through so many methodologies and trainings that the employees have stopped committing to a single one. Every time we had a new boss, they would start using the methodology they liked or knew and then the staff would have to change too and then that person would leave and would take the methodology with them. The new person will come with their own idea of QI. This created so much change fatigue in the organisation. Now even though, I am more for MFI, we are just using tools from different methodologies when we want to. It is easier and works for now. Maybe when we have a strategy for QI, we will commit to one methodology

Participant 12

5.2.1.4 Employee Empowerment

Employee empowerment was a very prominent theme in the discussion with the participants associated with all the DHBs using LT. Participants acknowledged a certain organisational culture based on respect for people and empowerment as a crucial success factor for any QI methodology to work (explained in chapter 3) and LT provided tools and the philosophical thinking to the DHBs and their employees to create a culture of continuous improvement which is a tenet of LT:
Lot of people come at lean as standardization methodology which is the next phase of this. So, our first phase was giving them understanding of the principles and what it means to them and what it means to the patients and how both can get collective value from it in practical and with some key tools and techniques around it. So, it is all about the culture really.

**Participant 3**

Participants agreed that the fundamental part of LT is to shift decision making as well as problem solving responsibilities to the employees. However, before doing that, the employees must be provided with the training and skills/tools required to conduct QI on their own. This can be done by investing in improving the employees’ skills and competencies:

> Our trainings are all focused on one thing, providing employees with the skills required to conduct their own QI initiatives. They are familiar with the tools. If anyone wants to start a QI initiative, they use A3 thinking. That A3 is then forwarded to the managers for approval especially if the initiatives will require some kind of resource.

**Participant 7**

once people are comfortable and feel like they have the permission then they start to challenge why do we do this differently? Why do you do it that way and I do it that way? And they start to work collaboratively towards a standardised method of working. Then that’s their shared engagement. That happens on a much broader environment than just your work environment.

**Participant 8**

Our focus has been on providing insights to people, look everybody wants to do the right job, they just need exposure to concepts that exist beyond health that they probably have never seen or had exposure to.

**Participant 3**

A challenge that is faced by DHBs in this process is associated with the language and nature of LT. Participants mentioned that as employees generally will not have an operations background, it is good to keep LT simple and about the employees, at least in the beginning. If they see a benefit of implementing LT practices in their work for them, they will tend to be more likely to implement and support it:

> Don’t make lean about technocratic, keep it simple, it is about what’s in it for me [employee]. It’s all these bits of it. If they [employees] see the benefit for themselves, they will do it. What happens usually is that employees get afraid of the language or the technocratic aspect of QI and LT, that turns them off. It’s about baby steps.

**Participant 1**

Table 5.2 provides an overview of the coding scheme, including the major themes (1st order codes), and sub-themes (2nd and 3rd order codes), and the number of participants from each
DHB that cited them as reasons for adopting, and hence, describing the essence of LT as perceived by them.
<table>
<thead>
<tr>
<th>Themes</th>
<th>DHB1</th>
<th>DHB3</th>
<th>DHB4</th>
<th>DHB5</th>
<th>DHB9</th>
<th>DHB13</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Emphasis on Problem Solving</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other methodologies use lean tools for problem solving</td>
<td>2/4</td>
<td>3/3</td>
<td>2/4</td>
<td>1/3</td>
<td>2/4</td>
<td>3/3</td>
</tr>
<tr>
<td>Root cause problem solving at its core</td>
<td>4/4</td>
<td>2/3</td>
<td>1/3</td>
<td>4/4</td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td>Tools for different types of wastes/problems</td>
<td>2/4</td>
<td>2/3</td>
<td>1/3</td>
<td>3/4</td>
<td>2/3</td>
<td>3/3</td>
</tr>
<tr>
<td><strong>Employee Empowerment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less power distance in culture (manager-employee)</td>
<td>2/4</td>
<td>2/3</td>
<td>1/3</td>
<td>2/4</td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td>Involving employees in decision making</td>
<td>2/4</td>
<td>1/3</td>
<td>1/3</td>
<td>2/4</td>
<td>1/3</td>
<td>2/3</td>
</tr>
<tr>
<td>No need to get permissions for QI</td>
<td>4/4</td>
<td>3/3</td>
<td>2/4</td>
<td>3/3</td>
<td>2/3</td>
<td>2/3</td>
</tr>
<tr>
<td>Other Lean + Employees [positive comments]</td>
<td>1/4</td>
<td>1/3</td>
<td>1/3</td>
<td>1/4</td>
<td>1/3</td>
<td>1/3</td>
</tr>
<tr>
<td>Promoting QI and waste recognition</td>
<td>2/4</td>
<td>3/3</td>
<td>2/4</td>
<td>3/3</td>
<td>2/3</td>
<td>2/3</td>
</tr>
<tr>
<td>Training employees to conduct QI on their own</td>
<td>3/4</td>
<td>2/3</td>
<td>3/4</td>
<td>2/3</td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td>In-house training</td>
<td>2/4</td>
<td>3/3</td>
<td>2/4</td>
<td>3/3</td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td>External trainers</td>
<td>2/4</td>
<td>3/3</td>
<td>2/4</td>
<td>3/3</td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td><strong>Systematic Methodology</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developed and improved for long time</td>
<td>4/4</td>
<td>3/3</td>
<td>2/3</td>
<td>3/4</td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td>Healthcare used it for long time</td>
<td>3/4</td>
<td>3/3</td>
<td>1/3</td>
<td>3/4</td>
<td>3/3</td>
<td>2/3</td>
</tr>
<tr>
<td>Other big names used/tested it for long time</td>
<td>2/4</td>
<td>3/3</td>
<td>2/4</td>
<td>2/3</td>
<td>2/3</td>
<td>1/3</td>
</tr>
<tr>
<td>Toyota tested it for long time</td>
<td>3/4</td>
<td>2/3</td>
<td>3/4</td>
<td>2/3</td>
<td>1/3</td>
<td>1/3</td>
</tr>
<tr>
<td>It is not just tools, it’s a philosophy</td>
<td>2/4</td>
<td>3/3</td>
<td>2/4</td>
<td>1/3</td>
<td>2/3</td>
<td>2/3</td>
</tr>
<tr>
<td>Not a one-off thing, it is continuous improvement</td>
<td>3/4</td>
<td>3/3</td>
<td>2/4</td>
<td>2/3</td>
<td>2/3</td>
<td>1/3</td>
</tr>
<tr>
<td>Systematically removes waste</td>
<td>4/4</td>
<td>3/3</td>
<td>3/4</td>
<td>2/3</td>
<td>2/3</td>
<td>2/3</td>
</tr>
<tr>
<td>Not simply jumping to solutions, examining problems</td>
<td>4/4</td>
<td>3/3</td>
<td>2/4</td>
<td>2/3</td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td><strong>Systems Thinking</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New wards and processes are designed with LT in mind</td>
<td>2/3</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitate flow in the wards</td>
<td>2/3</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitate flow between the interfaces of wards</td>
<td>2/3</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No systems thinking, lean in small pockets</td>
<td>3/4</td>
<td>2/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systems optimization rather than point optimization</td>
<td>3/4</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste elimination, not waste transference to other parts</td>
<td>2/4</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste elimination from the system</td>
<td>3/4</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended value stream mapping</td>
<td>2/4</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5.2: Overview of the essence of lean thinking
5.2.2 Benefits of Lean Thinking

Although, this research did not explicitly consider the benefits of LT, participants still mentioned them to explain ‘why’ LT was a better choice for QI, and the inductive research approach compelled the researcher to code these benefits (of LT) and form appropriate categories and sub-categories of relevant themes from them. Similarly, later in the study, benefits of MFI are presented and then a cross-comparison along with the explanation is provided in the discussion chapter (see section 8.1).

5.2.2.1 Finance

Out of the six DHBs implementing LT, four of them cited the use of LT had a direct effect on their finances, whereas the other two DHBs mentioned that it might have a direct effect, but they are not in a position to witness or comment on that. However, all of them unanimously agreed that they do not measure the benefits of LT implementation financially. It is primarily because every, or at least most of the improvements will have a financial effect but they were more interested in measuring the success of a QI initiative around patient safety and experience:

We focus on process improvement and it provides finance, patient safety and time saving as a result. So, we know we got that but the goal is then, the trick is then to pummel the gates and amplify it so that the staff could understand it that the focus wouldn't be around the financials and the mantra of one health system, one dollar.

Participant 1

5.2.2.2 Time

Participants revealed that the most appropriate metrics to look at the success of a QI initiative were time-related. For example, the effect of a QI programme on waiting times or length of stay of patients in the hospitals. Effective QI programmes always show positive change in such metrics. Four DHBs mentioned that it (LT) helps them to improve throughput by reducing waiting time and turnaround time for their respective patients in the wards and separate health pathways. Lean tools such as A3-thinking and VSM were highlighted by all the DHBs using LT for providing insights into a process/operation and helping to recognise non-value adding activities and unnecessary waste:

Most of the metrics are time management related. Reducing the time to complete the task or the time it takes to take the patient from A to B or to get their outcome, the time it takes to achieve the outcomes. LT allows us to eliminate the root causes of such time-related inefficiencies in our DHB.

Participant 2
Amount of time patient spends in a system is one of our most critical metric. So, whenever we are reducing, we are doing an improvement project, usually there is a time component somewhere and it is contributing to that in some way.

**Participant 3**

The interview data also showed that the use of LT principles can and has increased the direct care time of the patients in the DHBs using it for QI. One of the foremost examples of it was seen in DHB1 after successful implementation of LT principles in nursing:

I think we just looked at how with releasing time to care we have increased our average direct care time from nurses spending more time at patient's bedside. I think we have improved it from 38% over the 60 wards to at 60%. We have improved it significantly in terms of nurses spending time on the bedside of patients with using lean approach … we now get more than 175,000 additional nursing hours a year which is like having another 195 nurses.

**Participant 16**

Similar time-based improvements were observed in other DHBs as well. Overall, the use of LT was shown to improve the end-to-end patient journey by reducing the overall non-value adding time, i.e., waiting time to increasing direct care time. For example, DHB13 mentioned the use of Pixys® machines for medication in the wards after finding out pharmacy and medication rooms were a bottleneck in the process (an outcome of value-stream mapping). The same improvement also improved patient safety by reducing wrong fulfilment of medication to patients and by removing expired medicine from the shelved.

### 5.2.2.3 Storage & Inventory Management

DHBs were using LT principles such as JIT (two DHBs), Kanban (one DHB), 5S (six DHBs) and standardised layouts in the storage spaces (six DHBs) across the wards. Upon further questioning, it was discovered that four out of the six DHBs using LT were also implementing Releasing Time to Care (RTC) principles, which is a nursing-based QI initiative based on LT principles. RTC was designed by NHS UK. According to a research participant from HQSC, the majority of the New Zealand DHBs, if not all, have purchased the license to its training manuals as well:

Medication room takes too much time finding medicine, why don’t we use 5S there, so they can locate stuff quickly. It’s not 5S in RTC, it is called something else but the idea is the same.

**Participant 16**

As part of the RTC, all of our inventory rooms have a standardised format. So that when nurses are moved from one ward to another, they do not have to learn anything new. It is good for the supply chain department who has to restock all the rooms.

**Participant 15**
So, we have already, we have around 50-odd locations, out of that, we have already implemented Kanban in 9 locations in the last 12 months. So, our plan is to get all clinical locations put into Kanban and scanning in the next 12 to 24 months. So that, addresses your lean methodology coming into practice.

Participant 8

Efficient inventory management is a crucial part of LT. However, in healthcare, LT implementations are more focused on process improvement and QI rather than supporting efficient inventory management especially at the inter-organisational level (as shown in table 2.3) partly because it is still relatively a new concept in healthcare, and the organisations using it are not as mature as in other industries such as automotive. Early traces of LT implementations in healthcare are from less than two decades ago, as shown in the literature review whereas it has been around and being used in manufacturing industries for over half a century:

Mostly what health does with lean is quality improvement type thinking, 5S and all that type of things whereas the production aspect of it often missed in terms of understanding work rates and flows and takt times and all the bits that go into that.

Participant 3

Table 5.3 provides an overview of the DHBs using LT, and the number of participants that cited the different benefits of LT recognised by them in their respective role.

Table 5.3 provides an overview of the coding scheme, including the major themes (1st order codes), and sub-themes (2nd and 3rd order codes), and the number of participants from each DHB that cited them as main perceived benefits of using LT as a QI methodology in their respective DHBs.
<table>
<thead>
<tr>
<th>Themes</th>
<th>DHB1</th>
<th>DHB3</th>
<th>DHB4</th>
<th>DHB5</th>
<th>DHB9</th>
<th>DHB13</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Financial Benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct monetary benefits</td>
<td>3/4</td>
<td>2/3</td>
<td></td>
<td>3/3</td>
<td>1/3</td>
<td></td>
</tr>
<tr>
<td>Reduced operational costs</td>
<td>2/4</td>
<td>1/3</td>
<td>1/4</td>
<td>2/3</td>
<td>2/3</td>
<td></td>
</tr>
<tr>
<td>Less errors and patient return after 1st visit</td>
<td>2/4</td>
<td>3/3</td>
<td>1/3</td>
<td>1/3</td>
<td>2/3</td>
<td></td>
</tr>
<tr>
<td>Increased number of patients served OR increased capacity</td>
<td>3/4</td>
<td>1/3</td>
<td></td>
<td>2/3</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>Shorter length of stays</td>
<td>4/4</td>
<td>3/3</td>
<td>2/4</td>
<td>3/3</td>
<td>1/3</td>
<td></td>
</tr>
<tr>
<td>Faster throughput</td>
<td>4/4</td>
<td>1/3</td>
<td>1/3</td>
<td>3/3</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>Better end-to-end patient journeys</td>
<td>4/4</td>
<td>1/3</td>
<td></td>
<td>3/3</td>
<td>1/3</td>
<td></td>
</tr>
<tr>
<td><strong>Increased direct care time</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Nursing time increase [direct nursing time with patients]</td>
<td>4/4</td>
<td>3/3</td>
<td>3/4</td>
<td>3/3</td>
<td>2/3</td>
<td></td>
</tr>
<tr>
<td>Decrease in patient waiting time</td>
<td>4/4</td>
<td>3/3</td>
<td>1/3</td>
<td>2/4</td>
<td>3/3</td>
<td>3/3</td>
</tr>
<tr>
<td><strong>Inventory management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased storage space</td>
<td>2/4</td>
<td>2/3</td>
<td>1/3</td>
<td>1/3</td>
<td>2/3</td>
<td>1/3</td>
</tr>
<tr>
<td>Staff safety (less accidents (storage space related)</td>
<td>1/4</td>
<td>1/3</td>
<td></td>
<td>3/3</td>
<td>1/3</td>
<td>1/3</td>
</tr>
<tr>
<td>Less time to locate stuff</td>
<td>3/4</td>
<td>2/3</td>
<td>2/4</td>
<td>3/3</td>
<td>3/3</td>
<td></td>
</tr>
<tr>
<td>Patient Safety</td>
<td>1/4</td>
<td>1/3</td>
<td>1/4</td>
<td>1/3</td>
<td>1/3</td>
<td></td>
</tr>
<tr>
<td>Easy to recognise expired items</td>
<td>2/4</td>
<td></td>
<td>1/4</td>
<td>2/3</td>
<td>1/3</td>
<td></td>
</tr>
<tr>
<td><strong>Standardisation</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Process standardisation</td>
<td>2/4</td>
<td>2/3</td>
<td>1/3</td>
<td>2/4</td>
<td>2/3</td>
<td>2/3</td>
</tr>
<tr>
<td>More visibility on operations</td>
<td>3/4</td>
<td>2/3</td>
<td>1/3</td>
<td>3/4</td>
<td>3/3</td>
<td>2/3</td>
</tr>
<tr>
<td>Easy to conduct improvements</td>
<td>4/4</td>
<td>1/3</td>
<td>1/3</td>
<td>2/4</td>
<td>3/3</td>
<td>1/3</td>
</tr>
<tr>
<td><strong>Just-in-time</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kanban</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1/3</td>
</tr>
<tr>
<td>Medicine delivery in wards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1/3</td>
</tr>
</tbody>
</table>

Table 5.3: Overview of the benefits of Lean Thinking
5.3 Criticisms of Lean Thinking

This section provides details surrounding the criticisms of LT as mentioned by the participants of this research. The findings and supporting quotes in this section are primarily an outcome from interviews with participants which were not using LT as their core QI methodology. These respective participants mentioned the reasons for not using LT as a QI methodology in their DHBs, and those criticisms were then coded into themes and sub-themes, and are presented below.

5.3.1 Need Professional Operations Managers

One of the key criticisms of LT was that it requires employees with an operations management background. It is not easy to effectively train people in LT without them having experience and knowledge of operations management. Many different programmes have been designed in order to simplify the principles of LT in healthcare for the employees with no understanding and background of operations management including Releasing time to care® (RTC) which is a training programme designed for the nursing staff by NHS.

The interviews revealed that majority of the DHBs (n=11) had implemented the principles of RTC in the past. Sometimes, they were not sustained or the DHBs moved to different to QI methodologies and abandoned the use of RTC or they incorporated RTC with their primary QI methodology:

We used to be big on RTC, we had it in our nursing operations and wards but then, we slowly moved away from it. We still have it going but it is now a combination of RTC and MFI principles. I think you will hear that from a lot of DHBs, when it came out, we all got the license from NHS via Ministry of Health but then, after a few years or so, we started moving away from it.

Participant 20

DHBs using LT as their primary QI methodology had hired staff from production and operations management background in their QI teams especially, whereas the DHBs using other methodologies, their QI teams mostly comprised of people from healthcare background:

I have my educational background in operations management...

Participant 1

I have nursing experience for many many years...

Participant 6
They say MFI is phenomenal but for you and I, people with operations management background…

Participant 2

I was a production manager before.

Participant 3

Our DHB created a position at the executive level called director of performance improvement and innovation or something along those lines and hired a chap [guy] called [Mr. X] who previously I think came from 3M as a plant manager. He was also a master black belt and he was familiar with a lot of different improvement methodologies. He met with the CMO and said we should pick an approach and there is IHI approach based on PDSA which comes from Deming and lean six sigma approach which is based on DMAIC and they decided to go with the latter one because it was more suitable and had stronger data reporting mechanisms and it is a fully developed and proven to be successful methodology.

Participant 16

[Mr. X] started looking for non-healthcare background individuals with strong lean six sigma background and he hired them as contractors to start creating a performance improvement team and I was one of the first ones. The idea was to hire people from operations management background because they have better grasp and knowledge required for QI. For medical staff, you can have some trainings to familiarise them with QI, but for actual QI, you need staff who are trained in QI and operations management for years.

Participant 16

5.3.2 Lean is a Manufacturing Technique/ Not Suitable for Healthcare

LT originated from the Toyota Production System®. While it has been implemented in many different production and service operations settings including healthcare, there is still a lot of resistance towards implementing LT. Upon probing the participants regarding not using LT, they mentioned that the key reason for the resistance towards using LT comes from the fact that its origin is from manufacturing and it is not from healthcare settings, a fact that healthcare employees do not appreciate and hence, do not believe LT can be of any significance in healthcare settings:

I think it [lean] runs into a psychological problem which is potentially described as ‘not invented here’ syndrome which you may have heard. Some people will go on and say this is a failed system from the NHS, why are we bothering with it. That is not a fair characterization of it but nevertheless that’s a perception.

Participant 4

This misunderstanding regarding the application and compatibility of LT could also be linked to the previously stated criticism, i.e., DHBs need more people with operations management training and background as that will help to improve the perception of the healthcare system specifically its labour force about LT. Participants (n=10) mentioned that medical staff should be exposed to operations management and QI education to change
their perception regarding LT and its efficacy in healthcare because when they are unfamiliar with the true meaning of ‘waste’ and ‘value’ in QI terms, LT does not sit well with the medical staff:

Within health we don’t really like to talk about lean because it has the wrong connotations. You can’t tell a nurse to eliminate waste, they will take it very wrong. Similarly, you can’t talk about non-value adding time with a physician because it will piss them off. They will just say, I know what is best for the patient and shut you down.

Participant 28

Six DHBs clearly stated that they used LT in the past. However, after some time, they observed that it was not showing significant results and was not well-liked and accepted as an appropriate QI method among the employees. Hence, they decided to switch to other methodologies that had their roots in healthcare such as IHI’s MFI approach:

We used to subscribe to lean probably around 2008 through to 2012 but we found people really struggled with it. We want people on the floor to do an improvement that might not be a big thing, but it was too much for them. It wasn’t practical. It wasn’t about healthcare.

Participant 23

Lean is maybe good for making cars, but when it comes to taking care of actual human beings, lean has no place there. I know it because I have seen it

Participant 12

If the employees are not happy with lean, what are you going to do about it? Even if it has the ‘change the world’ capabilities, without staff’s approval, it is not good enough.

Participant 32

5.3.3 Difficulty of Application

The participants also talked about the high level of difficulty of understanding and implementing LT as one of the reasons for not using it in their DHBs. Upon probing it, different reasons emerged in the interviews. One of the reasons was LT’s reliance on statistics for problem solving especially when it is combined with six sigma (commonly known as lean six sigma). This made it difficult for employees without a background in data statistics:
In lean six sigma, there is such a heavy focus on six sigma principles around reducing variation and understanding basically the statistical analysis and how processes perform and how you reduce your variation. The statistical side can be quite challenging. Not everyone has a knack for that analytical data science. So, people that go through our green belt training, we teach them statistical process control, hypothesis testing, box plots and I’d say fewer than half in each class get a good grasp on that because in their day to day job, they are not doing much data manipulation and analysis. It is quite challenging.

Participant 16

Another reason behind healthcare employees finding LT difficult was its reliance on the jargon that makes it difficult to comprehend and follow at times. This ‘jargon’ participants referred to is a result of LT’s roots in manufacturing and its link with the Japanese culture and language. Eight DHBS mentioned that LT and its Jargon has a poor reputation in healthcare especially among the employees who are supposed to be implementing it:

Because we are in health and our product if you like is healthy people, the connotation of lean is getting the most you can for your money which just doesn’t fit well with patient care I suppose.

Participant 28

As soon as you say we are going to be lean, employees get petrified that they are going to lose their jobs or they feel like they will not be able to provide care to the patients because ‘eliminating waste’ means spend less time taking care of people

Participant 13

LT relies so strongly on the Jargon, people from medical background do not understand it. They tried to simplify the language with RTC but, that’s not really enough. Lean’s jargon puts our staff off.

Participant 23

Participants from DHBs using LT were asked if they faced any problems during implementation processes because of LT’s language and reliance on strong Jargon. One of the DHBs mentioned that they do not use the lean Jargon with the medical staff, but rather focus more on lean as a philosophy and demonstrating the advantages of the different tools within LT:

At that time [beginning of LT implementation], we had a decision to make to whether use Japanese terminology or not and we opted not because at that time, we were having trouble with our engagement and our credibility in the organisation and the last thing a doctor wants to hear is you are trying to apply manufacturing principles to patients and the way we mange patients. So, we made a very deliberate decision to not using terms like Poka-yoke or Heijunka and Jidoka. We stayed with English plain language. We even build our framework which didn’t have these references and approaches that were developed in manufacturing.

Participant 16

Another DHB mentioned that their goal is to train its employee so that they get familiar with LT as when employees are not familiar with the core philosophy of LT, i.e., improving value
for the customer and eliminating true waste, they tend to resist the change and get scared of the production-related jargon of LT:

People get scared of LT’s language, that is why our [training programme] focuses on showcasing the value of LT rather than throwing a whole chunk of Japanese words on them and telling them to go implement them. LT started with production, so for a layman, the terms are from production but us [quality managers], they are process-related terms”

Participant 2

5.3.4 Lean is only a toolset

Another criticism of LT and its applicability in healthcare was based around the misunderstanding of LT as a toolset rather than a system-wide improvement methodology/philosophy. The operations management literature recognises LT as a process improvement philosophy for a complete system (Bortolotti et al., 2016; Womack & Jones, 1996). However, three DHBs seemed to disagree with that and perceived LT as a toolset:

My personal opinion is that it [LT] has its place in terms of efficiencies … but lean is more like the tools you use to then achieve what you are trying to achieve

Participant 12

The same three DHBs stated that they use the tools from the LT toolset but, they do not agree with the philosophy of LT and they firmly believed that it did not have any place in the healthcare:

We use 5S because it is a good tool but LT, no. Not really. LT is about cars or something, right? We are not fixing cars. We are running a hospital.

Participant 39

5.3.5 Resource Intensive

According to the participants from the DHBs not using LT, LT is a highly resource intensive strategy; it requires DHBs to invest in developing its employees to ensure its success. A key reason, the majority of the DHBs were not inclined towards implementing LT was based around training the staff for LT. Healthcare staff being already very busy, it is very hard for them to learn LT principles. DHBs also mentioned that LT requires a big QI team and most of them do not have enough funding to support a big QI team:
If I want lean here, who will teach it to everyone? who will teach it to me? I know the basics of it but as I understand, that is not enough.

Participant 23

You have to have big improvement teams for that [LT and six sigma] because they are so technical. They have their own jargon. DHBs do not have resources for that.

Participant 20

This concern was articulated by seven DHBs as they did not have enough human capital in their organisations, and especially in their QI teams, who were familiar with LT. The majority of the QI teams in these DHBs included people from medical and nursing background, who were trained by HQSC in mainly MFI; it was therefore not possible to build capabilities based on external trainings as QI requires constant monitoring and problem solving, and consequently, without having onsite capabilities, it would be very hard to implement and sustain LT:

My limited knowledge of lean would make me feel that it would feel like or people that ok I got to go away and do a course on lean. I guess the organisations that have used it have developed that capacity internally to be able to deliver those courses but I am not sure if they have the same vision that everybody in their organisation would be trained.

Participant 25

DHBs who have been successful in implementing LT have their teams comprised of either people with operations and QI background or they were specifically trained in LT and overtime, they had built their capabilities to implement LT successfully. All the DHBs using LT as their core QI methodology had developed their internal training programmes based around teaching the principles of LT to their employees including both medical and non-medical staff for using LT in their everyday work:

Our [internal training programme] familiarises people with the principles of LT

Participant 2

Our focus of [internal training programme] is to allow people to see LT in action, they solve everyday problems using simple LT tools and we slowly build on that. Then, they are sent back to their jobs where they have to recognise a problem and solve it using LT principles. This way, they get familiar with it and remember it whereas if it was just a seminar and no hands on experience, they will forget everything as soon as they left the seminar.

Participant 1

This resource intensive element of LT makes it almost impossible for the smaller DHBs in New Zealand who do not have the capabilities or financial resources to establish a presence
of LT in their organisation. Three DHBs mentioned being in this particular situation. A description of those DHBs cannot be provided as it would risk their anonymity:

We are a small DHB. Actually, call us very small [DHB]. The problem with that is no money and not many people willing to come work for us with good knowledge of QI. Then, we have to live off the crumbs of the giants. We do MFI because of HQSC. They provide us training and other help that allows us to do at least something. The sad thing is that in the New Zealand, whether you are small or big, you are somehow expected to show same results. The big guys with $100 and we with $10 are supposed to give same result. It is impossible and sadly very poorly designed system. No one here has time or energy but because we are told to in national programmes, we just do whatever they [HQSC] tells us to do as long as they provide resource too. If someone is capable, they leave for a bigger DHB.

Participant 28

5.3.6 Too Systematic

DHBs mentioned that LT relied on both Jargon (as mentioned above) and technical tools; it was a very systematic approach; and it had to be implemented in a systematic and well-defined way, which made it very prescriptive. This prescriptive nature of LT is discouraging to the employees who want to test different ways to resolve problems in their work.

Participants from six DHBs believed that LT in fact takes away autonomy from the employees and also takes away a chance to perform their jobs in a way that is easier and more comfortable for them. That is why, these six DHBs inclined towards using MFI, a relatively very new QI methodology because it answers to the shortcomings of LT:

You have got the old fashioned, I call it old fashioned because we don’t use it anymore, sometimes things are applicable, methodology and stuff. A lot of that stuff, you can end up with meeting after meeting and planning and shaping everything up, theorizing about what might and might not work, you get a big launch date where you launch the whole thing but this IHI methodology seems to appeal to clinicians a lot better and its easily accessible, it’s less words and more action based.

Participant 20

Table 5.4 provides an overview of the criticisms of LT and the number of participants from each of the 15 DHBs who cited their concern regarding these criticisms.

Table 5.4 provides an overview of the coding scheme, including the major themes (1st order codes), and sub-themes (2nd, 3rd and 4th order codes), and the number of participants from each DHB that cited them as main perceived criticisms of using LT as a QI methodology in healthcare environments (DHBs).
Table 5.4: Overview of the criticisms of lean thinking

<table>
<thead>
<tr>
<th>Themes</th>
<th>DHB1</th>
<th>DHB2</th>
<th>DHB3</th>
<th>DHB4</th>
<th>DHB5</th>
<th>DHB6</th>
<th>DHB7</th>
<th>DHB8</th>
<th>DHB9</th>
<th>DHB10</th>
<th>DHB11</th>
<th>DHB12</th>
<th>DHB13</th>
<th>DHB14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Needs professional operations managers for implementing lean</td>
<td>2/4</td>
<td>2/3</td>
<td>2/3</td>
<td>2/4</td>
<td>2/3</td>
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<td>Healthcare staff does not have the same mentality or vision of operations managers and engineers</td>
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<td>Operations managers do not resist QI or lean thinking, and consider it positive</td>
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<td>Lean is a manufacturing method</td>
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<td>Good for cars only, not caring/healthcare</td>
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<td>Perception about lean’s manufacturing background being unfit for health systems</td>
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<td>Some DHBs used it and failed</td>
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<td>It is all words, no action</td>
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<td>Lean is only a set of quality tools</td>
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<td>Use of statistical process control and numbers</td>
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<td>Hard to teach statistics to frontline employees</td>
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<td>Translation in healthcare does not work</td>
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<tr>
<td>&quot;Waste&quot; has wrong connotations in healthcare</td>
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<td>Don’t see human lives and care services in “efficiency”</td>
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<td>Jargon puts people off</td>
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<td>It costs a lot of money to train people</td>
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<tr>
<td>It costs a lot of money to hire people who understand and implement it</td>
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<tr>
<td>Big teams required for lean implementation</td>
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<td>Internal training and development programmes are required</td>
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<td>Too systematic</td>
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</table>

Table 5.4: Overview of the criticisms of lean thinking
5.4 Model for Improvement

Similar to the previous section, this section includes the research findings related to IHI’s MFI including the essence of MFI, i.e., key reasons for selecting it over other QI methods, its recognised benefits and criticisms as a QI methodology based on the interview data.

Model for Improvement (MFI) is specifically designed for and originated out of healthcare albeit at the core of MFI is the QI philosophy preached by Edwards Deming and systems theory. MFI concerns itself with combining theories and techniques from various disciplines to maximise successful QI in a system. MFI also tends to distinguish between the system that requires improvement and the tools required in the implementation process of said improvement. Implementers set targets that can lead to improvements and then test them using Plan-Do-Study-Act cycles. As defined by (Scoville & Little, 2014) “The Model for Improvement is the engine that propels Profound Knowledge from a static catalog of interesting ideas into a dynamic program of learning and action. The Model represents a ceaseless quest for practical, functional knowledge gained from hands-on experience in execution.”

MFI’s paradigm is based on rapid improvements, i.e., putting different change ideas, making a prediction and trying them out. If one idea does not work, next one should be tried instantaneously and so on…

Out of the 15 DHBs that participated in this research, 11 of them were using MFI either as their primary QI methodology or to some extent in combination with other QI methodologies.

5.4.1 Essence of Model for Improvement

It [MFI] is widely used. It’s had years of development. It’s very simple, it appeals to clinicians, it’s very practical methodology and it’s not so much planning for years and then doing all at once. It’s got a practical applicable process in it.

Participant 20

MFI is a widely adopted QI methodology in the New Zealand healthcare system. As mentioned earlier 11 out of the 15 DHBs who participated in this research were using it to some extent in their operations whereas all of the DHBs were at least familiar with its principle teachings and methodology for QI. As part of the research, it was considered significant to ask the DHBs using MFI about what were the reasons behind their decision to use MFI to capture the essence of MFI as understood and explained by the participants.
5.4.1.1 Originally from Healthcare

One of the most important factors for the widespread use of MFI as the primary QI methodology by the majority of the DHBs was its healthcare-based origin (see table 5.5). MFI is a healthcare-directed and originated methodology; it understands the needs of the healthcare industry and provides tools that allow the DHBs and their employees to provide better care and service to their respective customers:

MFI is better because it is from the healthcare.

Participant 23

According to the participants, MFI works better than other QI methodologies in healthcare because its scope and language is more aligned with healthcare system and its structures. When organisations use QI methodologies such as LT and six sigma, their reliance on strong manufacturing terms and their own jargon makes healthcare employees sceptical of them. As a solution, MFI has handpicked quality tools that are more relevant to healthcare needs and settings, and the healthcare staff do not feel the same scepticism with MFI:

The IHI model [MFI] has successfully rebranded a number of generic quality tools that have a veneer of respectability in healthcare sector and you get past the 'why you are telling me something that comes from a manufacturing background'.

Participant 4

5.4.1.2 Developed by Institute of Healthcare Improvement

MFI is developed and supported by the Institute of Healthcare Improvement (IHI) – a renowned institution in the global healthcare sector. This has given MFI significant credibility among the healthcare system and the people working in it:

I suppose what is good about the model for improvement that is used by an organisation like IHI, it was originally developed around a healthcare model

Participant 25

On the other hand, LT was developed by Toyota® and six sigma was developed by Motorola®. Both of these are highly tested methodologies for promoting and supporting QI. But, as they were not developed within healthcare or by an organisation such as IHI, healthcare staff tends to incline towards using MFI as according to them, it is more focused on improvement within healthcare settings:
because the MFI is taught through the IHI and it's more focused on improvement within healthcare setting.

*Participant 12*

As it was developed by IHI specifically to drive QI in healthcare settings, it has been adopted by many healthcare organisations ever since. IHI has also been developing it for many years. It does not rely on any industry-specific jargon, which makes it appealing to the medical staff without any QI background:

That's because we had a look at it. It is widely used. It's had years of development. It's very simple, it appeals to clinicians, it's very practical methodology and it's not so much planning for years and then doing all at once. It's got a practical applicable process in it.

*Participant 20*

### 5.4.1.3 Patient Oriented

MFI’s roots from healthcare make it an optimal choice for QI as its language and outcomes are based on globally established health goals such as patient care and patient outcomes. Its language is not based around waste elimination such as LT or process variation such as six sigma. MFI’s language is based around patient safety and improving the care delivery process to the patients. This simple yet multi-layered language feature has aligned MFI with clinical thinking, i.e., providing better care to the patients:

I think its [MFI] better aligned with clinical thinking, lean typically doesn’t gel well with clinicians. You start to go on the wrong foot if you just focus on the lean elements rather than applying to things that have much more like patient outcomes or population outcome purposes.

*Participant 29*

Although, better care or clinical goals are accomplished by traditional process improvement and QI, MFI’s focal attention on clinical goals makes it a suitable methodology for healthcare. The majority of DHBs when asked about process improvement discerned it as a secondary goal and said improving care was their primary objective – on this basis, they preferred MFI over other QI methodologies which relied on process improvement or waste elimination rather than improving care (see table 5.5):

We don’t want to improve a process so that the process is set. We developed our integrated healthcare strategy a few years ago and at the centre of that was person or patient centred care.

*Participant 25*
MFI is a complete care system, unlike LT, it [LT] focuses on process, not patient care and it [LT] does not align the healthcare mantra. Patients are not cars or airplanes, they are living things. That is why, LT cannot be even an option for us in this DHB. We are very patient oriented DHB.

Participant 39

5.4.1.4 Involves Everyone

The QI literature unanimously concurs that QI is everyone’s responsibility in an organisation, and one of the primary tasks of an organisation is to involve everyone in QI. However, DHBs are considered very large and complex organisations and involving everyone in QI with a single shared language or a QI methodology is an exceptionally difficult task. In the interviews, participants mentioned that MFI is a good answer to this fundamental problem in healthcare because it is easy to understand, relatable because of its origins in healthcare and it involves all the stakeholders:

MFI has positive and it is getting better and better with time. The more exposed they are to it, the more they see it working and then the more they sort of become used to it and trust it. The understanding is that you need to involve all your stakeholders in the change and then it has more chances of sticking and sustaining and that is why, MFI is good because it involves all the stakeholders in the discussion and improvement.

Participant 18

MFI is simple, it is easy to get. You don’t need to spend hundreds of hours just to get the basics. That’s why it is the best option for DHBs [complex organisations]

Participant 27

5.4.1.5 Quick Results

According to the participants, MFI is a uniquely fitting QI methodology for healthcare environments as it provides quick results whereas in other QI methodologies, one has to set up long and tedious process improvement and problem-solving agendas using methods such as DMAIC or A3 thinking; there is a lot of pre-implementation work DHB employees have to do before they can actually start the implementation process. But, MFI allows DHBs to implement rapid improvement interventions to test ideas and support QI. Hence, employees do not have to do the same pre-implementation work and can see the results of the intervention quickly:

DMAIC is such a long process. It takes forever to design it, MFI is fast and easy, no trouble.

Participant 22
The MFI suggests doing small tests of small things in small areas and that really helps whereas lean would ask you to implement things on big-scale at the same time and that does not help, that creates more problem because you are not ready for it and it fails and then you have low morale problem.

Participant 27

Table 5.5 provides an overview of the coding scheme, including the major themes (1st order codes), and sub-themes (2nd, 3rd and 4th order codes), and the number of participants from each DHB that cited them as reasons for adopting, and hence, describing the essence of MFI as perceived by them.
<table>
<thead>
<tr>
<th>Themes</th>
<th>DHB2</th>
<th>DHB6</th>
<th>DHB7</th>
<th>DHB8</th>
<th>DHB10</th>
<th>DHB11</th>
<th>DHB12</th>
<th>DHB14</th>
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<tbody>
<tr>
<td><strong>Originated and developed within healthcare</strong></td>
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<td>MFI was developed in and for healthcare</td>
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<tr>
<td>MFI was developed by people who understand healthcare</td>
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<tr>
<td>Healthcare needs are fully aligned with MFI model</td>
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<td>Answer to the 'not from healthcare' syndrome</td>
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<td>MFI is developed by IHI</td>
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<td>IHI has a good reputation in healthcare</td>
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<td>IHI understood the healthcare needs, and then designed MFI</td>
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<td>Clinical staff likes MFI because it is backed by IHI</td>
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<td><strong>Patients Oriented</strong></td>
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<td>MFI’s language is about healthcare</td>
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<td>Talks about patient care, rather than waste or efficiency</td>
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<td>More compassionate language than lean (its about people, not cars)</td>
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<td>Gives respect to patients and people</td>
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<td>Treats people like people, not cars or planes</td>
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<td>Less rigid and more flexible in implementation</td>
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<td>Provides opportunity to do what is best for patients</td>
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<td>Not a strict standardised process, care is art, not a thing written in stone</td>
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<tr>
<td><strong>Involves everyone [clinicians + nursing staff]</strong></td>
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<td></td>
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<tr>
<td>It involves everyone equally</td>
<td>3/3</td>
<td>1/2</td>
<td>2/2</td>
<td>1/3</td>
<td>1/3</td>
<td>2/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Because it is simplified, everyone is involved in it more</td>
<td>2/3</td>
<td>1/2</td>
<td>1/3</td>
<td></td>
<td>1/4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy to comprehend for everyone</td>
<td>1/3</td>
<td>1/3</td>
<td>2/2</td>
<td>1/3</td>
<td>1/3</td>
<td>1/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Everyone has their role to play in MFI, and they do it because it speaks about what they value</td>
<td>1/3</td>
<td>1/2</td>
<td>1/3</td>
<td>1/3</td>
<td>1/4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caring for patients</td>
<td>1/3</td>
<td>1/2</td>
<td>1/3</td>
<td>1/3</td>
<td>1/4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Best for patient care</td>
<td>2/3</td>
<td>1/2</td>
<td>1/2</td>
<td>2/3</td>
<td>2/4</td>
<td></td>
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<tr>
<td><strong>Quick Results</strong></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Rapid improvements</td>
<td>3/3</td>
<td>2/2</td>
<td>2/2</td>
<td>3/3</td>
<td>3/3</td>
<td>1/3</td>
<td>3/4</td>
<td></td>
</tr>
<tr>
<td>Fast and easy</td>
<td>3/3</td>
<td>2/2</td>
<td>1/2</td>
<td>3/3</td>
<td>2/3</td>
<td>1/3</td>
<td>2/4</td>
<td></td>
</tr>
<tr>
<td>Testing solutions, and use one that works</td>
<td>2/3</td>
<td>1/2</td>
<td>2/2</td>
<td>1/3</td>
<td>1/3</td>
<td>1/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small frequent improvements</td>
<td>2/3</td>
<td>1/3</td>
<td>1/2</td>
<td>1/2</td>
<td>2/3</td>
<td>1/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less paperwork and meetings, more action</td>
<td>3/3</td>
<td>2/2</td>
<td>2/2</td>
<td>3/3</td>
<td>2/3</td>
<td>2/4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>•less hue, more doi (less meetings, more actions OR direct to action approach)</td>
<td>3/3</td>
<td>1/2</td>
<td>1/2</td>
<td>2/3</td>
<td>1/3</td>
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</tbody>
</table>

Table 5.5: Overview of the essence of Model for Improvement
5.4.2 Benefits of Model for Improvement

After looking at the reasons for DHBs to select MFI as their core QI methodology, this section continues the discussion and presents the benefits of MFI acknowledged by the research participants.

5.4.2.1 Accessible

The most significant benefit of MFI that was mentioned by the participants from each of the DHBs using MFI was its accessibility in terms of training materials and other resources required to successfully use MFI. Participants mentioned that they could partake in the training materials available online through the IHI open-school website for very little cost. This training was considered very effective for healthcare staff and has played an important part in increasing the overall awareness of the healthcare staff towards MFI:

With IHI MFI, the good thing is that the training is easily available. I think it is an excellent methodology. I really like it.

Participant 6

It’s [training] easily available, its [training] easily shared and it’s cheap. It costs about $30 per person that we put in it, if everyone does it, it’s $30 per year which is basically negligible.

Participant 20

Other than the online training, Ko Awatea – a healthcare improvement institute part of Counties Manakau DHB (South Auckland region) also provides training programmes licensed by IHI and supported by HQSC. There are two different training programmes: a one year long ‘improvement advisor training programme’ and six months long ‘improvement facilitator training programme’:

DHB will pay the people to go get trainings from different places like Ko Awatea or IHI, lean training. We fund people to go and get the training.

Participant 17

This is based around training healthcare staff to use the MFI approach. Both the DHBs and the HQSC provide healthcare staff with several yearly scholarships for MFI training through Ko Awatea. Having a local institute and HQSC supporting MFI was recognised as one of the primary factors for the DHBs, especially smaller DHBs, to use MFI:
You will find that the smaller DHBs are all using MFI because of the access to trainings and a resource like Ko Awatea, the people there. You need help, you know who to ring or ask for.

Participant 28

Other than online training and access to Ko Awatea, HQSC and other local resources, DHBs can also access different resources from the IHI website which is recently updated with new publications and case studies focusing on the use and implementation of MFI principles in different healthcare settings and other guides of similar nature:

I like it [MFI] because it is very simple, and it gives you access to a lot of other ideas and things which can you shamelessly from the IHI website.

Participant 12

5.4.2.2 Language

As mentioned earlier, the MFI was developed by IHI to drive QI in healthcare settings. They have used a simplified language for their model rather than using the QI jargon from mainly the manufacturing industry. This simplified language has attracted a lot of healthcare organisations towards using MFI. Even in the New Zealand, the majority of the DHBs are using MFI (see table 5.1), and its simple and healthcare-specific language is one of the reasons for its high rate of adoption. As the MFI does not rely on the strong QI jargon, it is easy to teach and learn, which makes it more accessible and preferred by the majority of New Zealand’s DHBs and their respective staff:

The thing is that it [MFI] is a very simple approach and it is very approachable to clinicians and for them to understand. It is relatively easy to teach. So, there are a lot of benefits to IHI MFI.

Participant 16

The thing about MFI is the tools are very easy to understand and they are easy to use. When we tell them, we need this, they do it and they hardly come back and say we don’t know how this tool or diagram will work, you get quick result of it as well, so you see the real improvement right then and there and you don’t wait for a long-term trend.

Participant 29

Participants talked about using MFI because it explains the fundamentals of QI in plain and simple English using terminology that fits with the healthcare sector, whereas other QI methodologies have their own particular language and jargon (see section 5.3.3):

We [DHB] like MFI because it actually talks in common sense plain English and when you don’t have a lot of people to support you, you don’t need to be having to learn a whole set of new jargon.

Participant 23
The language of MFI is easier to get for medical staff, nurses etc. it is designed with healthcare in mind whereas lean is not.

*Participant 27*

According to the gurus (Crosby, 1996; Deming, 1982; Ohno, 1988; Womack & Jones, 1996), QI is part of everyone’s job in an organisation. However, DHBs are very complex organisations comprising of staff from different backgrounds. To implement and sustain QI, it is important for all the staff members to share the same QI methodology and language. Participants mentioned that it is very easy to train employees for using and following the principles of MFI. This allows the DHB to have one shared QI language and methodology, which helps them to disseminate QI in their organisation effectively:

> For me the most important thing is creating that shared language and ensuring that what you are trying to use is accessible because we believe that quality improvement needs to be everybody’s responsibility.

*Participant 25*

### 5.4.2.3 Supported by Health Quality Safety Commission

MFI is one of the primary QI methodologies that is supported by the HQSC – a crown entity with the responsibilities of implementing and supporting QI in the New Zealand DHBs.

HQSC has been licensed by IHI to use MFI in their national programmes and in everyday DHB operations as well, and has helped to build a training and development setup by partnering with Ko Awatea. This international and local partnership has given HQSC a unique position and opportunity to aggressively expand the use of MFI in the New Zealand healthcare system:

> In our national programmes, we will mostly and mainly use IHI’s MFI because it is a solid methodology for driving QI in healthcare.

*Participant 32*

HQSC also provides scholarships every year for the DHB staff members to attend their one-year long ‘improvement advisor training programme’ that coaches staff members to be fully trained in developing and running QI programmes in their DHBs based on the MFI method. The DHBs also sponsor their staff to be trained as ‘improvement advisor’ by Ko Awatea:

> Some of our staff members have been provided with scholarships to go and get those [improvement advisor trainings] from the HQSC in Ko Awatea up in the counties.

*Participant 9*
We sent some people to get the training because HQSC had mentioned it.

**Participant 18**

This support from HQSC has played a vital role in DHBs’ decision to use MFI as their primary QI methodology. HQSC does not provide the same support for other methodologies per se. Participants interviewed from HQSC were all trained in LT as well and they mentioned that if a DHB requires our help in using LT, we would not refuse it, albeit it has never happened. HQSC admitted that was an unacknowledged fact that they have a preference for MFI because they use it in their National programmes and they have contracted Ko Awatea to deliver trainings in MFI:

> I know LT, I have experience in it. I am happy to help DHBs or PHOs who want to use it and need my help, but it has never really happened.

**Participant 51**

Participants from smaller and rural DHBs or DHBs with a small or no designated QI team stated they are satisfied using MFI. However, they also do not have any other choice of methodology for QI because they do not have the financial and human capital and capability resource to use LT or six sigma. So, a QI methodology supported by HQSC in every way is a definite deciding factor for such DHBs to adopt MFI:

> Also, because it is offered by HQSC, there is no reason to go for another philosophy, no matter how good or effective they are. HQSC helps us learn, train etc, for a small DHB that is a huge factor. If I want lean here, who will teach it to everyone? who will teach it to me? I know the basics of it but as I understand, that is not enough.

**Participant 23**

5.4.2.4 Responsive

MFI is all about rapid improvement

**Participant 13**

MFI is based on rapid improvement events which are conducted using PDSA cycles. This particular characteristic of MFI was recognised as very attractive to the participants who mentioned that they do not like to use other QI methodologies because the actual implementation of an improvement takes a very long time; there is a lot of work that one has to do to reach a point of implementing the improvement, whereas in MFI, one can jump directly to implementation. MFI suggests testing ideas rapidly instead of spending time on designing improvement plans using tools such as A3 reporting or DMAIC before one can actually start the implementation process:
The value of the model for improvement is that you can test ideas. It enables us to try new ideas and it really enabled us to try things without having a big huge plan written down initially for that. We were able to have an idea and try it and adapt it, adapt it and adapt it as we go through.

Participant 22

In terms of IHI MFI, it enables you to, if you see a problem in the medical practice then you can kind of look at some solutions using the model like using PDSA cycles to teach the ideas. I think it’s been really effective.

Participant 25

The rapid improvement events allow the DHBs to test the improvements in smaller settings across the DHB in different processes, which admittedly allows them to tweak some changes in the implementation plan and compare different implementation and reporting mechanisms that can help them to sustain the change on a larger scale:

There’s just so much going on and the changes themselves and we look at what might work and then we’ll try it, a small test of change and then evaluate it and if it works, we do more and still keep testing it, evaluating it and then roll it out if it is beneficial without any negative impact.

Participant 20

5.4.2.5 Employees and the Model for Improvement

According to majority of the participants (n=21), employees showed less resistance towards MFI compared to other QI methodologies. This was mostly attributed to the fact that MFI is a healthcare-oriented methodology and it is easy to understand and implement (see section 5.4.2.2):

In my experience, MFI sees less resistance and people understand it quicker.

Participant 23

Because of the rapid improvement events, employees can witness the improvement and its explicit benefits sooner which helps with increasing MFI’s awareness and reducing resistance in the hearts and minds of the healthcare staff towards it:

The MFI suggests doing small tests of small things in small areas and that really helps… quick results help to get people on board.

Participant 27

Overall, MFI’s simple language, accessibility in the New Zealand, responsiveness in terms of implementing improvements and exhibiting positive results has made it a first choice for QI in healthcare. It has increased the overall confidence of DHBs to conduct QI initiatives
successfully and has empowered their respective employees to conduct several QI initiatives in their work:

I think it’s just enabled us to be able to have the confidence to make some changes and to know that we are going to test somethings, we will implement something and have look at it and we’ll see if it works and then modify it if we need to and then have a look at that process and see if we need to modify it. So, that continuous cycle, improvement and change, it’s empowered me to say let’s try this, we can give a go and if it doesn’t work, we can adjust or alter it. I think that’s been really good in terms of enabling that change and that process and I think when you present ideas to people and you say we’d like to try this and just see what happens.

Participant 22

Table 5.6 provides an overview of the coding scheme, including the major themes (1st order codes), and sub-themes (2nd, 3rd and 4th order codes), and the number of participants from each DHB that cited them as perceived benefits of MFI.
<table>
<thead>
<tr>
<th>Themes</th>
<th>DHB2</th>
<th>DHB6</th>
<th>DHB7</th>
<th>DHB8</th>
<th>DHB10</th>
<th>DHB11</th>
<th>DHB12</th>
<th>DHB14</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accessible</strong></td>
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<tr>
<td>Supported by HQSC</td>
<td>3/3</td>
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<td>3/3</td>
<td>3/3</td>
<td>3/3</td>
<td>4/4</td>
</tr>
<tr>
<td>Trainings done in New Zealand by Ko Awatea</td>
<td>3/3</td>
<td>3/3</td>
<td>2/2</td>
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<td>2/3</td>
<td>2/3</td>
<td>2/3</td>
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<tr>
<td>Trainings conducted by medical staff</td>
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<td>1/3</td>
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<td>1/3</td>
<td>1/3</td>
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<td></td>
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<tr>
<td>Supported by IHI</td>
<td>3/3</td>
<td>3/3</td>
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<td>3/3</td>
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<td>4/4</td>
</tr>
<tr>
<td>Online trainings from IHI open school</td>
<td>3/3</td>
<td>2/3</td>
<td>1/2</td>
<td>1/2</td>
<td>1/3</td>
<td>1/3</td>
<td>2/4</td>
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<tr>
<td>Very cheap to train online</td>
<td>3/3</td>
<td>2/3</td>
<td>1/2</td>
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<td>2/3</td>
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<td>2/4</td>
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<tr>
<td>Flexibility of training at work/home</td>
<td>3/3</td>
<td>1/3</td>
<td>1/2</td>
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<td>1/3</td>
<td>1/3</td>
<td>2/4</td>
<td></td>
</tr>
<tr>
<td>Each DHB has staff trained for it</td>
<td>2/3</td>
<td>1/3</td>
<td>2/2</td>
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<td>1/3</td>
<td>1/3</td>
<td>2/4</td>
<td></td>
</tr>
<tr>
<td><strong>Language</strong></td>
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<td></td>
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<tr>
<td>Healthcare specific language</td>
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<td>2/3</td>
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<td>2/2</td>
<td>3/3</td>
<td>3/3</td>
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<tr>
<td>No Jargon</td>
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<td>3/3</td>
<td>3/3</td>
<td>3/3</td>
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<tr>
<td>Simplified tools and techniques</td>
<td>1/3</td>
<td>1/3</td>
<td>2/2</td>
<td>1/2</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td>2/4</td>
</tr>
<tr>
<td>Language is not frightening</td>
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<td>2/3</td>
<td>1/2</td>
<td>2/2</td>
<td>3/3</td>
<td>2/3</td>
<td>1/3</td>
<td>1/4</td>
</tr>
<tr>
<td>No use of word “waste”</td>
<td>3/3</td>
<td>2/3</td>
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<td>1/3</td>
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<td>1/3</td>
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</tr>
<tr>
<td>Care is the core concept, not efficiency</td>
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<td>1/2</td>
<td>2/2</td>
<td>2/3</td>
<td></td>
<td></td>
<td></td>
<td>2/4</td>
</tr>
<tr>
<td>Language is closer to medical staff and their work/logic</td>
<td>3/3</td>
<td>2/2</td>
<td>2/2</td>
<td>2/3</td>
<td>1/3</td>
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<tr>
<td><strong>Responsive</strong></td>
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<tr>
<td>Rapid improvements</td>
<td>3/3</td>
<td>2/3</td>
<td>1/2</td>
<td>1/2</td>
<td>3/3</td>
<td></td>
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<tr>
<td>Direct to action</td>
<td>2/3</td>
<td>2/3</td>
<td>1/2</td>
<td>2/2</td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>No need for tiresome paperwork and A3s</td>
<td>1/3</td>
<td>1/3</td>
<td>1/2</td>
<td></td>
<td>1/3</td>
<td>2/3</td>
<td>1/4</td>
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<tr>
<td>Directly test ideas</td>
<td>3/3</td>
<td>3/3</td>
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<td>3/3</td>
<td></td>
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<td></td>
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<tr>
<td>A fast version of PDSA</td>
<td>1/3</td>
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<td>2/3</td>
<td></td>
<td>2/2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Small but quick changes</td>
<td>3/3</td>
<td>2/3</td>
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<td>3/3</td>
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<tr>
<td>Small frequent improvements</td>
<td>1/3</td>
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<tr>
<td><strong>Employee Empowerment</strong></td>
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<tr>
<td>Clinical staff does not resist MFI</td>
<td>3/3</td>
<td>2/3</td>
<td>2/2</td>
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<td>3/3</td>
<td>3/3</td>
<td>3/3</td>
<td>4/4</td>
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<tr>
<td>They trust and believe in IHI</td>
<td>3/3</td>
<td>2/3</td>
<td>1/2</td>
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<td>2/2</td>
<td>3/3</td>
<td>3/3</td>
<td>3/4</td>
</tr>
<tr>
<td>It is easy to understand</td>
<td>2/3</td>
<td>2/3</td>
<td>1/2</td>
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<td>3/3</td>
<td>2/3</td>
<td>1/3</td>
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</tr>
<tr>
<td>Quick results help to bring people on board</td>
<td>2/3</td>
<td>2/3</td>
<td>1/2</td>
<td>2/2</td>
<td>1/2</td>
<td>1/3</td>
<td>2/3</td>
<td>1/3</td>
</tr>
<tr>
<td>Actions are always better than paperwork or stories about improvements</td>
<td>2/3</td>
<td>1/3</td>
<td>1/2</td>
<td>2/2</td>
<td>1/3</td>
<td>3/3</td>
<td>2/3</td>
<td>2/4</td>
</tr>
<tr>
<td>Brings confidence in clinical staff that they can improve things</td>
<td>3/3</td>
<td>3/3</td>
<td>2/2</td>
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<td>2/2</td>
<td>1/3</td>
<td>1/3</td>
<td>1/4</td>
</tr>
<tr>
<td>No need of operations background or engineering degree</td>
<td>3/3</td>
<td>1/3</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Makes improvement a part of common sense</td>
<td>2/3</td>
<td>1/2</td>
<td>1/2</td>
<td>1/3</td>
<td>1/3</td>
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</tr>
<tr>
<td>If you want to improve it, just do it.</td>
<td>2/3</td>
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<td>1/2</td>
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</tbody>
</table>

Table 5.6: Overview of the benefits of Model for Improvement
5.4.3 Criticisms of the IHI Model for Improvement

This section includes the detailed account of criticisms and reasons for not using MFI as mentioned by the research participants, especially those from DHBs not using MFI as a QI methodology.

5.4.3.1 Model for Improvement is Basically Lean Thinking

Some participants (associated with DHBs not using MFI) did not see MFI as a separate and unique QI methodology. For them, it was a simplified version of LT or just a few QI tools that have been used and tested in healthcare for some time now. Those simple tools are useful but only to a limited extent. Driving QI requires looking at the whole system as one and improving the patient flow by eliminating waste from the root cause in the respective system. According to the participants, the reason MFI is being used in the New Zealand’s healthcare system is because HQSC adopted it and decided to use it as their core methodology in the National programmes. It is a short-term improvement strategy which lacks systems thinking:

To be honest, MFI is lean thinking and the old classics of QI with a different packaging. Now, I know you must think well then, they are the same. But no, they are not. When you repackage something, you leave behind some parts of the old thing, some really crucial parts of it. I am an operations engineer. I have worked with the big names from both sides [IHI and Lean], I can tell you that MFI is not even remotely close to Lean thinking. It is a short-term solution, not a long term. In the long term, it might end up causing issues because it will be hard to migrate people back to the real thing, i.e., lean... MFI is a money-making scheme and unfortunately the guys upstairs [ministry of health and HQSC], they took the bait.

Participant 2

MFI is one of those fad QI methods. It’s not the real deal and I am only saying it because I have worked with it and seen how it is used

Participant 1

I am not a big fan of it. For a layman, it is a new, unique methodology but if you are good operations manager as any then you know it is just nothing. It will go away sooner or later. It has no legs to stand on in my opinion. It is PDSA and that's it.

Participant 4

Participants also mentioned that MFI lacks the analytical characteristics of a robust QI methodology, which meant that it might show positive results in small improvement initiatives, but not for systemic improvements:

I suppose if you skip all of that analytical stuff, then that is MFI and that might be alright in some areas.

Participant 16
Because of the notion that MFI is a simplified version of other QI methodologies and is comprised of the same tools as other methodologies, four DHBs mentioned that they decided to use the original QI methodologies rather than adopting a new one as it was not worth making the transition from the original methodologies these DHBs were using to their simplified version, i.e., MFI:

I think we never even considered it to be honest. I have partial access to it but yeah never bothered to look. We might use one tool of it in our work but that would be because the tools are overlapping. I mean you have VSM in both maybe and if you use VSM in [our DHB] as part of lean six sigma, that should not mean you are now supporting IHI’s MFI.

Participant 19

Problem with MFI is that it says just do PDSA for everything without looking at the bigger picture or system or even the root cause. If I have a problem in a ward, but the root cause is somewhere else, MFI will not do much. Also, it cherry picked the easy parts of lean and people think they are now champions of QI. The problems on a grander scale, production planning, problem solving, variation, Jidoka etc, they are not covered in MFI.

Participant 2

5.4.3.2 Lack of Systematic Problem Solving

The key difference between [MFI and LT] is that most of the projects where we use MFI as a core framework, there is an assumption that they have already got their research done—know the problem, know the solution. So, you are doing less of a problem-solving aspect of the work. You are testing the solutions to see if they do work the way you expect them to work whereas in the lean work, we put more emphasis on understanding the root cause, understanding what the problem is, spending more time with the diagnostic stuff and then starting your implementation for solution.

Participant 21

Participants criticised the MFI for not focusing on root-cause problem solving. One of the primary reasons for not choosing MFI was because it lacked robust problem-solving capabilities, found in other QI methodologies. It does not focus on eliminating problems from their root cause and works by testing rapid improvements which may or may not eliminate the real problems from the processes:

I really don’t think they spent the time thinking about the problems. It is much more a solution based approach and while the PDSA cycles are very very important in implementation, I don’t think that PDSA cycles are in the way which IHI use them are a problem solving technique.

Participant 2

In my experience, in MFI, it lacks the problem-solving element. It’s very fast, you see a problem and you do something about and test the idea. It doesn’t have, it is not self-evident how you select or solving the right root cause in MFI. I think it is appropriate for somethings but not all.

Participant 7
This lack of systematic problem solving does not allow the DHBs to improve their systems by eliminating waste. In some cases, they might be eliminating visible waste. However, they will not be necessarily improving the overall system:

We used a structured A3 approach with cascading A3s and one of the A3s that staff down there came up with was around collecting blood samples because they identified that the way the phlebotomist collect the blood samples, he would walk around the department, it would take an hour, they would get right around the ED, they’d take all the blood, put it in the bins and they would come back and take the next batch of the blood and do it again. That level of batching which potentially adds an hour to the process is a significant issue in terms of flow except that when they actually went down and looked at the problem and if you are using an IHI approach you are probably going to change that but when we looked at it, although it was a problem, it didn’t actually make any difference to the end process in time because it was running parallel to all the other processes and stuff. So, the staff just said ok we will park that one, come back to it if we have time. It is a problem, but it is not a problem that we have to fix and that is the difference I think, the difference between thinking rather than reacting to the problem.

Participant 3

That [IHI MFI] wasn’t really there in 2009 when we started. MFI to some extent is PDSA, before you get to plan, you basically identify a problem and you pick a solution and carry on but there is not much focus on identification of what the root cause was, its not something that is called out and it is breezed over…The tools to do that, to identify root causes, brainstorm and what solution is best are kind of absent from the IHI approach.

Participant 10

5.4.3.3 Applicable for small scale projects

According to some participants, MFI was only applicable to small-scale projects. Upon probing this discussion point, it was revealed that participants believed this because of MFI’s reliance on rapid improvement events using PDSA cycles. Therefore, participants further believed that this applicability of MFI on small projects made it more like a passing fad rather than a credible QI methodology:

The MFI approach works a lot better in small scale and local ward improvement. When you start working on big things and bring systems thinking into the discussion or you are working across multiple services, it is actually not robust as an approach. I don’t think so as compared to lean or six sigma approach. That is why, I don’t think it will last very long in healthcare.

Participant 16

MFI is also very prescriptive in nature, another reason why it works only for small-scale projects. This prescriptive nature of MFI was appreciated by the participants with medical sciences background as it allowed them to conduct QI initiatives in their domain:

MFI is very good for us because it gives us a very simple step-by-step guide to improvement.

Participant 13
However, participants with QI or operations background had a completely opposite reaction on this characteristic of MFI. According to them, QI methodologies should not be prescriptive to such an extent as it takes away their universality in terms of their application in different industry as well as different processes:

I found that IHI was a little bit prescriptive and long winded. You can’t be so prescriptive. You need some room in there otherwise, you will never think out of the box.

Participant 10

5.4.3.4 IHI is a Big Business

A key theme that came out of the interviews data surrounding the criticisms of MFI was the fact that it is developed by IHI. As mentioned earlier, this very fact also was a key reason for DHBs to adopt it whereas the participants from DHBs not using MFI stated IHI is a renowned business organisation in the healthcare industry. They developed MFI and provided licenses to other healthcare providing organisations to use it. This puts them in a position where they could not be held as a reliable source of information regarding QI and other QI methodologies. Some of the participants who had either worked with IHI or attended their training seminars mentioned that they deliberately portrayed other QI methodologies to be weaker than MFI by presenting them as unfriendly or incompatible to healthcare settings or by misrepresenting their tools and/or other attributes:

IHI didn’t use to be but it is a big business now and they have published two white papers; one in about 2007 where they basically said lean is the way to go and 4 years ago they published a comparison of lean and IHI methodology where they basically say lean isn’t relevant to healthcare, you have to use the IHI methodology and it is rubbish. The paper is a complete misrepresentation of lean. It was a reaction to the fact that a lot of hospitals in US have moved towards lean as a QI methodology.

Participant 2

I have been to IHI’s trainings and I know a few colleagues who work or worked there [IHI]. It is a good institute but not when it comes to training people for QI. It is because they want you to throw away other proven [QI] methods and use their method.

Participant 10

Participants also talked about the same description of QI methodologies by IHI; the problem-solving aspect in MFI; and the white papers published by them on LT and MFI:
The HQSC basically paid IHI to come over and run a collaborative and I spoke to the guy from IHI who spoke at the 2nd National workshop. I told him what I thought of their paper on lean and my views on PDSA cycles. He said that we don’t say that, we don’t say that. You got to work out the problem first but that is not the way they sell the programme. They sell the easy stuff, make changes. I refer to it as sort of a house approach to QI. We’ll just keep doing things and hope that something works.

Participant 3

Table 5.7 provides an overview of the coding scheme, including the major themes (1st order codes), and sub-themes (2nd, 3rd and 4th order codes), and the number of participants from each DHB that cited them as main perceived criticisms of using MFI as a QI methodology in healthcare environments (DHBs).
### Themes

<table>
<thead>
<tr>
<th>MFI is basically LT</th>
<th>DHB1</th>
<th>DHB2</th>
<th>DHB3</th>
<th>DHB4</th>
<th>DHB5</th>
<th>DHB6</th>
<th>DHB7</th>
<th>DHB8</th>
<th>DHB9</th>
<th>DHB10</th>
<th>DHB11</th>
<th>DHB12</th>
<th>DHB13</th>
<th>DHB14</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFI is handpicked simple LT tools</td>
<td>3/4</td>
<td>3/3</td>
<td>2/3</td>
<td>4/4</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>3/3</td>
</tr>
<tr>
<td>Simple LT tools are nothing without the overarching philosophy</td>
<td>2/4</td>
<td>2/3</td>
<td>2/3</td>
<td>3/4</td>
<td></td>
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<td></td>
<td>2/3</td>
<td>3/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MFI is pretending to be not lean, but it is Lean minus analytics is MFI</td>
<td>1/4</td>
<td>2/3</td>
<td>1/4</td>
<td>2/3</td>
<td></td>
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<td></td>
<td></td>
<td>1/3</td>
<td></td>
<td>1/3</td>
</tr>
<tr>
<td>MFI took out all the good stuff of lean Just because it is hard to implement is not a good reason to take out lean tools</td>
<td>2/4</td>
<td>3/3</td>
<td>2/3</td>
<td>4/4</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>2/3</td>
<td>3/3</td>
<td></td>
<td>2/3</td>
<td></td>
</tr>
<tr>
<td>Lean was big picture, MFI is small stuff</td>
<td>2/4</td>
<td>3/3</td>
<td></td>
<td>2/4</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>1/3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Lack of systematic problem solving

| MFI lacks root cause problem solving | 4/4  | 2/3  | 2/3  | 3/4  | 1/2  | 3/3  |       |      |      |       |       |       |       | 3/3   |
| MFI looks at visible part of problems, not the invisible or root causes | 2/4  | 2/3  | 1/3  | 1/4  | 1/2  | 2/3  | 1/3   | 2/3  |      |       |       |       |       |       |
| It is a solutions-based system, not problems based like LT or TQM | 2/4  | 1/3  | 1/3  | 2/3  | 1/4  | 2/3  | 3/3   |      |      |       |       |       |       |       |
| MFI is taught to have quick actions | 4/4  | 2/3  | 1/3  | 2/4  |      |      |      | 2/3  | 3/3   |       |       |       |       |       |
| You are supposed to do homework, but people don’t | 4/4  | 2/3  | 1/3  | 2/4  | 1/2  | 2/3  | 3/3   |      |      |       |       |       |       |       |

### Applicable for small scale projects

| MFI is for small projects | 3/4  | 2/3  | 1/3  | 1/2  | 2/3  | 1/3  |       |      | 3/4   |       |       |       |       |       |
| Appropriate for single process or value stream only | 3/4  | 1/3  | 1/3  | 1/2  | 1/3  | 2/4   |       |      |       |       |       |       |       |       |
| Not appropriate for creating flow | 3/4  | 2/3  |      | 3/3  | 1/3  |       | 1/4   |      |       |       |       |       |       |       |
| It is very prescriptive | 3/4  | 2/3  |      | 1/2  | 1/3  | 1/3   |       |      |       |       |       |       |       |       |
| Step-by-step guides of MFI are for very certain type of problems and projects | 3/4  | 2/3  |      | 1/2  | 3/3  | 1/3   |       |      |       |       |       |       |       |       |
| IHI creates these step by step guides for certain problems You follow steps by IHI | 3/4  | 1/3  | 2/3  | 1/3  | 2/2  | 2/3  | 1/3   | 2/4  | 3/3   | 2/3   |       |       |       |

### IHI is a big business

| IHI is making money | 3/4  | 2/3  | 1/4  |      | 2/3  |      |       | 2/3  | 2/4   |       |       |       |       |       |
| MFI is licensed by IHI | 2/4  | 2/3  | 3/4  |      | 2/3  |      |       | 2/3  | 3/4   |       |       |       |       |       |
| HQSC went to IHI and got it for New Zealand | 2/4  | 2/3  | 2/4  | 1/2  | 2/3  | 2/3   |       |      |       |       |       |       |       |       |
| Not about improvements, it is about making money | 3/4  | 2/3  | 3/4  | 1/2  | 3/3  | 3/4   |       |      |       |       |       |       |       |       |
| IHI is cashing their name | 2/4  |      | 1/4  | 1/2  | 2/3  | 3/3   |       |      | 2/3   | 2/3   | 1/3   |       |       |       |
| IHI did not develop MFI | 3/4  | 2/3  | 1/4  | 2/3  | 2/3   | 1/4   |       |      |       |       |       |       |       |       |
| IHI published papers about lean being the best in healthcare then started saying no MFI is better | 4/4  | 2/3  |      |      | 2/3   |       |       |       |       |       |       |       |       |       |

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**Table 5.7:** Overview of the criticisms of Model for Improvement
5.5 Summary of the Chapter

This chapter presented the findings related to RQ4 and RQ 4.1. A quick overview of QI methodologies being used in the New Zealand healthcare system was presented, which highlighted LT and IHI’s MFI to be the most adopted QI methodologies in the New Zealand. Following that, a thorough investigation of LT and MFI, and their benefits along with criticisms as perceived by the participants, who are very close to their respective DHB’s QI agenda, and are responsible for supporting it were presented.
Chapter 6
Findings 2
Quality Improvement Managers
6 Introduction to the Chapter

Following the discussion on QI methodologies in the New Zealand DHBs, this chapter includes the findings from interviews regarding the challenges faced by employees responsible for introducing, implementing and supporting QI in DHBs.

In this research, they are referred to as QI Managers (QIMs). With the exception of HQSC participants, all the others recognised themselves as QIMs.

First, participants were asked questions surrounding their QI role followed by questions regarding skills and resources required by QIMs to perform their job well and the challenges faced by them. This exercise was conducted to develop an understanding of the role and deployment of QIMs; and what differentiates successful QIMs from the rest. These findings are presented below:

6.1 Characteristics of Quality Improvement Managers

Initially, the discussions were based around the particular role QIMs play in each of the DHBs to recognise the characteristics of effective QIMs:

Our job is to improve the quality of our healthcare services, but without the right ammunition, we are nothing, we are useless.

Participant 12

6.1.1 Quality Improvement Expertise

One of the most acknowledged characteristics of QIMs was based around their expertise in QI. The majority of the participants \((n=43)\) agreed that an effective QI owner needs to be an expert in QI, so they can disseminate QI efficiently in the DHBs.

Upon probing the participants regarding this particular characteristic of QIMs and what they thought ‘expertness’ of QIMs was comprised of; two very prominent categories were revealed: (1) QI owner’s experience in QI, and (2) QI owner’s experience within healthcare. Both of these are further explained with supporting quotations from the participants.
6.1.1.1 Experience in Quality Improvement

It was revealed through the interviews that an effective QI owner needs to be an expert QI owner. One of the key features of this expertise was based around QIMs having past experience in QI and with using certain QI methodologies described in the previous chapter.

Participants disclosed that QIMs especially those who had either no experience in QI or they were still getting trained in QI methodologies had a hard time establishing their relevance and legitimacy in the organisation. However, if the participants were experienced in QI, they had higher legitimacy as a QI owner:

If you are new to this [QI in DHBs], you will have zero support. You have to build that. You have to create your relevance and build that too because healthcare has no history of QI in terms of process and operations management. QI means and meant for a long time, a very different thing in healthcare.

Participant 21

QIMs who were in the early years of their role as QI owner and were still learning more and more as they conducted QI initiative mentioned that whilst their first projects showed positive outcomes, they made mistakes and have been getting better at QI with each new initiative they undertake. The QI trainings focus primarily on the theory which explains the use of various QI tools but, when QIMs started using those tools in their actual work, it was very difficult because there are many different variables involved in the actual implementation of QI initiatives. The training does not prepare the QIMs for dealing with adverse incidents in the implementations. However, the goal is to learn from one’s mistakes, instead of repeating them project after project as that can affect their legitimacy negatively among the staff:

After learning MFI, when I came back [to my DHB] and did my first project, I thought naively that everything will work out as they taught me but the real world is more dynamic. So, the first project went well but I made so many mistakes. I have learned my lesson and I am still learning new ones every day.

Participant 6

Overall, the more experienced QIMs were in QI, the better chance they had of being a legitimate stakeholder in DHBs. Majority of the participants (n=42) recognised this and mentioned it in the interviews:

You need to be an expert in what you are preaching. Whatever QI method it is, you need to be an expert so that when people come to you, you can solve their problem.

Participant 38
6.1.1.2 Experience in Healthcare

According to the participants, other than the experience in QI (as mentioned above), they should have prior experience of working in specifically healthcare too. This is also to do with their legitimacy and to be seen as a reliable QI owner who knows how the healthcare industry works and how it is different than other industries. Participants especially (but not only) who joined QI teams after working in other industries (manufacturing-related industries primarily) talked about difficulties they faced in their early career days to be seen as a legitimate and reliable QI owner by other healthcare employees – the primary reason behind the distrust other employees had was their past experience outside the confines of healthcare industry:

You don’t want to be seen as an outsider to the staff. They are just going to diss [dismiss] you by saying you don’t know how healthcare works. I have a production background but I have been in this business [healthcare] for a long time now. I have earned my legitimacy with these people [healthcare staff].

Participant 3

The participants revealed that when someone does not have this particular characteristic (experience in healthcare), they fail to do their job effectively because either the people don’t listen to them, i.e., demonstrate resistance or the healthcare staff sometimes do not work with the QIMs because they are not sure whether the respective QIMs can in fact successfully conduct a QI initiative and deliver a positive outcome:

I know people who did not have those [QI] expertise and people [employees] in their ward just did not give them any support, which is fair. You can’t go on and start QI because if you don’t know what you are doing, chances are you are going to make things worst rather than improving them.

Participant 10

Healthcare staff can smell the fear on you, they can smell you are new to this. If they do it, you [QI owner] are not gonna [going to] be able to get them to change their mind. This is where what I mentioned earlier about experience in health systems characteristic becomes a part of the recipe.

Participant 29

6.1.2 Change Managers

Continuing the discussion on expertise of QIMs, the participants mentioned that being an expert in QI methods can make one a quality manager, but to be an effective QI owner, one should be an effective change manager too:

I don’t see myself as a QI manager, I think me and others in my team are change managers

Participant 24
The QIM’s job was not just to be well-versed in the QI tools and their implementation, their job was to promote, stimulate and support the QI culture in their DHBs. The QI culture was described very differently by different participants, where some compared it to something one cannot actually explain, but as soon as one sees it, they can tell whether it is there or not:

Don’t ask me about QI culture. It’s just something you can feel if it is there or not. I cannot explain it and honestly, I refuse to explain it. I can give you the textbook stuff such as empowerment or being proactive or whatever people say. But, that’s not all there is. Innit [isn’t it]?

Participant 19

The vast majority of the participants did not explain what QI culture was and agreed with the stance presented in the quote above. Hence, it was decided not to explain what QI was here. However, for this research, QI culture has been defined in the Maturity Model chapter and DHBs and their level of maturity has been analysed based on that definition of QI culture.

As far as the change manager characteristic was concerned, participants mentioned some properties of change managers that made them effective QIMs.

6.1.2.1 Sensegiving

QI is not seen as an integral part of everyone’s job in healthcare, but is presumed to be an add-on feature of people’s jobs. Employees invest their time and energy in QI only when they either see a direct benefit of it or when they have time to take part in it:

Mostly, employees will say we don’t have time for all this and just ignore us.

Participant 13

QIM’s job is to change that thinking in the healthcare sector and promote a culture which endorses QI and employees’ efforts towards improvements. QI makes people’s jobs easier and provides them with more time and energy to perform their job effectively.

The interviews mentioned, to be effective at promoting and supporting the QI culture as a change manager, they should be able to take on a role of a ‘sensegiver’ in the organisation as they should be able to influence the organisational stakeholders to understand the value of QI and why it is a crucial part of everyone’s job:
Sensegiving is crucial in QI. QI is everyone’s job and people don’t see it like that. I think our job is to ensure that this thinking that QI is everyone’s job only then can you have a sustainable QI initiative in a DHB.

Participant 4

QIMs also need to help the healthcare staff in the sensemaking process when it comes to QI, so that employees do not see it as an add-on feature to their jobs but see QI as an integral part of their work and stay fully committed to it:

If we can’t change this thinking that QI is secondary part of their job, then we can’t do QI at all. I got the nurses and ask them if they need help in QI and they say, we are too busy. We don’t have time to do anything. When I ask them what they are doing or where are they spending their time? They can’t tell you. We did this work where we saw where were the nurses spending most of their time and we found out that big chunk of the time was being used in non-value adding jobs. So, we worked with a few of them improve that part. The key factor in that whole project was to facilitate the thinking that QI does not waste time, it actually saves time and it is an important part of everyone’s job. This is what they tried to do with RTC too. This is what we are doing too.

Participant 9

6.1.2.2 Proactive Long-Term Thinking

Successful QIMs take a proactive view towards QI and the change process itself, which requires them to have a long-term QI plan that not only includes an implementation strategy but also a strategy to promote the QI culture in the organisation. Effective QIMs have a long-term view of quality and they work towards providing skills to the employees to conduct their own QI initiatives; QIMs work more as a guiding hand rather than actually conducting the implementations themselves in that case:

The problem is that people think my job is to do the QI work but then, I will need a team of maybe a thousand people to do QI in this big DHB. The only way to resolve this problem is by creating a culture where QI is everyone’s responsibility. In that case, I am a change manager or part of a change team overlooking the process and if you look at the QI gurus like Ohno from Toyota, this is what he was doing too.

Participant 2

You can only be good at QI if you are forward thinking and proactive. The healthcare has a culture of being reactive in process management. We go and fix something when it is fully broken. There is no continuous improvement and that is just not right. I see myself being a part of the problem too but I try not to be, I try to be proactive but my small team can only do so much.

Participant 12

6.1.2.3 Reward Power

The participants mentioned that most healthcare employees have very hectic jobs and they do not get any protected time out of their jobs to conduct QI. Therefore, investing their on-the-job time in QI is considered as a secondary priority by the majority of them. QIMs can
be successful when they have reward power which they can exercise to motivate staff members to be more involved in QI initiatives.

One of the probing questions in the discussion was regarding the nature of said rewards, and the majority of the participants (n=26) agreed that non-monetary rewards tend to be more successful than monetary rewards to promote QI. Monetary rewards have a negative connotation and set a negative precedent that employees should only participate in QI when they are provided with monetary rewards:

I personally think that monetary rewards are not going to be useful in the long-term. We don’t give monetary rewards because they will set a very wrong precedent. We don’t want them to do QI just for money.

Participant 24

On the other hand, non-monetary rewards have a positive effect on the overall motivation of employees and facilitation of QI. Some examples of non-monetary rewards mentioned by the participants included ‘QI awards’ conducted by DHBs internally and by HQSC; recognition from senior leadership; and employee profiles in newsletters. Participants revealed that something as simple as taking the employees out for a coffee after finishing an initiative went a long way in terms of improving motivation.

The primary objective of such rewards was to recognise employees’ efforts in QI and for that, just thanking them for their work was considered a reward and it improved their motivation and participation efforts in QI. This also demonstrated employees that the QIMs and change managers respected them, their work and considered them a crucial part of the QI process:

We try to stick with recognition rewards. Simple things like an award to show our gratitude and appreciation of their contribution. Sometimes, the patients will say thank you and that is a huge reward in itself. It is very satisfying. That is all we can do anyways, we don’t have the power to give better rewards. Maybe the directors or CEs can. Not me.

Participant 15

6.1.2.4 Good view of the Organisation

According to the participants, QIMs were only able to perform their job effectively because they had a good view of the organisation; and their department was linked with every other department or directorate. This way, they could ensure that the QI initiatives would not have a negative effect on another part of the system and would create improvements in the overall system:
If I think about it, my position in the organisational structure is very appropriate for the job. I am well connected to everything vertically and horizontally. In my previous job [in another DHB], I lacked that and it made things very hard.

Participant 10

When the QIMs do not have this organisational view, they tend to have a narrow focus of QI. For example, participants from two DHBs kept their focus on nursing operations mainly when it came to QI, primarily because the QIMs in those DHBs were from the nursing staff and they did not recognise other operational and organisational areas to have issues with quality:

We are mainly focused on nursing operations in my DHB because it is very crucial for us... Other places require improvement, but I am not familiar with them right now. Maybe once we are done here, we can move to other parts of the DHB too.

Participant 30

Similarly, when the QIMs were from particular wards, they did not focus on the systems thinking element of QI, i.e., they did not consider waste transference in their QI initiatives whereas the QIMs with a better view of the organisation from the same DHB acknowledged such adverse scenarios and mentioned about ways to eliminate waste from the root cause rather than transferring to other parts of the organisation:

My job is to make sure renal ward [my ward] is doing well. So, all my initiatives deal with only renal ward. I guess somethings might affect others but, that is outside the boundaries of my work.

Participant 11

6.1.3 QIM’s Relational Characteristics

Effective QIMs are required to be highly relational in nature as suggested by the participants. Further defining this characteristic, participants provided elements of relational qualities of QIMs.

Overall, the QIMs should be approachable by others, so that people do not hesitate to put forward ideas for QI and they do not feel any hesitation to even call for help and assistance. QIMs should be supportive because the majority of the healthcare staff do not have QI expertise and they require constant help and assistance in running and supporting QI projects. It is also because the QIMs are also tasked with training the healthcare staff to run effective and sustainable QI initiatives. Lastly, Effective QIMs are trusted by employees in the organisation. If they are not trusted by the employees, they tend not to approach the QIMs with their problems:
People want to make things better but usually they are too afraid to put forward ideas, you got to create a culture where people can suggest new things, get the discussion going around QI.

Participant 6

6.1.3.1 Approachability

This element of relational capabilities of QIMs posits that the healthcare staff should not feel any hesitation in approaching the QIMs for help and assistance at any point in a QI initiative. The frontline healthcare staff are not experts in QI, and if they are tasked to be part of or lead a QI initiative, it is likely that they will require some assistance at some point—they tend to reach the QIMs if they do not feel threatened to approach them in any way:

The grassroot staff in healthcare know what's wrong. They are so close to the processes. Obviously they will know what's wrong but they are not trained for process improvement. They will need help of people like me and all I have to do is to somehow convey to them that my door is open but you will see that most DHBs [and their QIMs] are not good at it. Probably my team is not good at it too, but we are making things better.

Participant 3

A set of participants described this element of approachability can be formed by creating a low power distance between the QIMs and the frontline healthcare staff. With low power distance, employees do not feel hesitant about reaching the QIMs for help and assistance:

A QI owner as you said has to be very close to the people doing the work, they [employees] should not feel like there is a power distance and they cannot approach me directly because it is against the teachings of the gurus of quality like Ohno and Deming.

Participant 2

Another way to improve the approachability of QIMs was around creating a suggestions and feedback loops between the employees and the QIMs. The frontline staff are closer to the actual work and operational processes which gives them a better vantage point to recognise waste and value-adding processes; the customers; and the inefficiencies in the system itself. If the healthcare staff feel comfortable, they can approach the QIMs with suggestions about new QI initiatives and seek their assistance and guidance in developing a QI initiative:

Without the active involvement of the staff, we [QIMs] can’t do our job. This involvement means them [employees] providing suggestions for improvement, and us [QIMs] deciding which ones are doable and what kind of resource is required for them, and then we can go out, train the people and assist them in designing and implementing a change.

Participant 9
After a QI initiative, if we don’t hear any feedback from the staff, we will assume it is working alright and there is nothing we can do better next time, but it is not true. You can do better but if I don’t know ‘what’, then how can I do it? If the staff feels threatened to come to you and tell you what you can do better, then you are not a good QI owner. QIMs have to be very approachable in every sense.

**Participant 8**

### 6.1.3.2 Supportive

The participants mentioned that the effective QIMs have to be supportive in nature. They are not only tasked with conducting QI but to improve the QI capabilities of the whole organisation as well. They can only accomplish both of these responsibilities by being supportive to the grassroot healthcare staff. QIMs should be able to encourage people to recognise waste and support them in not being hesitant to bring a positive change. Therefore, participants talked about creating and promoting an organisation-wide narrative that QIMs are working for the staff rather than the other way around. This way, the employees see themselves being supported and coached by QIMs to be better at their jobs:

> I am here not to boss around and run QI initiatives. I am here to make things easier and better for our staff and customers. I am more of a coach teaching people how to look at waste, supporting them in running their own QI initiatives small or big.

**Participant 7**

The QIMs conduct training activities to develop and improve overall employee capabilities in the organisation so that employees can run their QI initiatives themselves. However, to do that effectively, employees need to feel empowered and supported by the QIMs. Similarly, for QIMs to effectively run QI initiatives, they need support from employees, and they can only get that support when they reciprocate it too:

> QI requires a two-way relationship with the staff. I help them out, they help me out. We both need to support each other. If I am not supporting them and seeking their support only, I am not an effective QI manager.

**Participant 5**

We can be good at fixing people, but fixing processes is a new domain. It is an unchartered territory for us. I got my training in QI and now I am able to run my initiatives and help others in my ward. But, every now and then, I need help and support too, then I go to one of the other improvement advisors who then assist me because they have been in the quality game for far longer than me.

**Participant 11**
6.1.3.3 Trustworthy

The majority of the participants (n=40) recognised that trust between the employees and the QIMs was a cornerstone of an effective QI initiative. Hence, it was recognised as an element of relational characteristic of QIMs.

Participants mentioned that it takes time build trust between QIMs and the frontline employees. In the beginning, it was very difficult for the participants to get the required support from the employees as they did not trust the participants to be working for mutual benefit. However, some of the participants were able to build and improve the level of trust between them and employees by conducting effective QI initiatives which provided results that benefited both parties:

I think we need to develop trust between us and the employees. If they don't trust us, they might superficially take part in a change. But, if they trust us, they believe us that it is good for the patients and for their job, that superficiality won't be there. It will be hearts and minds in the change process.

Participant 29

Another way to improve the level of trust between the QIMs and the employees was by promoting a view that they were all in this together as ‘one’ team rather than two stakeholders with opposite interests. This was considered an effective approach by the participants. However, this required some work from their side to reduce the power distance between their position and healthcare staff involved in QI in the respective QI initiatives as described earlier:

Most of the times, people see us as outsiders, that is why they don’t trust us. If you want to be effective at your job [as QI owner], then you need to create a culture where healthcare employees see you as one of them and you also show them that it is not their problem or my problem, it is our problem and the best way to deal with it is by collaborating.

Participant 25

Participants mentioned that there was a relationship between providing healthcare staff with autonomy and increase in the level of trust between them. By giving autonomy to the grassroots employees, they were passing the responsibility of QI to them, which was mostly seen as a positive move by the healthcare staff that they were being trusted by the QIMs and they reciprocated the same level of trust towards the QI staff as well. According to the participants, healthcare employees felt themselves to be an important part of the QI process when they were involved in the decision-making process throughout a QI initiative:
I have seen that if I provide them responsibility, I give them some power, some autonomy, they are more effective whereas if I go and tell them what to do, the results won’t be too good.

Participant 22

One of the facet of lean thinking [QI] is to provide empowerment to your staff. You know why? Because then they own the process. Once they own the process, they work hard to improve it because it is their responsibility. When I go for any initiative, I show them how to create an A3, they then create one for their job and submit to their managers and start working on improving their jobs.

Participant 2

You got to remember the respect for people principle of lean too, you can’t force people to do something, you respect their choice too and present it in a way it makes sense and they are happy to do it because they see the value in it.

Participant 4

Table 6.1 provides an overview of the coding scheme, including the major themes (1st order codes), and sub-themes (2nd, 3rd and 4th order codes), and the number of participants from each DHB that cited them as perceived characteristics of successful QIMs.
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<td>High trust among QIMs and frontline staff</td>
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<td>Frontline staff sees them as ‘insider’, not ‘outsider’</td>
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Table 6.1: Overview of the characteristics of QIMs
6.2 Challenges for Quality Improvement Managers

Our jobs are very challenging. Sometimes, it makes things interesting and sometimes, it just makes you feel quite crushed and disappointed.

*Participant 27*

The discussions regarding the role and characteristics of QIMs were followed by the challenges faced by them that inhibit or prohibit them to perform their job effectively and efficiently. This allowed the researcher to gather data that was then coded using Nvivo® and presented below.

6.2.1 Leadership Support

One of the primary challenges faced by the QIMs as described by the participants was leadership’s support towards the QI agenda and the QI team itself. Generally, there is someone in the Senior leadership teams that represents either the QI team itself or the quality directorate. However, the effectiveness of their presence differed across DHBs:

Top leadership and the staff are committed, and that commitment is increasing every day. It is not going away.

*Participant 1*

Our senior leadership is only verbally supportive of QI I can say that.

*Participant 22*

In four DHBs, participants felt the leadership supported the QI agenda wholeheartedly and actively involved themselves in it in various capacities. Participants from those respective DHBs talked about this involvement of the senior leadership and how it allowed them to improve the legitimacy of the QI agenda in their DHBs, which in turn allowed them to get the employees involvement in it:

Our CEO is also a fellow of IHI, that is why, he knows about MFI. He understands the language and participates in change in some capacity whenever he can. But not all CEOs are like that.

*Participant 20*

In a further seven DHBs, participants considered the senior leadership team supported the QI agenda in a lesser capacity than the group discussed above. In these DHBs, whilst senior leadership did not necessarily know about the QI methodologies being used; and they did not take part in any of the initiatives, they still supported the QI agenda and provided resources to the QI team:
I don’t know if members of SLT know the details of QI initiative. They are supportive in terms of resources etc but, I don’t know if any one of them knows what we are doing.

*Participant 14*

Lastly, there were four DHBs, where participants did not feel the senior leadership supported the QI agenda or necessarily knew about it. The QIMs were either not in direct communication with the senior leadership or their presence in leadership was not recognised or effective in any way, i.e., they did not have enough power or influence to make or initiate a lasting QI agenda:

The senior leaders don’t have any clue except for the initiatives that come from the HQSC or the ministry as far as I know.

*Participant 32*

### 6.2.2 Complexity

Another challenge faced by the QIMs was based around the complexity of healthcare and DHB structures. According to the participants, the organisational structure of DHBs were very siloed, where each ward and department operated as a separate unit from others for a long time and thus, each silo developed their own work practices.

When the QIMs implement QI initiatives, it is particularly hard to conduct inter-departmental initiatives because they have to train and develop staff from each department differently; staff from a particular ward might not fully understand or comprehend the effects of their work processes (and even improvements) on other departments since employees tend to primarily focus only on their departmental processes rather than the extended value-streams moving within and between different departments:

Healthcare really is one health system with 1000 different villages [in it]… You go from one ward to another ward and they are 20 metres apart and it's like going to visit another country. Completely different environment not physically but emotionally, contextually and sociologically in every way.

*Participant 1*

One of the prerequisites of QI is eliminating departmental silos in organisations (Liker, 2004). Some of the participants acknowledged this prerequisite and mentioned how their teams were trying to eliminate silos in their respective DHBs. However, participants acknowledged this but failed to provide any examples or strategies to ensure they were eliminating the departmental silos and moving towards systems thinking when it came to QI:
When we started our QI initiative, we decided to adopt LT. Now, I have had past experience in Lean, I have read Womack and Jones, Liker and all the big names in the field. I have met some of them too. If you read their text, you will see that they ask you to see everything as one big system, not department, not organisation but a system whereas we are working in silos. Big part of my training programme is based around training and imploring people to conduct a GEMBA walk of the whole process, not just their part and eliminate silo mentality.

Participant 2

Due to this siloed mentality caused by complex DHB organisational structures, participants mentioned about the phenomenon of waste transference in their work, i.e., when waste is not eliminated but rather transferred to another part of the organisation.

Upon further probing about this phenomenon, the participants revealed that one of the biggest reasons for the waste transference was the small and department-level QI initiatives, which were prepared with a small scope, never anticipating the probable effects of these QI initiatives on other departments or the extended value streams. One of the most common examples of this waste transference was associated with ED and the departments next in the process such as Radiology. Participants mentioned how QI initiatives related to improving and streamlining ED processes regarding patient-care showed improvements in the overall performance of ED. However, those performance improvements created a new backlog or a bottleneck in the radiology department or other departments in the extended value-streams:

I completely agree that of course you can’t properly do a continuous improvement project where all of those supporting functions aren’t accounted for. The challenge is complexity. So, in time. They may say, we acknowledge. For example, the movement of the patients from emergency department, the key contributing factor is the access to radiology. So, you start on the journey of looking at, we do the value stream mapping for movement of patients moving in the DHB system.

Participant 17

6.2.3 Staff Resistance

Staff resistance towards QI initiatives was also recognised as a major challenge from the participants of this research. QI teams generally include a group of employees who are neither medical or clinical employees nor administrative staff in nature. This made them outsiders to other employees, and according to the participants, one of the primary reasons for having staff resistance revolved around this outsiders element of their job:

We get resistance or at least used to get resistance because they [employees] used to see us as outsiders, people not from healthcare and hence, people who do not understand healthcare.

Participant 16
Participants mentioned that the most effective response to such resistance was to have at least some people within medical employees’ category to be trained in QI and be part of the QI team (or QIMs). These respective members of the QI team then serve as a bridge between the QIM’s agenda and the frontline staff. Another benefit of such an arrangement was that the QIMs would get the perspective of the medical staff regarding improvements and can include it in the planning stage of the QI initiatives.

Another reason for staff resistance was based around the beliefs of the healthcare staff about the underlying motives behind the QI initiatives. Participants mentioned that the healthcare staff ordinarily associated QIMs and their initiatives with lowering costs and lowering the healthcare staff’s abilities to control the care process, and hence, they would show resistance toward such initiatives:

People resist to a change which they don’t understand. The language of QI sometimes can create this resistance too. The word ‘waste’ in and outside QI is taken very differently. Best way to reduce resistance is to train the staff.

Participant 23

I think when we got the access to NHS’s RTC programme, it was based around nursing. Before that, nursing staff was generally resisting QI-related change but, after that, we saw a reduction in their level of resistance. So, what changed? They just got familiar with the terms and what they mean and how QI works.

Participant 30

Overall, the reasons regarding the resistance towards QI in healthcare staff were very multidimensional. There was no single issue that was highlighted to being the focus of attention in the discussions.

6.2.4 Capability & Manpower

A team of 3 can never be capable of delivering QI to a DHB of this [urban] size with thousands of employees. Can it?

Participant 6

In the New Zealand, DHBs are one of the biggest public organisations comprised of thousands of employees. However, the QI teams in these DHBs are very small compared to their overall labour force. The biggest QI team in the New Zealand comprised of 30+ people whereas some DHBs recognised themselves who did not have a designated QI team at all.
Overall, it was very hard to define the exact number of employees in the QI teams of each of the DHBs because QI teams comprised both permanent employees and part-time or contractual employee who would join from different wards and directorates on ‘as required’ basis for different QI initiatives:

Our DHB has been very good because we are big, we have money. Our DHB probably has the biggest QI team. I don’t think other DHBs have the same resource in their QI teams but even with this big team, we are sometimes bound to hire contractual employees because otherwise, it is hard to implement QI at this rate.

Participant 16

Participants from all the DHBs except one described having shortage of manpower in the QI teams to be a significant challenge as it inhibited their ability to conduct multiple system-wide QI initiatives at the same time in the DHB. Having a small team was also considered to be a reason for not being able to sustain QI initiatives as there were not enough people in QI teams who could run regular audits to monitor the effectiveness of the previously done QI initiatives:

We are doing ok, just ok. The challenge is this small team I have been given and I cannot hire more people because I have been told ‘there is no budget’ countless times. I can make a point that my team saves money but, nobody wants to listen or acknowledge that. Tell me what can I do?

Participant 14

When you have a small team for QI, you can do only so much. It is impossible for us to go back to our initiatives because we are continuously asked to go to next project. It would be good to have people in my team who are only for auditing previous initiatives and make sure they are on track but we can’t hire new people. So, I am trying to get some internal medical staff to do that but even for that, they require training from HQSC that costs money.

Participant 29

Another challenge was centred around the capabilities of the QI team members. The participants acknowledged the fact that most of the DHBs tend to be inclined towards one particular methodology and most of the QI team members would be trained for that QI methodology. But, if they had bigger QI teams, it would be valuable to have people trained in different methodologies to then pick and choose the most appropriate QI methodology for each of the initiatives or a hybrid approach to QI could be used as well depending on the project scope:

People focus on the [QI] philosophies part so much. I think any philosophy is good as long as it provides results. Every DHB should have people who understand these philosophies. So, you can actually pick and choose the ones which will be the best for a particular initiative. I use PDSAs and VSM, it is a bit of lean and IHI, isn’t it?

Participant 22
6.2.5 Sustaining Change

Sustaining change after a QI initiative has been implemented is recognised as a challenge in the QI literature. Participants mentioned that they also faced this very same challenge in their jobs as QIMs.

QIMs described their role as the facilitators of QI in their respective DHBs. Having a relatively small QI team, the QIMs provide required assistance to departments and wards to conduct QI initiatives. Once the initiatives have been implemented, the QIMs must transfer the responsibility to local employees of the respective wards/departments for sustaining the change and move to the next initiatives. They can install mechanisms to standardise the new value-streams and processes or install auditing and reporting mechanisms to get the required data to inspect the sustainability of the change later, but transfer of responsibility to the appropriate line manager was the final goal:

Every project has auditing mechanisms built into it. So, at the end of each project and again, this is to be taken with a grain of salt as nobody is perfect, but the intention is that at the end of each project, there is a sustainability component. If something goes wrong, those audits should show us that.

Participant 17

It is the responsibility of the local employees to ensure that the change efforts are not wasted and the QI initiative are sustained after the implementation stage. If QI change is not sustained, the QIMs will have to go back and start over, which is not easy for them as they do not have enough manpower in QI teams to take extended responsibility of a change initiative and its sustainability:

Sustaining improvement is always a challenge because once any improvement has been implemented, you as a project manager don’t have ongoing involvement with the service, you don’t have any say in it anymore. You have to go to the next initiative and you transfer the responsibility to the employees in that ward. If they don’t sustain it, it is not your fault. But, you will have to go back to the service later and start over maybe but when, you don’t know because we are short-staffed as it is.

Participant 26

The simple answer is yes, we try our best to control and sustain a change. But, it falls to the owner of that process, it can be a service clinical director or a manager of the ward or a clinical lead of the project because that adds the accountability aspect into the equation too. If they don’t their job, then it is a shame really because all your effort and resource was pointless.

Participant 19

Another reason behind the QI initiatives having unsustained endings was because of the frontline employees resistance and the legitimacy of the QI philosophy in their hearts and minds. Participants mentioned that the employees will sometimes take part in a change
initiative and reach positive changes. However, they will go back to their old routine processes as soon as the QI team would leave after transfer the responsibility for sustaining the change back to the employees. This was because the departmental lead in the QI initiative would sometimes not believe that the change or the QI methodology being used to conduct the change was appropriate enough to be used in their department:

Healthcare staff like to do things there way. Sometimes you get their support during the change process but as soon as you leave, the clinical lead in that ward will say ok, let’s go back to how things were before. Staff is going to listen to them more than us obviously.

Participant 18

Finally, the participants mentioned that the healthcare system of the New Zealand has been exposed to many different QI methodologies. DHBs are notorious for using a certain methodology for a little while and then switching to others. Some DHBs have used different methodologies on a test basis for a short while to check which one works better. On the frontline level, this switching between QI methodologies has created ‘change fatigue’ in the employees. It also reduces their acceptance of the QI agenda of a DHB because it depicts the DHB is not serious about QI or hasn’t really planned it properly:

You have so many QI methods going around in healthcare here [New Zealand], DHBs jump from method to another in a heartbeat. Senior staff makes a decision like this without thinking about how it will impact employees. It creates change fatigue in them. Just trying to fix things using different methods where each method has a different language. They start to lose their faith on QI. So, when a legitimate change happens, they don’t give it their 100% thinking it is a fad too.

Participant 12

Overall, the final choice of QI methodology depends highly on the key players involved in designing a QI agenda in a DHB – a notion shared by the majority of participants of this research. When those key players leave the DHB and someone else with a different view of QI or preferred methodology replaces them, the DHB starts over and undo the changes done by the previous person in charge of QI. This also creates the same reactions at the frontline level in the organisation as mentioned in the paragraph above and inhibits the QI owner’s control on sustaining QI changes.

6.2.6 Power/Influence

The participants frequently mentioned that a critical challenge faced by QIMs is the lack of power and influence in the organisations that inhibits them to promote and support the QI agenda:
I am a senior leader. Have a got power and authority? Not really.

Participant 28

Some of the obvious circumstances recognised in smaller DHBs were where the QI team did not have positional power to promote the QI agenda. The majority of the participants (see table 6.2) acknowledged this fact, but only 3 DHBs (out of the 15 participating DHBs) fell in this category directly and participants from these DHBs recognised positional power was a necessary prerequisite to at least initiate a QI initiative. They acknowledged that they lacked the necessary positional power to conduct and promote QI initiatives despite being a member of the senior leadership team in their respective DHBs. Without the position power, they were unable to get the required acceptance or approval of initiatives they had designed previously:

If I had some power in the DHB, I could get things rolling. But, I am not in that position here. I have to chase people all the time for the smallest changes. But, if HQSC says you have to do this [a QI initiative], then the seniors listen. Why? Because HQSC has that power to get things started.

Participant 32

Another similar challenge in this category was based around QIMs lacking influence in the DHBs. This was also acknowledged by the majority of the participants (see table 6.2). *Influence* comprised of the relationship of QIMs with other stakeholders; the success of previous QI initiatives; and the way QI initiatives were designed and presented:

I had positional power but to be honest, power is boring as batshit. What’s way way more useful is influence and people think power is what counts, it doesn’t. now I have no staff, no budget but what I do have is influence. This way it is much more fun. Who needs power and if people think it is about power then they are missing what lean is about. You know this as well that the sensei's role is to put context and ask the right questions, it is not to tell, it is to help people foster their own understanding and own solutions.

Participant 1

If the QIMs have had a good relationship with the employees from a certain department or they had worked with employees from said department before, this had a positive effect on their influence and thus, positively affected the success (or at least the employees involvement) of QI initiative. That is why, participants mentioned that it was beneficial for them to involve a senior employee/manager as a project lead from the departments where they were implementing a QI initiative to create/maintain that influence. When the employees see their manager (or someone form the same department) involved in the QI initiative, they tend to show less resistance towards the initiative and showed more involvement in the initiative:
When I go to a department for a new project, my first question is always who here has done the green belt training or a project or even the local training. Whoever says yes to that, I put them in my team because I don’t have to start from scratch and they have a better chance of changing other’s view in their department whereas I will be a stranger there and will struggle for that first push. So, this makes my day to day job easier.

**Participant 19**

Similarly, the participants mentioned that the success rate and outcomes from the previous initiatives also help to increase QI owner’s influence in the organisation. Participants stated that the more successful they were with QI initiatives, the more influence and support they started gathering in their respective DHBs. They also agreed that initially, they did not have influence but as the employees started seeing the benefits and positive outcomes from each of the initiatives, they gained legitimacy in the organisation, which increased their influence in the DHBs too. Without the required influence, it was almost impossible for QIMs to do their job effectively:

If the staff has seen QI initiatives working, providing positive results. They will be happy to do it. That will also allow us as the managers [QIMs] to be influential with senior leaders and staff because we deliver results. If we don’t, they are not going to even listen to a word we say.

**Participant 20**

Finally, the participants mentioned the involvement of staff and their reaction to an initiative depended on how a QI initiative was presented to them. If QIMs presented a new initiative without consulting the key stakeholders from that particular department or directorate, they would hardly get the required support they needed to successfully start the initiative. The employees would see it as an unnecessary change and would resist it. This was a challenge for QIMs as it inhibited the change process. As mentioned earlier, another challenge for QIMs was around manpower. When the wards show resistance, it is very difficult for QIMs to spend their time and other resources to minimise the resistance by demonstrating the benefits of QI and by training the employees, so the employees could understand what the change was actually about and what outcomes will it bring. Some DHBs had internal QI training programmes who minimised such resistance but DHBs which did not have such programmes struggled with such resistance:

How you present an initiative makes all the difference. You go and tell them what to do? they hate you. You go and say I need your help to do this, you are the guys who know better. My job is to support you, train you with these QI tools etc. They listen. The problem with this is that now everyone has these people skills in operations management. Also, the problem is to go through this people pleasing process. My job is to improve things, not this. But I have to do this to do my job which just takes a lot of my energy and time.

**Participant 9**
6.2.7 Lack of QI strategy

QIMs found it very challenging to do their job, i.e., introduce, implement and support QI initiatives, without the DHBs having a QI strategy document containing a roadmap or a strategic plan regarding supporting QI activities in the respective DHBs:

We don’t have any QI strategy and it is the equivalent of shooting in the dark.

Participant 23

All the DHBs produce a yearly document called ‘Quality Accounts’ which contains an overview of the quality of the services provided by each DHB. These quality accounts are publicly available on DHB websites. However, they serve more as an audit report rather than a long-term strategy document. QIMs acknowledged that the quality accounts are developed as a compliance requirement by the Ministry of Health (MOH) rather than for developing a future direction for QI. They are written by DHB staff who are sometimes not involved in QI directly, and do not understand all the dynamics of QI and QI initiatives in the DHBs. The majority of the participants admitted that they do not even read or know what is included in the content of the quality accounts of their DHBs mostly:

Quality accounts are not reliable documents. They are written by people I don’t even know and I know they exist but I don’t read it and would suggest you don’t rely on them for your PhD too. They are written for a different and political purpose.

Participant 32

Nearly all participants mentioned this lack of QI strategy in almost all the DHBs in the New Zealand is because of many reasons. One of the biggest reason is that the senior leadership and the board members of the DHBs do not understand QI very well. The majority of the senior leadership teams in the New Zealand DHBs do not have enough members who have been trained or even exposed to any QI implementation strategies and hence, they lack the proper and required understanding of QI and because of that, they might verbally support the QIMs and the QI initiatives, but that is as far as they go:

I have raised a point of having QI strategy for our DHB but the SLT does not understand QI or what we are doing. They always say quality is what we do in everything. We don’t need a strategy plan for that. I know my colleagues in other DHBs are going through a similar problem too.

Participant 12

Participants unanimously agreed that a long-term strategy plan for QI in each of the DHBs in the New Zealand is required and this plan should be made with the input of QIMs in each of the DHBs.
6.2.8 Time Commitment from the Staff

The participants mentioned that QI requires time commitment from the frontline employees, and it also requires them to be vigilant of waste in their jobs. However, not many of them see QI this way, which inhibits the success and expansion of QI agenda:

To effectively implement it requires time but mostly we are not given enough time or people who have to do the work, they don’t get this special time for implementing it. They take that time out of their actual work.

Participant 26

Healthcare employees do not get any ‘protected time’ to work on QI, they are already fully occupied with providing care to the patients and this leaves them with no time to spend on QI initiatives. Participants acknowledged that QI in healthcare requires time commitment from the staff and even when the healthcare staff wants to be involved in the QI initiatives, they do not have the time to do it. If they get involved in QI, it will be in addition to their already hectic jobs, which leaves them very exhausted. If for any reason, the QI initiative fails or does not show positive results, the frontline employees get demotivated and then tend not to be involved in the QI initiatives:

I think the main challenge is of time. Clinical staff is so busy in each hospital and their involvement in QI is necessary. So, when you have to get some time off of them or their calendar you try to find the trade-off value. You ask yourself is this really worth it? They don’t get any extra allocated time to do QI, they have to take out of their actual work or they do QI on top of their actual work. This makes things hard.

Participant 11

The participants mentioned that while the frontline employees get some implicit and explicit rewards for their involvement in QI initiatives (see section 6.1.2.3), these rewards are usually provided to them at the end of a successful initiative.

QIMs have to provide certain rewards to the healthcare staff just to get their involvement in the beginning of the initiatives. In such cases, having power or influence can also work. QIMs will do small things to get the required support from the healthcare staff. However, these small things do not work all the time and that is very challenging having to do things to get support from the stakeholders themselves as it slows down the change process and the QI initiative.
6.2.9 Short-Term View of Healthcare Leaders

According to the participants, healthcare leaders tend to have a very short-term view whether it is members of MOH who want to run projects which will get them elected for another term or the chief executives who are under constant pressure to show quarterly results.

DHB performances are judged on multiple criteria and health target achievements. Part of their funding is also linked to their performance. A good example of these health targets is the six national health targets designed by the MOH, which were discontinued after the first quarter of 2018. Due to these short-term health targets, and the incentives attached to them, the chief executives tend to make decisions that will have quick positive results. Such thinking does not fully comply with the fundamentals of QI as it requires long-term strategic thinking:

QI thinking inspires you to plan for long-term. You can have short-term goals or benefits, but QI is for long-term. The people with power to make decisions and guide our healthcare system think in the short-term. Minister wants to be re-elected. If he creates a plan that will show results after 10 years, he can’t ask for your vote again. So, the way they talk about quality is different. The way they talk is we will improve funding or build you a new hospital or other very tangible things or outcomes. That is not QI.

Participant 10

We have a fundamental problem of unaligned incentives and objectives of many stakeholders. MOH is a good arm of the government, but you have people there who want to be re-elected. Think about it, what will make the better news? A new big fancy hospital or QI methodologies in healthcare? Same is then for the leadership team to some extent. They all want to do good for people, but obviously they want to keep their jobs too. You gotta do these things to stay relevant. Not everyone is like the chief executive Mr. Z from DHB 5, who is famous in New Zealand for their stance on QI.

Participant 29

It is a shame that our DHB’s funding is tide to things like national health targets, which are good thing. Don’t get me wrong. But, that means you have to do good on them one way or another. CEOs want that too because otherwise, they don’t get money, or they will lose their job. SO, their decisions are mostly around those kind of things, not things that actually improve things for the DHB as one system and for our public.

Participant 22

Participants agreed to using QI tools which show quick results for many reasons from getting acceptance from the staff to providing quick results to satisfy the needs of the senior leaders. QI requires persistence and a culture of continuous improvement. However, when the senior leaders in healthcare have a short-term view, QIMs find it very challenging to conduct QI initiatives that might not show positive results in the short-term but will be very beneficial in the long-term. This was again a very crucial challenge for small and rural DHBs:
When you have to make a business case for QI and then that business case is competing with medical improvements, it always loses. My DHB is already in deficit, we are small. We don’t get money, we hardly get doctors to work for us. No one gives you money for a QI initiative that will maybe show results later.

Participant 28

Table 6.2 provides an overview of the coding scheme, including the major themes (1st order codes), and sub-themes (2nd, 3rd and 4th order codes), and the number of participants from each DHB that cited them as perceived challenges faced by of QIMs.
Lack of QI strategy
Capability and Manpower
Staff resistance
Complexity of healthcare
Capability and Manpower
Sustaining Change
Power/influence
Lack of QI strategy
Time commitment from the staff
Short-term view of quality

Themes
DHB1  DHB2  DHB3  DHB4  DHB5  DHB6  DHB7  DHB8  DHB9  DHB10  DHB11  DHB12  DHB13  DHB14

Leadership Support
Leadership lacks knowledge of QI
No training programme for leadership
3/4  3/3  3/3  2/3  4/3  2/3  1/2  2/2  2/3  3/3  3/3  2/3  3/3  2/4
Poor representation of QIMs at senior level
1/4  1/3  1/3  1/3  2/3  1/2  1/2  1/3  1/3  3/3  1/3  1/3  4/4
Only verbal support
1/4  1/3  2/3  2/3  2/4  1/3  2/3  1/2  3/3  3/3  3/3  3/4  3/4
Because QI is the right thing to say
2/4  1/3  2/3  2/3  3/4  1/3  2/3  1/2  2/3  3/3  1/3  2/3  2/4
No one will say they don’t want QI obviously
2/4  1/3  2/3  2/3  3/4  1/3  2/3  1/2  2/3  3/3  1/3  2/3  2/4

Leadership supports what HQSC says or wants
1/4  1/3  1/3  3/3  2/3  1/2  1/2  1/3  2/3  3/3  3/3  3/4  3/4
Haphazard implementations
2/4  1/3  1/3  2/3  2/3  3/4  1/3  2/3  1/2  3/3  3/3  3/4  3/4
Leadership supports what HQSC says or wants
1/4  1/3  1/3  3/3  2/3  1/2  1/2  1/3  2/3  3/3  3/3  3/4  3/4
QI is only done to tick boxes
3/4  1/3  1/3  2/3  2/3  3/4  1/3  2/3  1/2  2/3  3/3  1/3  2/3  2/4

No field to quality performance
3/4  1/3  2/3  2/3  3/4  2/3  1/3  1/3  1/3  3/3  3/3  3/4  3/4
Frontline staff is very busy, they don’t have time for QI
4/4  2/3  2/3  2/3  3/4  2/3  1/2  2/2  3/3  2/3  3/3  3/3  3/4
They are not paid for extra time in for QI
4/4  2/3  2/3  1/3  2/3  1/3  3/3  3/3  3/3  3/3  3/4

Performance is judged on short term metrics
3/4  2/3  3/3  1/3  2/3  1/3  2/3  2/3  3/3  3/3  3/3  3/4
CEOs want to do things that show results in their tenure
1/4  2/3  3/3  2/3  1/4  2/3  1/2  2/3  3/3  1/3  2/3  1/3  3/4
Ministers want to do things that show results quickly, (re-election)
3/4  1/3  1/3  3/3  2/3  2/2  3/3  2/3  1/3  2/3  1/3  3/4
Funding is tied to short term performance
3/4  1/3  2/3  2/3  3/4  2/3  1/2  1/3  1/3  1/3  1/3  3/4
No room for long-term vision
2/4  3/3  1/3  3/3  2/3  1/2  3/3  1/3  2/3  3/3  2/3  3/4
Long term vision is not incentivised
3/4  2/3  2/3  1/3  4/4  1/3  2/2  1/3  1/3  1/3  1/3  3/4

Table 6.2: Overview of the characteristics of QIMs
6.3 Summary of the Chapter

This chapter presented the findings related to RQ2 and RQ 2.1 by providing a thorough set of findings based on interview data regarding QIMs in DHBs. First, the key characteristics of QI managers were presented followed by the challenges faced by QIMs in DHBs.

These findings can provide readers with insights regarding the everyday jobs of QIMs and allow them to use this characteristics framework (table 6.1) to recognise successful QIMs from the rest. These findings can also be used by organisations as a basis to train and develop their QIMs to be more prepared for supporting QI initiatives in their respective organisations.
Findings 3
State-of-the-Art of Quality
7 Introduction to the Chapter

This chapter concludes the findings portion of this research by identifying the maturity level of each of the participating 15 DHBs and their QI practices. Each DHB’s individual maturity diagram is provided separately in the Appendices number 3. These appendices are confirmed by at least two participants from each DHB using member checks approach (see section 4.6). Holistically, this analysis provides an overview of the current state of QI in the New Zealand healthcare system with the help of the quality improvement maturity model (QIMM) developed and presented earlier in the dissertation (see chapter 3) after an extensive literature review of QI implementation case studies. Table 7.1 presents the QIMM as an aide memoire.

Although, quantitative methods are normally used to evaluate and assess the level of maturity in organisations (Reyes & Giachetti, 2010), for this research, qualitative interviews were conducted for two reasons: first, interviews were already required for the other research questions, the findings of which were presented before (see chapter 5 and chapter 6). Second, as research participants were all from different backgrounds (medicine, nursing, operations and production engineering, etc.), they did not always understand the questions or details of the QI tools and techniques being used in their respective DHBs and hence required further clarification. A copy of the QIMM was also used during the interviews to form a tentative maturity position of each of DHB, which were later finalised by using a template analysis approach in Nvivo® (see section 4.5). These were sent to the participants in case they wanted to amend something ensuring nothing was misinterpreted by the researcher (see section 4.6).

As the QIMM focuses on four categories: QI strategic capabilities, QI principles, supply chain and QI philosophy. Each of these are discussed separately for the ease of the readers.
Table 7.1: Quality improvement maturity model

| A3 Copy of the QJMM inserted here in the printed or PDF version separately. |  |
7.1 Strategic Maturity

Strategic maturity refers to an organisation’s strategic view of QI; and how it wants to use and improve its capabilities for effective QI. The QIMM suggested there were five crucial elements in the strategic maturity, they are presented in table 7.2

7.1.1 Vision

Vision refers to how an organisation understands and views QI. According to the findings, majority of the DHBs (n=13) do not have a well-documented long-term QI vision and strategy for system-wide improvements.

Six DHBs placed were in the adoption stage (stage 0 and stage 1) of their QI journey, being exposed to QI for multiple years through MOH’s Crown agencies such as HQSC. The rest of the DHBs were placed in the implementation stage, formalised QI practices, process driven and striving for excellence in their internal processes. No DHB was identified with a supply chain/network vision for QI where they would incorporate external supply chain and entities present in it, i.e., suppliers with their internal QI initiative and practices.

The participants noted that the lack of a proactive QI vision can be easily observed as DHBs do not tend to have long-term QI strategy, nor do they include QI in their organisational strategy. Participants mentioned that even if QI is part of their strategy, it is included to fulfil government requirements not as an improvement initiative. DHBs publish a Quality Accounts document annually, however, these documents are not effective and do not contain vital information about the vision of the respective DHBs for long-term QI initiatives. Instead, they mostly contain information regarding quality assurance and compliance. Most of the participants agreed with this statement and hence, admitted to not having read the Quality Accounts document from their own DHB.
<table>
<thead>
<tr>
<th>Training</th>
<th>Organisational training activities do not contain any QI modules</th>
<th>QI trainings are provided by external entities and are sporadic in nature</th>
<th>Customised QI trainings are provided to majority of the department with feedback support</th>
<th>QI trainings are internally provided by QI department and continuous self-learning is designed into majority of the job descriptions</th>
<th>QI training and support is provided to direct suppliers</th>
<th>QI training/support is provided by supply chain partners to all the members of the supply network to ingrain QI in the supply network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Objective</td>
<td>QI is seen as a cost-adding feature rather than cost-cutting feature</td>
<td>Short-term financial objectives peripheral in nature are linked to QI activities</td>
<td>Short-term financial objectives are optimised into the QI activities</td>
<td>Financial objectives linked to QI are long-term and strategic in nature</td>
<td>Financial objectives of the direct supply chain partners are aligned and facilitated by the focal organisation</td>
<td>Irrelevant, the benefits are seen as an outcome of QI rather than a direct objective for everyone across the supply network</td>
</tr>
<tr>
<td>Project Selection</td>
<td>There are no QI projects going on in the organisation</td>
<td>QI is primarily done on a reactive and ad hoc basis</td>
<td>There is a formal process for selecting projects for QI. Visual controls are mostly used to ensure identification of problems.</td>
<td>Projects are selected to improve entire value-streams rather than on ad hoc or siloed mentality</td>
<td>Inter-organisational projects are selected across direct supply chain members</td>
<td>Projects are selected to be continuously improved across entire supply network</td>
</tr>
<tr>
<td>Leadership support</td>
<td>One/Two key leaders support QI. However, they don't have any experience with key QI methodologies/philosophies</td>
<td>The majority of organisational leadership team sees potential benefits of QI</td>
<td>QI is validated by the complete leadership team</td>
<td>Leaders across the organisation regularly participate in QI activities</td>
<td>Majority of the supply chain partners thoroughly understand and validate QI and teach it to others</td>
<td>QI is ingrained across the entire supply network</td>
</tr>
<tr>
<td>Vision/Scope</td>
<td>Organisation has a very nascent view of QI</td>
<td>Quality improvement is done in a reactive manner; implemented in places where quality needs to be improved, with short-term goals</td>
<td>QI starts to be seen as a long-term approach for organisational improvement by majority of the organisation</td>
<td>QI methods are built into majority of the value-streams across the organisation</td>
<td>QI becomes systems improvement approach rather than focusing on singular value-streams moving further out to direct suppliers</td>
<td>QI is seen as a continuous improvement state by the entire supply network and is measured by true value for the customers</td>
</tr>
<tr>
<td>Stage 0</td>
<td>Stage 1</td>
<td>Stage 2</td>
<td>Stage 3</td>
<td>Stage 4</td>
<td>Stage 5</td>
<td></td>
</tr>
<tr>
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<td>Formal</td>
<td>Process driven</td>
<td>Optimised Enterprise</td>
<td>Way of Life</td>
<td></td>
</tr>
</tbody>
</table>

Table 7.2: Overview of components and stages of strategic capabilities maturity
7.1.2 Leadership Support

There is a long-standing view in QI that it always starts from the top (Dahlgaard et al., 1998). Leadership’s support and involvement in QI plays a crucial role in the success of a QI initiative. In quality driven organisations, top management leads by example and helps employees to better comprehend and use the quality tools for process improvement.

The researcher observed that majority of the DHBs and their leadership was supportive of QI. However, there were only two DHBs where the majority of top leadership actively participated in QI themselves. According to the participants, the majority of top leadership positions are filled by people who do not have any experience in QI methodologies. Therefore, they support it verbally and validate it, as it is the right thing to say, but when it comes to participation or supporting the QI teams in the DHBs, top leadership tend to not show the much-required support.

No one will ever say, they don’t want to have quality. Same with other things like integrated care, or patient focused care. Can you imagine someone saying, no, we actually want disintegrated care or we don’t want patient-focused care. We want money focused or physician focused care. But very few will be able to tell you what these words mean.

Participant 2

Another significant finding regarding the leadership capabilities and support were the external supply networks. No DHBs were identified cooperating with leadership of external supply chain members to incorporate QI in their organisations and between the interfaces of their respective organisations, which is considered a crucial element of a system-wide QI programme (Bortolotti et al., 2016).

7.1.3 Project Selection

Organisations at the beginning of their QI journey tend to not have the capabilities to initiate big projects and hence, they tend to start with smaller QI projects mostly acting reactively. However, as the organisation matures in QI, they create a formalised approach based on data driven reporting mechanisms for selecting QI projects across the system. In the New Zealand, DHBs were seen to be selecting projects based on two criteria:

1. National projects designed by HQSC
2. Projects based on internal DHB recommendations

The HQSC designed projects were being conducted by all the DHBs as they were part of a national movement towards QI. Such projects were almost always the result of adverse
events or data showing poor performance of DHBs in certain areas, such as falls prevention, surgical site infection reduction or hand hygiene programmes.

The latter group of internal DHB projects were mostly done in a reactive way, mostly after a problem had been known for a long time, and with little planning ahead by DHBs new to QI (see table 7.3; project selection, stage1). The more mature DHBs (see table 7.3; project selection, stage 2) adopted a standardised way of selecting new projects that was mostly data driven, i.e., reporting mechanisms were placed and analysed carefully to identify improvement projects. Interestingly, the analysed DHBs were not conducting any inter-organisational projects with members of their external supply chain.

### 7.1.4 Financial Objectives

The conventional view against quality posits that QI is a cost-adding activity rather than a cost-cutting or cost-saving activity — a perspective which reflects an organisation’s view of quality. However, only two DHBs were identified to be at this *identification* stage. Participants from these DHBs recognised it as a failure on their part. Their respective DHBs did not want to invest financial resources in QI, because they did not see it as a good investment. Hence, they mostly took part in only the national projects designed by HQSC (see previous section 7.1.3). This notion regarding quality was mostly linked with the top leadership’s viewpoint regarding quality. Hence, the above-mentioned DHBs were found to score very low on *leadership support* element of the QIMM as well.

Majority of the participants considered financial objectives were either not relevant to, or they were not optimised in, QI activities, i.e., DHBs considered financial benefits as a secondary benefit of QI activities. These DHBs suggested that the objectives of QI initiatives were around patient and staff safety, i.e., they were around improving waiting times for patients and decreasing their length of stay. These improvements if sustained always have a positive effect on finances. Similarly, DHBs recognised the positive effect of saved bed days and nursing time on their finances. The financial aspect of such improvements was not the driving force for QI initiatives. However, some participants (n=23) admitted that linking QI to financial objectives is not considered a politically correct statement, even though majority of the QI initiatives are accepted (or rejected) primarily based on their positive financial aspects.
7.1.5 Training

The last but a highly crucial element under strategic maturity is the QI training as it helps in capability development in organisational studies. Similar to the project selection aspect of QIMM, two different types of training were identified in the New Zealand healthcare system.

1- HQSC-led training
2- Internally-led training

The HQSC training was being offered to all the DHBs who wanted their employees to get trained in MFI. HQSC has contracted Ko Awatea institute to provide training to DHBs. There are two main types of training courses being offered called the quality improvement facilitator training – a 12 month training course and improvement advisor training – a 6 month training course. Both programmes were highly popular in small and medium-sized DHBs, who do not have enough manpower or financial capabilities to design and conduct internal training programmes. Such DHBs would usually have a few people trained from Ko Awatea, and then they would supervise the QI initiatives in their respective DHBs, who would mostly be participating in only National programmes. However, there were some exceptions—other than the Ko Awatea training, some DHBs also subscribed to IHI’s Open School® online training because they were not costly and easily accessible. Overall, all of these training initiatives were based on teaching staff IHI’s MFI. A more detailed explanation of the respective methodology is provided in chapter 5.

DHBs with internally-led training programmes were few in number, and they all had invested a lot in their training programmes. These happened to be larger urban DHBs with comparatively more funding. These DHBs had bigger QI teams comprising of people with operations and process improvement background, trained in different QI methodologies. Such set of characteristics made them more prepared for QI, and gave them freedom to choose their preferred QI methodology based on their needs; and to design and conduct training in a way that will suited their organisational needs. Overall, it was observed that the latter group of larger urban DHBs were more mature than the former group as they had a higher number of people trained for QI in various departments across their organisation.

A significant element missing in both groups' training programmes and activities was the incorporation of external supply chain entities. No DHB conducted any training activities to improve capabilities of their suppliers per se. Similarly, HQSC also did not have any certain training programmes or future initiatives for suppliers except the primary health providers who, although suppliers to DHBs, are not necessarily supplying any physical and tangible
supplies to DHBs. A few DHBs (DHB1, DHB3, DHB5, DHB9 and DHB13) agreed that it is important for DHBs to reach out to their suppliers but, they are not yet there for several reasons primarily because, they are still working on improving internal capabilities; and because the suppliers are managed by a separate organisation, Health Alliance the New Zealand. Two DHBs (DHB 9 and DHB 13) mentioned that they wanted to conduct supplier training, however, their proposals were rejected by the senior DHB leadership due to financial constraints.

7.1.6 Summary of Strategic capabilities Maturity

Strategic maturity analysis depicted that majority of the DHBs are formalising their QI initiatives, with some ahead of the others. At this point, the focus is on improving their internal capabilities. Lack of a developed QI vision and strategy is perceived as one of the biggest inhibitors, which could be due to the lack of consideration and responsiveness to QI-related activities from the leadership teams in DHBs. Leadership is verbally supportive of QI mostly because it is the right thing to say. Project selection (see section 7.1.3) also requires more attention, and participants believed that a better long-term QI strategy in DHBs would improve this.

In terms of building capabilities through training, HQSC is playing a significant role, especially for DHBs who do not have any internal QI programme or training programme. However, the DHBs with internal QI programmes scored better in the training index of QIMM, partly because their training programmes were focused on individual DHB needs related to QI, and they were continuously training employees throughout the year. Finally, the analysis suggested that DHB5, DHB3 and DHB 13 were the most mature DHBs in terms of capabilities whereas DHB10 and DHB 6 were the least mature. None of the DHBs had or were observed to be working on extending/improving capabilities in the external supply network, as can be seen in table 7.3. No DHBs were placed on stage 4 or stage 5 of QIMM.
<table>
<thead>
<tr>
<th>Training</th>
<th>DHB2</th>
<th>DHB4</th>
<th>DHB6</th>
<th>DHB8</th>
<th>DHB11</th>
<th>DHB10</th>
<th>DHB1</th>
<th>DHB7</th>
<th>DHB12</th>
<th>DHB14</th>
<th>DHB3</th>
<th>DHB5</th>
<th>DHB9</th>
<th>DHB13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Objective</td>
<td>DHB8</td>
<td>DHB10</td>
<td>DHB4</td>
<td>DHB7</td>
<td>DHB11</td>
<td>DHB13</td>
<td>DHB1</td>
<td>DHB2</td>
<td>DHB8</td>
<td>DHB14</td>
<td>DHB3</td>
<td>DHB2</td>
<td>DHB3</td>
<td>DHB14</td>
</tr>
<tr>
<td>Project Selection</td>
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<td>DHB4</td>
<td>DHB6</td>
<td>DHB7</td>
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<td>DHB5</td>
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<td>DHB13</td>
<td>DHB14</td>
<td>DHB12</td>
<td>DHB8</td>
</tr>
<tr>
<td>Leadership support</td>
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<td>DHB4</td>
<td>DHB6</td>
<td>DHB7</td>
<td>DHB11</td>
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<td>DHB3</td>
<td>DHB13</td>
<td></td>
</tr>
<tr>
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<td>DHB9</td>
<td>DHB10</td>
<td>DHB4</td>
<td>DHB7</td>
<td>DHB1</td>
<td>DHB2</td>
<td>DHB3</td>
<td>DHB11</td>
<td>DHB12</td>
<td>DHB13</td>
<td>DHB14</td>
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<th>Stage 3</th>
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</tr>
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<td>Way of Life</td>
</tr>
</tbody>
</table>

Table 7.3: Overview of strategic maturity of DHBs
7.2 Process Maturity

Lockamy and McCormack (2004, p. 273) mentioned that “a process has a lifecycle that is assessed by the extent to which the process is explicitly defined, managed, measured and controlled”. Process maturity refers to an organisation’s ability to conduct process improvements based on these four spectrums using various QI tools and principles. Elements of process maturity are presented in table 7.4.

7.2.1 QI Tools

The majority of the QI methodologies have their own specific toolbox that comprises of wide range of QI tools that can be used for different purposes. In the New Zealand healthcare system, it was found out that the majority of DHBs use tools from various QI methodologies. One of the reasons behind that was because majority of the DHBs do not limit themselves to using a single methodology. Another reason behind it is the heavy reliance of DHBs on MFI, as a core methodology. MFI consists of tools from various other QI methodologies that have their origins in manufacturing.

Overall, it was observed that majority of the DHBs were using rather simpler QI tools such as 5S; limited visual management tools; and process maps in their operations. Very few DHBs explained the use of multiple QI tools in their operations or more developed QI tools in their initiatives. It was because QI teams were only recently trained and were still getting used to implementing simpler tools to define or manage initiatives rather than creating complex initiatives and getting into analysis paralysis.

A limited number of DHBs mentioned having a standardised process for the selection of QI tools for different initiatives. These DHBs were recognised to be more mature than others in process maturity; and they had more people trained in QI with much more experience than other DHBs.
<table>
<thead>
<tr>
<th>Value stream mapping (VSM)</th>
<th>Production Levelling</th>
<th>Problem Solving</th>
<th>Standardisation</th>
<th>QI Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence of flow is not present anywhere in the organisation</td>
<td>Unintentional and unrecognised traces of flow appear because of basic QI tools being implemented in piecemeal around the organisation</td>
<td>Problems are solved after they occur (firefighting)</td>
<td>Majority of the workforce do their jobs in their own preferred way.</td>
<td>No QI tools are used in the organisation</td>
</tr>
<tr>
<td>VSM is used for individual processes to understand the process flow</td>
<td>Production levelling is initiated in individual processes to align capacity and minimise bottlenecks. However, their impact on other processes is not recognised</td>
<td>Employees are trained to use a standardise methodology like A3 thinking or PDSA to tackle problems</td>
<td>Organisation begins to develop standardised work flows</td>
<td>Basic QI tools such as 5S and VSM are used to improve individual small-scale problems</td>
</tr>
<tr>
<td>Complex value-stream maps are made for individual departments with multiple interacting processes</td>
<td>Production levelling is introduced to align capacity and minimise bottlenecks in multiple value-streams throughout the system putting foundations of a JIT system</td>
<td>The emphasis of problem solving is moved from firefighting to ‘root-cause analysis‘; problems are eliminated in a systematic way from the root cause</td>
<td>Majority of the organisation understands that standardised tasks are the foundation for continuous improvement</td>
<td>Multiple tools are implemented to resolve quality issues and to support QI vision</td>
</tr>
<tr>
<td>Inter-organisational VSMs are made to understand and support flow between direct suppliers</td>
<td>Focus on direct suppliers to facilitate production levelling is placed; direct suppliers’ role and development is recognised as crucial to production levelling</td>
<td>Supply chain partners are encouraged and trained to systematically eliminate waste using problem solving methodologies; focal organisation assists in this endeavour</td>
<td>Standardised processes become a common practice in internal and external supply chains and different entities start kaizen events when standards are not adhered to</td>
<td>Standardised methods are implemented in multiple organisations (direct suppliers) and their interfaces</td>
</tr>
<tr>
<td>Flow is supported throughout the supply network with the use of extended VSMs that provide a bird’s eye view of flow in the supply network.</td>
<td>Focus on both direct and indirect suppliers to facilitate production levelling is placed. Thus, creating a just-in-time supply network</td>
<td>Systematic problem solving using a standardised methodology (A3 thinking) becomes the way individuals in the supply network deal with problems</td>
<td>Standardisation becomes the lifeline of supply network; every entity starts to follow standard protocols, making continuous kaizen improvements and adding them into standards automatically</td>
<td>Philosophy driven use of QI tools across the supply network</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>Stage 1</th>
<th>Stage 2</th>
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</tr>
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</table>

**Table 7.4: Overview of components and stages of process maturity**
7.2.2 Value-Stream Mapping

Value-stream mapping (VSM) is a highly useful tool from the quality toolbox (Bicheno & Holweg, 2008), and provides organisations with the required support to visualise their processes and the waste in them, thus providing a basis for process redesign, eliminating the shortcomings of the process (Rother & Shook, 1998), and creating improved flow (Lasa et al., 2008).

Almost all of the DHBs were familiar with it and had used it in their QI work. Despite this familiarity, few of them have improved workflow in their processes, especially inter-departmental processes. These DHBs were positioned in stage 2 of value-stream mapping in the maturity model (table 7.5). Out of these DHBs, only a few agreed to have started working on creating inter-departmental workflow using health pathways, however, the complexity of the healthcare system and different operational work practices of departments were recognised as the biggest impediments in this regard.

Four DHBs (DHB1, DHB3, DHB 9 and DHB 13) also cited different cases of unintentional inter-departmental workflow as a consequence of QI tools deployment in singular value-streams, i.e., sometimes, an improvement in one ward improved workflow in the subsequent ward/department. All the other DHBs acknowledged this phenomenon, however, they could not provide any examples of it.

7.2.3 Problem Solving

Problem solving is a critical aspect of QI and many tools have been designed to help organisations in problem solving such as A3 reporting (Roemeling et al., 2017), PDSA (Allaudeen et al., 2017), SIPOC (Bhat et al., 2014), and fishbone diagrams (Vassilakis & Besseris, 2009).

In the New Zealand, as most of the DHBs use MFI for QI, the majority of the DHBs recognised using PDSA cycles. However, the way PDSA is used in MFI could be considered unconventional. As described in chapter 5 (see section 5.4.3), MFI proposes quick fixes for problems. If one fix does not work, try the next one and so on. Participants agreed with this explanation and suggested that the focus is hence, not on root-cause analysis, but rather on trying fixes which seem like they will work. The more mature DHBs (see table 7.5) still focused on root-cause problem solving, but the less matured DHBs did not have the appropriate experience or training for it, and hence stayed with the MFI quick fix method.
DHBs using LT or Lean six sigma methodologies (see table 5.1) were using structured A3 thinking, fishbone diagrams or DMAIC cycles to do problem solving. However, there number was smaller. These DHBs were training their employees internally to use these tools/methods to conduct problem-solving.

7.2.4 Reporting

As QI is primarily data driven, the role of reporting cannot be overstated. Organisations tend to rely on their data to conduct and ensure sustainability of QI (Juran & Godfrey, 1999).

The analysis showed that the DHBs have quite a lot of organisational reporting mechanisms placed at different points within different processes. Such reporting mechanisms are prescribed by the Ministry of Health, New Zealand and hence, all the DHBs regularly report on them. A good example are the six National health Targets updated quarterly until the first quarter of 2018 (discontinued afterwards) and available on the Ministry of Health website. Moreover, each DHB also publishes annual Quality Accounts. So, it may be presumed that all the DHBs should score high in terms of maturity under reporting element. But, reporting does not only consist of such mechanisms, this element of QIMM relates to the accuracy of the output of such reporting mechanisms and how much is the organisational QI activities driven by these respective mechanisms.

In terms of the accuracy, quite a substantial number of participants agreed that the National health targets are not accurately reported. A primary reason behind that was because the DHBs’ funding is linked to these targets. Therefore, DHBs tend to use different strategies to ‘game the system’ to ensure that their funding is not affected. Participants showed their discomfort with the National Health targets as they create a circular issue where the funding is reduced if an organisation fails to perform well on these targets, and as a result, the DHBs have even less funding. Similar concerns about Quality Account documents were also shown by the participants and were mentioned previously in this research (see section 6.2.7).

Regardless of everything mentioned above, better performing DHBs in the QIMM (table 7.5) had multiple additional reporting mechanisms placed in different places in a process/value-stream and were closely observing them to highlight places for improvement and ensuring the sustainability of the implemented improvements.
7.2.5 Standardisation

Juran referred to standardisation as mechanisms to ‘hold the gains’ (Bicheno, 2000, p. 114). The underlying principle behind standardisation is that organisations can improve processes or performance but if those improvements do not become part of the modus operandi of the organisation, those improvements can be lost as well (Hines, 2010).

According to the findings of this research, DHBs being large public organisations, have well-documented standard operating procedures. However, the majority of the DHBs and employees within their respective DHBs do not follow them. Participants admitted that the DHBs lack the required procedures to institutionalise them mainly because of two reasons: 1) whilst DHBs are very big organisations, their quality assurance departments are quite small, and primarily looking at compliance issues rather than driving or institutionalising the standard operating procedures; 2) the majority of the frontline staff do not have the required QI education or skills to understand the importance of standardisation.

Failing to standardise QI initiatives, majority of the DHBs tend to go back to their pre-improvement work processes after some time. As a result, the resources used to conduct such QI initiatives are wasted completely. However, participants mentioned that the majority of the DHBs are finally starting to develop and ensure standardised workflows at least in the value-streams where they have conducted an improvement or QI initiative.

7.2.6 Error-Proofing

Error-proofing or fail-safing processes prevent organisations to make defects—Fail-safing processes react to abnormalities only. In the New Zealand, this aspect of process maturity is one of the least developed by the DHBs. The majority of DHBs (n=10) agreed that their QI initiatives or future VSMs lack error-proofing processes and they tend to deal with mistakes in a reactive manner, i.e., when they arise or are highlighted as their processes lack error-proofing mechanisms. In healthcare, such mistakes can have extreme consequences.

One DHB recognised this situation and has started to implement error-proofing processes in their new QI initiatives. DHB 13 mentioned the use of electronic dispensaries in their wards to reduce errors relating to medication. However, as the majority of DHBs stated that such error-proofing procedures were only being placed at visible parts of the value-streams. They were still being hit by errors and mistakes from less visible parts of the value-streams and were dealing with them as they arose, i.e., in a reactive manner.
7.2.7 Production-Levelling

Although the title implies this to be a production specific concept, it is also applicable in service management. It includes principles such as demand smoothing, load levelling and line balancing (see Bicheno, 2000). Like error-proofing, it is also one of the least considered aspect of process maturity in the New Zealand healthcare system.

All the DHBs mentioned that they have participated in National programmes to develop health pathways, which is similar to the production-levelling concept. However, they have not been very successful at it. Therefore, the majority of the DHBs mentioned production-levelling principles were not being used anywhere in their systems and they were also not in the short-term future agenda. It was mainly because they did not have the required skills to conduct complex QI inter-departmental initiatives that would improve the flow in extended value-streams.

Five DHBs (DHB1, DHB3, DHB5, DHB9 and DHB13) mentioned that while they were not intentionally implementing production-levelling principles, they were still seeing some positive outcomes resulting from QI tools and improvements in their value-streams that indirectly improved the flow. Finally, there was a small group of DHBs (n=6) who mentioned piloting production-levelling principles in one or few value-streams or departments, mostly the operations theatres.

7.2.8 Summary of Process Maturity

In terms of process maturity, the sector has got a long way to go. Production-levelling and error-proofing was observed to be the two most neglected aspects of QI initiatives by QI teams in DHBs.

In terms of QI tools, DHBs seemed to be familiar with at least the basic QI tools that are required for analysing and driving QI initiatives. It did not matter which overarching QI methodology was being used, DHBs mentioned the use of various QI tools in their operations. DHBs had been exposed to several QI methodologies and programmes in the past such as NHS’s productive ward® and Releasing time to care®—they were both composed of several modules that prescribed the use 5S, VSM, standardisation and process mapping techniques from LT and six sigma.

The majority of DHBs were working on improving their reporting and auditing mechanisms. The bare minimum reporting mechanisms are required by MOH such as the National Health
Targets, but, the majority of the DHBs (n=8) were focusing on adding more reporting mechanisms and making them more accessible and easier to comprehend so that they could be used to drive QI. Similarly, standardisation of improved processes was also observed to have a similar trajectory like the reporting mechanisms.

In terms of problem solving, DHBs were mostly using PDSA cycles partly because it is the prescribed technique in MFI. HQSC also provided PDSA training as the core problem solving technique. DHBs using LT or six sigma chose A3 thinking or DMAIC cycles for problem solving. However, the majority of the DHBs (n=12) did not have a standardised way to tackle problem solving and would start forming solutions without using any specific QI tool or thinking mechanism. Such DHBs agreed that this approach to QI was incorrect, and initiatives would have many issues in both the implementation and sustainability stages, but they did not have the skills and competency to use a standardised QI approach to problem solving.

Finally, the analysis suggested that DHB5, DHB11, DHB12 and DHB13 were the most mature in terms of process maturity, whereas DHB10, DHB8 and DHB4 were the least mature. It was confirmed by the participants that none of the DHBs were working on extending/improving process maturity in the external supply network, as can be seen in Table 7.5. No DHB is indexed on stage 4 or stage 5 of QIMM.
<table>
<thead>
<tr>
<th>Process</th>
<th>Stage 0</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
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<tbody>
<tr>
<td>VSM</td>
<td>DHB10</td>
<td>DHB2</td>
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<tr>
<td>Standardisation</td>
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<tr>
<td>Problem Solving</td>
<td>DHB3</td>
<td>DHB7</td>
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<td>Production Levelling</td>
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<tr>
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<td>Error-Proofing</td>
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<td>QI Tools</td>
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Table 7.5: Overview of process maturity of DHBs
7.3 Supply Chain Maturity

Without incorporating supply network partners in QI activities, DHBs run a risk of transferring waste to other members of the supply network rather than eliminating it by addressing the root cause. Hence, Parveen and Rao (2009) concluded that conducting QI activities in the supply network allows focal organisations to improve their internal operations.

Supply chain operations offer the required backend support to guarantee continuous delivery of products and services and ensuring their performance is equally important as of focal organisations. Hence, this section of the QIMM mentions the details around the supply chain function and its role and how it is related to the overall QIMM. Supply chain maturity tend to start after the organisation has formalised their internal QI initiatives (Bortolotti et al., 2016). Table 7.6 contains the elements of supply chain maturity from the QIMM.

7.3.1 Involvement in QI

*Involvement in QI* refers to the engagement of intra- and inter-organisational members in QI. According to the findings of this study, majority of the DHBs were still working on improving the involvement and participation of the intra-organisational members in QI activities. Each DHB had at least two to five key people (usually the QIMs) and departments who understood the importance of QI and were involved in it. HQSC has played a significant role by making QI training accessible to all the DHBs especially the smaller organisations.

Larger DHBs are more mature in terms of the involvement in QI as more departments were actively designing and implementing QI initiatives. Four DHBs had at least the major departments involved and participating in QI consistently (table 7.7). These respective DHBs had internal QI and training programmes, which according to the participants played a vital role in dissemination of QI and improving the involvement and participation of intra-organisational members in QI.

In terms of inter-organisational members, i.e., supply chain partners, none of the participants from their respective DHBs recognised any QI projects or activities involving the development of the supply chain. Four DHBs (DHB1, DHB3, DHB 5 and DHB 13) recognised the importance of such initiatives to their internal QI practices, however, they were not exploring such initiatives, at least not in the near future, primarily due to the MOH’s focus on getting the internal QI initiatives right first.
### Open and Transparent Communication

There is virtually no communication among supply chain members. Supply chain members believe in keeping their work practices and ideas a secret as sharing them might affect their position in the supply chain.

The organisation is more focused on internal communications and do not pay much attention to creating channels for communication in the external supply chain. New channels of communication are established in the supply chain to promote open and transparent communication between supply chain members. However, they are still not used.

Majority of the direct supply chain partners practice two-way open and transparent communication with a shared goal of increasing the overall supply chain's performance. Open and transparent communication becomes an integral part of the supply network; all the members share resources with each other and believe it is the only way to move forward.

### Just-In-Time (JIT)

There are no signs of JIT in the organisation. JIT principles are taught to employees but are not implemented by anyone. JIT is piloted in at least one process/value-stream. JIT is fully established within the organisation. Customer demand is pulled rather than products being pushed to the customers.

Direct suppliers also become part of the JIT philosophy. Majority of the raw materials and inventory management is done using JIT principles. Almost no excess inventories are present in the wider supply network at any time.

### Supplier Involvement

Supply chain relationships tend to be of 'bullying' nature; focal firm tends to go with the suppliers with the lowest bid. Supplier's involvement in product design and development is not seen as a reason for competitive advantage.

There is no supplier involvement present in product/service design and development. Some of the most crucial suppliers are invited to be involved in the development of new products and their inputs are taken into consideration during product/service development.

Majority of the direct suppliers provide their inputs during product/service development stage and work closely with the focal firm to ensure success. Majority of the supply network partners are intrinsically motivated to provide feedback and support each other keeping in mind the end goal to be a better and resilient supply network.

### Supplier Development

Supplier development practices do not exist at all. Organisational focus regarding QI lies more towards developing internal functions rather than focusing on external supply chain.

Supplier development strategy is created but it is not functionalised; suppliers are also reluctant to be involved in development activities and tend to rely on their own expertise.

Suppliers crucial for delivering more direct value to customers are recognised and the need for their development is recognised. Some development activities like training and collaboration are initiated with minimal success in most cases.

Supplier involvement in the internal processes becomes more apparent and suppliers are also trained to use QI methods in their internal processes. A JIT system is established to minimise inventory by creating a resilient Kanban system to increase flow.

Indirect supplier (Tier 2 and Tier3) are also involved in product/service development. The supply network partners help each other to develop and thus creating a more resilient system overall.

### Involvement in QI

QI is not understood within the organisation. One/Two key positions with QI experience are present in the organisation.

QI awareness is present in few departments; a designated team is formed to support and promote QI in the organisation.

Majority of the organisation is aware and involved in QI. Direct suppliers are motivated to be part of the QI vision; focal organisation provides necessary support during the process.

Majority of the supply network partners are expected and attracted to be part of the QI vision.

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<thead>
<tr>
<th>Stage</th>
<th>Identification</th>
<th>Ad hoc</th>
<th>Formal</th>
<th>Process driven</th>
<th>Optimised Enterprise</th>
<th>Way of Life</th>
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Table 7.6: Overview of components and stages of supply chain maturity
7.3.2 Supplier Development

Supplier development is a key component and supporting element of QI in supply chains. Highly developed organisations with strong emphasis on QI such as Honda® and Toyota® have created strategies around supplier development which helped to improve their products and services for the customers (see Liker & Choi, 2004).

As mentioned earlier, DHBs and their respective QI initiatives lack the inter-organisational involvement and participation from their supply chain partners, they all scored poorly in the supplier development aspect of supply chain maturity except for DHB3 and DHB13, both of which were developing a supply chain strategy that would have a component of supplier development. The responsibility will be given to the supply chain management department, who will then become a significant stakeholder of the overall QI programme in both DHBs.

Other than the two DHBs mentioned above, all others stated that no supplier development practices existed in their DHBs and they were all more focused on developing their internal QI capabilities.

7.3.3 Supplier Involvement

Supplier involvement refers to a focal organisation’s tendency to involve the supplier in product/service design and delivery stage (Womack et al., 1990). Toyota famously invited its suppliers to its facilities during the design phase of its cars and asked suppliers to provide their feedback and input in the whole process, allowing them to create better quality products for their customers.

Similarly to supplier development, supplier involvement was also largely ignored by the majority of the DHBs (n=12). DHB3 and DHB13 reported that their new supply chain strategy would, in the future, improve the supplier involvement however, no serious supplier involvement currently takes place that affects their internal QI programmes or any singular value-streams. The reasons behind this situation were very similar to those presented in the supplier development section – a focus on internal QI (see previous section 7.3.2).

7.3.4 Just-In-Time

Just-In-Time (JIT) is a part of a wider Toyota Production System and has been widely praised by researchers and practitioners alike (Kim & Takeda, 1996; Lea & Parker, 1989; Sugimori et al., 1977). Kannan and Tan (2005, p. 153) comment “The JIT philosophy
advocates the elimination of waste by simplifying production processes. Reductions in setup times, controlling material flows, and emphasizing preventive maintenance are seen as ways by which excess inventories can be reduced or eliminated, and resources utilised more efficiently”.

Four DHBs were recognised to be piloting JIT and Kanban systems in either a single or few department/value-stream. Apart from those, all the other DHBs stated there were no working value-streams that followed the JIT principles. Some of the latter DHBs highlighted their training materials etc. with JIT principles being taught to the frontline employees, however, they were still not being implemented. One of the reasons that stood out in the discussions was around the skills, competencies and experience of the frontline staff with QI and that majority of the DHBs did not have the required skills, competencies and experience for even a single successful JIT enabled value-stream. Another reason mentioned by the participants was around the high risk factors related to JIT in healthcare. Having a JIT enabled value-stream requires very mature supply chain, and at this point DHBs do not have that as summarised later in this chapter (see section 7.3.6 and table 7.7).

7.3.5 Communication

The last element of supply chain maturity is communication. Effective communication plays a key role in QI initiative implementations. Organisations actively involved in QI tend to have clear and effective communication channels that allow transparent two-way communication instead of conforming to a silo-mentality where each function/department works in their own silo and do not communicate or know what other department/functions are doing (Dyer & Nobeoka, 2000).

Similar to other elements of supply chain maturity, DHBs generally agreed to be focused on improving internal communication within their organisation rather than working on improving or creating new channels of communication in their supply networks. The participants spoke about the DHB sizes and the different departments and functions working within them. This complexity of functions inhibits communication and a lot of the usual issues could be prevented by better communication, a point raised by many participants (n=18). However, it is only now that they are focusing on improving it, and already seeing significant results in terms of flow and patient safety. That being said, there were four DHBs (DHB1, DHB3, DHB 9 and DHB 13) who mentioned that they were working on improving communication links with their external suppliers for the sake of QI programme. However, it was still in its infancy in all of them.
7.3.6 Summary of Supply Chain Maturity

The QIMM highlighted that supply chain maturity is the most neglected aspect of the QI within DHBs, scoring very low on their supply chain maturity index. Supply chain maturity mainly depicted an organisation’s involvement in QI activities going beyond the organisational boundaries and into the external supply network. As none of the DHBs had any specific QI-related programmes and involvements in the external supply network, all of them performed similarly.

The DHBs are almost exclusively focused on internal QI. On a supply network level, it might be seen as a point optimisation rather than system optimisation. DHBs are focused on improving involvement of internal stakeholders and for that, they are focusing on improving the internal communication instead of creating new and more effective channels for communication in the external supply network. Table 7.7 contains details regarding participating DHBs’ supply chain maturity.
| Communication | DHB2 | DHB8 | DHB1 | DHB3 | DHB5 | DHB9 | DHB13 |
| | DHB4 | DHB10 | DHB11 | DHB7 | DHB14 |
| Just-In-Time | DHB6 | DHB7 | DHB12 | DHB14 |
| | DHB8 | DHB10 | DHB11 | DHB12 |
| | DHB1 | DHB3 | DHB9 | DHB13 |
| Supplier Involvement | DHB2 | DHB8 | DHB10 | DHB14 |
| | DHB4 | DHB11 | DHB12 |
| | DHB3 | DHB9 | DHB13 |
| Supplier Development | DHB2 | DHB8 | DHB10 | DHB14 |
| | DHB3 | DHB11 | DHB12 |
| | DHB9 | DHB13 |
| Involvement in QI | DHB2 | DHB8 | DHB10 | DHB14 |
| | DHB3 | DHB4 | DHB9 |
| | DHB6 | DHB11 | DHB12 |
| | DHB7 | DHB13 |
| | DHB8 | DHB5 |

<table>
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<tr>
<th>Stage 0</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
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<tr>
<td>Identification</td>
<td>Ad hoc</td>
<td>Formal</td>
<td>Process driven</td>
<td>Optimised Enterprise</td>
<td>Way of Life</td>
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</tbody>
</table>

Table 7.7: Overview of supply chain maturity of DHBs
7.4 Philosophical Maturity

The last section of QIMM deals with the philosophical maturity of quality improvement initiatives in an organisation. Table 7.8 contains details regarding the elements of philosophical maturity in the QIMM.

7.4.1 Waste Elimination

Waste elimination is at the core of each of the QI methodologies because the removal of waste from a system directly increases value for the customers. Overall, there was a wide array of scores in the waste elimination aspect of the QIMM; some DHBs being more mature than others.

Overall DHBs showed a understanding of waste; and the importance of removing it systematically. However, the actual QI implementation processes had some issues related to waste elimination. Participants acknowledged that the siloed mentality in healthcare system, i.e., departments being managed separately, inhibited the QIMs to systematically remove wastes from the system. Mostly the QI initiatives were within a singular value-stream or department and hence, waste would get transferred to others rather than being eliminated from the system. This frustration was acknowledged by all the participants whether they scored high or low in terms of waste elimination maturity.

The DHBs who had more developed internal QI programmes were trying to move to a more systematic waste elimination process by creating a standardised model for planning and implementing new initiatives with a focus of minimising waste transference.
<table>
<thead>
<tr>
<th>Systems thinking (ST)</th>
<th>Continuous improvement (CI)</th>
<th>Sustaining improvements</th>
<th>QI Culture</th>
<th>Respect for People and Empowerment</th>
<th>Waste Elimination</th>
<th>Stage 0</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
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</tr>
</thead>
<tbody>
<tr>
<td>The ST concept is virtually missing in the organisational strategy and mentality</td>
<td>There are no signs of CI present in the organisation</td>
<td>No improvements happen in the organisation</td>
<td>There are no elements of QI culture present in the organisation</td>
<td>Majority of the employees virtually have no autonomy or authority to run any improvement project; all the actions and orders come from the senior management</td>
<td>Wastes are not fully understood and recognised; they are generally identified in small sections with no or minimal overlap</td>
<td>Identification</td>
<td>Stage Identification</td>
<td>Stage Ad hoc</td>
<td>Stage Formal</td>
<td>Stage Process driven</td>
<td>Stage Optimised Enterprise</td>
</tr>
<tr>
<td>ST is mostly done on reactive levels.</td>
<td>Organisation tends to improve processes only after any kind of fault is recognised in the process</td>
<td>Improvements are hardly sustained, if any.</td>
<td>QI culture starts to develop from the top; middle managers and frontline staff are still sceptical about QI and do not want to invest their time in implementing it</td>
<td>employees are empowered to be more engaged in the organisation. However, most of them feel they still don’t have any autonomy in their work</td>
<td>employees are identified and removed by section, without acknowledging their potential transfer to other sections</td>
<td>Stage 0</td>
<td>Stage 0</td>
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<tr>
<td>Traces of ST start to appear in continuous improvement strategy; organisation starts to recognise patterns throughout the organisational processes that add inefficiencies</td>
<td>CI is built into each and every job description in the organisation; employees are asked to be vigilant of waste. However, it is not followed all across the organisation</td>
<td>Improvements are sustained but only with the help well placed audits and controlling mechanisms.</td>
<td>Basic elements i.e., collaboration and autonomy are introduced to the organisation; a priority for long-term vision, even at the expense of short-term goals is presented to the people</td>
<td>Employees began to feel empowered; they become more vigilant of waste in their daily work; they start working as partners providing feedback and suggestions on how to improve organisational processes</td>
<td>Waste identification and removal goes through a standard process</td>
<td>Stage 1</td>
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<td>System-level measures created to create systems improvements rather than small scale siloed improvement; however, they are still based on organisational rather than supply chain performance</td>
<td>Incremental improvements become a company-wide practice to reduce bottlenecks</td>
<td>Process designs support sustaining improvements</td>
<td>A culture embedded in QI philosophy is present in the organisation that encourages empowered employees to identify waste and eliminate them; continuously improving processes</td>
<td>Employees play a crucial role in organisational decision making and their inputs are considered to be of great value.</td>
<td>Waste is seen as inadvertently generated by the way the process is designed, resulting in process redesign to systematically remove it</td>
<td>Stage 2</td>
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<td>Systemic structures between the organisation and its direct suppliers are designed in a way that they help supply chain partners to fulfill their vision of creating a leaner supply chain</td>
<td>Close supply chain partners are encouraged to be involved in CI initiatives.</td>
<td>Supply chains work collectively to sustain improvements and understand the importance of them</td>
<td>Behavioural changes are introduced in external supply chains encouraging entities in supply chains to be more proactive in waste elimination and continuous improvement</td>
<td>The same principles of respect and empowerment are transferred to the direct suppliers; they are considered partners rather than suppliers and organisations tend to collaborate rather than compete for better deals among themselves</td>
<td>Waste elimination becomes a responsibility across individual supply chains, with majority of participants involved in it voluntarily</td>
<td>Stage 3</td>
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<tr>
<td>ST is preached and understood by the majority of the supply network partners; every QI intervention is judged on its impact on the complete system</td>
<td>CI become a part of the supply network; it is practiced by all tier suppliers making it a system-wide programme</td>
<td>Entities across supply network achieve 100% sustainability of QI initiatives on their own and also have a system based on collaboration and knowledge sharing system to help others</td>
<td>A learning supply network culture through relentless reflection and continuous improvement</td>
<td>Respect for people is the guiding principle in the supply network extending to all the stakeholders of the organisation</td>
<td>Waste is eliminated from the entire supply network rather than being transferred elsewhere</td>
<td>Stage 4</td>
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Table 7.8: Overview of components and stages of philosophical maturity
7.4.2 Respect for People & Empowerment

Respect for people & empowerment are also a part of QI philosophy (Kobayashi, 2018; Liker, 2004; Seaker & Waller, 1996). Mature organisations tend to have a culture where employees feel empowered; and are encouraged to seek perfection by highlighting areas for improvement. Toyota’s ‘pull the chain’ policy is an absolute example of such culture.

The participants mentioned that the QI revolution in healthcare, especially New Zealand, started with a focus on technical aspects of QI, i.e., the tools and techniques of QI (process maturity), no attention was given to the philosophical dimension of QI. Hence, elements like culture and empowerment did not come up as critical success factors in the early beginnings of QI. However, things are beginning to change. Employees are provided with more autonomy in their work; and are asked to be vigilant of wastes in their work. Majority of the DHBs (n=10) mentioned that anyone can offer suggestions for new QI initiatives, with some (n=4) even training employees to use A3 thinking, PDSA or DMAIC methods for problem solving. With such techniques, employees can design a QI initiative and present it to their departmental managers or QI teams for approval.

7.4.3 QI Culture

Organisational culture is considered to play a significant role in successful implementation of QI initiatives (Maull et al., 2001). The participants were asked to define the culture suitable for QI and whether their organisations had that culture or elements of it. All the DHBs unanimously agreed that they don’t have the appropriate culture for QI, however, they are working on improving it.

Participants mentioned that leadership’s support and involvement as well as employee empowerment were a critical part of QI culture, and have been defined in detail above. Similarly, promoting teamwork and collaboration while removing silo-mentality in the organisation was also recognised as a crucial part of QI culture. QI culture also included creating a no-blame culture, that highlights employee ownership of their work processes. It is easy to see problems in processes, and hence different measures can be taken to improve them.

According to the participants, the foundations of QI culture are laid by the top management. They are required to lead by example, by being involved in QI and by explaining the importance of it. QI trainings also play a crucial role in creating and sustaining a QI culture as they increase the familiarity of employees with QI, and plays a positive role in getting
employees to buy-in into QI. According to the participants (n=37), the majority of the clinical staff are not familiar with QI, and hence they show resistance towards it in the beginning. However, establishing a QI culture helps to decrease such resistance.

### 7.4.4 Sustaining Improvements

Sustaining QI changes requires both procedural and cultural changes in the organisation (Hines, 2010). QI implementation can revert back to a pre-QI position if improvements are not standardised and embedded in the organisation. Every element of each type of maturity plays its role in helping an organisation to make QI changes a part of its *modus operandi*.

Similar to regarding waste elimination, the participants showed good understanding of the importance of sustaining improvements. However, majority of them admitted that their respective DHBs (n= 12) were not particularly good at it. Participants acknowledged the role of reporting and auditing mechanisms in sustaining improvements. However, as showed earlier in the process maturity section (see table 7.5), the majority of the DHBs (n=10) did not score highly in the *reporting* category, sustaining improvements therefore appears to be a constant challenge for the DHBs.

DHBs also acknowledged the positive relationship between establishing a strong QI-focused culture and sustaining improvements. Hence, they are working on improving the organisational culture to match with what is required in a QI-focused organisation, as explained earlier.

### 7.4.5 Continuous Improvement

Organisations which lack a mature QI perspective generally tend to only conduct improvements in a reactive manner, i.e., after a fault or crisis is recognised, whereas mature QI organisations live by a QI philosophy of continuously seeking to improve their processes—proactively.

With the exception of DHB3, DHBs recognised that they are not following the *continuous improvement* approach, instead, they are mostly *firefighting* or dealing with QI-related concerns reactively. DHB3 focused on incremental improvements in majority of its QI initiatives. Similarly, HQSC also followed the same *firefighting* approach. Hence, the national programmes conducted by HQSC were mostly based on issues that were present in processes for a long time. However, that is very common in organisations and industries new to QI. Participants recognised the need for their respective DHBs to adopt a continuous
improvement philosophy, after they had enough employees in their organisation who understood and took part in QI.

7.4.6 Systems Thinking

Systems thinking is a critical part of QI (Jambekar, 2000) as it requires organisations to think of the big picture instead of working on smaller and siloed problems without realising their consequences on other parts of the system. Traces of systems thinking were present in almost all the DHBs partly because of how the healthcare system of the New Zealand is organised, and because of some of the health targets and reporting mechanisms are designed by the Ministry of Health. As far as the singular DHBs and their QI programmes are concerned, the lack of systems thinking was acknowledged and highlighted by the participants and the principal researcher alike.

As repeatedly mentioned earlier, a silo-mentality in DHBs encourages the waste transference to other value-streams, and almost no interaction with external supply chain entities and members in DHBs and their QI programmes points to rather lack of systems thinking.

7.4.7 Summary of Philosophical Maturity

Philosophical maturity includes organisational culture and other soft practices that enable DHBs to implement and sustain QI. DHBs scored very similarly, suggesting an alike view of the philosophical dimension of QI in DHBs. Sustaining improvements is a challenge in DHBs as almost all of them mentioned having difficulties in this aspect of QI primarily due to two reasons: 1) resistance towards QI showed by clinical staff and 2) lack of attention given to improved processes after the interventions. Similarly, because of the siloed approach to QI, DHBs recognised waste transference as a result of QI initiatives instead of waste elimination, i.e., waste is transferred to other value-streams/departments rather than eliminated from the system completely.

DHBs recognised the importance of setting up a culture appropriate for QI and empowering employees to conduct QI initiatives. However, majority of them were not able to fully operationalise said culture. This has been inhibiting the success of QI programmes in the DHBs, as suggested by the participants. Table 7.9 shows details regarding the philosophical maturity of the participating DHBs.
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<tr>
<th>Systems thinking</th>
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<td>Waste Elimation</td>
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Table 7.9: Overview of philosophical maturity of DHBs
7.5 Summary of the Chapter

This chapter focused on providing the findings related to RQ3 and RQ3.1; and concluded the findings portion of this dissertation by providing details regarding DHBs and their performance in many facets of QI using the QIMM (see chapter 3). It is argued that the QIMM will provide organisations with an integrated set of QI principles that are deemed important to help them diagnose their QI related issues and visualise what steps would be appropriate to advance their quality improvement maturity status.

Although, this chapter provided a bird’s eye view of QI in the New Zealand by providing details of the participating DHBs, their performance based on QIMM separately is provided in appendix 3. Participants were provided with a copy of QIMM, during the interviews and were asked to judge their DHB’s position on the many facets of QI presented in QIMM and questions regarding their judgement were asked. A final copy of the assessment was emailed to the participants at the end of the analysis, and they were asked to highlight their concerns, if the results were different than what they believed. This strategy is known as member checks, and it helped to ensure the accuracy of the findings of this research especially this chapter. More details on how this strategy was incorporated in the research design are presented in section 4.6.

These findings can provide readers with insights regarding the state-of-the-art of QI in the New Zealand healthcare system. These findings can be used by DHBs to drive QI activities based on the assessment results of their DHB; and can be used by the MOH to design new QI initiatives that focus on improving DHBs’ capabilities in supply chain and other weak facets of QI. Both managerial/practical and policy implications of these findings are presented in the conclusion chapter (chapter 9).
Discussion
8 Introduction to the chapter

The findings of this research (chapter 5, 6 and 7) helped to establish a sector-wide almanac regarding the state-of-the-art of quality improvement (QI) in the New Zealand DHBs, and contrasts it with the relevant literature from chapter 2. It includes details regarding the multiple QI methodologies used to facilitate and implement QI, i.e., lean thinking (LT) and Model for Improvement (MFI) and the state of resistance towards QI present in the New Zealand healthcare system using Goldratt and Cox (2016) layers of resistance model.

Furthermore, using the outcomes of QIMM as a basis (see table 8.1), strong isomorphic properties in the scope and the breadth of QI principles in the system are identified and analysed. QI literature (from healthcare and beyond) is used as a source of comparison and future direction, and to provide a foundation for the future development of QI in the New Zealand healthcare system.

8.1 Resistance in the New Zealand Healthcare System

Using Goldratt & Cox's (2016) layers of resistance model (figure 8.1), it was observed that the New Zealand’s healthcare system is more mature than others presented and analysed in the literature (see section 2.3.5), the interviews identified a collective belief (in the New Zealand DHBs) that healthcare quality is a critical concern (identified in layers of resistance model as the ‘problem stage’), and QI initiatives using the principles of process and operations management is the most optimal approach to address this concern (identified in layers of resistance model as the ‘solution stage’). The divide between Quality improvement managers (QIMs) and their individual DHBs based on their preferred QI methodology, i.e., LT and MFI showcase that the resistance is present at the implementation stage, instead of solution stage as seen in the literature (see section 2.3.5).
8.1.1 Institutional Logics in Healthcare

This resistance is primarily based on the disagreement on the details of the implementation, i.e., which methodology (LT or MFI) is more suitable for improving healthcare delivery processes. The concept of institutional logics provides a novel framework to comprehend this resistance and move beyond anecdotal evidence of different mechanisms used to overcome it. Following Ocasio et al. (2017) institutional logics are defined as a set of cultural beliefs, values and practices that provides understandings of appropriateness in any environmental settings. Institutional logics is a relatively recent development in neo-institutional theory (DiMaggio & Powell, 1983) intended to provide an account of how institutions focus the attention of decision makers on particular issues and solutions (Greenman, 2013; Reay & Hinings, 2009).

A rivalry is formed when a new institutional logic (challenger logic) is induced in an organisational setting as the supporters of this new logic start to challenge the supporters of the old logic (dominant logic). These competing logics can represent different viewpoints, actions or practices or organisational forms (Thornton, Ocasio & Lounsbury, 2012), which creates resistance (Reay & Hinings, 2009).
In this research, the competing logics of QI (challenger logic) and medical professionalism (dominant logic) were recognised as colliding and competing with each other at multiple levels. Healthcare organisations want to provide better and more efficient care to their patients, and for this purpose, the principles of QI are acquired from the field of operations management in the form of a QI methodology such as LT or MFI. However, as the principles of QI are induced into the healthcare environment, they are challenged by the followers of the dominant logic, which causes resistance and inhibits the process of QI, as recognised in the literature (Fillingham, 2007; Hasle et al., 2016) as well as the findings of this research.

The literature posits that the process of creating an environment that enables co-existence of different institutional logics by minimising the resistance of individuals towards other logics is similar to a change initiative (Thornton, 2002) such as a QI initiative. Such resistance is a common occurrence in change events, and success of a change event depends on the organisation’s capability to manage said resistance (Lines, 2004; Pardo del Val & Martínez Fuentes, 2003).

DHBs subscribing to LT employed Quality improvement managers (QIMs) with QI background from manufacturing industry. These QIMs were familiar with most of the QI methodologies such as LT, six sigma and TQM and strongly associated themselves with the institutional logic of QI. They also acknowledged MFI’s roots in the principles of QI. However, they considered MFI to be a lesser QI methodology because it was a subdued version of QI with incomplete principles and small scope.

On the other hand, DHBs subscribing to MFI did not necessarily have QIMs with similar credentials. However, these QIMs preferred MFI and considered it a superior QI methodology because MFI has been touted as a healthcare-oriented QI methodology. Therefore, it is endorsed by HQSC and majority of the DHBs subscribe to it (see table 5.1). MFI’s most discussed benefit was its healthcare-specific language and orientation as well as its origin in healthcare, which makes it more aligned with healthcare requirements. Subsequently, MFI’s validation by IHI – an internationally renowned entity in healthcare industry was also considered reassuring of its superiority. That is why, it resonates more with the institutional logic of medical professionalism. Consequently, LT was criticised for being a manufacturing-specific QI methodology with people arguing that we are fixing people, not cars.

This difference between these methodologies and their compatibility with the dominant logic of medical professionalism was indeed observed throughout this research. DHBs using LT observed higher level of resistance due to LT’s links to manufacturing industry, i.e., it was
developed outside of the healthcare industry. In these cases, the challenger logic was much different than the dominant logic, and hence it took more time for organisations to create ideal conditions for the coexistence of these logics. On the other hand, DHBs that decided to adopt MFI saw less resistance, because MFI’s close association with healthcare industry provided a sense of association to the followers of the dominant logic and hence, exhausted less efforts to create harmony between the competing logics.

Several mechanisms which enabled the blending of dominant and challenger logics to create a hybrid QI-Care logic were identified throughout this research. Although in many instances these mechanisms did not address the institutional contradictions between QI and medical professionalism, they did go some way in easing tensions, making QI implementations more likely to be successful, especially when LT was being used as the core QI methodology.

8.1.1.1 Quality Improvement Training: Sensegiving and Knowledge Translation

One of the most significant mechanisms used by both groups of DHBs to create harmony between the two competing logics was QI training because it allowed DHBs to introduce and familiarise their employees to the QI concepts that allay the staff resistance to QI (Cinite, Duxbury & Higgins, 2009).

The use of training for knowledge management and translation improves the overall dissemination of change initiatives (Simons et al., 2015) and enables competing logics to coexist in healthcare delivery process (Dunn & Jones, 2010), which further helps in the implementation and institutionalisation of a QI initiative (Riley et al., 2016); and it has a positive effect on the overall QI programme and its success (Mosadeghrad, 2014). Thus, allowing the organisations to improve involvement in QI activities as well as create a sustainable QI initiative (Schattenkirk, 2012).

QI methodologies are often called “human-based systems” (Dahlgaard & Dahlgaard-Park, 2006, p. 266). That is why, training and development is considered a very crucial part of a quality-driven organisation (Fredriksson & Isaksson, 2018), because it provides employees and other stakeholders with required QI-related skills and expertise to conduct QI-related changes (Chavez et al., 2015; LaGanga, 2011; Michaels, 1999). All the DHBs corresponded positively to this notion agreeing that the best way to reduce frontline staff’s resistance towards QI was to train them in QI, and training should consist of both tools, i.e., hard practices as well as philosophy, i.e., soft practices that familiarises them with the
concept of quality and create a quality-driven culture in the organisation (Bortolotti et al., 2015).

A common characteristic that separated the DHBs using LT from DHBs using MFI was regarding QI training. The former group of DHBs had developed their internal QI training and implementation programmes whereas all the DHBs from the latter group except only two did not have internal QI programmes, and mostly relied on HQSC for trainings and implementing QI initiatives. Hence. Some of these DHBs did not even have designated QI staff. Instead, they had quality assurance and compliance staff.

DHBs using LT developed their training programmes out of necessity because HQSC did not offer LT-related training. Two DHBs developed their own QI training programmes based on QI tools and principles from various QI methodologies that were relevant for their particular DHB. The internal training programmes allowed these DHBs to continuously train their employees and familiarise them with the principles of QI and LT. However, it required these DHBs to allocate more resources to training and development of their employees. That is also why, these DHBs had bigger QI teams.

On the other hand, DHBs using MFI were not required to have internal training programmes because majority of the training responsibilities were assumed by HQSC and Ko Awatea (see section 5.4.2.3 and section 7.1.1.5). These entities were training DHB staff as Improvement Advisors in a one-year training programme (see section 5.4.2.1). However, a very small number of employees from each DHB received this certification every year. Moreover, three DHBs also used the IHI Open School online trainings initiative for better dissemination of QI principles.

Depending on DHBs’ preferred QI methodology, either sensegiving or knowledge translation was adopted as a system to deliver QI training and guidance. Sensegiving is defined as “an interpretive process in which actors influence each other through persuasive or evocative language” (Maitlis & Lawrence, 2007, p. 57) whereas knowledge translation is concerned with “to address the gap between what is known from research and knowledge synthesis and how this knowledge finds its way into practice” (Kitson, 2009, p. 219).

Both MFI and LT are based on somewhat similar principles and techniques of QI (Scoville & Little, 2014), however, MFI relies more on knowledge translation, i.e., adapting the QI tools and techniques to healthcare-specific language and scenarios. That is why, DHBs and employees using MFI always highlighted its strong resonance with healthcare industry whereas LT was criticised for being difficult and relying strongly on QI. Because MFI relies
on knowledge translation, it was accused for oversimplifying the concepts of QI by LT devotees. This oversimplification requires organisations to downgrade the scope of QI and practice to very limited processes, and hence makes MFI only applicable for small scale projects (see section 5.4.3.3).

Similarly, DHBs using MFI focused their training on teaching employees various QI tools and their use in specific healthcare contexts whereas DHBs using LT relied more on *sensegiving*, i.e., they focused more on teaching employees the language and concepts of QI in its original form such as problem solving and waste, based on a holistic view of QI. For example: PDSA cycles are a cornerstone of process improvement in both LT and MFI (Scoville & Little, 2014). However, DHBs using LT trained employees about PDSA cycles in general and compared them with other process improvement strategies such as A3 thinking and DMAIC cycles, and allowed employees to choose the one most appropriate for their use, whereas MFI training were composed of PDSA cycles only, and their use in specific healthcare processes such as medication allotment process or blood transfusion process.

In summary, QI demands a complete organisational transformation for a sustainable QI initiative (Kaplan et al., 2014), and in this transformation process, the QI logic has to coexist in harmony with the dominant organisational logic. In manufacturing industry, quality revolution took place in the mid-20th century (Berawi, 2004). One of the primal part of this revolution was that quality is everybody’s responsibility in the organisation (Deming, 1982). Since then, the industry has adopted QI principles in their everyday operations (Dahlgaard et al., 1998), whereas in healthcare, QI being a relatively a new management concept still struggles to resonate with the institutional logics associated with medical professionalism (Reay & Hinings, 2009). However, training plays a crucial role in creating harmony between the competing logics of QI and medical professionalism (Bhat et al., 2016) especially when there is a strong divide between these logics, i.e., the case of LT in healthcare (McCann et al., 2015).

8.1.1.2 Commitment Devices and Incentives

*Commitment devices* are described as strategies or activities that limit certain future behaviour. They are voluntarily adopted and tend to be a consequence associated with not achieving the desired goal (Rogers, Milkman & Volpp, 2014). In the participating DHBs, the use of commitment devices to conduct quality improvement activities, and to control resistance towards such activities was clearly identified through the interviews.
One of the simplest forms of commitment devices observed in DHBs was the adoption of different QI programmes such as Releasing Time to Care® or The Productive Ward® from the UK’s National Health Service (NHS). These programmes are costly, and audited regularly by international organisations. In New Zealand, when the DHBs invested money in a programme, they setup targets and endeavoured to achieve results. Typically, QI tools would be implemented in wards of DHBs encouraging competition between these wards to do better, and maximise the opportunities for shared learning about success and failure factors.

Standardisation protocols also served as commitment devices. For example, DHBs created standardised layouts in storage rooms (complete with visual management boards). Similarly, DHBs also standardised electronic patient records and data collection instruments to ensure information was systematically collected and inputted into information systems.

Other commitment devices were imposed by central government including the six national health targets focused on shorter stays in emergency department, improved access to elective surgery, faster cancer treatment, increased immunisation, better help to quit smoking and raising healthy kids. Each one of their target was being constantly monitored and reported on Ministry’s website, and part of DHB funding was attached to it, which forced DHBs to take action.

Another principle from economics—incentives—was used similar to commitment devices for the same reasons. The theory of incentives is rather simple and posits that if followers of different logics lack the motivation to cooperate with each other (Fryer et al., 2012), incentive schemes could be designed and implemented to promote and improve cooperation.

In this regard, the use of financial incentives was always disregarded instantly by QIMs to promote QI agenda or the adoption of a certain methodology, the medical staff mostly associated QI-related initiatives as a cost cutting strategy, and did not appreciate its association in healthcare environments, especially with patient care. It is because medical professionalism is based on the patient-clinician relationship, and clinicians providing best possible care for their patients, regardless of resources such as time and other elements.

5 National health targets were discontinued by the New Zealand Government in the 1st quarter of 2018
are being efficiently spent or not (Reay & Hinings, 2009). Therefore, there was a consensus that financial incentives were not appropriate in a healthcare setting.

Moral incentives were considered to be the most applicable and useful incentives to create harmony between the competing logics. The basis of these incentives was the simple question of ‘why we do what we do?’, and answer to the morals of the followers of both logics. The healthcare logic focused on ‘patient care’, whereas the LT logic focused on ‘value maximisation and waste elimination’. The QIMs job was to make these goals synonymous to each other, and create an environment which appealed to both. For example, HPOs started using ‘unnecessary suffering’ instead of waste, and every process or activity that their believed to increase this unnecessary suffering was considered a red flag. This included issues such as waiting times, cancellations, patient safety and increased length of stay etc. By doing so, the ethos of both logics started to combine, and the morals of the followers of these logics answered to this call.

8.1.1.3 Effective Leadership

Similar to training, effective leadership also aids in increasing acceptance of QI initiatives and create space for coexistence of two competing logics, i.e., medical professionalism and QI.

Generally, DHBs are very hierarchical organisations, executives and physicians taking top placements mostly associated with medical professionalism logic who often ‘out-rank’ the rest of the clinical and non-clinical employees (Waring & Bishop, 2010), including QIMs, i.e., the primary supporters of challenger logic. Such hierarchical arrangement inhibits forging of an organisational culture where said competing logics can coexist in harmony, and where QI initiatives face minimal resistance and can be sustained (Guimarães & Crespo de Carvalho, 2012; Liker & Hoseus, 2008).

Literature emphasises on the crucial role played by top leadership in institutionalising QI concepts in organisations (Papadopoulos et al., 2011; Phillips et al., 2016). Al-Balushi et al. (2014) highlighted effective leadership as a critical readiness factor for QI in healthcare organisations after an intensive literature review of around 170 papers, whereas Mann (2009) referred to it as ‘the missing link’ in QI programmes. Organisational leadership highlights the shared goal of the two respective competing logics and the people associated with it, i.e., providing better care to patients. This shared-goal approach creates harmony between the logics, and the people associated with each logic get a chance to develop familiarity with the competing logics (Reay & Hinings, 2009).
Leadership emphasises the coexistence of these logics as the only way forward to achieve the shared goal. Leaders make themselves more accessible to the staff when they are involved in initiatives (Pocha, 2010; Steed, 2012), monitoring changes at the frontline-level and participating in QI trainings (Al-Balushi et al., 2014; Bercaw, 2013; Clark, Silvester & Knowles, 2013; Dahlgaard, Pettersen & Dahlgaard-Park, 2011; Erskine et al., 2013) and lead by example, highlighting coexistence with competing logics is achievable. Such acts enable QI culture to prosper and the initiatives to be sustained and institutionalised (Drotz & Poksinska, 2014; Poksinska et al., 2013).

Similar to QI training, DHBs using LT found it to be a more critical factor to disseminate QI. Leadership from these DHBs was more supportive of QI and even participated in QI initiatives and training exercises. Leadership stayed up-to-date and closer to the progress of the initiative. Such commitment to QI by the DHB leadership tends to be acknowledged and appreciated by the employees subscribed to competing logics, which is reciprocated in terms of improved morale and acceptance for competing logics to coexist (Bortolotti et al., 2016; Dyer & Nobeoka, 2000). The visible involvement of leadership in QI initiatives has also been reported to improve the dissemination of such initiatives (Fine et al., 2009; Holden, 2011) and improves engagement in the employees (White et al., 2013).

Such actions also provided employees with a sense of urgency of the QI initiative, and stimulate the behavioural requirements needed in the frontline staff, which institutes cultural change in the organisation (Steed, 2012). That is why, effective leadership is a critical success factor in QI initiatives (Achanga et al., 2006; D'Andreamatteo et al., 2015) and positively influences employees’ orientation towards QI (Drotz & Poksinska, 2014).

On the other hand, Leadership form DHBs using MFI also supported QI; but they were not actively involved in it (except for DHB2 and DHB5). These DHBs either did not have QIMs or designated QI employees; and implemented QI in a reactive way, i.e., only participating in National programmes from HQSC or MOH. In those cases, QIMs as well as other staff members highlighted their frustration with the QI initiative, and their DHBs scored poorly in the QIMM. At the same time, QIMs from these DHBs showed minimum characteristics required by them to perform effectively (see chapter 6). The DHBs using LT (or even MFI) that performed better, they all had either the support or the representation at senior leadership level of the organisation, whereas the DHBs that performed poorly lacked that significant feature in their organisations.

In summary, the majority of the frontline employees delivering the health services i.e. physicians, surgeons and nurses are supporters of medical professionalism logic, and
hence, do not have management/business or process improvement educational background to comprehend the concepts as well as the need for QI especially if the methodology being used for QI is not a healthcare-specific methodology such as LT. In such cases, leadership has to play a significant role to assist the introduction as well as the acceptance of both QI logic and the methodology being used to facilitate QI.

8.2 Quality Improvement and Isomorphism

QI in the New Zealand healthcare system observed through the QIMM depicted strong homogeneity in DHBs on a macro-level, with the majority of DHBs concentrated in the same stage of maturity in any given component of quality being explored, regardless of the QI methodology used by the DHB. Table 8.1 illustrates.

This homogeneity is caused by institutional isomorphism, which forces organisations to mimic/resemble other organisations in the industry (DiMaggio & Powell, 1991), especially public sector organisations (Frumkin & Galaskiewicz, 2004).

One of the most obvious pressures is coercive isomorphism, i.e., formal and informal pressure on organisations to improve quality of care both by the general population they serve and by the government. There is an expectation now that DHBs should be doing more and more to improve quality of care, while medical and technological innovations help in this endeavour, they alone are not enough. Medical and technological innovation has never been better than it is in the current age, and yet the quality of care has been decreasing, this was highlighted in the famous report To Err is Human (Institute of Medicine, 1999), and has been declining ever since (Classen et al., 2011; James, 2013). This decline is associated with operational and process-related issues, rather than medicine-related issues. Therefore, DHBs and healthcare providing organisations around the world have been facing pressures to improve care delivery processes. For that purpose, traditional QI methods and principles from operations management are seen as an optimal choice. DHBs are required train employees in QI; run QI initiatives; publish Quality Account documents yearly. The formation of HQSC and Ko Awatea could be accredited to these pressures and to facilitate DHBs in their QI journeys.

QI being a relatively new concept and somewhat poorly understood concept in the New Zealand healthcare system. This brings uncertainty in the industry’s climate, and it pushes organisations to model their QI initiatives and practices on other—in most cases, successful—organisations. QI methodologies, especially those from manufacturing background (LT, six sigma, etc.) and their introduction in healthcare is an example of
mimetic isomorphism, as well as the homogeneity present in the QIMM (see table 8.1) is due to this mimetic process. As HQSC and Ko Awatea has been training majority of the DHBs, and implementing nation-wide QI initiatives, DHBs and the state of their QI initiatives as well as outcomes is quite similar. Programmes such as Releasing time to Care® or The Productive Ward Programme®, have been opted by majority of the DHBs in their progression to seek legitimacy in the New Zealand healthcare system. Some QI tools such as 5S, VSM, 7 Wastes are used by all the DHBs regardless of their choice of QI methodology. Bigger DHBs usually experiment with such programmes, initiatives or tools, and then serve as a model, i.e., convenient source of effective QI practices that smaller DHBs can adopt later. Such mimetic responses highlight that DHBs’ efforts in improving quality of care and using industry standard innovations.

Finally, normative isomorphism is also a cause of homogeneity in the healthcare sector’s QI practices observed in the QIMM. The New Zealand Healthcare System (DHBs and MOH) is investing in QI, and making it a formal part of individual DHBs. Participants acknowledged these efforts throughout the interviews, and mentioned such isomorphic mechanisms were not present a decade or so ago. Now almost all the DHBs operating in the New Zealand have quality directorates or QI departments along with the quality assurance departments that were not part of the old organisational structure. Some of the DHBs (especially DHBs using LT, see table 5.1) have hired people from manufacturing industry specifically as there were not many people with QI background in the healthcare industry. Another interesting finding that has contributed to normative isomorphism is the highly fluid job market of QIMs in the New Zealand Healthcare System. Around 60% of the participants had worked for more than one DHB in the past, and some were employed by more than one DHB on contractual basis currently.

In summary, isomorphic mechanisms including coercive, memetic and normative isomorphism have created homogeneity in DHBs and their QI initiatives, regardless of the methodology being used by them. Some components of QI are present in the healthcare system and all the DHBs have (or in the works of) installing them in their operational processes; while others are completely missing. For example, the supply chain perspective is almost completely absent in all the DHBs (see section 7.1.3). Components of supply chain maturity are not being considered by any of the DHBs; and supplier involvement and development is lacking.
| Systems thinking | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Continuous improvement | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Sustaining improvements | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| QI Culture | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Empowerment | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Waste Elimination | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Communication | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Just-In-Time | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Supplier Involvement | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Supplier Development | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Involvement in QI | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| VSM | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Standardisation | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Problem Solving | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Production Levelling | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Reporting | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Error-Proofing | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| QI Tools | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Training | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Financial Objective | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Project Selection | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Leadership support | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Vision/Scope | DHB10 | DHB6 | DHB9 | DHB1 | DHB2 | DHB3 | DHB4 | DHB7 | DHB8 | DHB11 | DHB12 |
| Stage 0 | Stage 1 | Stage 2 | Stage 3 | Stage 4 | Stage 5 |
| Identification | Ad hoc | Format | Process drivers | Optimized Enterprise | Way of Life |

Table 8.1: Overview of the quality Improvement maturity of DHBs
8.3 Scope of Quality Improvement

One of the most crucial facets of QI is *continuous improvement* which implores organisations to continuously improve their processes by staying vigilant of wasteful activities. Part of that is increasing the scope of QI gradually from small QI initiatives to company-wide and supply network-wide QI initiatives. As organisations and their QI initiatives mature, they tend to increase the scope of it. This was depicted in QIMM by different stages of QI, where initially QI is conducted on an ad hoc basis but, as organisations get better at it, they start to consider extended value-streams and collaborate with their suppliers to facilitate QI in the supply network.

QI is still in its infancy in the New Zealand healthcare system as DHBs are still focusing on creating and implementing QI initiatives within the operational boundaries of singular entities, and therefore, the majority of the QI initiatives discussed with participants of this research were departmental in nature. Such point-optimisation in healthcare is present everywhere as the majority of the cases analysed in the literature review (see chapter 2) were also only focusing on singular departments instead of a complete organisation or a supply network system. This research provides empirical proof that corroborates with the same point raised in the literature review chapter regarding the limited scope of QI initiatives in healthcare (see section 2.3.2 and section 2.5), and shows that the development of QI in the New Zealand healthcare system is aligned with the same pattern. The literature does not offer a firm argument regarding the importance of SCM activities (such as inventory management and supplier relationship management) and their role in ensuring seamless delivery of healthcare processes, which aligns with the findings of this research (see section 7.1.3).

For QI initiatives to work and truly eliminate waste from a system, they must be integrated in extended supply chains. As suggested by Parveen and Rao (2009), implementing QI best practices in supply chain can help organisations achieve operational excellence. Consequently, supply chain operations should be included under the realm of QI because they provide the much-needed backend support to ensure the seamless delivery of care processes. QI techniques and initiatives do not stop with one organisation in the supply chain; it has to be transferred throughout the supply chain, within each of the organisations and across the interfaces (Bortolotti et al., 2016; Chavez et al., 2015), otherwise, the operational waste is not truly eliminated from a value-stream, and is transferred to other value-streams instead.
8.4 Principles of Quality Improvement

As discussed earlier, there is a strong divide in DHBs and their respective QIMs underscored by chosen QI methodologies. Further exploring DHBs and their QI initiatives using the QIMM exposed that they had an overall poor understanding of the principles of these QI methodologies.

MFI is based on the principles of Deming (Scoville & Little, 2014), and while LT is not explicitly based on the same principles, it is still comprised of similar principles (Liker, 2004). Similarly, both of these methodologies use similar approaches to problem solving, i.e., they emphasise root cause problem solving rather than taking an ad hoc approach to it, and they both emphasise on continuous improvement, and hence PDSA and similar improvement strategies are a core part of both of these methodologies (Bicheno, 2000; Langley et al., 2009; Womack & Jones, 1996). However, most (n=12) of the DHBs did not have well-constructed problem-solving mechanisms in place. DHBs using MFI admitted to testing multiple solutions and then selecting one that fit the needs in rapid improvement process improvements, instead of conducting thorough root cause problem-solving exercises. DHBs using LT seemed to do better with the aid of multiple tools and techniques for problem-solving such as A3 thinking, PDSA cycles, VSM and fish-bone diagrams. Regardless of the preferred methodology, all the DHBs had a very small portion of their employees trained in problem-solving.

Both of these methodologies implore organisations to have a long-term QI vision, and include it in the overall organisational strategy. No DHB was found to have a long-term QI strategy document explaining a roadmap for quality; and all the QIMs (except for DHB1 and DHB5) recognised this absence of a long-term strategy and vision as inhibiting QI. Without a long-term organisational strategy, QI is mostly performed in a reactive way (see chapter 7), and when QIMs or prominent leadership figures leave the organisation due to any reasons, the DHBs start over their QI initiatives. The senior leadership (from 12 DHBs) verbally supports QI because it is the right thing to say, they do not take serious measures to help support its continuous implementation or improvement.

Moving down the hierarchical ladder, QIMs are very vocal about their choice of methodology, but even they seem to pick and choose components of QI methodologies that they prefer, and only impart and implement them in their DHBs. For example: Error-proofing or Poka-Yoke (in LT literature), is a crucial part of QI (Crosby, 1996; Deming, 1982; Henderson & Larco, 2002; Kobayashi, 2018). However, DHBs (and QIMs) seemed to
neither invest in error-proofing mechanisms in their QI initiatives proactively nor did they include these respective principles in their training guides, regardless of their preferred methodology. The QIMs from DHBs using LT specifically recognised the importance of *Poka-Yoke* (mistake proofing), however, they admitted to not installing any particular mechanisms consciously in their value-streams to error-proof processes.

Similarly, production-levelling or *Heijunka*, also known as the “key” to LT (Coleman & Vaghefi, 1994) was almost completely ignored. Production-levelling allows organisations to evenly distribute the delivery of multiple processes in a value-stream; and balance the work load to the capacity and capability of different components of value-stream to complete the job (Bicheno & Holweg, 2008). The end result is a process that optimally balances between inventory, capacity utilisation and system variability (Hopp & Spearman, 2011). Much like error-proofing, improvement initiatives did not constitute production-levelling principles in DHBs, and it was one of the most ignored singular facets of QI (see table 8.2). The majority of the DHBs (and QIMs) did not highlight any plans to use production-levelling principles in their processes in the future, with the exception of six DHBs who were testing them in singular value-streams or departments. However, these DHBs mentioned that production-levelling in singular value-streams almost always tend to affect the subsequent processes; and hence, created new bottlenecks. For production-levelling to work, they would need to redesign multiple value-streams at the same time, and that was not always possible due to various reasons. Some DHBs were working on using these principles in their surgery-related value-streams. However, they were facing multiple challenges in the implementation due to the involvement of many different departments with different requirements and localised operational processes.

As mentioned earlier (see section 8.2.1), the scope of QI is very departmental in DHBs. MFI proposes doing small incremental changes, and hence departmental or even singular process-related improvements are encouraged in DHBs using this methodology. However, teachings of LT implores organisations to eliminate *waste* from the complete “system” (Womack & Jones, 1996; Womack et al., 1990). DHBs using LT did not share this “systems” view in their QI initiatives. Similar to MFI, they also had a narrow scope of QI, hence, DHBs were mostly recognised in *stage 1 or 2* for most part in the QIMM (see table 8.2). Supplier involvement and supplier development strategies were completely missing from DHBs; and communication among supply network entities was also recognised to be lacking inadequately.
This selected-focus on QI tools, and justifying it with QI methodologies has been negatively affecting DHBs and their QI initiatives. This tool-based myopic thinking, a belief that implementing certain process improvement tools will suffice, instead of a systems-view based on a complete understanding and commitment to quality, is an obstruction in QI initiatives (Bortolotti et al., 2015). That is why DHBs mentioned issues regarding sustaining QI initiative outcomes, and true waste elimination. A similar approach to QI was observed in literature as well (see section 2.3), where HPOs were using wide range of QI tools, with a few dominating all the QI initiatives. Tools such as JIT and SMED that were considered to be the important prerequisites to QI implementation are completely missing in healthcare sector. By ignoring these fundamental facets of QI and its underlying philosophy, organisations do not meet the conditions necessary to ensure success and set themselves up to fail (Drotz & Poksinska, 2014; Hasle et al., 2016; McCann et al., 2015).

In summary, QI in the New Zealand healthcare system is based on a narrow scope; DHBs lack QI strategy; and QIMs are focused on using QI methodologies in an arbitrary way, i.e., without understanding the essence of their principles and philosophy absolute entirety as shown with the use of QIMM. By ignoring those fundamental facets of QI and its underlying philosophy, DHBs do not meet the conditions necessary to ensure success of QI initiatives and set themselves up to fail (Drotz & Poksinska, 2014; Hasle et al., 2016; McCann et al., 2015).

Quality is Quality regardless of the method used to achieve it. However, this idea is somewhat missing in the New Zealand Healthcare system, where quality is somehow associated with QI methodologies, and even those methodologies are used with limited scope and principles. The use of QIMM exposed an exact opposite view, one that is not determined by QI methodology, instead it is determined by the focus of DHBs on the singular facets of QI depicted in QIMM. Healthcare system needs to install this inverted way of looking at quality, where focus is laid on the building blocks of quality rather than the QI methodology itself. This novel approach to quality requires organisations to understand the significance of these building blocks represented as the facets of quality in the QIMM, along with an acknowledgement of their impact on each other to forge and implement a truly system-wide QI strategy.

8.5 Quality Improvement and the Mathew Effect

This chapter highlighted a multitude of elements that can affect a DHB’s QI initiative, its development, its dissemination, and success. Other than that, the use of the QIMM could
also help DHBs to maintain their focus on the necessary principles of QI. Using the same QIMM, each DHB was given a maturity score presented in table 8.2. These scores are a proxy for their overall QI maturity. The qualitative nature of this research required the researcher to assume each component in QIMM to be equally important, and hence, given equal scores. Similarly, each subsequent level and the efforts required to move up a level (from level 1 to 2 or level 4 to 5 in the QIMM) are equal as well.

<table>
<thead>
<tr>
<th>DHB Name</th>
<th>Maturity Score (out of 115)</th>
<th>Preferred QI Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHB5</td>
<td>53</td>
<td>MFI</td>
</tr>
<tr>
<td>DHB1</td>
<td>52</td>
<td>LT</td>
</tr>
<tr>
<td>DHB3</td>
<td>48</td>
<td>LT</td>
</tr>
<tr>
<td>DHB13</td>
<td>48</td>
<td>LT</td>
</tr>
<tr>
<td>DHB12</td>
<td>44</td>
<td>MFI</td>
</tr>
<tr>
<td>DHB9</td>
<td>43</td>
<td>LT</td>
</tr>
<tr>
<td>DHB11</td>
<td>40</td>
<td>MFI</td>
</tr>
<tr>
<td>DHB2</td>
<td>38</td>
<td>MFI</td>
</tr>
<tr>
<td>DHB14</td>
<td>38</td>
<td>LT</td>
</tr>
<tr>
<td>DHB7</td>
<td>28</td>
<td>MFI</td>
</tr>
<tr>
<td>DHB4</td>
<td>22</td>
<td>MFI</td>
</tr>
<tr>
<td>DHB6</td>
<td>22</td>
<td>MFI</td>
</tr>
<tr>
<td>DHB8</td>
<td>21</td>
<td>MFI</td>
</tr>
<tr>
<td>DHB10</td>
<td>12</td>
<td>MFI</td>
</tr>
</tbody>
</table>

Table 8.2: Maturity score of DHBs

Table 8.2 illustrated DHBs and their respective maturity scores and displayed two other important points: 1) DHBs using LT tend to be doing better (four out of seven top-performing DHBs use LT for QI), but 2) MFI is the most favourite QI methodology (ten out of the fourteen DHBSs use MFI).

Furthermore, DHB funding also affected their respective QI maturity scores, i.e., better funded DHBs scored higher on QIMM. However, this relationship is not presented as it would compromise the anonymity of the participating DHBs, and also, the research participants.

However, when DHBs and their QI initiatives were judged based on multiple facets of QIMM, a strong homogeneity between their QI efforts was observed (see table 8.1). This homogeneity is a result of different isomorphic pressures (see section 8.1.3), which altogether affect the dissemination of QI in the healthcare system as a whole.
Finally, when these maturity scores were compared against one of the national health targets (six-hour emergency stay), there was a very weak correlation. Some of the bottom performing DHBs seemed to be performing efficiently against this health target compared to the other (even top-performing) DHBs. This comparison is not presented in this discussion because it would affect the anonymity and confidentiality of DHBs and the respective participants of this research.

While it would be remarkable to understand which of these many factors play a crucial role in the success of QI initiatives, not to mention an even more remarkable research contribution, QI and its success in some DHBs is due to a series of factors that provide them with small advantages. These advantages when accumulated together gave some DHBs a better chance to develop and disseminate QI, and hence, they were recorded as better-performing DHBs in table 8.2. Understanding these accumulated advantages could help in developing the basis for future strategy for QI across the whole sector.

First, some DHBs mentioned selecting QI methodology that was regarded as a better fit for their organisation while others just accepted MFI as the preferred QI methodology because either others were using it or because HQSC recommended it. The former group, who chose from multiple methodologies were comparatively better funded DHBs. This group had the financial resources to explore the appropriate methodology; they could hire operations/quality consultants and bigger QIM teams with different expertise; they could invest in more sophisticated training programmes; and they could invest in better reporting and implementation mechanisms. These DHBs also mentioned implementing QI initiatives before others, some of them using specific QI principles or methodologies for over a decade. Such lengthy time periods allowed them to gradually improve their QI initiatives, develop a QI culture and eliminate resistance towards QI. Smaller DHBs or DHBs with lesser funding did not seem to have this choice, using the limited resources offered by MOH and HQSC is a option and makes more sense: economically and financially.

As discussed earlier (see section 8.2.2.1), it was observed that DHBs using LT invest more resources to manage the competing logics of QI and medical professionalism. To do so, these DHBs had better and more sophisticated training programmes; along with bigger teams of QIMs with experience in QI and implementation methodologies; and they had higher level of maturity scores (see table 8.2). While research shows such organisational factors can help in successful QI implementations (Dyer & Nobeoka, 2000), they are a financial strain on these DHB organisations, who do not have any experience in QI. Bigger DHBs were able to explore the application of LT because of having better funding.
In the New Zealand, both funding and population are related to each other as Ministry of Health uses a population-based funding method to fund DHBs. DHBs with high population get more funding whereas the DHBs with low population get less funding. Urban DHBs usually have bigger population group to cater to with scarce resources. These DHBs adopt QI principles to ensure efficient use of their resources, whereas smaller DHBs do not face the same pressures.

In summary, the reason behind the variance in DHBs and their maturity score is not because of simply one factor such as their preferred QI methodology, even though, that is what most of the QIMs believe to be so. It is in fact the result of accumulated advantages based on different organisational and industrial factors that altogether result in some DHBs and their QI initiatives being superior over others. Such phenomenon is also known as Mathew Effect6, and it can be used to explain the said variance between DHBs and their maturity scores.

8.6 Future of Quality Improvement in the New Zealand

The participant responses indicated that no significant change to QI practices in the New Zealand healthcare system will be taking place in at least the near future. However, the findings of this research could be used to not only design and implement reforms at macro-level but also at the micro-level; and to initiate research streams that would correspond with these reforms.

The healthcare industry in the New Zealand as well as the rest of the world is concentrated on seeking the best QI methodology to implement and improve the operational activities. The literature review (chapter 2) highlighted LT as a most used QI methodology (Dobrzykowski et al., 2016; Doğan & Unutulmaz, 2016; Papadopoulos et al., 2011). However, literature criticising LT and its use in healthcare is also present (McCann et al., 2015; Savage et al., 2016; Stanton et al., 2014). Such mixture of literature is also present for other QI methodologies (Radin & Coffee, 1993; Zu, Fredendall & Douglas, 2008). However, as highlighted in this research, simply choosing a QI methodology does not guarantee success or failure in QI initiatives.

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6 Mathew effect is a term used to highlight the benefits of accumulated advantage. It was coined by Robert K. Merton in 1968 and takes its name from biblical Gospel of Matthew specifically “For to everyone who has will more be given, and he will have abundance; but from him who has not, even what he has will be taken away” [Matthew 25:29]
QI methodologies have been derived from the principles of QI, and while they help organisations to simplify QI initiatives and provide employees a guideline approach to QI based on the respective QI methodology, QI methodologies are not necessarily a solution to quality-related issues, especially when they are used in piecemeal approach, i.e., only some tools and techniques in limited application (Bortolotti et al., 2015; Deming, 1982; Juran, 1986).

At their roots, QI methodologies have more in common than their perceived differences. A plethora of literature is based on highlighting these similarities of different QI methodologies (Dahlgaard & Dahlgaard-Park, 2006; Lizarelli & Alliprandini, 2018; Scoville & Little, 2014). However, an intimate investigation of QI activities in the New Zealand healthcare system revealed an industry more interested in QI methodologies and rhetoric winning over reality, instead of promoting a basic understanding of QI to its occupants, which is not very different from the literature on QI in healthcare (see chapter 2). Moreover, this difference of QI methodologies being used by DHBs has created a divide in the point of view of their respective employees. This divide was observed throughout this research as every participant of the research (DHB employees and HQSC employees) associated themselves with one or the other QI methodology; and they underscored the reasons behind the effectiveness of QI initiatives was solely based on DHBs’ choice of QI methodology.

The QIMM exposed that the choice of QI methodology does not affect the effectiveness of QI initiatives as such. Regardless of their QI methodology, DHBs and their QI initiatives were observed in quite a similar state using the QIMM (see table 8.2). Hence, the focus needs to be moved from QI methodologies to QI. While QI methodologies and their relevance in different industries or even processes can be questioned, the concepts of QI are always going to be relevant (Juran, 1986).

However, this notion is clearly missing in the healthcare research as well as in practice as represented by the New Zealand healthcare system in this research. As depicted by Blumenthal and Kilo (1998, p. 643): “It remains too easy for health care organisations to talk a good game, to meet accreditation requirements, and yet to leave their daily operations virtually unchanged”. Therefore, for healthcare industry to reap benefits of QI, it is important that they focus on the fundamentals or the building blocks of the concept of quality, and the QIMM developed and presented in this research could serve as a trigger towards migrating the views of healthcare industry regarding QI.

Analysis on macro-level—New Zealand healthcare system, as well as micro-level—DHB/organisational-level, highlighted another element crucial for a sustainable future of QI
relates to the scope of its principles and implementation. Both the theoretical and empirical literature religiously acknowledges eliminating organisational silos as a crucial success factor of QI (Bakar et al., 2015; Burgess & Radnor, 2013; D’Andreamatteo et al., 2015; Deming, 1982; Kaplan et al., 2014; Latzko & Saunders, 1995; Reid et al., 2016; Womack & Jones, 1996), and so did the participants of this research. However, the vast amount of literature based on QI implementation in healthcare analysed for this research (see chapter 2) was based on departmental QI implementations (Culig et al., 2011; Niemeijer et al., 2010; van Lent et al., 2009). DHBs and their QI initiatives investigated in this research were also of the similar nature.

Multiple reasons were presented to justify these small-scale QI implementations, from lack of resources (financial and non-financial) to preferred QI methodology’s inclination towards small-scale implementations came up during this research. Such small-scale implementations admittedly have certain benefits as they allow organisations to highlight the advantages of using QI principles and reduce employee resistance in some cases, however, if organisations continue with QI initiatives in isolated value-streams, they run into a danger of transferring waste to subsequent processes rather than eliminating from the system (Fearne & Fowler, 2006; Michaels, 1999). Other than that, isolated QI interventions encounter issues regarding the interpretation of the concept of value for said QI interventions with rest of the others. Each intervention interprets value differently and measures it using different quality metrics which do not align with each other (Young & McClean, 2008). Finally, isolated interventions fail to explore and counteract the unintended effects of these intervention on other parts of the system (Kaplan et al., 2014; Perez et al., 2010).

Such negative implications of QI in isolation were highlighted by research participants from their respective DHBs. QI initiatives and applications should not only focus within individual processes or departments/wards in hospitals, they should also focus on the interfaces between these processes or departments/wards to truly improve and eliminate the system (Bortolotti et al., 2016; Shah & Ward, 2007). Such active system-wide QI initiatives require long-term vision of quality that is part of the organisational strategy (Conti, 2010; Miller et al., 2018).

Finally, the importance of the role of QIMs as facilitators and caretakers of QI in DHB organisations cannot be understated. QI tools are relatively easy to grasp (Bicheno & Holweg, 2008), and yet many organisations fail to successfully implement QI. It is because QI initiatives require more than just the implementation of quality tools in healthcare
organisations, they demand a complete organisational transformation for a sustainable QI initiative (Kaplan et al., 2014). Having professional QIMs in the organisation, who understand QI (Fillingham, 2007; Morrow et al., 2014); have optimal experience of implementing QI methodologies and QI initiatives (Ben-Tovim et al., 2007); and are able to facilitate the promotion and development of QI culture (Kaplan et al., 2014) are crucial for QI initiatives sustainable success (Mann, 2009; Phillips et al., 2016; Poksinska et al., 2013). DHBs without QIMs or with such personnel without the appropriate characteristics (see chapter 6) are at a disadvantage. Whilst HQSC trains employees from these DHBs, those efforts are miniscule compared to the size of these organisations. DHBs are large public organisations with thousands of employees, having only a few people trained in only a certain aspect of QI, who then later on train others (not a case in every one of the DHBs) is not going to be enough, especially if they are not able to create a culture of quality (Bhasin & Burcher, 2006).

Majority of the work force in the New Zealand healthcare system or even in individual DHBs is not familiar or trained for QI activities. DHBs face a crucial challenge of disseminating the teachings of application of quality in their entire work force. Without a long-term strategy and effective QIMs, DHBs cannot succeed. The piecemeal approach to both QI and its dissemination sets organisations to fail (Sheridan, 2004).

MOH would need to revamp the QI structure and strategy in the complete healthcare system, where regardless of the size or other factors that assist in the development of QI initiatives in DHBs (see section 8.6), each DHB is given equitable assistance and drive to implore long-term system-wide view of quality, as persisted by Karlsson and Åhlström (1996, p. 7) that QI “should be seen as a direction, rather than as a state to be reached after a certain time”.

8.7 Summary of the Chapter

This chapter provided a thorough state-of-the-art of QI in the New Zealand healthcare system by exploring the various dimensions of QI and their inter-relatedness. QI methodologies, and how they disseminate in organisations; the challenges faced by DHBs; and how they can overcome them were stated. The importance of system-wide scope and wider principles of QI was also discussed. Altogether, these various facets of QI should be considered and implemented in their entirety to reap the benefits of QI. Healthcare systems in their current state uptake QI in pragmatic rather than pure form, however, it is hoped that this viewpoint will be adopted as the future direction of QI.
Chapter 9 Conclusion
9 Introduction to the Chapter

The ninth and the final chapter of this dissertation summarises the key findings and contributions of the study. Moreover, it presents the new knowledge regarding the Quality Improvement (QI) in healthcare environments, and a future research agenda. As the New Zealand healthcare system was observed during the research, practice as well as policy development implications are also presented in this chapter, which could be used to improve the QI structure in the healthcare system. Finally, the research limitations and how they could have affected the research findings are clearly outlined.

9.1 New Knowledge and Research Contribution

The aim of this research was to examine the state-of-the-art of quality improvement activities in the healthcare providing organisations, District Health Boards (DHBs), and frame an agenda to support continuous improvement of healthcare delivery processes in the future.

For this purpose, the QI approaches used in multiple DHBs operating in the New Zealand healthcare system were observed in detail. New Zealand’s healthcare system is an excellent setting for investigating QI phenomenon in healthcare because there are multiple methodologies, i.e., Lean thinking (LT) and Model for Improvement (MFI) being used to improve the quality of care in different DHBs; and there is a strong Crown agency Health Quality Safety Commission (HQSC) under the authority of the Ministry of Health (MOH) assigned to develop and conduct QI initiatives across DHBs.

One of the primary contributions of this research, presented in Chapter 5, is a detailed comparison of two highly acclaimed QI methodologies (LT and MFI), both used in healthcare systems and healthcare Providing Organisations (HPOs) around the world. This was a follow-up to a White Paper published by the IHI called “Comparing Lean and Quality Improvement”, which compared both of these methodologies and notified readers from practice and research about the similarities and differences between these methodologies (Scoville & Little, 2014). However, Scoville & little’s (2014) work is not supported by empirical data, whereas this research provides an in-depth account of these methodologies with empirical evidence based on interviews conducted with Quality Improvement Managers (QIMs) from 15 DHBs. This comparison was based on comparing and contrasting essence, benefits and criticisms of these methodologies, which can be used as a guide by HPOs, who seek to understand these methodologies before using them for QI.
Another contribution of this research was associated with highlighting the role of QIMs in supporting QI initiatives in HPOs. While, the QI philosophy indicates that QI is everybody’s responsibility in an organisation, which is true in the long-term, in the early stages of QI programmes, QIMs are required to support this quality-driven change, especially in large and highly complex organisations such as DHBs. DHBs with designated QI departments or QI directorates with a number of employees continuously initiating, designing and supporting QI initiative; and training employees different QI tools and methodologies had better and more developed QI initiatives than DHBs without such designated departments. Poksinska et al. (2013) concluded that the role of QIMs change during QI initiatives, this dissertation complemented their work by analysing the core characteristics required in successful QIMs. At the same time, challenges faced by QIMs during QI initiatives were also presented in Chapter 6.

The Quality Improvement Maturity Model (QIMM), developed and presented in Chapter 3, whereas its application is presented in Chapter 7, was used to assess the state-of-the-art of QI in the New Zealand healthcare system. It is also an original contribution of this research. Multiple strategies were used to ensure the accuracy of the qualitative responses and their overall interpretation by the researcher (see section 4.6). Through this approach, the QIMM findings and participant responses were thoroughly validated.

The QIMM itself can serve a descriptive or diagnostic purpose if it is used as a self-assessment instrument; a comparative purpose if it is used to compare multiple organisations for benchmarking; or a prescriptive purpose if it is used as a guide to achieve a desirable state of maturity in the future. Finally, the outcomes from QIMM also shed a light on the limited and arbitrary use of QI methodologies and philosophies in healthcare environments—something the literature seems to agree upon (Anderson et al., 1994; Costa & Godinho Filho, 2016; Kaplan et al., 2010; McCann et al., 2015; Young & McClean, 2009; Young & McClean, 2008). Moreover, the QIMM can be used as a generalised tool to ensure both the scope of implementation and principles of QI are being continuously improved in healthcare organisations. The QIMM also contributes to a future research agenda and addresses concerns showed by many of the fellow researchers regarding QI implementations in healthcare and non-healthcare settings (Bhasin & Burcher, 2006; Blumenthal & Kilo, 1998; Danese, Manfè & Romano, 2017; Fearne & Fowler, 2006; Hasle et al., 2016; Varkey et al., 2007; Young & McClean, 2009).
9.2 Implications for Research and Practice

The primary implication of this research is surrounding a dire need to transfer the focus of QI from QI methodologies to the fundamentals of quality itself in healthcare providing organisations; and engage said organisations in rethinking QI from the ground up. Organisations are more focused on being labelled as lean than they are in true QI, which has led to the promotion of piecemeal approach based on selective QI tools. However, this proposed revamp of HPOs structure and culture cannot be easily fixed—it will require changes in not only the organisational cultures but also the sector’s culture and way of perceiving quality. The differences in the institutional logics of QI and medical professionalism are substantial, which inhibits the uptake of QI. However, more research will be required to understand this difference in more detail.

The role Quality Improvement Managers (QIMs) as change agents and facilitators was also extensively explored in this research. It is believed that they are a vital element of QI initiatives, and QIMs with right characteristics (see chapter 6) can serve as catalysts in QI-related changes. According to the literature, QI is everybody’s responsibility in a truly QI-driven organisation (Deming, 1982; Liker, 2004; Ohno, 1988; Womack & Jones, 1996), and the author of this research does not disagree with this statement in any way. However, when organisations in the early stages of their QI journey assume this statement that QI is everybody’s responsibility, the responsibility is diffused. Therefore, designated QIMs are deemed necessary for supporting QI initiatives. They are the Taiichi Ohnos\(^7\) of organisations, who implore the organisation to understand and install QI in their internal systems and beyond.

Finally, the use of QIMM has many implications for research. It sheds a light on the many facets of QI that are necessary for a system-wide QI programme. However, as observed in this research, HPOs inside and outside the New Zealand are focusing on a handful of these facets and ignoring others. Such isolated approach to QI can have many unintended consequences such as waste transference within different parts of the system (Fearne & Fowler, 2006). Organisations are implored to realise such consequences, and to undertake QI as a holistic approach rather than in piecemeal to ensure its effectiveness.

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\(^7\) Taiichi Ohno is the founder of the renowned Toyota Production System. Ohno played a crucial role in the success of Toyota Motor Corporation and the development of Lean Thinking and other QI methodologies.
9.3 Implications for Policy Development and Recommendations

This section relates specifically to the New Zealand healthcare system. MOH has been engaging DHBs to develop their internal QI initiatives for many years. HQSC – a Crown agency under MOH, was formed to help DHBs with this task. Other than that, HQSC has also designed multiple nationwide QI initiatives over the course of their existence. They provide training and development assistance to DHBs as well with the help of Ko Awatea – healthcare improvement institute in the New Zealand. However, QI is still in its infancy in majority of the DHBs as shown in this research.

However, it is believed that a change in the policy focused on systems-level change as well as organisation-level change could help to improve the current state of QI in the New Zealand.

In the current state, DHBs and other entities do not have a clear understanding of their responsibility for QI. QI initiatives and supporting activities such as training and development is done in scattershot way by DHBs themselves and HQSC. A new policy clearly stating each DHB’s responsibility regarding dissemination of QI initiatives is required. This will also help DHBs to hire employees with the appropriate skills and expertise required to fulfil the organisation’s responsibilities in this respect.

While HQSC provides guidance regarding QI methodologies (primarily MFI) by training DHB employees, only a handful of employees get this training every year. Instead of only training few employees with the principles of MFI, HQSC should take a different approach and start to build QI-related capabilities without a subtext of a singular QI methodology. This will help to reduce DHBs’ focus and attention from QI methodologies to QI principles themselves. Such training should be based on guidance towards a holistic view of QI and QI principles; and the cultural and contextual requirements for successful QI initiatives be the centre-focus of these training exercises (Bortolotti et al., 2015; Kaplan et al., 2010).

There is a strong relationship between QI and performance measurement (Blumenthal & Kilo, 1998). New QI-related performance measures should be designed and installed in DHB operations. While MOH had six national health targets and DHB performance was measured quarterly, many participants mentioned their DHBs fabricating their outcomes on those health targets. It was partly because part of DHB’s funding was associated with their performance on those health targets, and if DHBs performed sub-par, their funding would be decreased, which would then make it even harder to improve performance on those
It is crucial to develop and expand new performance measures that highlight accurate performance of individual DHBs.

### 9.4 Limitations of Research

This research has relied on qualitative interpretation of organisational documents and participant interviews to judge and score DHBs and their QI initiatives using QIMM by the researcher. Such methods are sometimes referred to as ‘highly contestable’ (Pollitt & Boucheaert, 2004). However, every attempt was made to ensure transparency of the research methods and research process by the researcher. Similarly, multiple strategies were adopted to ensure validity and accuracy of the findings. Chapter 4 stated the precautions taken to ensure validity, reliability and transparency of the research methods. Other than that, findings of this research were further validated by the participants using member checks strategy as well (see section 4.6). Parts of this research have been presented in different conferences and symposiums in the past three years, where they went through an extensive peer-review process.

One of the obvious limitations of this research is based on the fact that the data was collected only from the New Zealand healthcare system, and hence, the findings might not be generalisable. However, New Zealand’s healthcare system’s close resemblance with other National healthcare systems (especially socialist healthcare system) is hoped to minimise this limitation. Further research based on similar research questions in other healthcare systems would be advised before generalising the findings of this research.

Another limitation is based on the QI methodologies analysed in this research. LT and MFI are the two prominent QI methodologies being used in the New Zealand healthcare system, and hence, the analysis was mostly based on the interpretation of these two methodologies by the participants and the researcher. The QIMM was also validated based on QI initiatives using these two respective methodologies. Hence, its applicability regarding other QI methodologies such as six sigma and total quality management could be questioned. However, in terms of healthcare, it was discovered that LT is the most used QI methodology around the world (see chapter 2), hence, the findings of this research should be applicable in the current landscape of QI to say the least. Other than that, QI methodologies are based on somewhat similar principles and make use of similar tools from the quality tool box (Bicheno & Holweg, 2008; Dahlgaard & Dahlgaard-Park, 2006), hence, QIMM should be compatible with other QI methodologies. Again, further research on its applicability and compatibility with other QI methodologies will help to strengthen this argument.
9.5 Future Research Agenda

Although, this research culminated with a set of findings regarding QI in healthcare environments; QI methodologies and their dissemination; and a QIMM that could be used to as an aid in QI initiatives to increase their effectiveness, further research gaps were identified during this process, which require more work to be answered appropriately.

First of all, further research is required to understand the reasons and incentives behind organisation's selecting certain QI methodologies for QI initiatives in different industries including healthcare. Similarly, based on the findings of this research, the role of QIMs requires further investigation. Their key characteristics and how they can be further developed needs thorough investigation.

The use of QIMM in different healthcare systems and environments—capitalist vs socialist healthcare structures and HPO—would further test the applicability of the QIMM in healthcare systems and improve its overall validity. Also, the use of QIMM in different industries would help to further validate the model and its universal applicability. Finally, as the QIMM captures many dimensions and facets of QI, the link between these facets needs further research. Moreover, whether there are more facets of quality that can be included in QIMM need to be thoroughly looked at. In a sense, the concept of continuous improvement might be applicable to QIMM, and help to improve it and contribute towards a universal theory for QI implementation.

9.6 Research Summary

The overarching aim of this research was to understand and analyse the state-of-the-art of quality improvement in the New Zealand healthcare system. This was achieved by the development and validation of a quality improvement maturity model using data from 14 district health boards across the New Zealand. The findings shed light on the narrow scope of quality improvement initiatives, and the problems that arise from it. The healthcare sector’s fixation and subpar understanding of quality improvement methodologies based on selected quality improvement tools and their use was discovered. This research also helped to achieve an understanding of most used QI methodologies; why organisations adopt them; and criticisms that transform into resistance towards these respective QI methodologies. This research led to a number of contributions for research, practice and policy development outlined in chapter 9. It is hoped that this research provides an axiomatic platform for understanding and evaluating quality improvement phenomenon in
different organisational settings, and implores fellow researchers to further develop new theoretical lenses to contribute to this field of research.
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Appendices
Appendix 1: Ethics Approval

Dr R Greatbanks
Department of Management
Division of Commerce
School of Business

7 March 2017

Dear Dr Greatbanks,

I am writing to confirm for you the status of your proposal entitled "Opportunities and benefits of Lean implementation within healthcare supply chains", which was originally received on February 17, 2017. The Human Ethics Committee’s reference number for this proposal is D17/033.

The above application was Category B and had therefore been considered within the Department or School. The outcome was subsequently reviewed by the University of Otago Human Ethics Committee. The outcome of that consideration was that the proposal was approved.

Approval is for up to three years from the date of HOD approval. If this project has not been completed within three years of this date, re-approval must be requested. If the nature, consent, location, procedures or personnel of your approved application change, please advise me in writing.

Yours sincerely,

[Signature]

Mr Gary Witte
Manager, Academic Committees
Tel: 479 8256
Email: gary.witte@otago.ac.nz
## Appendix 2a: Geographic affiliation of authors publishing in QI

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Appendix 3: Quality Improvement Maturity Models of DHBs

This appendix contains the quality improvement maturity models from all the participating DHBs in this research.

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Shaded box represents the respective DHB’s position in a particular facet of quality.