An investigation of competencies for managing lean projects in Irish hospitals: A mixed methods study.

PhD Document

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Declaration

The author hereby declares that, except where duly noted and referenced, this research study and resulting thesis is entirely his own work and has not been submitted for any degree or other qualification in South East Technological University or any other third level institution in Ireland or internationally.

Signed _____  **_____ Aidan Walsh**

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Abstract

Increasing demand for the provision of healthcare services pose significant pressures for hospitals that function in resource-constrained environments (Leite *et al.*, 2022). Improvement approaches adopted from industry, such as lean management, are being increasingly implemented in healthcare organisations (Rotter *et al.,* 2018). Implementing a lean management approach in hospital organisations is not straightforward, and in healthcare, lean implementation outcomes are not yet evidence based (Lawal *et al.*, 2014). As managers play a key role in the success of any organisation, there is value in understanding the competencies that influence managerial effectiveness (Steyn and van Staden, 2018). Management competence positively influence healthcare service delivery and organisational success (Liang *et al.,* 2017). Calls have been made for further research concerning the role of the lean healthcare project leader (Souza *et al.,* 2018). This research identifies and investigates competencies for managing lean improvement projects in public hospitals in Ireland.

This research adopts a philosophical approach of engaged constructionism, recognising that human development is socially situated and knowledge develops through interactions with others (Easterby-Smith *et al.,* 2015). A pragmatic and interpretative approach is utilised, reflecting that management research should contribute to both theory development and management practice. A mixed method design is utilised that consists of a Modified Delphi technique and critical-incident interviews. The Modified Delphi technique comprised four rounds that included an initial round of open-ended questions, followed by three consecutive rounds of closed-ended questions, employing a Likert scale, rating competency statements on their relative importance to lean improvement project success. Critical-incident interviews were held with 17 participants in a project manager, or a project lead, role in hospitals in Ireland. The data collected from the field research were analysed statistically using SPSS software and analysed thematically using NVivo software.

This research develops a visual map that contextualises the challenges facing healthcare organisations (see Fig. 1.1) and puts forward a human resource development approach, viewing strategy through a resource-based view and lean lens that seeks to maximise value for patients and minimise resource spend. Many lean healthcare implementations are project based (Souza *et al.,* 2018; Regis *et al*., 2019). This research develops a competency model for managing lean improvement projects in hospitals, containing 90 competency statements and six competency domains. A conceptual framework (see Figure 9.3) is also developed that describes the

application of this model in a broader organisational and healthcare system context, highlighting practical implications of the model at individual, team-level, and project manager roles, in addition to organisational applications.

The research contributes to the existing literature base in the competency management and lean management literatures. A contribution is also made by considering the application of the resource-based view as a lens to consider how a human resource, namely, the lean project manager, can be supported in their role of delivering lean project outcomes, thus supporting organisational strategy. Capability deficits are identified in hospitals in Ireland in certain competency areas. Recommendations are made for further research in lean competencies and for further testing of the competency model and the conceptual framework in sectors other than the healthcare sector.

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List of Abbreviations

HRD	Human Resource Development.
HRM	Human Resource Management.
KSA	Knowledge, Skills, Abilities/Attitudes.
RBV	Resource Based View.
RBT	Resource Based Theory.
RIE	Rapid Improvement Event.
SCA	Sustainable Competitive Advantage.
SOP	Standard Operating Procedure.
SETU	South East Technological University.
SHRM	Society for Human Resource Management.
VBC	Value-Based Care.

Chapter 1 – Introduction.

1.1 Research Context.

The provision of healthcare in a global context is facing significant challenges. The global population is expected to grow by 1 billion by 2025, with more than 500 million over the age of 50 years old (Elton and O'Riordan, 2016). Global spending on health more than doubled in real terms over the past two decades, reaching US$ 8.5 trillion in 2019, or 9.8% of global GDP. (WHO, 2017, p.vi). In 2019 Irish healthcare spending as a proportion of GDP was 6.5%, compared to a high of 16.8% in the US (OECD, 2021). Many public and private health systems have been experiencing challenging circumstances for many years including revenue pressures, rising costs, declining margins, increasing demand, funding limitations, and infrastructure upgrades (Deloitte, 2018; Woolf and Schoomaker, 2019; Schiavone and Ferretti, 2021). In Ireland demand is expected to grow significantly over the next 15 years including up to a 46% increase in demand for primary care and a 24% increase in non-elective in-patient episodes in public hospitals (Department of Health, 2019). In order to best use capacity to meet these challenges, a focus on productivity and productivity measures has been introduced such as reduced Average Length of Stay, increased proportion of appropriate procedures carried out as day case, and improved day of surgery admission rates. There is also a move towards patient-centred approaches to healthcare (Department of Health, 2019). There has been a movement from a volume-based model of healthcare to a more value-based care (VBC) model of healthcare (Deloitte, 2015). VBC models involve maximising value for patients by providing the best care option at the lowest cost (Porter and Lee, 2013).

In response to some of the aforementioned challenges; and in pursuit of better efficiencies and value for money, government and public sector organisations have pursued the implementation of management ideas from the private sector into public services; many of which sought to pursue efficiency, value and cost reduction (White *et al.*, 2020; Van de Walle and Hammerschmid, 2016; Hood, 1991; Christensen and Laegreid, 2001; Hood and Dixon, 2013). The transfer of lean practice thinking into the public sector is one such approach. Lean thinking, which seeks to reduce waste and add customer value by re-organising processes, specifies focusing on the delivery of value to customers while at the same time improving organizational productivity and efficiency (Womack and Jones, 2003). Evidence exists in the literature of an

increased prevalence of research in the area of lean healthcare from 2000 onwards (de Souza, 2009; Pokinksa, 2010; d'Andreamatteo, 2015). There are also widely reported benefits from the implementation of lean projects in hospital settings such as reduced patient turnaround times, reduction of errors, improved processing time, improved quality, and reduced death rates (Jimmerson *et al.*, 2005; Chassin, 2008; Snyder and McDermott, 2009; Toussaint, 2009; Guthrie, 2006; Fillingham, 2007; Mannon, 2014).

However, there have also been some challenges to lean implementations in healthcare. McIntosh *et al*. (2014) reported mixed findings regarding lean implementation in healthcare. D'Andreamatteo *et al*. (2015) comment that much of the literature is based upon studies that are self-reported and may be biased towards success. Also, much of the literature is based around focused implementations in narrowly defined areas (McIntosh *et al*., 2014), although Radnor *et al*. (2012) comment that there is evidence of increased prominence of systemic implementations in the UK. The sustainability of lean practices has also been questioned in the literature (Bhasin, 2012; Bracket *et al.,* 2013). Managers play a critical role in the success of lean implementations (Studer, 2013; Drotz and Poksinka, 2014; Lorden *et al*., 2014).

Although there is significant literature available concerning competency modelling in various clinical contexts in hospital settings, and some studies research competency modelling in managerial/leadership contexts in hospital settings, the researcher was unable to identify any studies that specifically focused on the managerial competencies required to manage lean healthcare projects in hospitals. Studies have shown that benefits from the application of lean management in healthcare can be achieved (Guthrie, 2006; Fillingham, 2007; Tuck, 2009; Ben Tovim *et al.*, 2007; Wijma *et al.*, 2009; Niemeijer *et al.*, 2012; Balle and Regnier, 2007). Positive outcomes from the application of lean thinking have also been experienced in Ireland (Laureani *et al.*, 2013; Ryan *et al.*, 2013; White *et al.*, 2013).

However, some authors have questioned whether Lean principles such as flow and standardised work are fully applicable in a healthcare context (Carlborg *et al*., 2013; Cheng *et al*., 2015). Grove *et al.* (2010) indicate broader context-based challenges including: high process variability; poor communication and leadership; a lack of understanding of lean concepts; problems defining waste; initiatives being too target focused; and problems in defining who the customer is and what it is they value. McIntosh *et al*. (2014) have reported mixed findings regarding lean implementation in healthcare. D'Andreamatteo *et al*. (2015) questions the validity of self-reported accounts of lean implementations. However, Radnor *et al*. (2012)

comment that there is evidence of increased prominence of systemic implementations in the UK.

Radnor *et al.* (2012, p. 371) state the

> future of Lean in healthcare is to develop structures, mindsets and systems which ensure that the significant existing investment in Lean is sustained, while its underlying assumptions are recognized.

Waring and Bishop (2010) describe that healthcare leaders can struggle to articulate lean and can also experience difficulties involving employees in lean implementations. Furthermore, they conclude that successful implementation of lean requires the development of leaders at senior management and departmental levels. This research seeks to address this imbalance in the literature on managing lean in healthcare by proposing a competency model that builds on existing managerial and leadership competency models in healthcare such as the ACHSM Master Health Service Competency Framework (ACHSM, 2016) and the Healthcare Leadership Alliance Competency model (Stefl, 2008) and also incorporates competencies specific to lean management as identified by Seidel *et al*. (2017), lean behaviours as identified by Van Dun *et al.* (2017) and lean leadership capabilities for continuous improvement as identified by Van Elp *et al.* (2021).

However, there is limited empirical research on the competencies for managing lean projects (Seidel *et al.,* 2017; Camuffo and Gerli, 2018) and even less on the competencies for managing lean projects in hospitals (Van Dun *et al.*, 2017; Souza *et al.*, 2019). This research seeks to add to the existing knowledge regarding competencies for managers of lean projects in hospitals

1.2 Research Question and Objectives.

The objective of the research is to identify competencies for managing lean projects in hospitals, and evaluate the perceived significance and impact of these competencies on lean project outcomes In order to address this research problem two research questions have been developed:

Research Question One

What are the competencies required to manage lean projects in Irish hospitals?

Research Question Two

Which competencies are most important in managing lean projects in Irish hospitals, and why are those competencies perceived to be most important?

In order to fully address these research questions a number of secondary research objectives have also been developed. These objectives are listed below:

Research Objective 1: To ascertain the managerial competencies, as identified by recognised experts in the field, that are deemed necessary for managing lean projects in a hospital context?

Research Objective 2: To delineate the managerial competencies, as identified by lean managers, that are deemed necessary for effective managing of lean projects in Irish hospitals?

Research Objective 3: To determine the key differences between perceptions of lean experts and lean managers on the competencies deemed necessary for managing lean projects in a hospital context, and explain why differences, if any, exist?

Research Objective 4: To establish which competencies are most often reported as being influential in effectively managing projects in Irish hospitals?

Research Objective 5: To compare those competencies that are most evidenced in successful lean projects, compared with those that are most evidenced in less successful lean projects, as being influential in managing lean projects in Irish hospitals?

1.3 Research Method.

This research utilises a mixed methods design that consists of two key stages. A full description of the research design and methodology chosen for this research is presented in Chapter 5 of this document. Each phase of the mixed method design is briefly described below.

1.3.1 Research Method Phase 1.

The first phase of the research method of this study involved administering surveys to an expert panel using the Delphi method. Four rounds of surveys were used. The first survey was a qualitative survey that sought to identify the opinions of the expert panel regarding the competencies for managing lean projects in hospitals. The second survey took a quantitative form and sought the opinions of the expert panel, utilising a 5-point rating scale, as to the relative importance of the list of competencies that were identified from the responses to the first survey. Third and fourth round surveys that presented the findings from previous surveys were made available to the expert panel to seek consensus on ratings of each competency statement. Following the fourth round survey a list of competency statements that have achieved consensus, along with their corresponding ratings, was presented.

1.3.2. Research Method Phase 2.

The second phase of the research method of this study involved interviewing managers of lean projects in hospitals using the critical incident technique to identify knowledge, skills, attitudes and behaviours utilised by these managers to achieve lean project outcomes. The interviews were analysed using thematic analysis to identify patterns regarding the competencies that are most utilised by managers of lean projects in hospitals, and those competencies that are deemed most important to project outcomes.

Following the conclusion of the interviewing process, the data from both phases of the research method was compared to identify commonalities and divergences between the opinions of the expert panel and the opinions of the managers of lean projects in hospitals. The final output of the research study is a competency model that describes the competencies for managing lean projects in hospitals and categorises these competencies into competency ccategories and sub-categories.

1.4 Personal Motivation.

A career-long interest in the opportunities and challenges that present to managers during continuous improvement initiatives formed the foundation for this study. Previous education at undergraduate and postgraduate level exposed the researcher to managerial challenges in operations management, quality management and management accounting. A higher-level education teaching career in management studies built upon foundational, technical, and conceptual knowledge in management theory in general, and more specifically, in operations management and continuous improvement methodologies. The researcher has co-developed executive education programmes in lean enterprise excellence and is a member of the Academy of Lean Enterprise Excellence at the Rikon Research Centre in South East Technological University. A passion for better understanding the application and evolution of lean philosophy and practice forms the basis of the researcher's recent work career. Particularly appealing to the researcher was the opportunity to explore the application of lean in a healthcare context. The researcher has a high-level spinal injury and is the beneficiary of continuing excellence in medical treatment of highly complex medical conditions. Of particular interest to the researcher is the transferability of lean practice to hospitals. The researcher was enthused by the opportunity to research, analyse, reflect, contribute and disseminate useful knowledge that might assist the management of lean improvement in hospitals.

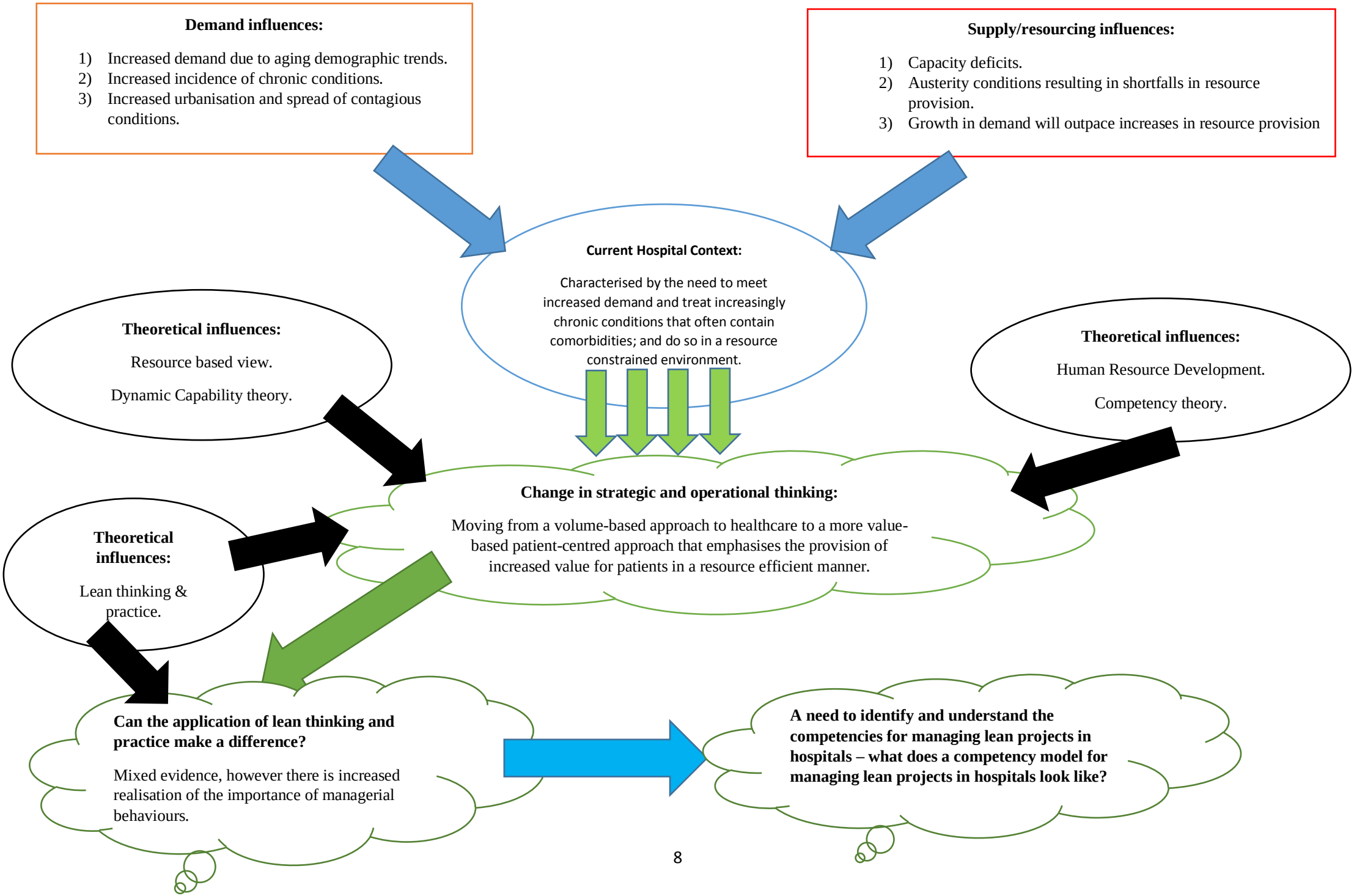
1.5 Visual map of healthcare challenges, operational context and theoretical influences shaping the direction of the research.

The visual map presented in Figure 1.1 (see p.8) illustrates the relationships between the hospital/healthcare context and demand and supply/resourcing conditions. With demand increasing significantly, capacity deficits and limited ability to provide matching resource provision; there is a need to reconsider existing approaches to managing healthcare provision in hospitals. Irish hospitals lag their international counterparts on a range of productivity measures such as average length of patient stay, occupancy levels, and patient turnaround times.

Hospitals are adopting more value-based approaches to healthcare that seeks to maximise patient value whilst minimising resource consumption/spend. This is a resource-based approach to managing hospitals seeking to maximise the impact of the utilisation of the resources. Management in hospitals are increasingly adopting approaches that have proved

successful in industry, and are adapting these for healthcare environments. Lean thinking and practices are one such management approach that has transferred from industry to healthcare. However, evidence regarding the success and sustainability of lean in healthcare is inconclusive (D'Andramatteo *et al.*, 2015; Narayanamurthy *et al.*, 2018; Henrique *et al.*, 2020).

The success of any strategy is impacted by the ability of its human resources, and in particular, its managers to implement it. Human resource development is concerned with creating a strategy for developing human resources that is aligned with the corporate strategic vision of the organisation. If hospitals adopt a lean approach to managing their operations, then it also makes sense to develop their managerial resource so as to complement a lean strategy. This requires an understanding of the knowledge, skills, abilities, attitudes and behaviours that can influence lean project outcomes. This research seeks to identify the competencies for managing lean projects in hospitals.


Demand influences:
1) Increased demand due to aging demographic trends.
2) Increased incidence of chronic conditions.
3) Increased urbanisation and spread of contagious conditions.
Supply/resourcing influences:
1) Capacity deficits.
2) Austerity conditions resulting in shortfalls in resource provision.
3) Growth in demand will outpace increases in resource provision
Current Hospital Context:
Characterised by the need to meet increased demand and treat increasingly chronic conditions that often contain comorbidities; and do so in a resource constrained environment.
Theoretical influences:
Resource based view.
Dynamic Capability theory.
Theoretical influences:
Human Resource Development.
Competency theory.
Theoretical influences:
Lean thinking & practice.
Change in strategic and operational thinking:
Moving from a volume-based approach to healthcare to a more value-based patient-centred approach that emphasises the provision of increased value for patients in a resource efficient manner.
Can the application of lean thinking and practice make a difference?
Mixed evidence, however there is increased realisation of the importance of managerial behaviours.
A need to identify and understand the competencies for managing lean projects in hospitals – what does a competency model for managing lean projects in hospitals look like?

1.6 Dissertation Document Structure.

Figure 1.2 below illustrates the structure of this dissertation and briefly describes what is included in each chapter.

Chapter 1: Introduction.	• The introduction chapter presents the background and context of the research study. • Research questions and objectives are presented along with the conceptual framework of the study.
Chapter 2: Foundational Literature	• Chapter 2 grounds the main focus of the research by linking it to foundational theories including the Resource Based View (RBV), Dynamic Capability Theory and Human Resource Development (HRD).
Chapter 3: Background Literature.	• This chapter provides background context for the research study by describing the evolving healthcare context. An overview of lean thinking and philosopy is presented and the evolution of lean thinking from its inception to current state is described.
Chapter 4: Focal Literature	• This chapter present a detailed account of the literature pertaining to competency and competency modelling. • The application of competency modelling in both a healthcare/hospital context and a lean transformation context is presented
Chapter 5: Research Methodology.	• Chapter 5 describes the researcher's philosophical perspective, the research process, the purpose of the study and the methodology adopted by the researcher.
Chapter 6: Irish Healthcare Context.	• This chapter presents the Irish healthcare context underpinning this research study, describing characteristics of the Irish healthcare and hospital system and recent national strategy initiatives.
Chapter 7: Research Findings - Delphi Technique.	• This chapter first presents the findings of the modified Delphi technique.
Chapter 8: Research Findings - Critical Incident Interviews.	• This chapter presents the findings of the critical incident interviews and a comparison of the findings from both research methods employed.

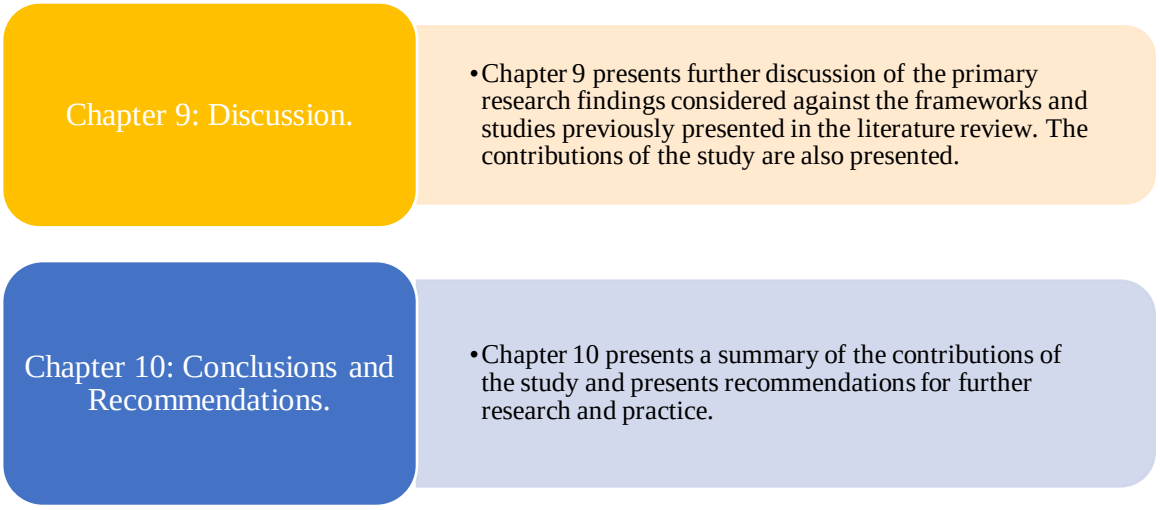


Figure 1.2 Dissertation Structure and chapter overview.

1.7 Chapter Summary.

This dissertation investigates the competencies for managing lean projects in hospitals. The healthcare sector is experiencing increasing demand for services in a resource-constrained environment. National health services are adopting management practices and approaches from industry in order to achieve better value from their resources. Lean management is one such approach. However, there is mixed evidence regarding the successful application of lean in hospitals. The next chapter will describe the foundational literature for this research study and provide an account of the foundational theories underpinning this research, namely, the Resource-Based View (RBV) and Human Resource Development (HRD).

Chapter 2 – Literature Review – Foundational Literature

2.1 An Overview of the Literature Review Chapters.

This chapter, and the following two chapters, provide a literature review for this research study. The literature review serves many purposes: it interprets and provides a synthesis of published literature relevant to the research themes (Merriam, 1988); it provides background to and justification for the research study (Bruce, 1994); and it demonstrates a comprehension of background theory related to the research (Phillips and Pugh, 2010).

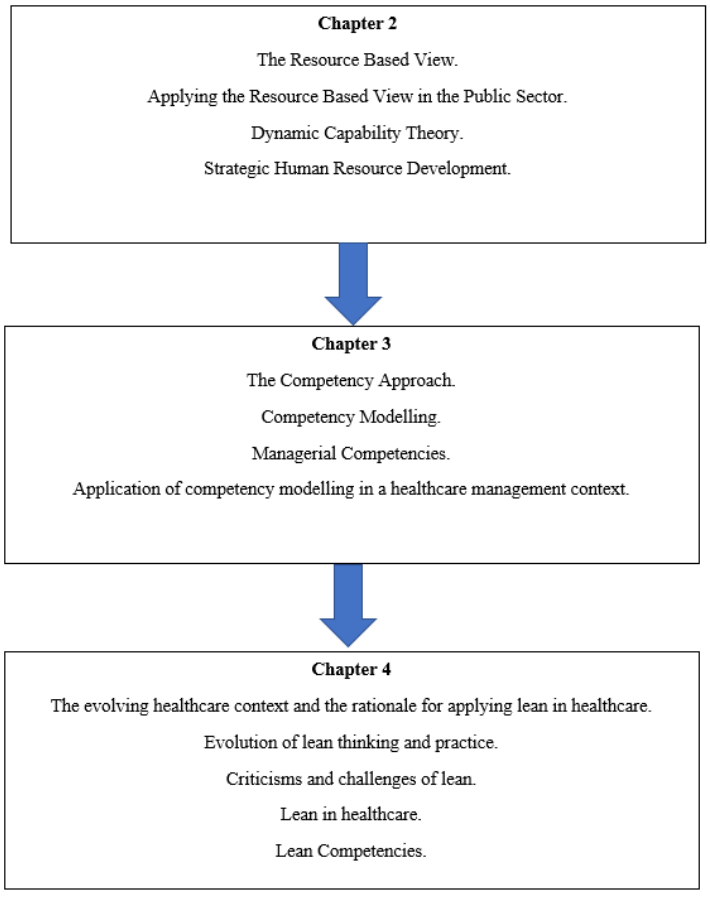
This literature review comprises three chapters. Chapter 2 commences with an overview of the structure of the literature review chapters, and then grounds the main focus of the research, namely the proposed development of a 'lean competency model' for lean managers in public hospitals, by relating it to key foundational theories of the Resource Based View (RBV), Dynamic Capability Theory and Human Resource Development Theory. RBV theory is presented as being core to the concept of developing the internal resources of a firm, in particular human resources, as a means of developing capabilities that can generate sustainable competitive advantage. Dynamic Capability Theory is then presented as a parallel and related theoretical development that seeks to explain how capabilities and competencies can be developed in changing, turbulent environments. Human Resource Development (HRD) Theory is then explained as it underpins the background literature on competency theory and competency modelling that forms the central focus of this research.

Chapter 3 presents a detailed account of the literature pertaining to competency theory and competency modelling. It begins by defining competency and describing the origin of the competency approach. A critical discussion of the competency literature is presented that highlights key evolutions in the competency approach and central debates that have progressed the thinking around applying competency-based approaches to developing people. Approaches to competency modelling are discussed and criticisms of the competency approach are debated. Finally, the focal literature relating to this research study is synthesised and evaluated, firstly by exploring the application of competency methods in a broader healthcare context, secondly by highlighting the use of competency approaches in lean transformations and lastly by

highlighting the lack of research regarding the development of competency models in a lean healthcare context.

Chapter 4 provides contextual and background argument for the research study by highlighting the evolving healthcare context and providing a rationale for considering the application of lean in a public sector context. The term "Lean" is explained and a summary overview of the evolution of lean philosophy and practice is presented, highlighting key contributions at each stage of evolution. Challenges and criticisms to the lean approach are discussed and consideration is given to the key debates that have driven the major developments in lean thinking. Chapter 4 discusses the importance of developing competent lean managers to support lean transformations in public healthcare and concludes by providing a detailed discussion of the application of lean in a public healthcare context.

Figure 2.1 below illustrates the core structure of the literature review chapters.



The literature review concludes by clearly signposting the research gaps as identified by the researcher and by explaining how the research study addresses these gaps and thus adds to the knowledge base on both competency and lean healthcare.

2.2 An overview of the foundational literature.

This chapter presents theoretical perspectives and root concepts that serve as a foundation to assist in bringing greater clarity to the core issues upon which the fieldwork evidence is focused. The chapter aim is achieved by reviewing the main concepts, criticisms and connections between the RBV body of literature, including the application of RBV in a public sector context and the strategic human resource development (HRD) literature. The RBV literature serves as a foundation for HRD theory development and is necessary to set the background for the fieldwork evidence. It is necessary to explore strategic HRD theory as again this provides necessary detail to understand the research context: the identification of management competencies for lean implementation in healthcare. It is useful to gain perspectives from these literatures as they serve as originating/influencing forces in the literature on competency. By using an organic analogy, originally developed as a construct to understand evolution of society by Spencer (Simon, 1960), and further developed by Morgan (1997) as a metaphor for organisational evolution, one can develop a construct for the evolution of a concept from the past, to the present and on to the future.

The first section of this chapter reviews the RBV of the firm. The concept of developing and exploiting resources are explored. In particular human resources are discussed in this context and whether human resources can be viewed as a source of strategic competitive advantage. It is also important to discuss the influences of RBV theory on HRD theory. Following from this key developments in human resource theory are briefly described, in particular highlighting influencing factors on strategic human resource development theory. The key influences of strategic HRD on the development of competency theory will be evaluated, highlighting research gaps that require further exploration.

Figure 2.2 illustrates the influencing relationship between the RBV, strategic HRD and competency literatures.

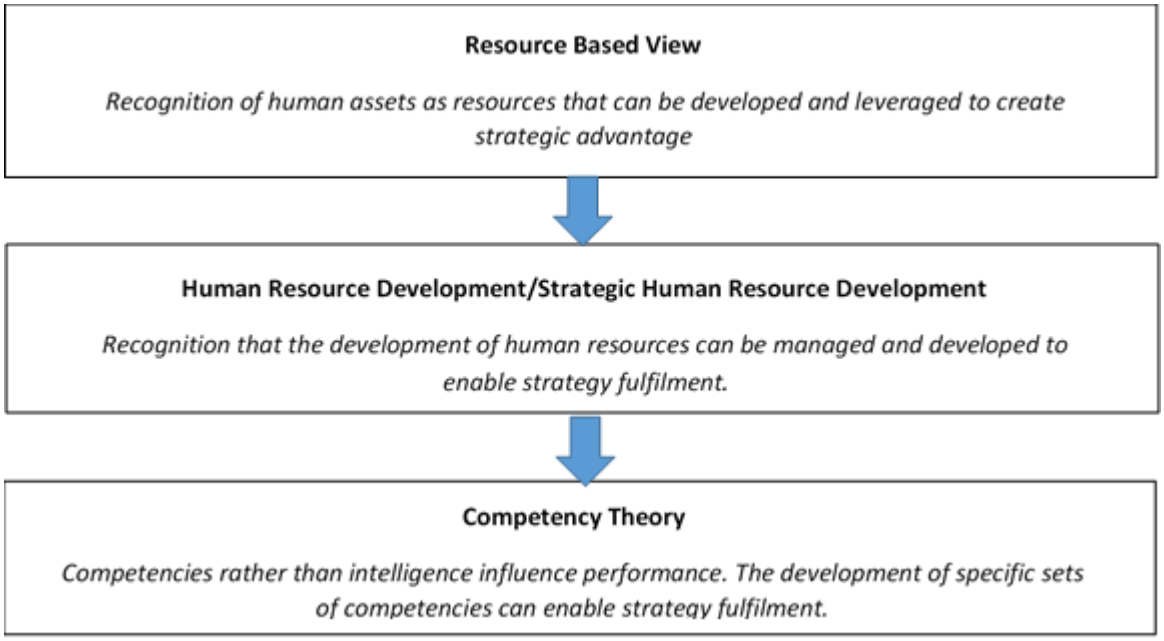


Fig. 2.2 The relationship between the RBV, Strategic HRD and Competency literatures (Source: developed by the researcher).

2.3 Resource Based View (RBV).

2.3.1 Introducing RBV.

The resource-based view of strategy developed as an alternative approach to traditional views of the firm that were based on economic rent theory and examined firms from a product perspective. Wernerfelt (1984) argued that firm strategy could also be analysed from a resource perspective and analogous to entry barriers and product share matrices suggested the concepts of resource position barriers and resource-share matrices. In essence RBV theory views competitive advantage through the application of a bundle of tangible and intangible resources at the firm's disposal (Wernerfelt, 1984; Rumelt, 1984). Several authors explain how the bundles of resources can be used to achieve a sustainable competitive advantage (Barney, 1986, 1991; Peteraf, 1993; Rumelt, 1984).

Before advancing these concepts further it is useful to provide definitions of the key concepts of resources and sustainable competitive advantage.

2.3.2. Defining resources.

Many authors cite Edith Penrose's *"The Theory of the Growth of the Firm"* as being a key influencing work in the development of RBV theory (Collis and Montgomery, 1997; Kor and Mahoney, 2000; Wernerfelt, 1984). Penrose (1959) posited that the firm could be viewed as a collection of productive resources that can be used to provide services that ultimately determine an organisation's uniqueness. Wernerfelt (1984) broadly describes resources as anything that could be thought of as a strength and weakness of a firm and that were also at least tied semi-permanently to the firm. Barney (1991) took a broad view and suggested that resources could be categorised as physical capital resources, human capital resources and organisational capital resources. However the possession of resources does not guarantee value in itself (Barney and Arikan, 2001; Priem and Butler, 2001a), value is created through the successful accumulation, combination and exploitation of resources (Grant 1991, Sirmon and Hitt, 2003).

2.3.3 Definition of Sustainable Competitive Advantage

RBV theory seeks to explain performance differences of heterogeneous firms in industries by internal examination of firm resources and capabilities (Barney, 1991; Peteraf, 1993). In order to seek a sustained competitive advantage it is necessary for resources to possess four characteristics: value (Barney, 1991; Amit and Schoemaker 1993); rarity (Barney, 1986; Dierickx and Cool, 1989); inimitability (Rumelt, 1987; Dierickx and Cool, 1989; Peteraf, 1993); and non-substitutability (Dierickx and Cool, 1989; Barney, 1991; Peteraf, 1993).

These characteristics are explained further in Table 2.1:

Table 2.1 Explanation of VRIN Characteristics

Characteristic	Explanation
Value	The resource must be valuable, in the sense that it exploits opportunities and/or neutralises threats in a firm's environment.
Rarity	The resource must be rare among a firm's current and potential competition.
Inimitability	The resource must be imperfectly imitable, in that it is difficult for competitors to exactly imitate the resource.
Non-substitutability	There cannot be strategically equivalent substitutes for this resource that are available to competitors.

Source: Adapted from Barney (1991).

Amit and Schoemaker (1993) offer a helpful distinction between resources and capabilities indicating that resources are tradeable and non-specific to the firm whilst capabilities are not tradeable and are specific to the firm. Makadok (2001) describe capabilities as special types of resource that are non-transferable and are embedded in the organisation. Capabilities can be harnessed to improve the productivity of other firm resources. However views differ as to what constitutes sustainable competitive advantage. Barney (1991) and Rumelt (1984) argue that a competitive advantage is sustained once all attempts by competitors to negate the competitive threat have stopped. Other authors indicate a time factor. Porter (1985) asserts that a competitive advantage is sustained when above average results are achieved in the long-term.

2.3.4 Utilisation of resources and capabilities.

Although RBT stresses that a firm's competitive advantage relies on the value, rareness and inimitability of its resources and capabilities, much depends on the firm's ability to organise itself to fully exploit those resources and capabilities (Barney, 1995). An associated strand of research, the dynamic capabilities approach, further stresses the need to demonstrate responsiveness, which is an ability to flexibly innovate and coordinate and exploit internal and external resources (Teece *et al.*, 1997). Complementarities between resources and their related activity systems enhances sustainable competitive advantage potential (Collis and Montgomery, 1995; Milgrom *et al*., 1991; Milgrom and Roberts, 1990). Dynamic capabilities are the organization and strategic routines by which firms achieve new resource configurations (Eisenhardt and Martin, 2000). Managing resource configurations effectively can greatly affect a firm's ability to achieve competitive advantage (Amit and Schoemaker, 1993; Black and Boal, 1994; Sirmon and Hitt, 2003; Sirmon *et al*., 2007; Grewel and Slotegraaf, 2007). Sirmon *et al.* (2007) put forward a resource management process that involves structuring the portfolio of resources, bundling resources to build capabilities and then leveraging capabilities in the marketplace to create value.

The management and orchestration of resources and resource combination has grown in significance as environments become increasingly dynamic, complex and hypercompetitive (Bettis and Hitt, 1995; D'Aveni *et al.*, 1995; Sirmon *et al.*, 2011). In these changed environments studies have shown that managerial decisions can account for variation in performance (Adner and Helfat, 2003). Helfat *et al*. (2007) developed a model of asset orchestration built around two main process configurations: search/selection of assets, and

configuration/deployment of assets. Fit between these processes is seen as being central to exploiting the potential of resources to create competitive advantage. Sirmon *et al*. (2011) suggest a process of resource orchestration that combines resource management (Sirmon *et al.*, 2007) and asset orchestration (Helfat et al., 2007) to better understand how managers take actions to manage a resource portfolio to develop resource-based competitive advantages.

Alongside the literature that examines the management and deployment of resources, there is a substantial body of research that examines organisational process in a temporal manner (Pettigrew, 1997; Tuttle, 1997; Langley, 2007; Tsoukas and Chia, 2002) and in context (Pettigrew, 1997; Pettigrew *et al*, 2001). Langley (2007, p.271) argues for a need for process thinking which she defines as "considering phenomena dynamically – in terms of movement, activity, events, change and temporal evolution*"* because traditional models of analysis quite often focus on a fixed point and largely ignore considerations of processes changing over time. Porter (1991) acknowledged this by observing that we have limited knowledge of the dynamic processes by which firms sustain superior competitive advantage, and Barney (2001) comments on a need to incorporate the behavioural phenomena of choice and implementation into resource-based models. It is important to study how processes, and indeed organizations, change over time to fully understand how they navigated that journey and the varying contexts they encountered along the way. Langley and Tsoukas (2010) observe that knowing how practice B is more effective than practice A reveals nothing about how to transition from one to the other.

This section has described aspects of the development of RBV/RBT, including linkages to associated theories such as dynamic capability theory, that describe the application of RBV in turbulent environments and asset orchestration theory, that, in particular, explain the importance of managers as resource orchestrators to successfully deal with organisational change. The contribution of RBT to strategic management theory is clear, with specific consideration of the importance of understanding the value of effectively managing resources and developing capabilities to securing competitive advantage. The role of the manager is pivotal in effectively completing these processes. Table 2.2 summarises a selection of key contributions to the development of RBT. The following section will detail some critiques of the RBV and RBT.

Table 2.2 Selected contributions to the development of Resource-Based Theory (RBT).

Author	Title	Contribution
Robinson (1931)	The structure of Competitive Industry.	Emphasised a crucial role for management in affecting the success of the business (Jacobsen, 2013).
Coase (1937)	The Nature of the Firm	Introduced the idea of transaction costs to explain the nature and limits of firms.
Penrose (1959)	The Theory of the Growth of the Firm	Seen by many as providing the intellectual underpinnings of RBV (see for example Lockett and Wild, 2014)
Rumelt (1984)	Towards a Strategic Theory of the Firm	Identified the importance of isolating mechanisms as a source of competitive advantage.
Wernerfelt (1984)	A Resource Based View of the Firm.	Seminal article. Put forward the view that firms can be defined by products/services or resources.
Barney (1986)	Strategic factor markets: expectations, luck and business strategy.	Introduced the concepts of strategic factor markets where firms acquire or develop the resources necessary to implement product market strategies.
Dierickx and Cool (1989)	Asset stock accumulation and the sustainability of competitive advantage.	Examined the causes of firm heterogeneity and developed a typology of asset accumulation.
Prahalad and Hamel (1990)	The core competence of the corporation.	SCA is achieved by being better at developing competencies that generate new products.
Barney (1991)	Firm resource and sustained competitive advantage.	Developed the VRIN categorisation for viewing resources in the context of competitive advantage.
Conner (1991)	A Historical Comparison of Resource-based Theory and Five Schools of Thought within Industrial Organization Economics: Do we have a new Theory of the Firm?	Postulated that RBV was developing as a new theory.
Harrison *et al*. (1991)	Synergies and post-acquisition performance: differences versus similarities in resource allocations.	Emphasised the significance of resources and synergy between resources in the context of diversification.
Amit and Schoemaker (1993)	Strategic assets and organizational rent.	RBV is a theory of rents based on resource market imperfections.
Peteraf (1993)	The cornerstones of competitive advantage.	Highlighted the importance of limits to competition as a necessary condition for SCA.
Barney (1995)	Looking inside for competitive advantage.	Developed the VRIO model of examining resources.
Grant (1996)	Towards a knowledge-based theory of the firm.	Articulated the knowledge-based view (KBV) of the firm.
Miller and Shamsie (1996)	The Resource-Based View of the Firm in Two Environments: The Hollywood Film Studios from 1936 to 1965	Tested the resource-performance link.
Teece *et al*. (1997)	Dynamic Capabilities and Strategic Management.	Introduced the concept of dynamic capabilities.
Barney and Arikan (2001)	The resource based view: origins and implications	Described the impact of RBV on related subject areas.
Makadok (2001)	Towards a Synthesis of the Resource-Based and Dynamic-Capability Views of Rent Creation	Synthesised theories of RBV and dynamic capabilities.
Dunford *et al*. (2001)	Human resources and the resource-based view of the firm.	Outlined the contributions of RBV to human resource management research.
Lippmann and Rumelt (2003)	A bargaining perspective on resource advantage.	Discussed the microfoundations of RBV.
Peteraf and Barney (2003)	Unravelling the resource based tangle.	Provided more meaningful definitions of value, critical resources and economic rents.
Peteraf and Bergen (2003)	Scanning dynamic competitive landscapes: a market based and resource based framework.	Outlined reasons why managers might be poor at understanding the range of potential functions from their resource-bases.
Winter (2003)	Understanding Dynamic Capabilities	Introduced the concept of higher order capabilities.
Sirmon *et al*. (2007)	Managing firm resources in dynamic environments to create value: looking inside the black box.	Provided a detailed conceptualisation of resource recombinations and their potential effect on capabilities.

Barney and Clark (2007)	Resource based theory: Creating economic rents and competitive advantage.	Organisation is essential to competitive advantage. Appropriate management systems and processes are necessary to fully exploit the value in internal resources.
Teece (2007)	Explicating dynamic capabilities: the nature and microfoundations of sustainable enterprise performance.	Specified the nature of capabilities required to sustain superior enterprise performance.
Crook et al. (2008)	Strategic resources and performance: a meta-analysis	Investigated whether strategic resources can explain variation in performance.
Kraaijenbrink (2010)	The RBV: a Review and Assessment of its Critiques	Explored prominent critiques of RBV.
Norman *et al.* (2013)	Resources matter: Examining the effects of resources on the state of firms following downsizing.	Examines the effect of downsizing on resources.

Source: Compiled by the researcher.

2.3.5 Criticisms of the Resource Based View and Resource Based Theory.

Kraaijenbrink *et al.* (2010, p.350) state that the "RBV has become one of the most influential and cited theories in the history of management theorizing". Indeed RBV has had an impact in related areas such as human resource management (Wright and McMahan, 1992; Wright *et al*., 1994; Barney and Wright, 1998; Allen and Wright, 2006; Kaufman, 2015), marketing (Gatignon *et al*., 1997; Capron and Hulland, 1999; Wernerfelt, 2014; Srivavasta *et al*., 2001; Alsem and Kostelijk, 2008), entrepreneurship (Rangone, 1999; Deeds *et al*., 2000; Barney et al., 2001; Guererro and Urbano, 2012), management information systems (Broadbent *et al.*, 1999; Wade and Hulland, 2004; Peppard *et al*., 2014), technology and innovation management (Helfat, 1997; Terziovski, 2010; Lawson and Samson, 2001) and manufacturing location decisions (McIvor, 2013) among others.

Although RBV has been widely accepted in the literature as a useful framework for firm analysis, it also has its criticisms. Priem and Butler (2001a) point to a lack of managerial implications and a shortage of operational validity. It can be argued that the early development of RBV theory was somewhat vague in that it specified the necessity for VRIN resources but failed to offer instruction on how these resources could be attained, developed and sustained (Connor, 2002; Miller, 2003; Lado *et al*., 2006). RBV has also been criticised because it implies infinite regress (Collis, 1994) – once SCA has been achieved by one firm then other competing firms first must seek higher order capabilities to surpass them (Priem and Butler, 2001a).

Further critiques arise from a suggested lack of generalisable applicability of RBV. Of particular interest to this research is debate concerning the application of the RBV approach in the public sector. Bryson *et al.* (2007, p. 713) conclude that an RBV approach is "relevant and potentially useful" in the public sector, Ferlie *et al.* (2015) comment that RBV appears to be

transferring into the healthcare domain, and Burton and Rycroft-Malone (2014) conclude that VRIN resource creation can be relevant in a quality improvement context in healthcare, though they also note that the mechanisms through which these resources are created and applied require further investigation. Gibbert (2006) suggests that the required dimension of uniqueness means that as a theory RBV cannot be generalisable. Similarly Connor (2002) argues that RBV usefulness is limited to larger firms with significant market power, with smaller firms not having the ability to develop sustainable competitive advantage from their smaller tangible resource base. Miller (2003) further expands this critique by identifying that in many cases the resources to develop SCA are also those that are hard to attain in the first place. The overarching goal of achieving SCA is also examined with many questioning whether it is actually achievable (Fiol, 2001; D'Aveni *et al.*, 1995; Eisenhardt and Martin, 2000). In dynamic environments competitive action will eventually ameliorate SCA, however dynamic capability theory (Teece *et al.*, 1997) offers a construct where competitive advantage takes a more temporal form and capabilities need to be developed to allow firms to adapt faster than the competition.

Others purport that RBV is not a theory of the firm (Foss, 1996a, 1996b; Mahoney, 2001; Priem and Butler, 2001a) citing that RBV does not address issues such as explaining why firms exist, conceptualising why a firm is structured in a way that defines their boundaries and internal organisation, and why firms are better at rent creation than markets. The suitability of the VRINO (Value, rarity, inimitability, non-substitutability, organisation) model for securing sustainable competitive advantage has also been questioned. Newbert (2007) and Armstrong and Shimizu (2007) state that existing studies only generated modest support for this model.

Perhaps the most significant criticism of RBV is that it is tautological, and the definition of value is ambiguous and unworkable (Lockett *et al*., 2009; Priem and Butler, 2001a, 2001b). Resources are considered valuable when they assist firms in creating strategies that improve efficiency and effectiveness (Barney, 1991). A firm has a competitive advantage when it deploys a value creating strategy that is not simultaneously being used by competitors (Barney, 1991). SCA is defined in terms of improving efficiency (reducing cost) and effectiveness (adding value). Priem and Butler (2001a) also note a lack of clarity in the definition of resources, finding that definitions offered are overly inclusive. Clarity is required regarding what constitutes a resource, the distinction between tangible and intangible resources and how resources can be developed, deployed and managed. These concerns have been somewhat

addressed by the dynamic capability literature (Teece, 1997; Eisenhardt and Martin, 2000; Sirmon et al., 2007; Sirmon et al., 2011), but further work is warranted in this area.

In summary, RBV has developed into a recognisable and much used theory that has generated a number of critiques. Kraaijenbrink *et al.* (2010) note that critiques add value in that they drive the evolution of a theory forward and they also note that, whilst many of the critiques have been addressed, further development is needed and suggest that concepts of time, space and uncertainty resolution should be incorporated into RBV's theoretical frame.

2.3.6. Concluding thought.

RBV is a useful lens through which operations management research can be viewed. It also serves as a foundational theory for the consideration of human capital as a resource. The next section will discuss the development of the human resource concept and discuss human resource development and strategic human resource management as foundational to the notion of managerial competency development.

2.4. The Human Resource perspective.

This section builds and draws upon theory presented earlier that views human capital as a resource. Many authors consider that modern strategic human resource management and human resource development is rooted in resource based theory (Allen and Wright, 2006; Nyberg *et al.*, 2014; Kaufman, 2015; Swanson, 2001). However there are significant other influences that have impacted on the development of the fields of human resource management and human resource development. The development of both of these fields will be examined in turn before examining linkages between human resource development and managerial competency.

2.4.1 The Development of Human Relations Theory.

Early developments in human resource theory have been linked to the human relations school of management thought that developed in the early 1900s at the Harvard Business School in response to challenges caused by industrial strife that developed in response to working practices adopted in the early stages of the industrial revolution (O'Connor, 1999) and a broader

change in political and social systems that had been occurring pre-World War 1 and had continued during the war (Chambers, 1963). The early 1900s had brought labour reform in terms of workplace policies that regulated the working hours of women and children and during the war further concessions to workers were granted to secure their support during the war effort, including in the United States the passing of the Adamson Act (8 hours Law) and the establishment of workers councils across many industries (Dickman, 1984). An industrial democracy movement developed that sought to apply the policies and practice of civic democracy to the workplace (Parker Follet, 1918; Plumb and Roylance, 1923). This view was criticised, and largely rejected, by 'democratic realists' who took the view that the masses required control by experts (Lasswell, 1928) and administrative elites (Mayo, 1933). Indeed, this debate, along with broader industrial, political and societal debates at the time, directly influenced the formation and funding of the Human Relations studies research at the Harvard Business School.

However, it is worth noting earlier influences that also advocated an increased focus on human relations. Whiting (1964) offers a useful account of the earlier theories; summarised by the researcher in table 2.3:

Table 2.3 Early contributions advocating an increased focus on human relations.

Contributor	Year	Contribution
Robert Owen	circa. 1800	Advocated a highly paternalistic approach to management-worker relations.
Andrew Ure	1835	Included a section in the "Moral Economy of the Factory System" on worker welfare and conditions.
F. W. Taylor	early 1900's	Taylor's system invited reaction against its principles which pushed forward alternate schools of thought.
Whiting Williams	1920	Conducted ethnographic research that concluded that workers feelings and emotions were of significant importance.

Source: Adapted from Whiting (1964)

Another major driving force towards shaping early human relations thinking was criticism of prevailing management philosophies at the time: Administrative Management developed by Henri Fayol, Bureaucracy developed by Max Weber and Scientific Management developed by F.W. Taylor and Frank and Lilian Gilbreth among others. Administrative Management and Bureaucracy offered frameworks and guiding principles for a management discipline that advocated separating the running of the business (to be carried out by managers) from daily

operations and the doing of the work (carried out employees). Scientific Management emerged as a different and more scientific approach to understanding and doing work. In this approach managers supported by scientists attempted to find the one best way of accomplishing a task and once this was identified workers were then trained to this method. Although productivity improvements were obtained using scientific management methods, criticisms also began to emerge such as the boring, routine nature of work; lack of worker autonomy; overly rigid systems; functional specialisation and a lack of opportunity for social co-operation in work (Prujit, 2000).

Whyte (1956) notes that a major early drive forward in the human relations movement occurred in the Harvard Business School studies at the Western Electric Company by Mayo, Roethlisberger, Dickson and others. These studies discredited the notions that workers respond as isolated individuals; to monetary incentives as a primary motivating force nor to excessive functional specialisation by increasing productivity. Table 2.4 below provides a summary of the contributions and criticisms of the Human Relations approach to management.

Table 2.4 Summary of Contributions and Criticisms of Human Relation Approach.

Contributions	Criticisms
Interrelatedness of Personality, Primary Group, Organization, and Culture.	Lack of scientific validity.
The role of personality.	Lack of generalisability.
The structure and form of work groups.	The nature of conflict and taking a too simplistic approach to this.
Participative organisation structures and communications.	Over emphasising the importance of groups at the expense of individuality.
A move toward more democratic organisation cultures.	Criticism of clinical interpretations of small controlled experiments.

Source: Compiled by the researcher.

2.4.2 Early developments in Human Resource Management Theory.

Much of the early development of human resource theory was more akin to administrative practices being applied to personnel management. There was a significant growth in Personnel Administration practices in the early 1900s, largely driven by the development of organisations of greater size (Kaufman, 2008). As unions and union membership grew in the 1930s and 1940s, labour relations developed as a related field.

Kaufman (2002) documents the significant impact that labour relations had on the field of personnel administration, or personnel management. In 1948, a small group of personnel administrators founded the American Society for Personnel Administration (ASPA). This group changed its name to the Society for Human Resource Management in 1989.

However, in the 1950s and 1960s a more comprehensive view of human resources began to emerge. The first use of the term 'human resource' is attributed to Drucker (1954, p. 263) who took issue with the prevailing personnel practices of the day as: 1) assuming people do not want to work; 2) viewing the management of workers and work as a specialist function; and 3) tending to be fire-fighting activities focused on solving problems rather than positive managerial activity. Marciano (1995) cites Pigors *et al.* (1964) as emphasising that the management of human resources is a primary issue for management and not just a secondary one, thus viewing the management of human resources as a broader and more inclusive term than personnel administration. Bakke (1958) proposed a 'Human Resources Model′ that he considered as important as any other managerial function and consisted of activity such as personnel administration, industrial relations, executive development and human relations. Similarly, research conducted by Miles (1965) found that managers preferred to take a human relations approach in their dealings with subordinates but preferred a more 'human resources' model be applied to them by their superiors. Miles (1965) also proposed a human resources model that he based on the work of Likert (1961), McGregor (1960) and others. This model suggests the experience and knowledge of workers is of vital importance to organisations.

This view of human resource management as an extension of personnel management continued in the 1970s. Robbins (1978, p.4) states that 'the academic discipline described as "personnel" represents the study of an organization's human resources and how their contribution to the organization's goals can be most effectively attained'. Peterson and Tracy (1979, p.3) go even further stating that:

human resource management, or personnel and industrial relations, consists of the activities within a given firm that deal with the recruiting, selecting, appraising, rewarding, and developing of employees (including managers) as well as negotiating with labor unions

2.4.3 A repositioning of HRM: the emergence of Strategic Human Resource Management.

In the 1980s a more strategic approach to human resource management emerged that broadened the scope of human resource management activities even further. Beer *et al.* (1984, p.1) put forward a definition of HRM as 'the study of all management decisions and actions which affect the nature of the relationship between the organization and employees'. Beer *et al.* (1984) describe four types of policy choice in HRM: 1) choices regarding employee influence mechanisms; 2) choices regarding organisational human resource flows; 3) choices regarding reward systems; and 4) choices regarding the type of work system deployed.

Similar broader perspectives were taken by many others, See table 2.5 for a summary of some of the major contributing works to the development of strategic human resource management.

Table: 2.5 Summary of major contributing works to the development of Strategic HRM.

Contributor	Title	Summary of contribution
Tichy *et al*. 1982	Strategic Human Resource Management	HRM has a significant impact on organisational performance outcomes. Effective strategic management requires effective human resource management.
Smith 1982	Strategic business planning and human resources	Discussed approaches to integrating strategic business and human resource practices.
Baird *et al*. 1983	Meshing human resources planning with strategic business planning: a model approach	Presented an integrative human resources strategic planning model.
Dyer 1983	Bringing human resources into the strategy formulation process.	Discussed approaches to, conditions for and situations where human resources can become more involved in strategy formulation.
Burack 1986	Corporate business and human resource planning practices: strategic issues and concerns.	The integration of strategic business and human resources planning systems has potentially valuable consequences.
Odiorne 1984	Strategic Management of Human Resources: A Portfolio Approach	Discusses the components of Strategic Human Resource Management and how human resource

		activities can contribute to attainment of strategic objectives.
Golden & Ramanujam 1985	Between a dream and a nightmare: on the integration of the human resource management and strategic business planning processes.	Explored configuration between the HR system and a firm's strategic suprasystem and the impact that this can have on competitive advantage.

Source: Compiled by the researcher

All of these works advocate the need for a more developed understanding of strategic human resource management. Essentially the case is made for more proactive approaches to human resource management activities that are more closely aligned to achieving organisational strategy, and less focused on fire-fighting activities designed to resolve personnel management issues on ad hoc basis.

As the strategic human resource management literature has developed, increased emphasis has been placed on linking strategic human resource management activity to organisational performance outcomes. Kaufman (2012, p.25) notes the HRM is an organisational input that "carries a price tag" but which also generates value by contributing to the production of output that generates revenue. Several studies have linked human resource practices with improved performance outcomes at plant (Arthur, 1994; Youndt *et al.*, 1996; Ichniowski *et al*., 1997), business unit (Koch and McGrath, 1996) and firm-level of analysis (Huselid, 1985; Becker and Huselid, 1998). Paauwe and Richardson (1997) conducted a summary review of 22 studies and concluded that HRM activities give rise to HRM outcomes that influence the overall performance of the firm. Huselid and Becker (2000) further substantiated the link between HRM practices and organisational performance by stating the effect of a one standard deviation in their measure of HR quality is a 10-20 per cent increase in a firm's market value, and Combs *et al.* (2006) similarly found that an increase of one standard deviation in high-performance work practices relates to a 4.6% increase in return on assets. However, criticisms began to emerge regarding the purported impact of HRM activity on organisational performance with several authors questioning the strength of the link (Wright *et al.*, 2003; Wall and Wood, 2005; Boselie *et al*., 2005; Hesketh and Fleetwood, 2006).

2.4.4 Human Resource Development.

The origins of Human Resource Development can be traced back to the Training Within Industry (TWI) initiative run by the US government from 1940 to 1945 to counter the shortage of skilled workers required to meet the needs of US industries closely related to the war effort (Opdyke, 1942; Breen, 2002; Soltero, 2004). It is interesting to note that, following the conclusion of World War II, TWI was extensively used by the US military in their efforts to rebuild a war devastated Japan and consequently had a significant influence on Japanese management practices (Robinson and Stern, 1995). An associated development that arose from the culmination of the TWI initiative in WWII was the formation of the American Society for Training and Development (Dooley, 2004). Many years later a professor's network from the American Society for Training and Development was involved in establishing the Association of Human Resource Development with the intention of expanding the volume of academic research in the field (Russ-Eft *et al.*, 2014).

Ghosh *et al*. (2014) argue that boundaries of HRD have been debated since its inception. Lee (2011) recalls her pivotal article on refusal to define HRD (Lee, 2001) to point out that HRD is different for all people and the concept and meaning of HRD emerges out of one's unique experience. Table 2.6 presents a selection of definitions of HRD from the literature that provide an indication of the various perspectives regarding what HRD is and the purpose it fulfils.

Commonalities can be ascertained from an examination of the discourse surrounding the definition of HRD and its origins. This is summarised by the researcher by noting that:

- HRD is multidisciplinary encompassing elements of learning, organizational development, change and personal/career development,

- HRD is closely tied to both individual and organisational performance outcomes,

- HRD is a planned intervention in organisational work systems with the aim of achieving strategic outcomes.

Table 2.6 Selected Definitions of HRD from the broader literature.

Authors/Source	Definitions
Watkins (2000)	"the aims of HRD are to bring about learning and change in an organizational context" (p. 54)
Bates *et al.* (2001)	"The purpose of HRD is to enhance learning, human potential, and high performance in work-related systems" (p.220-226)
Streumer and Kommers (2002)	"define HRD as a multidisciplinary field of study and practice, which has not attained the status of a discipline" p.4
Swanson (2001)	"HRD is the process of develop and/or unleashing human expertise through organization development (OD) and personnel training and development (T&D) to improve performance" p.304
Yorks (2005)	The fundamental purpose of HRD is to contribute to both long-term strategic performance and more immediate performance improvement through ensuring that organizational members have access to resources for developing their capacity for performance and for making meaning of their experience in the context of the organization's strategic needs and the requirements of their jobs. (pp. 20–21)
Chalofsky (2007)	HRD is an applied social or behavioral science discipline that is primarily concerned with people's performance in workplace organizations and how those people can strive to reach their human potential and enhance their performance p.437.
Swanson (2007)	HRD is a process for developing and unleashing human expertise through training and development and organization development for the purpose of improving performance p.457.

Source: Compiled by the researcher.

It is worth noting that HRD as a discipline has evolved since its inception and draws from the combination of knowledge and practice in other fields. HRD is a field with interdisciplinary foundations (Galagan, 1986; Jacobs, 1990; Chalofsky, 2007). Swanson (1995, 1996) notes the influence of psychological theory, economic theory, and systems theory on the development of HRD constructs. Graduous (1989) viewed systems theory as a unifying frame for HRD to access all theories as required; a view echoed by Jacobs (1987, 1989). Chalofsky (2007) posits that the seminal foundations of HRD are in the theories of people, learning and organisations; and is informed by diverse fields such as sociology, psychology, anthropology, education, management, physical sciences and philosophy.

As already noted, HRD is deeply rooted in the TWI initiative in the US in the early-mid 1940s. Its early development until 1975 was largely informed by practice (Chalofsky, 2007). Werner (2014), citing Nadler and Nadler (1989), notes that the term Human Resource Development was formally introduced by the Association for Training and Development in the 1980s to recognise that the field was broader than just classroom training. McClagan (1989) introduced a wheel model that illustrated HRD as incorporating three primary parts: training and development, career development, and organisation development.

This broader delineation of HRD activities led to others advocating a strategic role for HRD. Huselid *et al.* (1997) comment that technical practices alone are inadequate and that these should be used as a support for strategic HRD. Grieves and Redman (1999) emphasise a more strategic focus with HRD becoming the organisation strategy for aligning organisational objectives with the competencies and capabilities of employees. Bernthal *et al.* (2004) introduced an expanded HRD wheel that incorporated McClagan's dimensions of training and development, career development, and organisational development, and included two further sets of spokes for human resource management disciplines and other organisational disciplines.

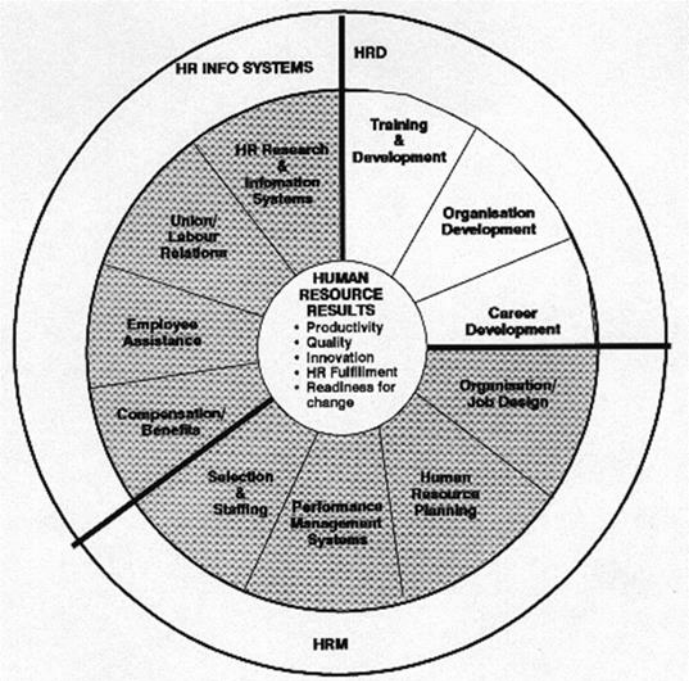


Figure 2.3 McClagan's HR Wheel (McClagan, 1989)

McKenzie *et al.* (2012) describe a shift from operational and tactical HRD to strategic HRD has witnessed HRD becoming strategic partners in organisations with broad remit to develop methods of aligning people, strategy, and performance alongside more traditional remits in learning and development. This strategic role is multifaceted and requires the ability to appreciate and understand different stakeholder demands (Corley and Eades, 2006; Rigg *et al.*, 2007; Sambrook, 2009). The shift towards a more strategic application of HRD has also influenced the themes actively researched in the HRD domain. Ghosh *et al.* (2014) report a declining trend of research in learning and training themes; a steadier trend of research in national human resource development and culture themes; and an increase in research in themes such as leadership, performance, work attitude, diversity, career, and knowledge.

2.4.5 Human Resources Development and Public Sector Performance.

This section of the chapter explores the role and influence of HRM and HRD practices on public sector performance. HRM has been described as being one of the key drivers of the modernisation of the public sector (Boyne, 2003; Pollitt and Bouckaert, 2004). Research studies have found that public service organisations can potentially improve their performance by strengthening their HRM practices (Selden, 2009, Carmeli and Schaubroeck, 2005). Within the public sector there has been a move towards a managing people as resources-approach, reflecting external or internal forces that aim to induce essential shifts in public service delivery like, for example, decentralisation, privatisation or public–private partnerships. This approach views HRD as an asset to achieve higher levels of value for the citizenry and as a strategic lever by which required governmental capabilities can be developed and sustained (Bach and Kessler, 2007; Llorens and Battaglio, 2010; Harris, 2005).

The modernisation of HRM practices in the public sector that involved viewing people as human resources reflects a conceptual reorientation that broadened the focus of HR practices at an individual level to more strategic considerations of the value of the HR stock at the organisational level of analysis, reflecting a resource-based view (Snell *et al*., 2001; Ployhart *et al*., 2009). A consequence of this change in perspective was considering people as assets for organisational change, with studies on changing HRM in public sector organisations considering outcomes such as evolutionary fitness (Helfat *et al.*, 2007), the institutional pressure to adopt HR concepts from the private sector, (Pichault 2007; Hays and Kearney, 2001), the opportunity and threats to develop more strategic HRM roles, policies, and practices (Harris 2002, 2005; Truss 2008). Indeed a broader debate has been sparked that considers whether a strategic HR approach contributes to managing modernisation in the public sector (Currie and Procter, 2001; Alfes *et al.*, 2010) and to improving the value of public service delivery (Teo and Rodwell 2007; Ridder *et al*., 2012).

Strategic HRD involves assessing the HR stock, as well as knowledge inflows and outflows, as internal sources related to organisational capability development that is necessary to carry out a value-creating strategy (Dierickx and Cool, 1989; Ployhart *et al.* 2009). The knowledge, skills, or attitudes necessary to maintain an organizational strategy reside in an organisation's HR stock (Bowen and Ostroff, 2004; Ployhart *et al*., 2009). Distinctive organisational capabilities are formed with HR behaviour embedded into formal structures and social relationships (Bruns, 2014). Indeed any potential erosion of HR stock presents a strategic risk,

one that the HR system should seek to offset lest the impact leads to HR depletion that possibly weakens capability performance (Nyberg and Ployhart, 2013). A resource and capabilities based view emphasises the organisational and management routines that help cope with the challenges of capability development (Eisenhardt and Martin, 2000; Pablo *et al.*, 2007). The public sector can experience inertia that can challenge capability development in terms of resource rigidity (a failure to invest in the required resources) and routine rigidity (a failure to develop routines to leverage resource opportunities) (Gilbert, 2005).

2.4.6 Human Resources Development and Competencies.

Although the topic of competency will be described in detail in the next chapter, it is first useful to briefly outline the linkages between HRD and competency to place both in context. Some research gaps will also be identified. Competencies have been of concern to HRD practitioners and researchers for many years (Russ-Eft *et al.*, 2014). One of the earliest cited works on competencies was that of McClelland (1973) when he argued that competencies rather than intelligence could inform job performance. However, it is also important to note that the purpose of the development of the critical incident technique (Flanagan, 1954) was to identify the critical requirements of officers in the United States Air Force - it in itself an early form of competency identification, testing, and evaluation. Stevens (2013, p.101) argues that competencies and competency modelling should represent "one of the foundational activities of HRD". Competencies form the basis for many HRD activities such as managing organisational change (Vakola *et al.*, 2007), career development (Gfroerer, 2000), assessment centers (Chen and Naquin, 2006), leadership development (Naquin and Holton, 2006), employee development and training (Rothwell and Lindholm, 1999), and the alignment of HRD functions (Gangani *et al.*, 2006; Meriot, 2005). Stone *et al.* (2013) describe informal evidence of increased adoption of competency modelling in both public and private sector organisations. However, although competencies and competency modelling are pervasive in HRD activity there are some issues that require further research. Stevens (2013) describes a need for further research to reduce conceptual ambiguity, increase methodological rigour, and improve psychometric quality. Russ-Eft *et al.* (2014) describe a need for more longitudional and time-based studies that investigate the effect of competency models over time. Seidel *et al.* (2017) describe a need for further analysis of lean competencies development in different hierarchical levels in the organisation, and in organisations with different lean maturity levels.

2.4.7 Concluding thought.

The importance of human resources and human capital as a key driver of organisational success is established. An understanding of the development of human resources in both a corporate and tactical strategic context is necessary to ensure strategic success. HRD activity can assist aligning the development of people with the development of organisations. The identification and modelling of competencies can assist in this process.

2.5 Conclusion and relevance to the thesis.

The aim of this chapter was to describe different strands of foundational literature, namely the Resource Based View, and Human Resource Development Theory as a lens to present multiple theoretical perspectives that will be useful when discussing the fieldwork evidence presented in later chapters. The theoretical perspectives presented will underpin the development of a lean competency model that will developed based on the findings of the primary fieldwork research. The following chapter will explore the development of the competency approach, competency modelling and the application of the competency approach.

Chapter 3 – Background Literature.

3.1 Chapter Introduction.

The previous chapter outlined the structure of this literature review and presented the foundational theories that have influenced the development of competency theory. This chapter describes the development and evolution of competency literature and examines the use of competency modelling as a means of aligning human resource potential with the strategic aims of the organisation. The chapter commences by reviewing various definitions of the term competency and by doing so, illustrates the evolution of the term to its current interpretation. Managerial competency will also be defined and a review of studies concerning managerial competency will be presented. Practices and approaches in competency modelling will be evaluated, and a review of managerial competency studies in hospital settings will be presented. The chapter will conclude by examining the use of competency modelling to manage lean initiatives in hospital environments, highlighting gaps in the literature that this study seeks to address.

3.2 Defining Competency and Managerial Competency.

3.2.1 Meaning of competency.

The origins of the research on competency can be traced back to McClelland's (1973) seminal paper "Testing for Competence rather than Intelligence". McClelland's research initiated a debate surrounding the suitability of intelligence testing as a predictor of performance and suggested that a more satisfactory method might exist in terms of "criterion sampling" and studying behaviours. The idea being that if you could identify the correct behaviours that lead to effective performance you could use these to test for "competencies" that would indicate whether an individual would perform well in a certain role. However, competencies can be difficult to define. Woodruffe (1993, p. 29) suggests that "definitions abound" and that the term competency has become an "umbrella term" for anything that might affect job performance. Hoffman (1999) identified different strands in the literature regarding the meaning of the term "competency": as observable performance (Boam and Sparrow, 1992; Bowden and Masters, 1993); the standard or quality of the outcome of a person's performance (Rutherford, 1995; Hager, 1994); and the underlying attributes of a person (Boyatzis, 1992; Sternberg and Kolligan, 1990). In its simplest expression a competency can be defined as a capability or an

ability (Boyatzis, 1982, 2008; McClelland 1973, 1985). Competencies are expressed as different sets of behaviour that are utilised to satisfy an underlying intent (Boyatzis, 2008). Different sets of behaviours will be utilised in differing contexts to reflect alternate manifestations of the intent. The definition of competency has broadened from traditional "KSA" (knowledge, skills, abilities/attitudes) to include anything that causes demonstrable effective performance. Dubois (2002) offers a detailed description defining competency as:

> Competency is any characteristic or trait that an individual uses for successful or exemplary performance of any type. These 'performance tools' include an individual's knowledge, skills, thought patterns, mindsets, social roles, and aspects of self-esteem or self-efficacy. A characteristic or trait is a competency only when its use can be proven to be necessary for successful performance of some type.

This broadening of thinking in relation to competency has seen the inclusion of emotional and social intelligence. Boyatzis and Saatcioglu (2008) state there are a set of competencies that have been shown to cause or predict outstanding leader, manager or professional performance and that these tend to include abilities from three clusters:

(1) Cognitive intelligence competencies, such as systems thinking;

(2) Emotional intelligence competencies, or intrapersonal abilities, such as adaptability; and

(3) Social intelligence competencies, or interpersonal abilities, such as networking.

For the purpose of this research competency will be defined as the knowledge, skills, abilities, attitudes, and values that can be used for demonstrable effective performance.

3.2.2 Evolution of the Competency Approach.

As previously noted much of the early work on competencies in the academic domain that was conducted in the US originated with the work of McClelland (1973) and was furthered by the work of Boyatzis (1982). The pioneering academic work of McClelland and Boyatzis posited that performance outcomes could be linked to skills, abilities and personality traits within a job. However, outcomes-based approaches to training had existed for many years in the form of guilds, apprenticeships, and technical training programmes in the military and other fields (Nodine, 2016). Indeed, the use of competency approaches in education pre-dates the work of

McClelland, with the introduction of the teacher education programmes in the US in the late 1960s (Ford, 2014).

The driving force behind an increasing of volume of academic research on competencies lay in the idea that the behaviours, knowledge, skills, and attitudes required by work situations could be assessed by competency-based approaches to assessment and developed by competency-based training programmes. Hirsh and Strebler (1994) note that competency-based approaches developed as a veritable industry in the 1980s, and Garavan and McGuire (2001) comment that growth in interest in competencies is reflected in the increased volume of academic literature on the topic. Competencies have been widely adopted in the development of national training systems such as the National Vocational Qualification (NVQ) system in the UK (Stokes and Oiry, 2012); featuring as a significant component in the development of the European Qualification Framework (EQF) in the European Union (Mehaut and Winch, 2012); and also featuring in similar national initiatives in the US, Germany, France, and Austria (Delamare Le Deist and Winterton, 2005).

Draganidis and Mentzas (2006) find that competency-based approaches have been undertaken by companies or business organizations to provide identification of skills, knowledge, behaviours and capabilities needed to meet certain criteria that are aligned with the organizational strategies and priorities, as well as to minimise competency gaps between the competencies required for a project, role or strategy, and existing competencies. Competency-based approaches in organisations have gained widespread appeal. Boyatzis (2008) identifies the popularity of competency-based approaches stating by 2008 almost every organisation with over 300 people use some form of competency-based HR management. Following a systematic review of the literature, Salman *et al.* (2020) conclude that competency-based HRM has a critical role in strategic management and organisational strategy. The next section will examine competency models and the practice of competency modelling in an organisation context.

3.2.3 Individual and organisational competencies.

Stokes and Oiry (2012) distinguish between individual competencies and organisational competencies. Personal competencies are those that comprise personal attributes, knowledge, skills, and behaviour to enable one perform a function or role of a job (Murray, 2003). The research on individual or personal competency lies primarily in the HRM domain and initially focuses on HRD considerations (McClelland, 1973). This work has been built upon by many

others, including Boyatzis (1982) and Spencer and Spencer (1993). These authors view competency as an individual-level concept. However the research on organisational competencies forms part of the strategic management discourse, evolving from theories of the RBV of the firm (Penrose, 1959; Wernerfelt, 1984; Barney, 1991) and notably developed in the work of Prahalad and Hamel (1990) who describe core competencies; and further developed by others (Javidan, 1998; Lado *et al.*, 1992; Ljungquist, 2007).

Prahalad and Hamel (1990) describe core competence as an organization-level concept. Organisational competencies are those systems, processes, and techniques that can transform individual competencies into organisation-wide competencies. Many authors have highlighted the link between competence at the individual-level and organisational core competence (Bergenhenegouwen *et al.*, 1996; Garavan and McGuire, 2001; Capelli and Crocker-Hefter, 1996; Hland and Tjore, 2006; Lahti, 1999). Competency models have frequently been used to relate individual competency to organisational core competency (Rothwell and Lindbohm, 1999), and to demonstrate alignment between individual ability/roles and corporate strategic objectives (Lucia and Lepsinger, 1999; Gangani *et al.*, 2006). Core competence can be embedded in organisational culture and develop and influence employee competence through the direction of the organisation's vision, mission, values, and strategy deployment (Lathi, 1999).

Chen and Chang (2010) posit that there is a link between 'competence' and 'core competence' and that these contain visible characteristics such as knowledge, skills and abilities, along with hidden characteristics such as values, intent, and motivation. These hidden characteristics are most effective in developing unique abilities that can be utilised to develop strategic competitive advantage (Barney, 1991; Lepak and Snell, 1999, 2002). Competence must also be considered in terms of context (Delamare Le Deist and Winterton, 2005). In this way, competency can become a 'temporary asset' that is influenced by contextual changes (Chen and Chang, 2010). In addressing dynamically changing contexts, consideration should be given to providing employees with more empowerment, discretion, and autonomy to react to changes in the competitive environment (Chen and Chang, 2010). In this way, the role of managers may also change from being oriented towards 'managing people' towards 'managing context', thus necessitating managers adopt more of a facilitating and coaching role (Hayton and McEvoy, 2006, p.499).

3.2.4 Managerial Competency.

Hellreigel *et al*. (2008, p.2) describe managerial competency as 'sets of knowledge, skills, behaviours, and attitudes that a person needs to be effective in a wide range of managerial jobs and various types of organisations'. Similarly, Rahman *et al.* (2014, p. 92) state the concept of managerial competencies can, therefore, be defined as a set of knowledge, skill, behavior, ability and attitude that contributes toward an individual's effectiveness in a managerial position.

There is a wealth of research on managerial competency in multiple sectors, including: hospitality (Siu, 1998; Wadongo *et al.*, 2011; Brophy and Kiely, 2002), banking (Pandey and Misra, 2015; Ekaterini, 2011; Vakola *et al.*, 2007), financial services (Tahir and Abu Bakar, 2010), tourism (Agut and Grau, 2002), supply chain (Ellinger *et al.*, 2012; Prajago and Sohal, 2013), telecommunications (Wickramasinghe and de Zoyza, 2009), food (Glaze, 1989), entrepreneurs (Mitchelmore and Rowley, 2010), public sector/civil service (Lodge and Hood, 2005), and social work (Drisko, 2014).

In healthcare, competency-based assessment and development are established practices for professional development in the administration of medicine and treatment by physicians and nurses. Previous research studies (Shewchuk *et al*., 2005; Calhoun *et al*., 2008; Garman and Scribner, 2011; Clarke *et al.*, 2004; Riley *et al.*, 2012) have also explored the use of competencies in healthcare management education and practice. Stefl (2008) comments on work undertaken by the Healthcare Leadership Alliance (HLA) on identifying competencies for senior leadership. These included communication and relationship management, knowledge of the healthcare system, professionalism, leadership, and knowledge.

3.3 Competencies and 'Tipping Points'.

Boyatzis (1982) distinguishes between threshold competencies, those that identify performance at the minimum level necessary to adequately perform a job, and differentiating competencies, those that indicate a comparative superior job performance distinguishing between the high and low performers. Boyatzis (2008), citing research conducted in varying countries (Bray *et al*., 1974; Boyatzis, 1982; Kotter, 1982; Luthans *et al.*, 1988; Howard and Bray, 1988; Campbell *et al*., 1970; Spencer and Spencer, 1993; Goleman, 1998; Goleman *et al.*, 2002), concludes that there are three clusters of competencies that can distinguish between average

and superior performers: cognitive (those dealing with systems thinking), emotional intelligence (those dealing with self-awareness and self-management), and social intelligence (those dealing with social awareness and relationship management). Differing combinations of competencies from each cluster will be used in different situations, depending upon the context. An emerging challenge in the research on competency is to identify competencies as "tipping points". Rather than focusing on what competencies are necessary for superior performance, McClelland (1998) argued that there is worth in identifying how often an individual would need to demonstrate a competency before it would "tip" them into outstanding performance. There have been a number of studies in this area (Boyatzis, 2006; Koman and Wolff, 2008; Hopkins and Bilimoria, 2008; Dreyfuss, 2008; Young and Dulewicz, 2008; Spencer *et al.*, 2008).

3.4 Competency models.

Competency models refer to collections of knowledge, skills, abilities, and other characteristics (KSAOs) that are required for effective performance in the jobs in question (for example Lucia & Lepsinger, 1999; Mansfield, 1996; Mirabile, 1997; Parry, 1996; Rodriguez *et al.*, 2002; Schippmann *et al*., 2000; Campion *et al*., 2011).

A competency model is the amalgamation of individual KSAOs or combinations of individual KSAOs that have been identified as required for effective performance in the jobs in question. Competency models are important for many reasons including: they can focus executive attention on job-related information and job analysis (Campion *et al.*, 2011); they can be used to distinguish top performers from average performers (Olesen *et al.*, 2007; Parry, 1996); they clearly link KSAOs to business objectives and strategies (Martone, 2003; Rodriguez *et al.*, 2002); they are future-oriented in that they consider future job requirements, either directly or indirectly (Parry, 1996; Schippman *et al.*, 2000; Rodriguez *et al.*, 2002); they identify a finite number of competencies across a number of functions or job families, thus simplifying HR systems (Campion *et al.*, 2011); and competency modeling can assist with broad-based organisational development interventions that facilitate organisational transformation (Campion *et al.*, 2011).

Table 3.1 below illustrates some definitions of competency modelling from the competency literature.

Table 3.1 Selected definitions of competency modelling.

Author	Year	Definition
Lucia and Lepsinger	1999	A descriptive tool that identifies the skills, knowledge, and personal characteristics as well as behaviours needed to perform a role effectively in an organization, and to help the business meet its strategic objectives.
Draganidis and Mentzas	2006	A list of competencies which are derived from observing satisfactory or exceptional employee performance for a specific occupation. It provides identification of the competencies employees need to develop in order to improve performance in current job or to prepare for other jobs.
Cooper	2000	A collection of competencies and standards of performance establishing qualifications for a specific position.
Society for Human Resource Management (SHRM)	2016	A competency model is a set of competencies that collectively defines the requirements for effective performance in a specific job, profession, or organisation.
Mansfield	1996	A competency model has been described as a behaviourally specific and detailed description of the skills and traits needed to be effective in a job.

Source: compiled by the researcher.

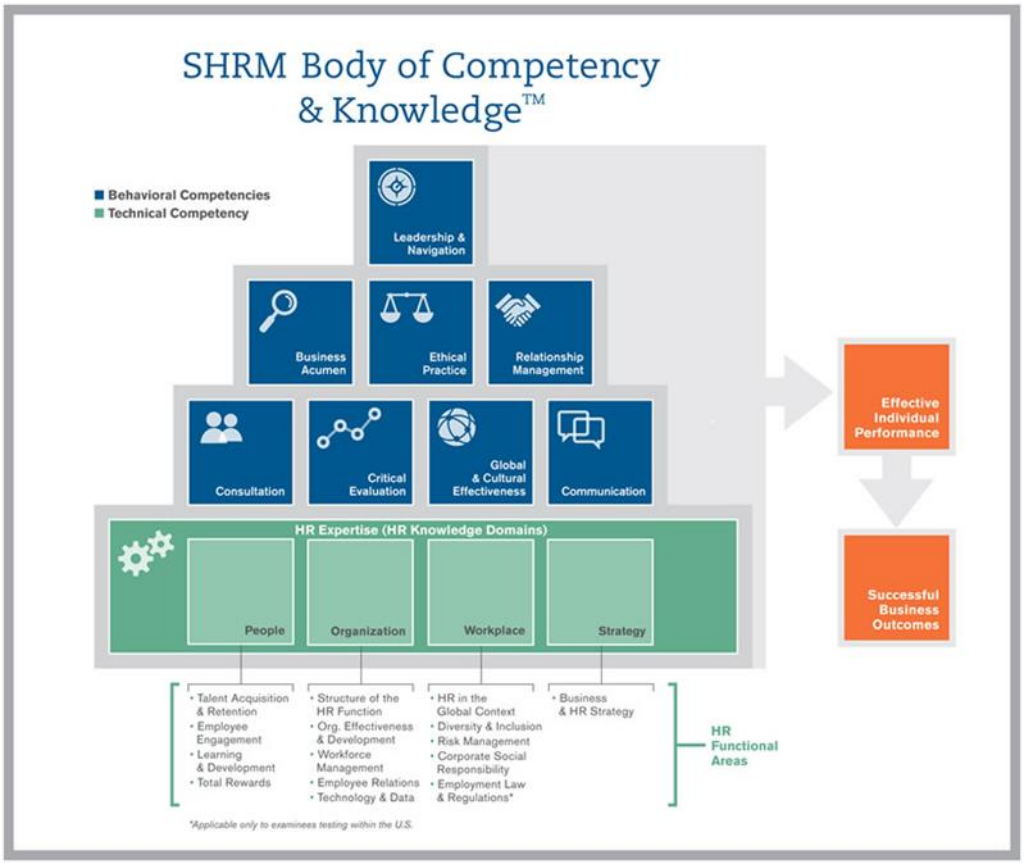
Competencies can be utilised in many HR activities such as: recruitment and selection processes that measure the competencies (Lawler, 1994; Bartram, 2005); evaluating performance appraisal (Lucia and Lepsinger, 1999; Catano *et al.*, 2007; Posthuma and Campion, 2009); training by designing delivery based on competencies (Lawler, 1994; Schippmann *et al.*, 2002); career development by analysing competencies to determine assignment choices and guide career opportunities (Berke, 2005; Groves, 2007); pay by structuring compensation scales to reflect the competency model levels (Tucker and Cofsky, 1994; O'Neal, 1995; Zingheim *et al.*, 1996); facilitating change by supporting organisational change efforts through the identification of future competencies (Lawler, 1994; Cummings and Worley, 2008); and skill retention by identifying and measuring competencies related to future objectives (Cameron, 1994; Camardella, 2002).

Common approaches to competency modelling usually begin by considering the broad organisational contextual factors that influence employee behaviour such as culture, life stage, employee relation, management style, market position, customers, and union presence. Competencies will be aligned to organisational goals and objectives (Green, 1999; Rodriguez

et al., 2002; Martone, 2003), begin with the executive level and involve rigorous job analysis (Mirabile, 1997; Rodriguez *et al.*, 2002; Lievens *et al.*, 2004; Catano *et al.*, 2007). It is often recommended that future-oriented competencies are considered (Parry, 1996; Brannick *et al.*, 2007), however, it is uncertain as to whether this really happens in practice (Campion *et al.*, 2011). Competency information is usually gathered through the use of interviewing techniques such as the Critical-Incident Interview (Flanagan, 1954), the Behavioural-Event Interview (McClelland, 1998), and surveys using carefully constructed rating scales (see for example Olesen, 2007; Campion *et al.*, 2011; Vakola *et al.*, 2008).

Once competencies have been identified, the competency information is then organised and presented. Competency descriptions typically contain three elements: (a) a descriptive label or title; (b) a definition that describes how the competency appears on the job including detailed behavioural information; and (c) a detailed description of the levels of proficiency on the competency. Care needs to exercised when developing levels of competency proficiency to ensure that these are easily distinguishable by position, for example, trainee engineer, staff engineer and senior engineer; performance, like marginal, good, or excellent; or by some other criteria containing unambiguous levels. It is important that these levels are defined by highly observable behaviours on the job (Mirabile, 1997; Catano *et al.*, 2007; Martone, 2003; Campion *et al.*, 2011). Competencies will often reflect the organisation's own unique language (Parry, 1996) and can help promote common language in the organisation (Rodriguez *et al.*, 2002). Generic lists of competencies developed by third-party providers can assist with competency language; however, it is usually best to combine/modify these with organisation specific content (Campion *et al.*, 2011). Once complete, it can be useful to illustrate the complete model visually (Campion *et al.*, 2011). Figure 3.1 illustrates the SHRM Body of Competency and Knowledge developed by the Society for Human Resource Management (SHRM, 2016).

Figure 3.1 The SHRM Body of Competency and Knowledge.



Source: Society for Human Resource Management (2016).

A significant challenge in developing competency models lies in getting the level of detail correct (Parry, 1996; Mirabile, 1997; Schippmann *et al.*, 2000) and a balance needs to be obtained between having the necessary amount of detail to ensure that the model is useful for HR systems and ensuring that the detail is not too onerous that it precludes simplicity and ease of use. A balance is also struck between different levels of competencies, for example a distinction may be made between general competencies and technical competencies, or between behavioural competencies and functional competencies (Woodall and Winstanley, 1998; Vakola *et al.*, 2008).

3.5 Application of competency modelling in a healthcare management context.

Recent studies have pointed to a requirement for the development of management and leadership competencies in healthcare and discuss the need to develop leadership and management in healthcare as a contemporary challenge (Ackerly *et al.*, 2011; Enterkin *et al.*,

2013; Yoder-Wise, 2014). However, strategies to develop these skills have been described as inadequate, contradictory, and less than successful (McCallin and Frankson, 2010; Ackerly *et al.*, 2011; Townsend *et al.*, 2012). Whilst the application of competency modelling to develop physician and medical practitioner expertise is well established (see for example, Franklin and Melville, 2015; Weeks *et al.*, 2013; Parson *et al.*, 2018; Van Houwelingen *et al.*, 2016; Daouk-Öyry *et al.*, 2017), it is also reported that management and leadership competencies exceed the normal role of the physician or medical practitioner and are often not present and deficient (Pillay, 2008; Dickinson *et al.*, 2013; Kuhlman and von Knorring, 2014; Pihlainen *et al.*, 2016). However there have been a number of studies describing the application of leadership and management competency models in healthcare settings in Europe, the United States, and Canada (Ackerly *et al.*, 2011; Garman and Scribner, 2011; Berkenbosch *et al.*, 2013).

Table 3.2 illustrates a number of leadership and management competency studies in hospital settings. Social competence featured as a significant factor in many European studies (O'Neil *et al.*, 2008; Hennessy and Hicks, 2003; Berkenbosch *et al.*, 2013). Organisational competencies pertaining to the knowledge and understanding of organisation functions, decision-making systems, and relationships were also identified (Kleinman, 2003; Connelly *et al.*, 2003; Hazelbaker, 2013). Financial competence emerged from several studies (Connelly *et al.*, 2003; Sherman *et al.*, 2007; O'Neil *et al.*, 2008; Kleinman, 2003; Palarca *et al.*, 2008). Financial competence referred to knowledge, understanding, and skills related to financial and budgeting issues, and the ability to manage these issues successfully. Related to this were business competences that include knowledge, skills, and abilities to practice business skills in clinical settings (Kang *et al.*, 2012; Hazelbaker, 2013), which included an awareness of process issues such as change, resource development, and service development (O'Neil *et al.*, 2008; Berkenbosch *et al.*, 2013). Understanding processes and process improvement in terms of quality, increased focus on patients, patient safety, and process management featured in many studies (Furukawa and Cunha, 2011; O'Neil *et al.*, 2008; Connelly *et al.*, 2003; Berkenbosch *et al.*, 2013; Lorber and Savicˇ, 2011). Issues surrounding demonstrating professional ethics and the ability to learn from mistakes and failures also featured in some studies (Sherman *et al.*, 2007; Berkenbosch *et al.*, 2013).

Table 3.2 Leadership and managerial competency studies in hospital settings					
Authors	**Year**	**Aim**	**Method**	**Participants**	**Findings**
Conelly *et al.*	2003	To identify charge nurse competencies	Delphi Interview n=42	Charge nurses, head nurses, staff nurses, supervisory. personnel	Identified 54 specific competencies grouped into four categories: clinical/technical (15), critical thinking (13), organizational skills (9), human relations skills (17)
Hennessy and Hicks	2003	To identify relevant characteristics necessary for working as a Chief Nurse	Delphi study, Round 1 n=330, Round 2 n=180	Chief Nurses in 22 European States	Sixteen relevant qualities were identified and listed in order of importance.
Kleinman	2003	To obtain perceptions of the roles, competencies and educational foundation required from nurses in mid-level and senior nursing management roles	Survey questionnaire	35 Nurse managers, 93 Nurse executives	Results indicate the groups are in basic agreement about required competencies, though nurse managers appear less clear about nurse executive role responsibilities.
Sherman *et al.*	2007	To identify the critical leadership skills and competencies required by nurse manager to build a nursing leadership model	Structured interviews	Nurse managers	Six competency categories emerged from the research findings to form a nursing leadership competency model.
Donaher *et al.*	2007	Tested validity and reliability for the Human Capital Competencies Inventory (HCCI).	Expert panel n=3, Questionnaires n=99	Nurse managers.	There was validity and reliability for the HCCI within the sample used.

O'Neil *et al.*	2008	To ensure that the required skills and competencies to lead are used.	Telephone survey, n=27, survey n=54.	Chief nursing leaders in hospitals, education and public health	This research highlighted the emergence of leadership development programs designed to enhance leadership effectiveness in the service of broader strategic objectives. By learning more about these opportunities, nurse executives can make better decisions for themselves and other nursing colleagues.
Palarca *et al.*	2008	To forecast relevant navy nurse competencies for the next 5-10 years	Delphi technique – Wave 1 n=200, Wave 2 n=200. Expert panel.	Senior navy nurses.	Nurses identified the top 5 competencies, knowledge, skills and abilities. Results used to form the basis of a leadership continuum.
Furukawa and Cunha	2011	Identified the profile and competencies of nurse managers of accredited hospitals from their perspective and that of their hierarchical superiors.	Two questionnaires n=24	Nurse managers and nursing directors.	Concluded that the profile and competencies of most of the nurse managers were compatible with the expectations of their superiors, who collaborate in the selection of candidates for the nurse manager position and evaluate their professional performance.
Herd *et al.*	2016	To investigate which National Center for Healthcare Leadership (NCHL) competencies were referenced by exemplary healthcare leaders as most important for success.	Qualitative interviews n=26.	Senior level executives.	Change leadership, self-development, talent development, and team leadership were the top four NCHL competencies most frequently referenced.

Lorber and Savic	2011	To compare nursing leaders and employee perspectives on leadership style, personality characteristics and management competencies.	Survey questionnaire n=750	Nursing leaders, nursing employees.	Leaders and employees significantly differently evaluated 13 out of 14 managerial competencies of the leaders.
Pillay	2011	To identify the competencies perceived to be important for effective nursing management.	Self-administered questionnaire n=215	Nursing managers	Public sector managers ranked controlling as the most important competency, followed by leading, organizing, and self-management. Health/clinical skills, planning, and legal/ethical competencies were ranked as being relatively less important.
Kang *et al.*	2012	To assess the level of and the differences in managerial competencies.	Cross-sectional survey self-administered questionnaire n=330.	Head nurses, supervisors, Deputy Directors, Directors of Nursing.	The study provides recommendations for future administrative training programmes to increase nursing administrators' managerial competency in fulfilling their management roles and functions.
Citaku *et al.*	2012	To identify and empirically investigate the dimensions of leadership in medical education and healthcare professions.	Focus group of 5 experts, Survey n=229.	Educators, physicians, nurses and academics.	The present study indicates that core competencies in medical education leadership can be empirically identified and categorised into five factors: (1) Social Responsibility, (2) Innovation, (3) Self-Management, (4) Task Management, and (5) Justice Orientation
Berkenbosch *et al.*	2013	To investigate how medical specialists perceived the managerial competencies of medical residents and their	Questionnaire n=129	Dutch Medical specialists.	Dutch medical specialists perceive the management competencies of residents in some areas to be inadequate. They feel that training in medical management during residency is necessary.

		need for management education.			
Hazelbaker	2013	To begin to explore the knowledge, skills, and abilities needed in the emerging practice setting of health care management.	Delphi study, 3 rounds of surveys, n=8.	Athletic trainers working as hospital or healthcare managers.	According to participants, effective health care managers need a strong understanding of business and management tools along with more interpersonal skills in communication and leadership.
Liang *et al.*	2013	To identify and confirm the core competencies required for middle to senior level managers in public hospitals.	Mixed method: Position description content analysis n=121, Focus group n=18, Online survey n=74	Managers across four levels in public hospitals.	Identified and confirmed six competencies across four management levels.
Liang *et al.*	2017	To measure the competence of mid-level managers in two Victorian hospitals in applying evidence-informed decision making (EIDM) in their roles	360° process using an online management competency assessment tool (MCAP Tool) and case-study objective assessment tool.	25 mid-level managers	The study supports the evidence that improving the competence of individual manager is important to enhancing the EIDM practice. However, such improvement cannot be achieved on a large and wide scale without a combination of efforts at system, healthcare organisation and individual management levels.
González García *et al.*	2020	To identify core competencies for nurse managers.	Delphi study, 4 rounds of surveys, N=50	Experts in health management and health environment.	Identified eight core competencies for nurse managers in the Spanish health system.

Source: compiled by the researcher.

Many clinical competencies were identified including knowledge, skills, and abilities relating to clinical operations issues (Hennessy and Hicks, 2003; Connelly *et al.*, 2003; Sherman *et al.*, 2007). Also identified were hospital operations management competencies including the ability to manage a ward (Berkenbosch *et al.*, 2013); understanding operations and the importance of resource management; and executing and delegating tasks (Furukawa and Cunha, 2011; Lorber and Savic, 2011; Berkenbosch *et al*., 2013).

Leadership skills and abilities also featured prominently in many studies (Furukawa and Cunha, 2011; Berkenbosch *et al.*, 2013; Hazelbaker, 2013; Hennessy and Hicks, 2003; Kang *et al*., 2012; Herd *et al.*, 2016). The ability to develop oneself and others was also identified in studies (Citaku *et al.*, 2012; Connelly *et al.*, 2003; Furukawa and Cunha, 2013; Palarca *et al.*, 2008; Herd *et al.*, 2016). Management ability to be proactive towards clinical and organisational change was also deemed relevant by some researchers (O'Neil *et al*., 2008; Sherman *et al.*, 2007; Palarca *et al.*, 2008; Herd *et al*., 2016).

Some general management competencies appeared in many studies. These included time management, including the ability to schedule tasks (O'Neil *et al.*, 2008; Kang *et al.*, 2012; Hazelbacker, 2013); interpersonal, communication, and teamworking skills (Hennessy and Hicks, 2003; Sherman *et al.*, 2007; Palarca *et al.*, 2008; Connelly *et al.*, 2003; Furukawa and Collins, 2011; Kang *et al.*, 2012; Lorber and Savic, 2011; Citaku *et al.*, 2012; O'Neil *et al.*, 2008; González García *et al*., 2020); strategic thinking and the ability to develop goals and plan tasks (Connelly *et al.*, 2003; Berkenbosch *et al.*, 2013; Hazelbaker, 2013; Kang *et al.*, 2012); human resource management skills, including the development and management of people (Kleinman, 2003; Sherman *et al.* 2007; Kang *et al.*, 2012; Palarca *et al.*, 2008; Lorber and Savic, 2011).

The above studies identify a range of managerial and leadership competencies that have relevance in a healthcare management context. The output of these research studies will assist in informing the development of competency descriptions that can be tested in the field study activity. The next chapter will explore the use of competency modelling in a Lean context.

CHAPTER 4 – FOCAL LITERATURE

4.1 Chapter Overview.

This chapter presents context for the research firstly, describing the evolving global healthcare environment and the rationale for the application of lean in healthcare. The chapter continues by describing in detail the development and evolution of lean thinking and practice; criticisms and challenges of the lean approach; the application of lean in healthcare; and the application of competency modelling in a lean context.

4.2 Evolving Healthcare Context.

The global healthcare sector is characterised by challenging trends, including escalating costs, increased incidence of chronic illnesses, aging populations, and greater urbanization - all leading to higher rates of many blood-born, infectious, and pollution-related illnesses (Atallah *et al*., 2012). In Europe, this situation has been exacerbated by difficult economic conditions that have necessitated the introduction of austerity measures. This has also been the case in Ireland where austerity measures in the health sector aimed to contain costs and to target resources more effectively (Thomas and Burke, 2012). Europe also faces an aging population with 37% of the population expected to be over 60 years of age by 2050. This, combined with an increase in chronic illnesses and restrictions on public spending, will require healthcare systems to undertake fundamental transformations in order to provide quality care (Harney and Richetta, 2014).

In response to the aforementioned context and drivers, there has been a movement from a volume-based model of healthcare to a more value-based care (VBC) model of healthcare (Deloitte, 2015; Walsh *et al.*, 2020). VBC models involve maximising value for patients by providing the best care option at the lowest cost (Porter and Lee, 2013). This requires greater co-ordination between healthcare organisations and requires investment into supporting clinical integration, population health, and other cost-reduction/revenue-enhancement opportunities (Deloitte, 2015). On face value it would appear that this context suggests that the application of Lean thinking, which seeks to reduce waste and add customer value by restructuring organisational processes (Womack and Jones, 2003), might be an appropriate strategy that could assist healthcare organisations transition to a VBC model.

The Irish healthcare system faces challenges similar to those previously outlined, including significantly reduced budgets; long waiting lists; capacity deficits; an ageing population; and a significant growth in the incidence of chronic illness (Department of Health, 2012). In response to these challenges the Irish Department of Health developed a "Future Health" strategy that established a strategic framework for the reform of the health service between the years 2012-2015. One of the core strategic objectives that features in current departmental strategy is promoting effective and efficient management of the health services (Department of Health, 2019; Department of Health, 2021).

4.2.1 Rationale for the application of lean practice in the public healthcare sector.

Van de Walle and Hammerschmid (2011) describe an emergence of new ways of thinking about the role and nature of government that led to a series of reforms that would become known as New Public Management. There are many definitions of new public management that take differing emphasis; however, they each have in common the implementation of management ideas from the business and private sector into public services; many of which sought to pursue efficiency, value, and cost reduction (Hood, 1991; Christensen and Laegreid, 2001; Hood and Dixon, 2013). This was evident in adoption of continuous improvement approaches such as quality management (Rosenhoover and Kuhn, 1996; Matei and Lazăr, 2011; Palm *et al.,* 2016), lean (Spear, 2005; Radnor *et al.*, 2006; Radnor, 2010; Emiliani, 2004; Bateman *et al.*, 2014; Agripino *et al.,* 2002), six sigma (Fryer *et al.,* 2007; Chiarini, 2013), and lean six sigma (Lokkerbol *et al.*, 2012; Antony *et al.,* 2016; Cole, 2011) in the public sector.

However, evidence suggests that the adoption of continuous improvement process strategies in the public sector may not just be a simple application of what has been tried in the private sector (Radnor and O'Mahoney, 2013; Brown *et al*, 2003) and that the public sector - which is based more on values, and has ethical and professional concepts to consider - may present many more complex challenges (Diefenbach, 2009). Public sector organisations also operate in a more volatile and highly politicised environment that can have a significant influence on business process change efforts (Jurisch *et al.,* 2013). Rainey (2014) describes how public sector organisations have many stakeholders and that this often places them under significant scrutiny from political superiors, citizens and the media. The differing needs of these many stakeholders can often result in managers of public organisations having multiple, and often conflicting goals (Boyne, 2002). Pettigrew *et al.* (2001) argue that the context in which change

takes place has a continuous influence on the change process, and Van der Voet *et al.* (2015) assert that to understand the change process in public sector organisations it is necessary to understand the public sector context.

The aforementioned need to understand the public sector context when introducing process change in public sector organisations is important when considering the nature, rate, mode, and durability of lean implementations in public healthcare.

4.3 Lean.

4.3.1 Defining Lean.

The term 'Lean' was originally coined by Krafcik (1988) to describe the Toyota Production System. The concept of lean production was subsequently popularised by the publication of "The Machine that Changed the World" (Womack *et al.*, 1990) where lean production was described as:

> Lean production is lean because it uses less of everything compared with mass production – half the human effort in the factory, half the manufacturing space, half the investment in tools, half the engineering hours to develop a new product in half the time.

Earlier definitions of lean tended to focus on the application of lean to production, and most notably describe efficient and effective resource utilisation (Womack *et al.*, 1990; Womack and Jones, 1996); managing variability in supply, processing time and demand (Hopp and Spearman, 2004; DeTreville and Antonikitis, 2006); and borrowed elements from established concepts such as Just-in-Time and Total Quality Management (Arlbjorn et al., 2008; Shah and Ward, 2007). However, it is well-established that the lean concept is not comprehensively defined (Dahlgaard and Dahlgaard-Park, 2006; Lewis, 2000; Holweg, 2007; Papadopoulou and Ozbayrak, 2004; Hallgreen and Olhager, 2009). Others speculate that the lack of a clear definition can cause problems with defining the overall goals of the concept (Anderssen *et al.*, 2006); communication and education of the concept (Boaden, 1997); and researching the concept (Parker, 2003; Godfrey *et al.*, 1997). The lack of a clear definition can be explained by viewing lean as a concept that is constantly evolving (Hines *et al.*, 2004; Pettersen, 2009). A better understanding of what lean is can be achieved by considering its evolution. The next section will explore the origins of lean and the key stages of its evolution to date.

4.3.2 Evolution of Lean.

Origins of Lean

The origins of Lean can clearly be traced to the development of the Toyota Production System (TPS) in the 1950s, and, as we saw above, the Lean concept was popularised by Womack *et al*. (1990) who described how Toyota achieved sustainable competitive advantage in their industry by continuously improving quality whilst at the same time reducing costs. The development of the TPS was heavily influenced by Scientific Management, mass production at Ford, Quality Management and other approaches to continuous improvement that developed during the last century. Table 4.1 below details some of the key influences on the development of lean production.

Table 4.1 Origins of Lean Production/Thinking.

Year	Individual/Corporation	Origins of Lean Production/Thinking
1800	Eli Whitney & US Military	An early effort that saw potential in developing interchangeable parts for the US military (Ford, 2005).
Early 1900s	Sakichi Toyoda	Toyoda develops looms in a textile factory that stop themselves when a thread broke. This ultimately leads to the development of autonomation and the Jidoka concept (Wada, 2006).
Early 1900s	Frederick W. Taylor	Publishes the "Principles of Scientific Management" in 1911 that is based on his experiences as a manager in the Bethlehem Steel Works. His teachings were a pioneering contribution to the science of Industrial Engineering. Taylor developed the concept of "time study" that later developed into the direction of establishing standard times for activities.
Early 1900s	Frank Gilbreth	Developed the concept of "motion study". This sought to reduce the number of movements associated with completing a task. Gilbreth was also instrumental in the early development of "process charts" and the graphical illustration of work activity (Gainty, 2012).
Early 1900s	Henry Ford and the Ford Motor Company	Henry Ford established the Ford Motor Company in 1903. The Ford assembly line is developed by Clarence Avery, Peter Martin, Charles Sorenson and C. Harold Wills in 1913 (Nye, 2013).
1924	Walter A. Shewhart and Bell Telephone	Pioneered the use of "control charts" and developed the "statistical quality control**"** method, critically distinguishing between assignable-cause and chance-cause variation (Stauffer, 2013).
1934 – 1937	Kiichiri Toyoda and Toyota Industries	Kiichiri Toyoda develops a division of Toyota Industries in 1934 to manufacture automobiles. In 1937 the Toyota Motor Corporation was founded. During this time Toyoda visits Ford to study the Ford assembly line and realises that the processes at Toyoda are hampered by excessive repairing of quality problems and these must be resolved by studying each stage of the process that causes them. In 1936 Toyoda develops "Kaizen" improvement teams to resolve process problems.

1940-1990	W. E. Deming	Built upon concepts pioneered by Walter A. Shewhart and contributed to continuous improvement thinking by developing the "PDSA cycle" (Plan-Do-Study-Act). Acted as an advisor to JUSE (Japanese Union of Scientists and Engineers) (Leitner, 1999). Worked with the Ford Motor Company throughout the 1980's and published "Quality, Productivity and Competitive position in 1982 (later renamed "Out of the Crisis" in 1986).
1950-1990s	Joseph M. Juran	Published the Quality Control Handbook in 1951. Invited to Japan by JUSE in 1952 and advised Japanese corporations over the next forty years on managing quality. Applied the "Pareto principle" to quality and stressed the importance of distinguishing between the "vital few and the useful many". Developed the Juran trilogy of quality management processes: quality planning, quality control and quality improvement (Godfrey and Kenett, 2007).
1950s	Kiichiri Toyoda, Eiji Toyoda and Taiichi Ohno.	Kiichiri Toyoda, Eiji Toyoda and Taiichi Ohno visit the US on a number of occasions to study the manufacturing system at Ford. They begin developing the Toyota Production System. Whilst observing supermarkets in the USA Ohno recognised the scheduling of work should not be driven by sales or production targets but only by actual sales. This led him to conclude that overproduction should be avoided and the notion of Pull (build to order) should drive production scheduling. The concept of Just-in-Time manufacturing (JIT) is developed to reflect this change in thinking. During this time they are advised by Deming, Juran and other quality experts. Toyota realises the importance of putting customer satisfaction at the heart of everything they do and involving all employees in improving processes. The twin pillars of the Toyota Production System; respect for people and continuous improvement are developed (Fujimoto, 1999).
1960s–1980s	Shigeo Shingo, Kaoru Ishikawa and Masaaki Imai.	Shingo develops the concept of Poka-yoke (mistake proofing) and contributes to the development of the quick changeover method which later becomes known as SMED (single minute exchange of die) (Shingo, 1989). The Toyota Production System is further developed with the assistance of Kaoru Ishikawa (of the University of Tokyo and JUSE) who develops Quality Circles (groups of co-works who meet to work on process related problems) and the Ishikawa Diagram (also known as the Cause and Effect diagram) to assist in identifying the root cause of process problems. Kaoru Ishikawa and Masaaki Imai bring many of the quality tools and concepts together into the Seven Basic Tools of Quality and explain their impact on continuous improvement (Dale *et al.*, 2007).
1988	John Krafcik	Publishes the "Triumph of the Lean Production System" in the Sloan Management Review.
1990	James P. Womack, Daniel T. Jones and Daniel Roos.	The "Machine that Changed the World" is published. This seminal work developed by Womack, Jones and Roos provides a comprehensive description of the entire lean system. The five core principles of Lean (Value, Value Stream, Flow, Pull and Perfection) are described.

Source: Developed by the researcher.

Adoption of Lean Production practices.

Towards the end of the last century, lean production practices were extensively adopted by Western countries. Efforts to capture the knowledge developed by Japanese automotive companies began to be captured and published (Monden, 1983; Ohno, 1988; Womack *et al.*, 1990; Womack and Jones, 1996). This early stage of lean evolution is characterised by attempts to transplant various manufacturing (lean) practices from Japanese companies to the West. This approach largely resulted from a reported gap in performance between the US and Japan (Hayes, 1981; Abernathy and Clark, 1982). Initiatives such as the NUMMI joint venture between General Motors and Toyota assisted in accelerating the transfer of Japanese production management practices (Inkpen, 2008). At this stage of evolution, the adoption of lean practices resembled a mainly operational, and segregated, tools and techniques approach. These tools and techniques focussed primarily at a cellular or process level and formed the foundation for lean practices, and included tools and techniques such as: 5S, kanban, pull production, Single digit Minute Exchange of Die (SMED), cause and effect analyses, demand smoothing (Heijunka) (see for example Shingo, 1987; Monden, 1983; Ohno, 1998).

A Shop-Floor Manufacturing Process Approach

Following the adoption of tools and techniques, a broader shop-floor approach became common, primarily focused on manufacturing operations (Hines *et al.*, 2004; Shah and Ward, 2007). This approach reflected the continuous improvement practices of that time that included quality management (for example Deming, 1986; Juran, 1974; Feigenbaum, 1991; Crosby, 1978; Dale and Plunkett, 1994; Shingo, 1987; Ishikawa, 1985) and world-class manufacturing (Schonberger, 1986, 1996; Hayes and Wheelright, 1984). These practices adopted the input-transformation-output model as a basis for explaining process activities. By understanding the causal relationship between inputs and outputs of the process and managing the variance in this relationship an end goal of improvement for the customer can be achieved. This was akin to Van den Ven's (1992) first classification of process that examines under variance theory the causal relationships between inputs and outputs of that process.

The continuous improvement literature also stresses the relationships between groups of activities, tasks, and steps. This structuring of activity fits with Van den Ven's (1992) second classification of process as a category of concepts. For example, much of the quality management, six sigma, and lean literature focuses on understanding how organisations and

processes, in particular order fulfillment processes, behave with a view to understanding how they can be improved with an end goal of achieving a form of superior performance. Indeed, *The Machine that Changed the World* (Womack *et al.*, 1990) focused on world-class performance in the mass production automobile industry and attempted to understand Toyota's superior performance in this space. This technical process literature sought to address the prevailing problems that existed with traditional mass production processes such as functional silos, task fragmentation, unnecessarily high levels of in-process inventory, high costs, poor quality, and comparatively low rates of customer satisfaction (Womack and Jones, 1996; Goldratt and Cox, 1993; Deming, 1986).

A Value Stream Approach

In order to counter the siloed thinking and process sub-optimisation that was common in traditional manufacturing processes, the focus changed to applying the five key principles of lean (Value, Value Stream, Flow, Pull, Perfection) to production practice (Womack and Jones, 1996). Approaches to "mapping" processes and value streams were developed as a way of creating greater visibility and understanding of what actually happens in manufacturing processes (Hines and Rich, 1997; Rother and Shook, 1998). The focus had now shifted to attempting to understand what customers actually valued, and how to design and improve processes that could deliver that value to the customer in the most efficient way This is encapsulated in Liker's (1996, p. 481) definition:

> Lean is a philosophy that when implemented reduces the time from customer order to delivery by eliminating sources of waste in the production flow.

The lean approach had now evolved to meeting customer needs as the primary driver of every activity (Dale and Plunkett, 1994; Deming, 1986) and understanding what customers value most (Womack and Jones, 1996; Bicheno, 2000). Secondly, a holistic organisational perspective was advocated that promotes alignment and goal congruence and avoids local optimisation and associated sub-optimal behaviour at the expense of the overall system (Goldratt and Cox, 1993; Hammer and Champy, 1993; Feigenbaum, 1991). Thirdly, greater teamworking and devolving responsibility for task ownership and control is advocated. Control over inputs, transformation activity, and outputs is provided to team members to instill a sense of ownership and responsibility. This serves to reduce boundaries, reduce hand-offs, reduce delays, minimise communication errors, and reduce faults (Goldratt and Cox, 1993; Dale and Plunkett, 1994; Womack and Jones, 1996). Fourthly, efforts are encouraged to seek out

improved process design that allows work to flow smoothly through the process (Womack and Jones, 1996; Bicheno, 2000). The goal here is to eliminate silos and sub-optimal localised production with the impact of eliminating/reducing boundaries and their associated queues and waiting delays. Finally, the continuous improvement literature advocates that organisations strive for perfection in processes and this is achieved through continuous improvement cycles such as PDCA (Plan-Do-Check-Act Cycles) (Deming, 1986).

A customer-oriented strategic approach

The next stage of lean evolution brought about a more strategic focus towards understanding customer value in conjunction with maximising operational efficiency. This refocuses lean efforts towards both reducing waste and improving customer value (Hines *et al.*, 2004). A deeper understanding of customer needs is captured by using techniques such as the voice of the customer, kano modelling, quality function deployment (Akao and Mazur, 2003), and the value attribute approach (Hines *et al.*, 2004). Once an understanding of customer requirements and the attributes that customers value is obtained it is then important to design/recalibrate value streams to deliver maximum value with minimum waste. There are established approaches to developing and deploying strategy that are utilised in the lean approach. These approaches to policy deployment are based on the Japanese "Hoshin Kanri" approach which involves developing, communicating, and implementing strategic goals in a collaborative manner (Lee and Dale, 1998; Hutchins, 2008). During this stage of evolution, it was also recognised that lean philosophy had broader application than its traditional manufacturing base and was extended to other sectors such as service (Swank, 2003; Piercey and Rich, 2009), healthcare (Fillingham, 2007; Jimmerson *et al.*, 2005; D'Andreamatteo, 2015), administration processing (Atkinson, 2004), and the public sector (Radnor *et al.*, 2006; Radnor, 2010; Emiliani, 2004; Agripino *et al.*, 2002).

Lean Leadership and Lean Culture

The adoption of a more strategic attitude to lean applications brought about an interest in the "softer" elements of lean transformations, with many authors observing that a tools-based approach is not sufficient. This is not without surprise as the two key pillars of the TPS are continuous improvement and respect for people (Sugimori et al., 1977; Emiliani and Stec, 2005). Mann (2009) indicates the implementation of lean tools represents at most 20% of the effort in lean transformations. The remaining effort is attributed towards developing leaders' practices, behaviours and mindsets. Liker (2004) identified four fundamental areas that

required attention to successfully convert an organization into a lean and learning enterprise: long-term philosophy, people, process, and problem solving. However, some authors (Spear, 2005; Emiliani and Stec, 2005) comment that although senior managers are vocal in their support for lean, this fails to translate into consistent participation in lean practices at leadership level and missed opportunities to internalize what it means to be lean.

The development of a lean culture has also been identified as being critical to lean success (Achanga *et al.*, 2006; Emiliani, 1998; Hines *et al.*, 2004; Bhasin and Burcher, 2006). The engagement of employees at all levels has been shown to lead to successful lean transformations (Lucey, 2009; Miller, 2011). Similarly, many studies have indicated a strong relationship between worker commitment and lean systems (Parker, 2003; Vidal, 2007; Angelis *et al.*, 2011). Successful lean transformations are often predicated on a cultural transition that involves adopting new behaviours, taking action, implementing new principles, and embracing organisational change (Boyer, 1996; Tracey and Flinchbaugh, 2006; Van der Merwe *et al.*, 2014).

This switch in focus from a primarily tools-driven approach to lean to a more culturally based change focus has led to increased interest in the behaviours and competencies required to successfully implement lean. Emiliani (2003) observes that leader beliefs shape leader behaviors, and these in turn develop into leadership competencies; however, competency models rooted in conventional management practices are likely to prove unsuitable for lean management systems. Several authors (Bortolotti *et al.*, 2015; Samuel *et al.*, 2015; Van Dun *et al.*, 2017) purport that by better understanding the 'softer' elements of lean such as behavior development, employee engagement, employee development, and change management, and then combining these with 'harder' proficiency in tools and techniques and operations management, one is likely to develop competency in the successful application of lean management practice. Similarly, Salentijn *et al.* (2021) identify that both 'hard' and 'soft' factors mediate the social outomes of lean implementations. Future models of lean are likely to emphasise these social, behavioural, developmental and learning aspects of lean. For example the BE SCILLED model (Hines *et al.*, 2020) places emphasis on behaviours, learning and development alongside more established components of strategy, continuous improvement and leadership.

4.4 Criticisms of the Lean Approach.

Although lean as a concept has proven to be resilient and popular it is not without its criticisms. As already noted, there is substantial confusion and variance regarding what the term "lean" actually means (Dahlgaard and Dahlgaard-Park, 2006; Lewis, 2000; Holweg, 2007; Papadopoulou and Ozbayrak, 2004; Hallgreen and Olhager, 2009; Hallam, 2003; Stone 2012) and this can lead to misinterpretations regarding the suitability and method of lean implementations (Anand and Kodali, 2010; Bhamu and Sangwan, 2014).

There are also concerns that lean implementations can have a negative effect on the workforce (Delbridge *et al.*, 1992; Garrahan & Stewart, 1992; Williams *et al.*, 1992; Salentijn *et al.*, 2021) potentially contributing to a dangerous work environment, limiting employee creativity, overburdening employees, and restricting professional ability (Mehri, 2006; Stewart *et al.*, 2009). The motives driving lean implementations are also questioned. Lean, if implemented for the wrong reasons, can often have the opposite of its supposed effects, leading to resource deficiencies, or corporate anorexia as described by Radnor and Boaden (2004), or result in managers that are burnt out, disenfranchised, and less productive, and thus causing negative implications for quality and customer satisfaction (Mintzberg *et al.*, 2002).

The general applicability of lean has also been questioned in service environments (Seddon and Caulkin, 2007) and in low volume, high variety environments (Christopher & Towill, 2000; Van Hoek *et al.*, 2001). However despite these criticisms, lean has endured and more than a quarter of a century beyond its introduction has become one of the most both widely applied and highly recognised continuous improvement methodologies (Hasle *et al.*, 2012; Krishna and Kodali, 2014; Samuel *et al.*, 2015).

4.5 Sustaining Lean

It appears that a key challenge, regardless of sector, lies in sustaining Lean improvements once success has been achieved. Bhasin (2012) highlights the low rates of successful Lean implementations in manufacturing, commenting that many implementations fail because of cultural and change issues. Brackett *et al*. (2013), citing Pocha (2010), state that a major cultural change is required before implementing Lean practices and Brackett *et al*. (2013) further suggest that more research needs to be conducted regarding the sustainability of Lean

initiatives. Drotz and Poksinska (2014) emphasise that Lean implementations will affect the roles, responsibilities, and job characteristics of employees, and that managers will need to understand the impact of these changes. The overarching shared vision and goals must be continually reinforced by senior managers (Hwang *et al*, 2014). Studer (2013) asserts that Lean success requires strongly aligned goals reinforced by strongly aligned behaviours, and that managerial roles may involve nurturing, coaching, and reinforcing employee behaviours that support success. Similarly, Lorden *et al*. (2014) comment that Lean success will require motivated managers who are skillful at balancing communication, leadership, and workload. It is also imperative that slippage back towards old systems and habits do not occur. Furthermore, Murphree *et al.* (2011) put forward a case for integrating effective controls closely linked to the integration of process changes to help ensure their continued sustainability.

4.6 Lean in Healthcare.

The application of Lean practices in healthcare has been researched since the early 2000s (D'Andreamatteo *et al*., 2015). Spear (2005) found that organisations such as Toyota, Southwest Airlines, and Alcoa have achieved sustainable competitive advantage in their industries by designing operations that are continuously improving wherein the process of learning to work better is carried out at the same time that work is completed. In the same article, Spear postulates that the TPS which formed the foundation of Lean practices, can be successfully applied in Healthcare. The application of industrial processes to Healthcare should be a process of gradual improvement according to Young *et al.* (2004) who advise against expectations that seek the invention of systems that work perfectly.

In Healthcare, lean can be defined as a set of operating methods and philosophies that help create maximum value for patients while reducing wastes and waits (Lawal *et al*., 2014). Aherne and Whelton (2010) identify the following principles as being fundamental to Lean thinking applied in a Healthcare context: specify value from the standpoint of the end customer; identify the value stream for each product or service family; eliminate waste; make the product or service flow; respond to customer pull; improve continuously in search of perfection; and encourage employee contribution.

There is evidence in the literature of an increased prevalence of research in the area of Lean healthcare from 2000 onwards (de Souza, 2009; Pokinksa, 2010; d'Andreamatteo, 2015). Also,

the application of Lean practices in healthcare is spreading worldwide (Antony *et al.*, 2019). In the US, Jimmerson *et al*. (2004) conclude that the application of TPS tools and practices can be used to address critical challenges in Healthcare such as medical errors, escalating costs, and staff shortages. At Mount Sinai Medical Center, reductions were achieved in laboratory turnaround times, in patient turnaround times, and in medical errors (Chassin, 2008). Other reported benefits from applications in the US include increased productivity (Toussaint, 2009); reduction in patient discharge times (Snyder and McDermott, 2009); and improved and proactive quality management systems (Mannon, 2014).

Similar benefits have been recorded in the UK. Guthrie (2006) cites benefits achieved at the Royal Bolton Hospital, including the death rate of patients undergoing hip replacement operations falling by a third, and processing times of some blood samples reduced from greater than one day to three hours. Fillingham (2007) describes additional benefits at the same hospital, including a 42% reduction in paperwork, faster recovery and lower demand on the rehabilitation ward, and total length of stay reduced by a third. At the NHS Doncaster, the transient ischematic attack (TIA) pathway has been reduced by between 21 and 41 days, and patients requiring vascular surgery are seen in 48 hours, a process that previously could take up to 50 days (Tuck, 2009). In Australia, Ben Tovim *et al*. (2007) outline significant benefits that accrued from the application of Lean at Flinders Medical Centre, drastically improving patient flow, reducing length of patient stay, and making the patient experience safer and more accessible. In the Netherlands, Wijma *et al*. (2009) describe improvement in nursing efficiencies, and Niemeijer *et al*. (2012) describe significant cost reductions following the implementation of a Lean Six Sigma initiative. Further studies have been identified in Canada (Isaac-Renton *et al*., 2012; Brunoro-Kadash, 2013), Taiwan (Yeh *et al*., 2011), and New Zealand (MacDonald *et al*., 2013).

There is limited research relating to the application of Lean thinking in healthcare in Ireland. However some research indicates positive outcomes. Laureani *et al*. (2013), in a review of student projects in an Irish hospital, concluded Lean Six Sigma can be used and proves beneficial in a variety of settings. Ryan *et al*. (2013) discuss how Lean thinking and theory of constraints can be used to identify bottlenecks in emergency department patient flows. Research on the "Productive Ward" initiative in the Irish Health Service Executive (HSE) has indicated that the implementation of quality improvement initiatives have a positive effect on work-based teams (White *et al*., 2013), and, in a review of literature concerning Lean

Healthcare and the Productive Ward, the same authors discuss the impact of both approaches on empowerment, leadership, and engagement.

4.7 Application of competency modelling in a lean context.

Emiliani (2003) presents criticisms of conventional leadership competency models, questioning whether they are actionable because competencies and behavioural indicators are open to interpretation and also suggesting dissonance may exist between individual beliefs and desired competencies and behaviours. However, Emiliani (2003) suggested that the lean management system contains behaviours, beliefs and competencies that minimise the distance between competencies espoused and competencies practiced.

Emiliani (2003) also puts forward an interesting observation, noting that, whilst the lean leader competencies are transformational in nature, their development occurs in an action learning context by engaging in continuous improvement activities that develop capabilities through direct observations and improvement activities that strive to create value and eliminate waste. A limitation of Emiliani's study is that the process by which the lean leader competencies were identified is not articulated, nor does he empirically validate the lists (Seidel *et al.*, 2017).

In order to identify competencies applicable to lean management a number of previous studies/papers were researched. Table 4.2 (see next page) lists these studies and describes the approach to each study, the method involved and the key findings of each study.

Table 4.2 Conceptual articles and research studies pertaining to lean management/leadership competencies.

Author	Year	Type of paper	Method	Aim	Participants	Findings
Emiliani	2003	Conceptual	n/a	Presents beliefs, behaviours and competencies of leaders skilled in the lean management system.	n/a	The lean management system should be utilised to develop beliefs, behaviours and competencies shaped by continuous improvement (kaizen) activities.
Emiliani and Stec	2004	Conceptual	n/a	Presents how value stream maps can be used to identify beliefs, behaviours and competencies.	n/a	Indicates how value stream mapping can reveal deficiencies in leadership beliefs, behaviours and competencies. Purport that the lean management system, practised correctly, can develop new behaviours and competencies that are aligned with business outcomes.
Huq	2006	Research study	Case study	Suggests that a company must develop a unique combination of resources and competencies to realize the benefits of six-sigma.	Hospital based six sigma professionals.	Conclude that a firm planning to implement Six-Sigma must develop a checklist of both organizational and individual competencies and assess its learning capabilities.
Schattenkirk	2012	Conceptual/Theoretical	Experiential	Presents how an experiential lean six sigma	Healthcare professionals.	The model demonstrates consistently high response rates by participants and statistically

				training model will reduce the time it takes to become competent at process improvement in a healthcare environment.		high, quantifiable return on investment results. The model demonstrates how competency and capability can be internally developed.
Hilton and Sohal	2012	Research study	Literature review, interviews and survey.	Examined the relationship between the successful deployment of Lean Six Sigma and a number of key explanatory variables.	Masters black belts and lean six sigma deployment leaders.	Identified variables pertaining to lean six sigma deployment success and also competencies for master black belt and black belt roles.
Hambach *et al.*	2016	Research study	Video behaviour analysis.	To examine if correlation exists between knowledge and the development of competencies that students need to a) complete a written exam and b) solve real industrial tasks at a Learning Factory.	150 engineering students.	Consolidated knowledge is one important prerequisite for the ability to act in practice. Video analysis acts as a good basis for the assessment and evaluation of competencies in group processes.
Hertle *et al.*	2016	Research study.	Observation, interviews and analysis.	Presents an approach to recording shop floor management competencies and comparing them to a list of target competencies.	Shop floor operators and team leaders.	Current state shop floor competencies need to be assessed and strategies need to be developed to close any gap between these and target competencies.

Hertle *et al.*	2017	Research study	Observation and interviews.	Researches how companies can design competency development approaches for the training of technical, methodological and socio-communicative competencies in production areas.	Production employees and team leaders.	Proposed a competency development concept that combines work-oriented as well as work-integrated approaches.
John *et al.*	2017	Research study	Descriptive case study	To describe the implementation of lean methodology into pharmacy residency programs at a community teaching hospital.	Preceptors and Residents in a pharmacy teaching program.	The incorporation of lean methodology into a pharmacy residence program has delivered realised and potential benefits.
Kelly	2016	Research study	Descriptive case study	To describe how a culture of continuous improvement was created and sustained at Abbott Diagnostics Longford (Ireland).	Managers and employees.	Applied five established core competencies to the four Shingo dimensions of operational excellence. These are supported by expected leader and individual contributor behaviours.
Papadopoulos	2011	Research study	Case study including observation, qualitative	To explore the link between continuous improvement (CI) and	Managers, nursing, medical and administrative staff.	Implementation of continuous improvement depends on the emergence of a “favouring” network from the dynamic associations between heterogeneous entities and constructing

			interviews and analysis of written documents.	dynamic actor associations through a case of lean thinking implementation in healthcare.		behaviours non-resistant to continuous improvement needed for creating competencies for the continuous roll-outs of such changes.
Van Dun *et al.*	2017	Research Study	Delphi study with expert panel (3 rounds), interviews (n=18), survey (n=43), video analysis.	To identify a constellation of lean values and behaviours of effective lean managers.	Lean expert panel from a consultancy background; lean middle managers in manufacturing and service.	Effective lean middle managers more in positive relations-oriented "active listening" and "agreeing" behaviours, and significantly less in "task monitoring" and counterproductive work behaviours (such as "providing negative feedback" and "defending one's own position").
Seidel *et al.*	2017	Research study	Review of literature, Interviews with lean experts (n=4), survey (n=91).	To define the individual leadership competencies that are necessary to implement and sustain lean systems.	Lean expert panel, lean managers/ practitioners from varying sectors.	Identified and validated sixteen leadership competencies as a basis for the development of lean leadership development programmes.
Found *et al.*	2009	Research Study	Expert panel, interviews, focus group, surveys.	To explore the behaviours and competencies of desired leaders and managers across different levels of lean organizations and identifies the skills	Senior managers, middle managers, lean change experts.	There are subtle differences in top management and leadership skills required to facilitate successful change from those required to sustain the change. Middle managers in established Lean organizations display higher levels of aptitude in certain skills from those in earlier stages of the transformation process.

				required to support and sustain a Lean transition.		
Poksinka *et al.*	2013	Research study	5 Case studies: Interviews, Observations, Analysis of written documents.	To contribute to a better understanding of managerial practices and leadership in Lean organisations.	Senior managers, middle managers, lean change experts, operational staff.	The focus in managerial tasks changed from managing processes to developing and coaching people. Supporting structures were developed to empower employees and give them more responsibility for daily management activities. Leadership styles utilised closely resembled transformational styles.
Souza *et al.*	2019	Research study	Action research study at a hospital in Brazil	To identify competencies of the lean healthcare project leader.	2 groups of managers.	Identified functions and skills associated with the lean healthcare project leader role.
Van Elp *et al.*	2021	Research study.	Multiple case studies: Interviews, Observations, Analysis of written documents.	Evaluated the role of leadership style in the development of continuous improvement capability.	Managers and team members.	A hybrid leadership style is associated with higher levels of continuous improvement capability and both transactional and transformational leadership styles influence continuous improvement capability.

Source: compiled by the researcher.

Social competencies featured strongly in the lean competency literature, with many studies making reference to communication and interpersonal skills. Emiliani (2003) refers to cooperation and mutual problem solving as lean leader competencies, Kelly (2016) emphasises the importance of communication as part of the policy deployment process and speaks to impact that company-wide visual management and daily management systems can have in providing employees with a clear picture of how their efforts contribute to organisational excellence. Seidel *et al.* (2017) identify the provision of value-added information clearly and objectively as being a significantly important competency. The nature and type of communication can also be important. Van Dun *et al.* (2017) stress that 'honesty' and 'candor' are significantly important values for encouraging employee participation and trust, thus building psychological safety.

Quality-centric and customer-focused competencies refer to process improvement (Seidel *et al.*, 2017; Huq, 2006); understanding customer needs and creating value for customers whilst eliminating waste (Seidel *et al.*, 2017; Emiliani, 2003; Emiliani and Stec, 2004); health and safety, process management, and designing robust mechanisms for resolving problems in process activity (Huq, 2006; Kelly, 2016; Schattenkirk, 2012), acting ethically (Seidel *et al.*, 2017) and learning from mistakes and failures (Emiliani, 2003; Huq, 2006).

Organisational competencies refer to knowledge and understanding of organisation functions, decision-making systems, and relationships. Emiliani (2003) identifies systems thinking as a lean leader competency and Emiliani and Stec (2004) purport that lean management systems encourage leadership behaviours conducive to system improvement. Papadopoulos (2011) investigated implementation of lean in the UK National Health Service and found that the creation of a 'favouring' network from the interaction with various dynamic actors in an organisation was important to facilitate successful implementation of continuous improvement activity. Ultimately, lean implementation involves significant change and consequently consideration needs to be given to dealing with resistance to that change.

Business competencies refer to process issues, process improvement, resource development and service development. Emiliani (2003) advocates using root cause analysis to understand problems and facilitate system improvement. Seidel *et al.* (2017) and Hilton and Sohal (2012) also identify an ability to identify and solve problems as a lean competency and advocates use of PDCA methodology to achieve continuous improvement. The ability to utilise, manage, and develop resources is also critical. Kelly (2016), in a case study describing the operational

excellence journey at the Abbot Diagnostics Longford plant, describes how organisational excellence can be achieved by 'tapping into existing resources' and then building on those to develop the resources required to achieve strategic objectives. Indeed Abbot has five core corporate competencies that include 'Build – develop yourself, your team, and the organisation' and 'Innovate' that encourages experimentation and challenges current thinking to facilitate process and service improvement. Resource utilisation and the project focus associated with lean thinking also require financial competencies relating to achieving results and return on projects and also project financing (Hilton and Sohal, 2012).

Operational and operations management competencies refer to the ability to manage tasks and the ability to execute and delegate tasks. Seidel *et al.* (2017) identify the importance of leading by example and Kelly (2016) speaks to the importance of empowering and involving employees at every level. Similarly, Poksinka *et al.* (2013) identified a change in managerial focus from managing processes to coaching and empowering employees to become actively involved in the management of daily tasks. This theme is further emphasised when one considers leadership competencies such as the ability to develop oneself and others, proactivity towards change (Seidel *et al.*, 2017; Emiliani, 2003; Found *et al.*, 2009; Hertle *et al.*, 2016; Hilton and Sohal, 2012), and coaching others (Kelly, 2016; Poksinka *et al.*, 2013) via the adoption of a more transformational style of leadership (Van Elp *et al.*, 2021). General management skills such as time management and strategic thinking (Seidel *et al.*, 2017; Emiliani, 2003; Kelly, 2016) also feature; with some authors describing a need for openness to change (Van Dun *et al.*, 2017).

However, some lean-specific competencies were also identified. Seidel *et al.* (2017) reinforced the need to continuously use lean practices and principles (Emiliani, 2003). Many authors advocate going to 'gemba' (from Japanese meaning going to the 'actual place') and seeing the problems with your own eyes (Emiliani and Stec, 2004, Kelly, 2016; Souza *et al.*, 2019). Others stress the need to put the group's interests above one's own interests (Van Dun *et al.*, 2017; Kelly, 2016). Finally, a need for continuous, systematic measurement (Kelly, 2016) is identified as important, alongside the development of a control plan (Schattenkirk, 2012) and the ability to identify and manage barriers during the lean journey (Papadopoulos, 2011).

As previously mentioned in the introduction chapter there are few studies that specifically focused on the managerial competencies required to manage lean healthcare projects in hospitals. Studies have shown that benefits from the application of lean management in

healthcare can be achieved (Guthrie, 2006; Fillingham, 2007; Tuck, 2009; Ben Tovim *et al.*, 2007; Wijma *et al.*, 2007; Niemeijer *et al.*, 2012; Balle and Regnier, 2007) and positive outcomes from the application of lean thinking have also been experienced in Ireland (Laureani *et al.*, 2012; Ryan *et al.*, 2013; White *et al.*, 2013).

4.8 Towards the development of a competency model for managing lean projects in Irish hospitals.

An extensive review of the literature has identified competencies pertaining to healthcare management (including hospital management) and lean management. Table 4.3 highlights the broad competency categories pertaining to both healthcare management and lean management.

Table 4.3 Broad competency categories.

Healthcare Management Competency Categories	**Lean Management Competency Categories**
Social.	Social and communication.
Organisational.	Organisational.
Financial.	Financial.
Business.	Business.
Process management and analysis.	Process management and improvement.
Professional ethics and development.	Measurement and control.
Clinical and hospital operations.	Operations management.
Leadership.	Leadership.
General management.	General management.
Human resource management.	Developing and coaching others.
	Continuous application of lean practices and principles.

Source: developed by the researcher.

As can be seen from Table 4.3 similar competency categories appear in both columns. In order to refine the categories further, and following best practice (Campion *et al.*, 2011) and established practice (ACHSM, 2016; Stefl, 2009), Table 4.4 refines the competency categories into broader competency domains and sub-domains relevant to managing lean projects in hospitals.

Table 4.4 Competency domains for managing lean projects in hospitals.

Competency Domain	Competency Sub-domain
Leadership.	Leadership Skills and Behaviours. Shaping culture. Leading change.
Hospital management and healthcare environment.	Hospital organisation and healthcare system. Human resource management. Building patient relationships.
Business skills.	Evidence based informed decision-making. Operations management, process management and improvement. Risk management, quality and safety. Project management and financial management.
Relationship management.	Relationship Management. Communication Skills. Conflict management.
Professional ethics and social responsibility.	Professionalism. Professional development. Ethics and social responsibility.
Lean management.	Understanding patient value. Continuous applying lean principles and practice. Measurement and control of key performance indicators. Mapping and improving processes.

Source: developed by the researcher.

To further develop the competency sub-domains for analysis it is necessary to develop competency statements for each sub-domain that further define the competency and describe it in behavioural terms (Parry, 1996; Campion *et al.*, 2011).

Table 4.5 illustrates the competency domain, competency sub-domain and competency statement for each of the competencies identified from the review of the literature.

Table 4.5 Lean Management Competency Statements

COMPETENCY DOMAIN 1: LEADERSHIP.	
Sub-Domain 1: Leadership Skills and Behaviour.	
Leads by example.	Demonstrates leadership qualities and exhibits behaviours conducive to a lean environment such as trust, integrity, honesty and respect for people.
Exhibits a transformational leadership style.	Demonstrates an ability to achieve improvement goals and drive change in their area.
Articulates mission.	Articulates the vision, mission and objectives of the organisation from a lean perspective and demonstrates an ability to actively engage in the policy deployment process.

Sub-Domain 2: Shaping Culture.	
Encourages staff commitment.	Demonstrates an ability to achieve results through people and empowers subordinates.
Engages in participative decision-making.	Encourages decision-making through consultation with others based around team problem solving.
Engages in leader standard work.	Demonstrate by their behaviours daily standard activities suitable for a lean culture such as being visible, engaging in problem solving, being present at daily performance measurement meeting, communicating with employees and ensuring performance is being measured and controlled.
Sub-Domain 3: Leading Change.	
Develop actions based on long-term views.	Demonstrates an ability to develop a strategic thinking mind-set based around long-term objectives. Exhibits an ability to link short-term and medium-term activities to long-term objectives.
Develop innovative and challenging actions.	Exhibits an ability to encourage creativity and challenging behaviours that can assist problem solving and innovation.

COMPETENCY DOMAIN 2: HOSPITAL MANAGEMENT AND HEALTHCARE ENVIRONMENT.	
Sub-Domain 1: Hospital Organisation and Healthcare System.	
Understands the regulatory environment.	Understands the role of government, regulatory, professional and accreditation bodies.
Understands how the health system operates.	Understands the wider health system structure and the organisations interfaces with it.
Balances competing priorities.	Understands the need to balance priorities in a resource constrained environment and demonstrates an ability to make effective resource deployment decisions.
Understands the inter-relationships between different hospital functions and units.	Demonstrates knowledge of the internal structures of the organisation and an awareness of the needs of internal customers.
Sub-Domain 2: Human Resource Management.	
Managing the Health Workforce	Demonstrates an ability to manage the volume, skill mix and scheduling of activity to deliver appropriate performance results.
Developing others.	Develops and implements guidelines, plans and policies to develop others.

Sub-Domain 3: Building Patient and Internal Customer Relationships.	
Appreciates customer value.	Demonstrates an ability to identify activities that add value for patients and internal customers.
Partners with consumers and internal customers.	Partners with consumers (including family and carers) and internal customers in the planning, designing and monitoring of care.
COMPETENCY DOMAIN 3: BUSINESS SKILLS.	
Sub-Domain 1: Evidence-Based Informed Decision-making.	
Uses appropriate data for decision-making.	Sources, understands and analyses both qualitative and quantitative data from internal and external sources to support effective decisions.
Sees the problem with their own eyes.	Engages in "gemba" walks, morning meetings and performance review meetings to obtain first-hand accounts of operational performance problems as they arise.
Sub-Domain 2: Operations Management, Process Management and Process Improvement.	
Manages flow in operations.	Demonstrates an ability to manage based on optimising process flow rather managing in silos/isolated operations.
Stabilises operations.	Understand the importance of stabilising operations and demonstrates an ability to meet planned schedules.
Identifies and solves process problems.	Demonstrates an ability to use lean tools and techniques such as Value Stream Mapping to identify improvement opportunities and generate process improvement solutions.
Sub-Domain 3: Risk Management, Quality and Safety	
Implements quality and safety programmes.	Develops, implements and evaluates policies and processes to enhance patient quality and safety in line with regulatory guidelines.
Measures patient and internal customer satisfaction.	Develops, implements and evaluates measures for patient and internal customer satisfaction.
Measures key performance indicators as defined by organisation strategy.	Demonstrates an awareness of organisational and national key performance indicators and measures contribution towards achieving organisational goals and objectives.
Manages risk.	Demonstrates an ability to manage clinical, workplace and project risk.

COMPETENCY DOMAIN 3: BUSINESS SKILLS contd.	
Sub-Domain 4: Project Management and Financial Management	
Financial management	Understands, effectively uses and effectively communicates financial data.
Project Management.	Demonstrates an ability to resource, manage and deliver projects.
Resource Management.	Plans, organises, effectively and manages the resources of the organisation.
COMPETENCY DOMAIN 4: RELATIONSHIP MANAGEMENT.	
Sub-Domain 1: Relationship Management	
Maintains stakeholder relationships.	Collaborates with others to develop and maintain effective relationships with internal and external stakeholders.
Works effectively in a team.	Develops and works effectively in teams. Values diversity and respects the opinions of others.
Sub-Domain 2: Communication skills.	
Displays empathy.	Listens to others, displays understanding and responds honestly with candour.
Written and verbal communication.	Demonstrates an ability to communication effectively in verbal and written formats.
Visual management.	Develops and promotes the use of visual management tools to communicate performance and highlight performance problems.
Sub-Domain 3: Conflict management.	
Manages conflict.	Demonstrates an ability to manage conflict through mediation, negotiation and communication. Reinforces the core values of the organisation.
Manages conflicting interests.	Demonstrates an ability to recognise conflicts of interest with the organisation's strategy and resolves these in a positive manner.
COMPETENCY DOMAIN 5: PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY.	
Sub-Domain 1: Professionalism.	
Puts organisational interests first.	Identifies closely with organisational values and puts organisational interests before personal interests.
Demonstrates professional conduct.	Demonstrates an ability to conduct themselves in a competent, professional manner and acts with integrity.

Sub-Domain 2: Professional Development.	
Practice self-development as well as professional development.	Is committed to personal and professional development and engages with training and development opportunities as appropriate.
Committed to developing others.	Demonstrates a commitment to developing others by mentoring, coaching, advising and teaching. Acts as a role model for others and encourages them to develop themselves.
Sub-Domain 3: Ethics and Social Responsibility.	
Promotes and demonstrates ethical behaviour.	Develops and takes actions that, based on ethical principles, respect the community, the environment and the workers' safety.
Balances corporate and social responsibility.	Understands social responsibility and demonstrates to balance the needs of the organisation, and unit, with those of the wider community.

COMPETENCY DOMAIN 6: LEAN MANAGEMENT.	
Sub-Domain 1: Understands Patient Value.	
Understands patient value.	Demonstrates an understanding of how the organisation defines patient value and is aware of national efforts to understand the patient experience e.g. the National Patient Experience Survey.
Gathers customer feedback.	Develops "voice of the customer" techniques to capture feedback from patients and internal customers.
Creates value.	Develop innovative processes and services that can deliver improved value and more accurately match customer needs.
Sub-Domain 2: Continuously applying lean principles and practice.	
Commitment to lean principles and practice.	Uses continuously lean principles and practice and reinforces their use by embedding these in daily activities.
Sub-Domain 3: Measurement and Control.	
Develops appropriate lean measures.	Understands organisational key performance indicators and develops appropriate lean measures to indicate performance towards these.
Controls performance.	Demonstrates an ability to identify deviations in operational performance and take action to bring these under control.
Visual management.	Develops and uses visual management techniques to monitor and control performance.
Sub-Domain 4: Mapping and Improving Processes	
Mapping processes	Demonstrates an ability to use process mapping techniques, including value stream mapping, to accurately portray process performance.

Visualising improvement opportunities.	Use mapping techniques to identify non-value add activity and barriers to flow; thus identifying opportunities for improvement.
Realise and sustain improvements.	Develop and implement improvements and put in place measures to sustain these.

Source: developed by the researcher.

4.9 Gaps in the literature addressed by this research.

Although the topic of competency has featured in academic studies for over forty years since the initiating work of McClelland (1973), the focus on leadership/managerial competency in lean thinking is relatively recent with early conceptual work proposed by Emiliani (1998, 2003) and since developed by others (Found *et al.*, 2009; Poksinka *et al.*, 2013; Seidel *et al.*, 2017). The researcher identified and illustrated a number of previous studies in Table 4.2. However, a number of these studies were conceptual or theoretical, descriptive case studies that identified competencies as a minor component of the case narrative, or were research studies only tangentially pertaining to lean in that they primarily focused on other continuous improvement approaches such as six sigma or lean six sigma. Indeed, Seidel *et al.* (2017) only identified in a literature search 11 papers where lean was the main focus of the paper when the search terms "lean" and "competencies" were used. This shortage of research regarding competencies for managing lean projects in hospitals provides an avenue for further research. Furthermore, Seidel *et al.* (2017) identify a positive correlation between the development of competencies and operational performance that underlines that there is merit in further exploring the identification of managerial competencies in a lean context.

Table 3.2 identifies a number research studies that explore managerial competencies in hospital and healthcare environments. Although these studies either identified or validated managerial competencies in a hospital and healthcare context, the researcher was unable to identify any study that specifically investigated competencies for managing lean projects in hospitals. Through a combined analysis of previous studies that explore hospital/healthcare management competencies and lean management competencies, the researcher has developed an initial competency model, informed by the literature containing six competency domains, 20 competency sub-domains, and 51 competency statements. This proposed competency model was utilised for informative and comparative purposes during the field research of this study.

4.10 Chapter Conclusion.

This chapter has described the research context and presented the case for the application of lean practices in healthcare. The evolution of the lean concept has also been presented, tracing its trajectory from a mainly tools-driven and production-based approach to a more people oriented and culturally-driven lean approach to management. The most recent evolution of lean places emphasis on leadership and employee behaviours, and on the competencies required to shape and sustain those behaviours appropriate to a lean management system. The application of lean in a healthcare context has also been considered, with an emphasis on the identification of potential competencies for managing lean improvement projects in healthcare and hospital contexts. The research aims, objectives, and methodology of this research study will be explained in detail in the next chapter of this document.

Chapter 5 – Research Methodology

5.1 Introduction

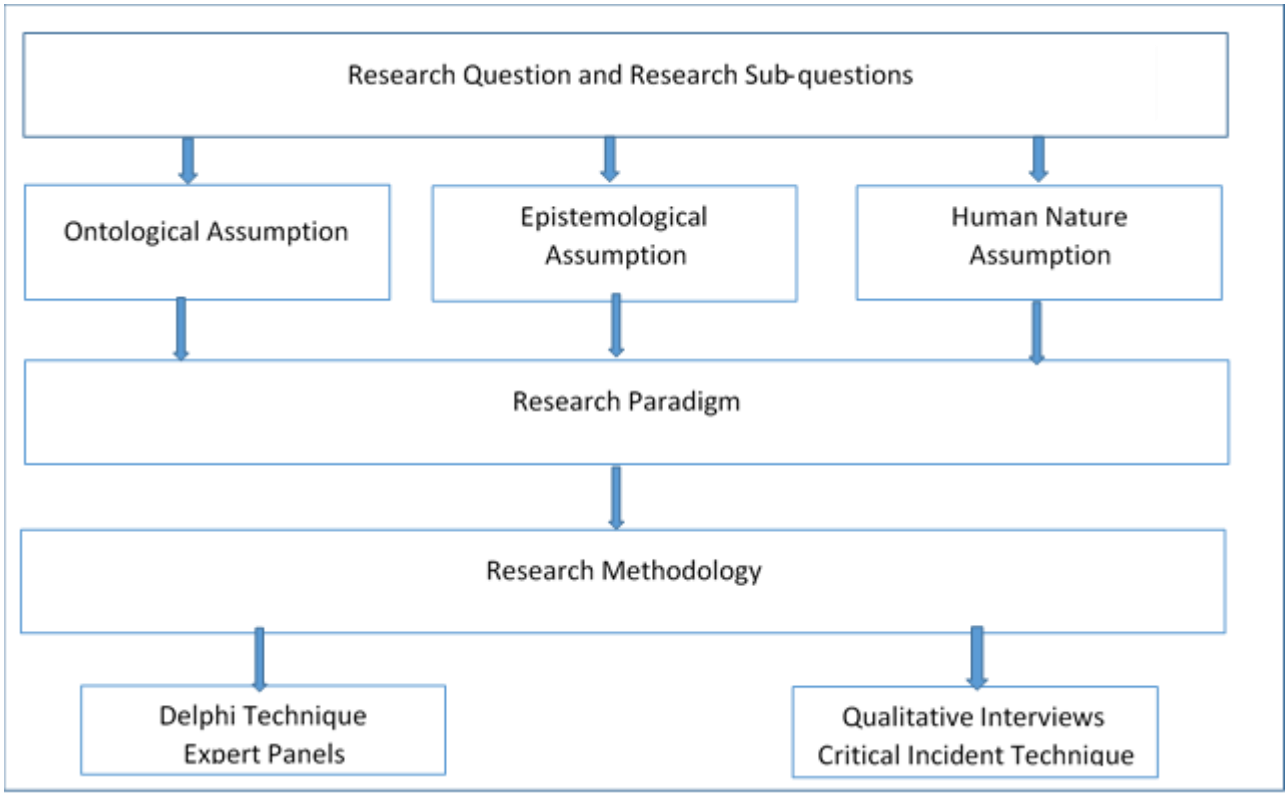
The purpose of this chapter is to describe to the reader the researcher's philosophical perspective, the research process, the purpose of the study and the methodology adopted by the researcher. The scope of the study was defined following an extensive literature review, and further refined following a pilot study. This chapter provides a detailed overview of the research methodology chosen by the researcher, and the researcher also justifies the methods chosen. As explained in the previous chapter, the research draws on the competency literature pertaining to lean management and healthcare/hospital management. It examines the competencies required to manage lean projects in a hospital context. A mixed methods approach to the research study will be adopted that involves iterative rounds of research. Firstly, competencies were identified by administering surveys to an expert panel using the Delphi method. Following this a series of qualitative interviews using the critical-incident technique were conducted with managers of lean improvement projects in hospital settings.

This chapter is structured into a number of different sections. Firstly, an overview of the research design, research questions and research objectives is provided. The rationale for choosing the research questions and research objectives is then presented. The researcher presents their philosophical approach to the research, detailing their ontological and epistemological positions. This will include consideration of their human nature and methodological viewpoints. An intermediate position is adopted, and this stance is explained. Following this, the secondary data used in the study is explained. The motivation behind choosing a mixed methods approach to the research is described and the use of the Delphi survey and critical incident interviews is outlined. The sample of participants chosen for each stage of the research is described and justified. The Delphi surveys will be statistically analysed using Likert scales to achieve consensus in the expert panels on the list of competencies that will be further examined by using critical-incident interviews. The interview data will then be analysed using thematic analysis. This use of multiple stages to the research will assist in ensuring the validity and reliability of the research.

5.2 Research Design.

A research design provides a logical and systematic plan for conducting a research study (Krishnaswami and Satyaprasad, 2010). The key objective of a research design is to provide a clear explanation of how the researcher will try to answer their research questions. Research designs are types of inquiry in quantitative, qualitative and mixed methods approaches that provide specific direction for procedures in a research study (Creswell and Creswell, 2018). Good research design is considered essential to achieving high-quality research (Easterby-Smith *et al.*, 2015; Saunders *et al.*, 2019). It is important to take time to carefully consider the choices of research design available in order to select the most appropriate design for a particular study (Groenewald, 2004). The research design is important as it connects a research methodology with an appropriate set of research methods to answer a research question (Wayhuni, 2012). According to Yin (1989, p. 29) research design 'deals with a logical problem and not a logistical problem'. Campbell and Cowton (2015) state that to varying extents all social science research struggles with epistemological challenges and stress that the method chosen must be able to answer the research question and deliver valid conclusions. The overall research design for this study is illustrated in Fig. 5.1.

Figure 5.1 Research Design for the Study



Source: developed by the researcher

This study is exploratory and explanatory in nature, combining elements of both quantitative and qualitative research. Exploratory research can be used to generate hypotheses that can later be tested and confirmed (Jaeger and Halliday, 1998). Saunders *et al.* (2019) emphasise that exploratory research can be useful in discovering information about a topic that is not fully understood by the researcher and by providing answers to tentative or initial questions the results of exploratory research can form the basis of more detailed research that provides more dependable answers. Explanatory research can be defined as research 'that focuses on studying a situation or a problem in order to explain the relationships between variables (Saunders *et al.*, 2019, p. 118). Exploratory research tends to utilise 'what' questions, while explanatory research utilises 'how' or 'why' questions (Brannick and Roche, 1997). Section 5.4 lists the research sub-questions utilised in this study and includes questions relating to the exploratory and explanatory components of this study. Before presenting these, the overarching research question of the study is described.

5.3 The Research Question.

The initial stage of the research process involves developing research questions and objectives that include main and secondary objectives that are worded clearly and precisely (Kumar, 2011), and by, doing so, transform your research idea into more precise and meaningful research question(s) and objectives (Saunders *et al.*, 2019). Developing good research questions is a critical part of the research procedure (Gillham, 2010). Research questions enable the researcher to achieve their aim and should be measurable in the research setting (Gillham, 2010). Searcey and Mentzer (2003, p.142) state that a research question should be 'precisely defined' and that a research question 'endeavors to solve a specific problem that has been directly or indirectly observed in the past'.

The author's philosophical stance influenced the research questions and objectives chosen for this study. Two research questions were developed for the proposed research. The research questions focus on identifying competencies for managing lean projects in Irish hospitals. This research intends to contribute to our knowldege by building on the broader research in the area and contribute to the literature due to the lack of research regarding competencies for managing lean projects in hospitals. Following an extensive review of the literature and a pilot study with practitioners, the researcher developed the following two research questions:

Research Question One

What are the competencies required to manage lean projects in Irish hospitals?

Research Question Two

Which competencies are most important in managing lean projects in Irish hospitals, and why are these competencies perceived to be most important?

5.4 The Research Objectives/Research Sub-questions.

Following on from the identification of the research questions, a number of research objectives were developed. Saunders *et al.* (2019) state that research objectives can add an element of precision to the research. This is a view echoed by Creswell and Creswell (2018) who affirm that research sub-questions narrow the focus of the study but leave open the questioning. The research objectives were informed by the literature, by attending lean practitioner seminars and fora, and from presenting at doctoral colloquia and at research conferences (see appendix 11). The answers to the overall research questions are informed by firstly answering the research objectives outlined below. These objectives focus on managerial competencies as identified by recognized lean experts and lean practitioners. The first three research objectives are instrumental to answering research question one, and focus on perceptions of the managerial competencies necessary for effective management of lean improvement initiatives in a hospital context. The fourth and fifth research objectives will inform the answer to research question two, and will investigate those competencies that are deemed most important to managing lean projects in Irish hospitals.

Research Objective 1: To ascertain the managerial competencies, as identified by recognised experts in the field, that are deemed necessary for managing lean projects in a hospital context?

Research Objective 2: To delineate the managerial competencies, as identified by lean managers, that are deemed necessary for effective managing of lean projects in Irish hospitals?

Research Objective 3: To determine the key differences between perceptions of lean experts and lean practitioners on the competencies deemed necessary for managing lean projects in a hospital context, and explain why differences, if any, exist?

Research Objective 4: To establish which competencies are most often reported as being influential in effectively managing projects in Irish hospitals?

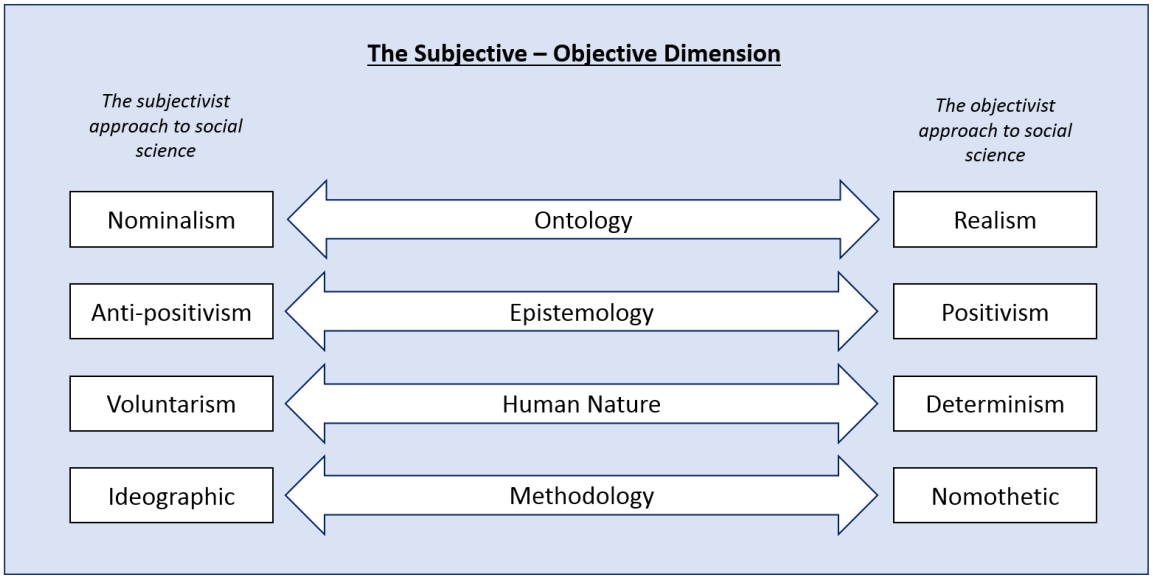
Research Objective 5: To compare those competencies that are most evidenced in successful lean projects, compared with less successful lean projects, as being influential in managing lean projects in Irish hospitals?

5.5 Philosophical Approach.

Easterby-Smith *et al.* (2015) stress the importance of thinking through philosophical issues, as failure to do so can adversely affect the quality of the research. Philosophical positions influence the practice of research and thus should be identified (Creswell and Creswell, 2018). Holden and Lynch (2004) contend that methodological choice should be consequential to the researcher's philosophical stance and the social science phenomenon being investigated. Easterby-Smith *et al.* (2015) concur, noting that the researcher has an obligation to understand the basic issues of epistemology in order to have a clear sense of their reflexive role in research methods. They further comment that knowledge of philosophy can assist in clarifying research designs and in recognising which designs will work and will not and encourage them to consider designs outside their past experience (Easterby-Smith *et al.*, 2015). Knowledge of the ontological and epistemological assumptions that underpins research can also assist researchers in understanding the interrelationship of key components of research; in avoiding confusion when discussing theoretical debates; and in recognising other's, and defending one's own, position (Grix, 2002).

Burrell and Morgan (1979) posit that 'all theories of organisation are based upon a philosophy of science and a theory of society'. Furthermore, it can be useful to conceptualise social science by utilising four sets of assumptions concerning ontology, epistemology, human nature and methodology (Burrell and Morgan, 1979). Debates regarding research philosophy cannot result in any philosophical solution (Holden and Lynch, 2004) and are best considered by positioning research as a stance along a subjective-objective continuum (Morgan and Smircich, 1980). The next sections of this chapter will outline the philosophical approach of the researcher and the research paradigm adopted for the research. A framework developed by Burrell and Morgan (1979) will be utilised to add clarity to the researcher's position on ontological, epistemological, human nature and methodological issues.

Figure 5.2 Burrell and Morgan's Scheme for Analysing Assumptions about the Nature of Social Science.



Source: Burrell and Morgan, 1979, p.3

5.5.1 Ontology.

Ontology is the starting point of all research (Grix, 2002, Easterby-Smith *et al.*, 2015), and is concerned with how one views reality (Burrell and Morgan, 1979; Morgan and Smircich, 1980; Holden and Lynch, 2004; Easterby-Smith *et al.*, 2015). Morgan and Smircich (1980, p.492) present a spectrum ranging from subjectivist to objectivist approaches to social science and describe ontology under a subjectivist approach as assuming reality is a projection of human imagination and under an objectivist approach reality is viewed as concrete structure. Ontology is defined differently elsewhere in the literature. For example, Easterby-Smith *et al.* (2015) describe ontological positions in the social sciences of realism, internal realism, relativism and nominalism. Realism refers to an ontological position of there being a single truth that applies everywhere (Easterby-Smith *et al.*, 2015). Internal realism, a concept originally proposed by Putnam (1987), reflects that we can only theorise about the world from within our own conceptual schemes and within such a scheme existential claims and attributions of properties are to be interpreted realistically (Decock and Douven, 2012). A relativist ontology accepts that issues are perceived differently by different people, and thus there is no one truth but many perspectives on the issue (Easterby-Smith *et al.*, 2015). Nominalism extends this concept further by suggesting that the labels and names we attach to events matter and there is no one truth but different ways of creating different versions of the truth (Easterby-Smith *et al.*, 2015). Grix (2002) refers to the different ontological perspectives of 'objectivism' and

'constructivism'. According to Grix (2002, p.177) objectivism is 'an ontological position that asserts that social phenomena and their meanings have an existence that is independent of social actors', and constructivism is an alternative ontological position that 'asserts that social phenomena and their meanings are continually being accomplished by social actors'.

This researcher adopts neither a strong nominalist nor realist view of reality on Burrell and Morgan's (1979) framework. Instead, reality is viewed as being achieved through discussion, dialogue and consensus in line with a more constructionist approach (Easterby-Smith *et al*., 2015). The researcher's ontological position would be slightly to the left of Burrell and Morgan's (1979) framework taking an intermediate position as has become more common in social science research (Burrell and Morgan, 1979).

5.5.2 Epistemology.

Easterby-Smith *et al.* (2015) define epistemology as 'the study of the nature of knowledge and ways of enquiring into the physical and social world'. Epistemology can be thought of as justification of knowledge (Carter and Little, 2007, p. 1317). Epistemology describes the nature of our knowledge - in essence, how we know what we know. Grix (2002) describes that different epistemological positions exist along perspectives of 'positivism' and 'interpretivism'. Again differing terminology appears in the literature regarding epistemology. Burrell and Morgan (1979) refer to dimensions of 'positivism' and 'anti-positivism'. Morgan and Smircich (1980) describe two extreme positions with on one side an objective approach of 'positivism' and on the other side a subjective 'phenomenological' approach. Positivism is concerned with developing an objective way of understanding knowledge that is based on natural phenomena and their properties and relations. Positivism seeks out knowledge that can be scientifically verified or can be proved logically or mathematically. Easterby-Smith *et al.* (2015) describe a new approach to interpretivism called 'social construction' that has been developed over the last fifty years as a reaction to difficulties in applying the principles of positivism to social sciences. Social constructionism focuses on the ways that people make sense of the world and recognise that aspects of social reality are determined by people rather than by objective factors (Easterby-Smith *et al.*, 2015). Table 5.1 developed by Easterby-Smith *et al.* (2015) link different ontological positions to their epistemological counterparts and describes key components of the resulting methodologies.

Table 5.1 Methodological implications of different epistemologies.

Ontologies	**Realism**	**Internal realism**	**Relativism**	**Nominalism**
Epistemology	**Strong positivism**	**Positivism**	**Constructionism**	**Strong constructionism**
Methodology				
Aims	Discovery.	Exposure.	Convergence.	Invention.
Starting points	Hypotheses.	Propositions.	Questions.	Techniques.
Designs	Experiments.	Large surveys, multi-cases.	Cases and surveys.	Engagement and reflexivity.
Data type	Numbers and facts.	Mainly numbers with some words.	Mainly words with some numbers.	Discourse and experiences.
Analysis/ interpretation	Verification/ falsification.	Correlation/ regression.	Triangulation and comparison.	Sense-making; understanding.
Outcomes	Confirmation of theories.	Theory testing and generation.	Theory generation.	New insights and actions.

Source: Easterby-Smith et al., 2015.

With regard to epistemology, the researcher adopts an approach that would be more associated with anti-positivism (Burrell and Morgan, 1979), phenomenology (Morgan and Smircich, 1980), and interpretivism (Grix, 2002). A position of engaged constructionism (Easterby-Smith *et al*., 2015) is adopted that recognises that reality in the form of meaningful structures arise from the lived experiences of individuals. In this research study it is accepted that there may be many different realities that will require the researcher to gather multiple perspectives. This will be achieved through a mixture of quantitative and qualitative methods designed to gather the views and experiences of diverse individuals which will then be triangulated to add further reliability and validity. Deductive methods were used to develop an initial list of competencies from previous studies in the literature, and these were further refined via a pilot study and by using Delphi technique surveys with an expert panel. Inductive approaches were then utilised to validate these competencies against the lived experiences of practitioners through interviews using the critical-incident technique.

5.5.3 Human Nature

Burrell and Morgan (1979) identify a third set of assumptions separate from ontological and epistemological assumptions that should also be considered. These 'human nature' assumptions relate to how the researcher views their relationship with their environment. A spectrum can be used to separate the extreme endpoints on a continuum from a position of 'determinism' to a position of 'voluntarism'. In a deterministic position, human beings and their experiences are considered to be products of their environment and conditioned by their external circumstances. However, in a voluntarist position human being are credited with a much more creative role and them being the creators of their environment. In essence the position taken on the human nature dimension depends on whether the researcher perceives man 'as the controller or the controlled' (Burrell and Morgan, 1979).

With regard to the dimension of human nature, the researcher adopts neither a voluntarist nor determinist position as is common with social science research (Burrell and Morgan, 1979) recognising that humans enter into defined structures that influence their actions and also influence, by their actions, social structures and cause them to evolve from their interactions (Holden and Lynch, 2004). In many respects this position reflects the evolution of lean thinking (see Chapter 3) from a more mechanistic, tools and techniques approach to a more behavioural, people centred approach based on developing empowered organisational cultures. From a methodological perspective this study adopts a mixed method perspective that leans towards the idiographic dimension on Burrell and Morgan's (1979) framework. Although both quantitative and qualitative methods are employed in the mixed methods approach the larger volume of research is conducted on the qualitative side.

5.5.4 Methodological argument.

The position the researcher takes on an ontological, epistemological and human nature perspective all influence the choice of methodology (Burrell and Morgan, 1979; Holden and Lynch, 2004). Burrell and Morgan (1979) identified two approaches to methodology: an ideographic (subjective) approach and a nomothetic (objective) approach. Extreme subjectivist approaches are often called solipsism (Holden and Lynch, 2004) and take the view that reality does not exist outside oneself and that all reality is imagination (Morgan and Smircich, 1980). Objective, nomothetic, approaches take an opposing view that society is governed by general laws and employ scientific, quantitative, methods to demonstrate cause and effect. Luthans and

Davis (1982) cite Allport (1937) as defining nomothetic approaches as those that seek only general laws and employ only those procedures admitted by the exact sciences. An idiographic approach takes a more inductive approach, utilising qualitative data to make sense of meaning through words and expression. A nomothetic approach adopts a more deductive approach, utilising quantitative data focusing on causal relationships. Luthans and Davis (1982) argue that there is a place for both idiographic and nomothetic approaches and that both can contribute to knowledge of organisational behaviour.

A mixed methods approach will be adopted for this study that combines both quantitative and qualitative methods. The rationale for choosing such an approach is explained in detail in the following sections.

5.5.5 Competency Research and Methods.

Much research in the social sciences has traditionally been positivist adopting scientific methods from the natural sciences (Burrell and Morgan, 1979; Morgan and Smircich, 1980; Luthans and Davis, 1982). However, debates concerning the effectiveness of research methods in the social sciences have led to the search for alternative qualitative methods (Luthans and Davies, 1982; Morgan and Smircich, 1980). The pattern of adoption of these methods is somewhat uneven on a country level, for example, Easterby-Smith *et al.* (2009) in a review of research methods for organisational learning, found that 68% of UK studies used qualitative techniques such as in-depth interviews and observation, compared with 15% of US studies included in the review. Similarly, Easterby-Smith *et al.* (2015) comment that roughly 80% of papers in the leading US journals are positivist compared to around 25% in the leading European journals.

Campion *et al.* (2011) identify a number of methods commonly used in competency modelling including content analysis of documents; surveys utilising a variety of ranking instruments and rating scales, and in-depth interviews including critical-incident interviews and behavioural-event interviews. Indeed, many studies advocate a mix of these methods to develop a more reliable, valid and robust competency model (Robinson *et al.*, 2007; Bhardwaj and Punia, 2013). A review of the literature on managerial competencies in hospital settings identified different methods used such as: the Delphi Technique (Conelly *et al.*, 2003; Hennessy and Hicks, 2003; Palarca *et al.*, 2008; Hazelbaker, 2013), questionnaires/surveys (Kleinman, 2003; Donaher *et al*., 2007; O'Neil *et al.*, 2008; Furukawa and Cunha, 2011; Lorber and Savic, 2011;

Pillay, 2011; Kang *et al.,* 2012; Citaku *et al.,* 2012; Berkenbosch *et al.,* 2013; Hazelbaker, 2013, Liang *et al*., 2013), expert panels (Donaher *et al.*, 2007; Palarca *et al.,* 2008), focus groups (Citaku *et al.,* 2012; Liang *et al.,* 2013), and interviews (Sherman *et al.*, 2007; Herd *et al.,* 2016**).**

A review of the literature on competencies applied to lean leadership/management identified the application of different methods also. These included: descriptive case studies (Huq, 2006***;*** Papadopoulos, 2011; Kelly, 2016; John *et al.,* 2017); interviews (Hilton and Sohal, 2012; Hertle *et al.,* 2016; Hertle *et al.,* 2017; Papadopoulos, 2011; Van Dun *et al.,* 2017; Found *et al.,* 2009; Poksinka *et al.,* 2013); questionnaires/surveys (Found *et al.,* 2009; Seidel *et al.,* 2017; Van Dun *et al.,* 2017); expert panels (Found *et al.,* 2009; Van Dun *et al.,* 2017); observation (Poksinka *et al.,* 2013; Hertle *et al.*, 2016; Hambach *et al.,* 2016; Hertle *et al*., 2017; Van Dun *et al.,* 2017); and documentary analysis (Poksinka *et al.,* 2013; Papadopoulos, 2011).

An examination of the methods used in previous research studies investigating managerial competencies would suggest that there are many suitable methods that can be employed. Many studies apply a mix of methods (for example Palarca *et al.*, 2008; Citaku *et al*., 2012; Found *et al.,* 2009; Poksinka *et al.,* 2013; Seidel *et al.,* 2017). The application of mixed methods can be useful to triangulate research findings, thus offering greater confidence in observations (Easterby-Smith *et al.,* 2015).

5.5.6 Philosophical assumption and research paradigm adopted for this study.

Research paradigms are approaches to research that contain distinct sets of ontological and epistemological assumptions that are largely shared by supporters and exclude other points of view (Easterby-Smith *et al.,* 2015). The research paradigm adopted can be measured on a dimension between subjective and objective approaches (Burrell and Morgan, 1979; Morgan and Smircich, 1980; Holden and Lynch, 2014). However, on this continuum between subjective and objective approaches, an intermediate position can be taken (Holden and Lynch, 2004; Easterby-Smith *et al.,* 2015). Indeed debates about the appropriateness of primarily quantitative and qualitative approaches have led to the emergence of a third research paradigm, mixed methods research (Johnson and Onweugbuzie, 2004; Denscombe, 2008). Creswell and Creswell (2018) define mixed methods research as:

> Mixed methods research is an approach to inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data, and using distinct designs that may involve philosophical assumptions and theoretical frameworks.

The rationale for using mixed methods research is based on the idea that by using a mix of both qualitative and quantitative methods additional perspective and insight is gained than would have been possible by using qualitative or quantitative methods alone (Johnson and Onweugbuzie, 2004; Denscombe, 2008; Creswell and Creswell, 2018). A detailed discussion of mixed methods research and the rationale for its choice by the researcher is described in Section 5.7 of this chapter.

5.6 Secondary Research and Analysis.

This study utilised a range of secondary data that comprised documentation from various sources including government websites, Department of Health publications, the annual reports and other corporate documentation of participating hospitals. This use of secondary data formed part of the qualitative component of this mixed methods research study. Qualitative researchers typically gather data from multiple sources including government data, company documentation and interviews, and then make sense of that data by organising it into codes and themes that cut across all of the data sources (Creswell and Creswell, 2018; Saunders and Lewis, 2018).

There are obvious benefits in using secondary data in research including efficiencies in resources, time and money (Whiteside *et al.*, 2012; Cowton, 1998; Brannick and Roche, 1997). Secondary data also can help reduce bias as there is less chance to skew the data collection process based on the researcher's preconceptions (Rabinovich and Cheon, 2011). However, challenges in using secondary data also exist. These include a loss of control as the research data are collected by a third party (Cowton, 1998); the data may have been generated for another purpose and thus may not suit the research study (Cowton, 1998; Whiteside *et al.*, 2012); there may be ethical issues when secondary data are used to expedite ethical approval or as a means of avoiding ethical responsibilities of data collection (Whiteside *et al.*, 2012); and the documents used may lack authenticity or accuracy (Creswell and Creswell, 2018). In keeping with good research practise (Easterby-Smith *et al.*, 2015; Creswell and Creswell, 2018; Creswell, 2015; Plano Clark and Ivankova, 2016) reliability, validity, and bias issues were

considered in relation to the use of secondary data. Overcoming the issues of generalisability, validity and reliability in mixed methods research is discussed later in this chapter.

Databases from within the South East Technological University (SETU) libraries, and other internet sources such as Google Scholar, were extensively used in terms of sourcing relevant academic literature. A number of books and ebooks from SETU library sources were also used, in addition to books purchased by the researcher independently. Government publications from the Department of Health, and World Health Organisation publications were also consulted to identify themes and challenges facing hospital operations. Annual reports from the Department of Health and participating hospitals were also studied to inform the research.

5.7 Rationale for using Mixed Methods Research.

5.7.1. Why Mixed Methods Research?

Plano Clark and Ivankova (2016) define mixed methods research 'as a process of research in which researchers mix quantitative and qualitative methods of data collection and analysis to best understand a research purpose'. Mixed methods research has developed as a 'natural complement' to traditional quantitative and qualitative research (Johnson and Onwuegbuzie, 2004) and has emerged as a research field in its own right during the last 25 years (Creswell, 2015, Easterby-Smith *et al*, 2015; Tashakkori and Teddlie, 2010). Johnson *et al*. (2007) affirm that there are now three widely accepted research paradigms – quantitative, qualitative and mixed methods – with all three thriving and co-existing. Advocates of mixed-methods research have suggested ways in which mixed-methods studies are potentially superior to single method approaches (Venkatesh *et al.*, 2013). However, whether quantitative and qualitative approaches can and should be mixed has also been debated (Denzin and Lincoln, 1994; Guba, 1987). Despite such debates it is feasible to conduct mixed methods research that cuts across methods and paradigms (Tashakkori and Teddlie, 2010; Creswell, 2015; Easterby-Smith *et al.*, 2015).

Before discussing the advantages and disadvantages of mixed methods research, a definition of both qualitative and quantitative research will be provided along with a summary of the advantages and disadvantages of both approaches. Qualitative research tends to be exploratory in nature and involves open-ended responses (Easterby Smith *et al.*, 2015). Qualitative methods adopt a different type of approach to scholarly enquiry than quantitative research, relying on textual and image data (Creswell and Creswell, 2016). Johnson and Onwuegbuzie (2004)

identify the main characteristics of qualitative research as taking an inductive approach, viewing research as a process of discovery that involves exploration, that utilises theory/hypothesis generation, where the researcher is the primary instrument of data collection, and involves qualitative analysis. Quantitative research can be defined as an approach for testing objective theories by examining the relationships amongst variables (Creswell and Creswell, 2016). These variables are usually measured numerically with survey instruments that produce data that can be analysed statistically. Johnson and Onwuegbuzie (2004) identify the major characteristics of traditional quantitative research as involving a focus on deduction, that utilises confirmation, theory/hypothesis testing, seeks explanation from data relationships, that engages in prediction and uses standardised data collection and statistical analysis. Table 5.2 describes the advantages and disadvantages of using both qualitative and quantitative methods of inquiry.

Table 5.2 Advantages and Disadvantages of Qualitative and Quantitative Research.

Qualitative Research	
Advantages	*Disadvantages*
Provides detailed perspectives of a few people. Captures the voices of participants. Is based on the views of participants not the researcher. Appeals to people's enjoyment of stories.	Has limited generalizability. Provides only soft data not hard data (like numbers). Studies few people. Is highly subjective. Minimises use of researchers expertise due to reliance on participants.
Quantitative Research	
Advantages	*Disadvantages*
Draws conclusions for large numbers of people. Analyzes data efficiently. Investigates relationships with data. Examines probable cause and effect. Controls bias. Appeals to people's preference for numbers.	Is impersonal, dry. Does not capture the voice of participants. Provides limited understanding of the context of participants. Is largely researcher driven.

Source: Creswell (2015): A Concise Introduction to Mixed Methods Research.

Benefits of mixed methods research include: the ability to address confirmatory and explanatory research questions simultaneously within the same research inquiry (Tashakkori and Teddlie, 2010); the ability to provide stronger inferences than a solely quantitative or

qualitative approach (Clark and IVankova, 2016; Ventakesh *et al.*, 2013); and the ability to provide a broader range of perspectives (Creswell, 2015; Easterby-Smith *et al.*, 2015). Johnson and Onweugbuzie (2004) identify other benefits to mixed methods research, including: the ability to provide qualitative and quantitative research strengths; the ability to answer a broader range of research questions than a single method alone; the strengths of one method in a mixed method study can potentially negate the weaknesses of another method in the same study; and the ability to provide stronger evidence for research conclusions through the corroboration and convergence of findings.

Weaknesses of mixed methods approaches are also discussed in the literature. Johnson and Onweugbuzie (2004) summarise the main weaknesses of a mixed method approach as: it can be difficult to carry out both methods of research, especially if doing so concurrently; it can be more expensive and time consuming; and methodological purists advocate that a single approach to research methods should be adopted. Other issues that need to resolved in the research design include the choice of methods to mix, the sequencing of the methods used and the extent of dominance of qualitative over quantitative techniques, or vice versa, in the research design (Plano Clark and Ivankova, 2016; Creswell, 2015; Easterby-Smith *et al.*, 2015)

5.7.2. Pragmatism as a Paradigm for Mixed Methods Research

Paradigms can be described as accepted models, patterns, or philosophical positions as to the nature of social phenomena and social structures (Feilzer, 2010). Pragmatism can be viewed as a compromise between internal realism and relativism, originating in the early 20th century in the philosophical contributions of William James and John Dewey (Easterby-Smith *et al.*, 2015). Pragmatism is a philosophical approach that evaluates theories or beliefs in terms of the success of their practical application. A key point of the pragmatic approach is that any meaning comes from the lived experience of individuals (Easterby-Smith *et al.*, 2015). In a pragmatic approach, theories are viewed instrumentally – they are true to different degrees based on how well they currently work (Johnson and Onwuegbuzie, 2004). Pragmatists also reject traditional dualisms, such as positivism and anti-positivism, preferring more moderate versions of philosophical dualism based on how well they work at solving problems (Johnson and Onwuegbuzie, 2004; Plano Clark and Ivankova, 2016; Rorty, 1999). Pragmatists adopt an abductive approach that moves back and forth between inductive and deductive approaches, or vice versa, combining qualitative and quantitative methods in a sequential fashion (Morgan,

2012). Essentially, pragmatists seek out the approach that is most likely to answer what the researcher wants to know (Hanson, 2010; Denscombe, 2008; Felizer, 2010). This pragmatic approach fits with the philosophical position of "engaged constructionism" (Easterby-Smith *et al.*, 2015) that has been adopted by the researcher.

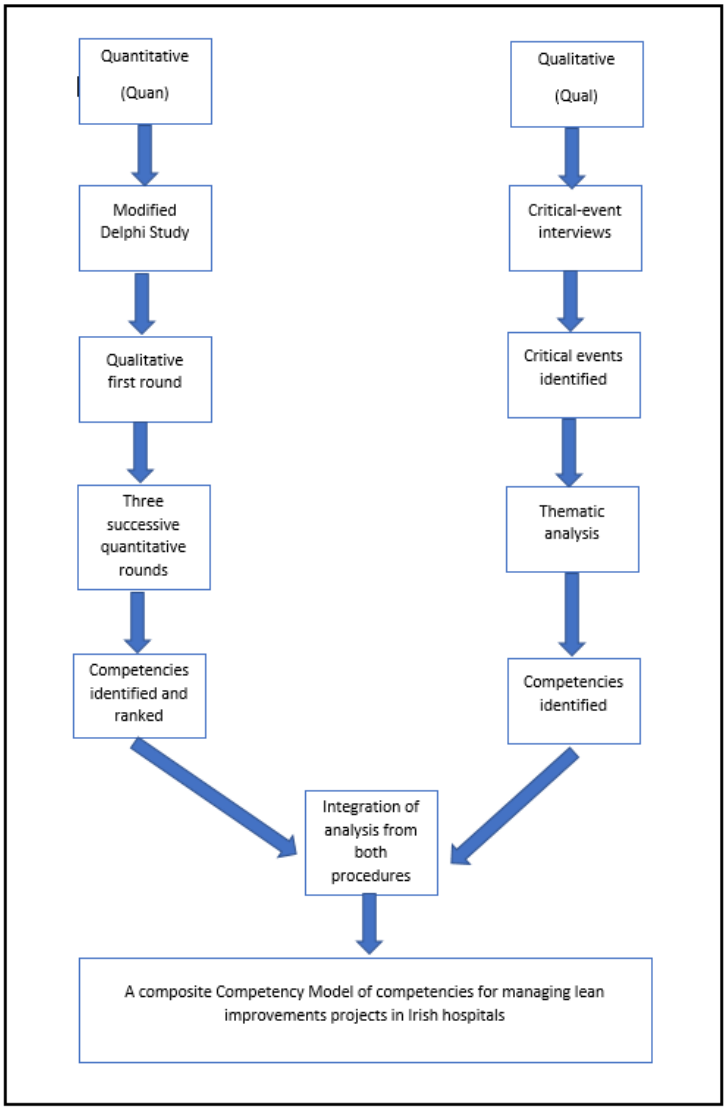
5.7.3 Mixed Methods Research Design.

Creswell (2015) identify the basic types of mixed method research design. These can be categorised in three types: convergent design; an exploratory sequential design and an explanatory sequential design. A convergent design combines qualitative and quantitative data analyses thus allowing the problem to be viewed from multiple angles and perspectives. An explanatory sequential design investigates a research problem by beginning with a quantitative strand to collect and analyse the data and then conducting qualitative research to explain the quantitative results (Creswell, 2015). An exploratory sequential design studies a research problem by exploring it firstly through qualitative data analysis. Following this analysis a second phase is undertaken wherein those qualitative results are developed into measures or a new research instrument. A third phase is then conducted by testing the newly developed measures or by applying the newly constructed research instrument (Creswell, 2015).

A convergent design is adopted for this research study. Plano Clark and Ivankova (2016) recommend using a procedural diagram to depict the flow of the research activities in a mixed methods study. The development of a procedural diagram enables the researcher to model the integration point of the quantitative and qualitative components of the study and plan methods integration procedures (Plano Clark and Ivankova, 2016).

Figure 5.3 illustrates the procedural diagram that will be applied in this research study.

Figure 5.3 Procedural diagram illustrating the concurrent research design and corresponding research activities.



Plano, Clark and Ivankova (2016) state that notation can be used to signify the relative prominence of the quantitative and qualitative components of a mixed methods research study. This study adopts a convergent design with the purpose of using both qualitative data and quantitative data to provide deeper and richer interpretations of the phenomenon being studied and enable expansion by evaluating different facets of a phenomenon to obtain a more detailed understanding of it (Lopez-Fernandez and Molina-Alorin, 2011). The main limitations of this approach are that it can extend the duration of the study (Plano Clark and Ivankova, 2016) and that it requires researcher expertise in both qualitative and quantitative research techniques (Creswell, 2015).

Mixed method approaches have been used in previous research studies investigating lean competencies, values and behaviours. Seidel *et al.* (2017) utilised a mixed method sequential study to identify lean leadership competencies. That study initially undertook a review of the literature to identify an initial list of lean leader competencies; then refined and elaborated on this list by conducting interviews with four lean experts; and then conducted a survey of 91 respondents. Van Dun *et al.* (2017) adopted a mixed methods concurrent study to research the values and behaviours of effective lean managers. That study commenced with a systematic literature review to compile an initial list of lean values and behaviours, then refined and supplemented this list using a Delphi study of lean experts via the administration of closed-ended and open-ended surveys, and also conducted critical-incident interviews, surveys and video analysis with a cohort of lean middle managers.

The researcher utilises a convergent mixed-methods study that will comprise a literature review; a pilot study combining quantitative and qualitative elements; a Delphi study of lean experts; and qualitative interviews with lean managers using the critical-incident technique.

5.8 Rationale for using a Delphi Technique.

5.8.1 The Delphi technique.

The Delphi technique was conceived and developed by the Rand Corporation in the 1950s (Kezar and Maxey, 2016; Ab Latif *et al*., 2016; de Souza *et al*., 2015). The Delphi technique is a formal consensus development method and is used in research problems where there is limited evidence or evidence is contradictory (Vernon, 2009). The Delphi technique utilises expert panels to solicit opinions and then uses convergence to gain consensus on a particular topic (Kezar and Maxey, 2016; Vernon, 2009; Borges and Richard, 2018). The contribution of each panel member is confidential and none of the participants can be traced to their contribution (Kezar and Maxey, 2016). The Delphi technique is comprised of a number of rounds of survey questionnaires designed to solicit expert opinions (Yousuf, 2007; Kezar and Maxey, 2016). A number of rounds of surveys are used to gain consensus from expert panel participants (de Souza *et al.*, 2015; Vernon, 2009; Gardner *et al*., 2018). The number of surveys used in a Delphi study can vary depending on the nature of the study, or on the level of response received from participants. However, the first round typically comprises a qualitative, open-ended survey, designed to solicit opinions from experts. The second round then seeks to quantify and statistically analyse the responses from the first round. Potentially further rounds of surveys can then be used until consensus is achieved (Yousuf, 2007; Hasson *et al.*, 2000). A key feature is the provision of controlled feedback to participants to ensure that their opinions have been accurately captured, and to allow them an opportunity to amend their opinion and provide further comment (Vernon, 2009).

5.8.2 Composition of the Expert Panel.

A critical component of Delphi studies is the composition of the expert panel. Homogenous groups of experts are required where the purpose of the study involves forecasting, or where a specialised or technical area is being considered (Vernon, 2009). This is the case with this research study where expert panel participants are required to have knowledge of lean philosophy and practice, in a hospital/healthcare context. When homogenous groups of experts are used a sample size of between 10 and 15 expert panel participants can be sufficient (Kezar and Mazey, 2016; Ogbeifun *et al.*, 2017). Vernon (2009) advises that researchers employing the Delphi technique should carefully define selection criteria for the expert panel and prepare recruitment strategies to obtain participation. Following the approach of Kezar and Mazey

(2016), Ogbeifun *et al.* (2017) and Vernon (2009), the expert panel composition for this study targeted participants from academia, consultancies and practitioners in hospitals. A mix of perspectives was sought as opinions were required regarding current and future competencies for managing lean projects in hospitals.

The selection of participants in the expert panel utilised a purposive sampling method. Purposive sampling chooses participants due to the qualities that the participant possesses (Etikan *et al.*, 2016). According to Teddlie and Yu (2007) purposive sampling techniques are primarily used in qualitative studies to select units based on specific purposes required to address a particular research question. The researcher chose a sample size of 20 for the expert panel component of the research. This is at the upper end of expert panel sizes recommended for panels with a homogenous composition (Kezar and Mazey, 2016; Ogbeifun *et al.*, 2017).

5.8.3 Composition of the Delphi study.

The Delphi technique utilised four rounds. A modified Delphi technique was adopted. The first survey (Round 1) gathered the expertise of the participants regarding the competencies required for lean managers in hospitals based on questions posed. Round 1 comprised a number of open-end questions designed to gather opinion regarding the knowledge, skills, abilities, values and behaviours required by managers of lean projects in hospitals. Participants were provided with a definition of lean, a definition of management and a definition of competency to assist in their understanding of the questions. Participation was solicited by invitation (See Appendix 1) sent by email to candidates requesting their involvement. Once preliminary consent to participation was received each candidate was sent a voluntary consent form (See Appendix 2) and the Round 1 survey (See Appendix 3), accompanied by a research information sheet (See Appendix 4).

Twenty individuals participated in the first round of the Delphi study. The responses from Round 1 of the Delphi study was analysed using Thematic Analysis. Thematic Analysis involves searching for themes in narratives that emerge as important to the nature of a phenomenon and involves the identification of themes through careful reading and re-reading of the data (Fereday and Muir-Cochrane, 2006; Creswell and Creswell, 2016). A systematic approach to analysing the data was adopted as recommended by Creswell and Creswell (2016). This approach involves: organising and preparing the data for analysis; reading and examining

the data; coding all of the data; generating a description and themes; and representing the descriptions and themes.

The analysis of data from the Round 1 survey will be utilised to develop competence categories and competency statements. These competency categories and statements will then be used as survey items in Round 2 of the Delphi study adopted for this study (See Appendix 5).

Four individuals withdrew after the first round. Withdrawal of participants is a common feature of Delphi studies (Keeney *et al.*, 2011) and decreasing participation in subsequent rounds commonly occurs in Delphi studies – see for example McPherson *et al.* (2018). The second survey of the Delphi study (Round 2) uses the results of Round 1 of the study and applies descriptive statistics to determine the relative importance of each competency statement. Participants will be asked to rate each competency statement on a scale of 1-5; with a score of 1 indicating a rating of high importance and a score of 5 indicating a rating of low importance. Descriptive statistics for each competency statement were analysed to better understand tendency towards converging opinions. Statistical measures including the median, interquartile range and standard deviation were generated and interpreted to better interpret panel consensus.

A further two individuals withdrew from the study following the scond round survey. Fourteen individuals participated in the third-round survey (See Appendix 6). The third round of the Delphi study presented participants with the median score for each competency statement from the second round of the Delphi study alongside the participants second round rating. Participants were asked to reconsider their original rating and an opportunity was provided for them to change or amend their opinion should they wish to do so.

The fourth round of the Delphi study (See appendix 7) presented participants with the median score, interquartile range and standard deviation for each competency statement from the third round of the Delphi study alongside the participants third round rating. Participants were asked to reconsider their original rating and an opportunity was provided for them to change or amend their opinion should they wish to do so.

Following the fourth-round survey, participants were contacted via email and asked to explain their rating if the rating they provided for a competency statement significantly differed from the consensus rating of the broader expert panel. Appendix 8 provides a sample of this correspondence.

5.8.4 Benefits and Limitations of the Delphi study.

Delphi studies have a number of benefits. Firstly, they provide access to expert opinion and typically have good response rates (Vernon, 2009; Ab Latif *et al.*, 2016). Another benefit of the Delphi technique is that they are relatively easy to construct and use (Vernon, 2009). Delphi studies are also participatory, provide participants with a democratic process and guarantee anonymity (Vernon, 2009; Youssuf, 2007; Hasson *et al.*, 2000; Ogbeifun *et al.*, 2017, Ab Latif *et al.*, 2016) Delphi studies can also be cost-effective and time-effective (Youssuf, 2007; Vernon; 2009).

The Delphi technique also has limitations. Concerns exist over transfer of measures between qualitative and quantitative methodologies (Hasson and Keeney, 2011). Vernon (2009) observes that while the Delphi technique can produce consensus, it does not mean that this consensus is correct, or that it has not been manipulated (Yousuf, 2007). Turoff and Linstone (2002) also warn against creating artificial consensus and stress that disagreeing opinion should not be ignored and explored to understand the nature of the disagreement. Furthermore, the role of the researcher/monitor needs to be carefully considered ensuring that their views and preconceptions of the research problem are not imposed on participants by specifying a structure for the study that is too restrictive (Turoff and Linstone, 2002). Vernon (2009) also warns that concerns exist regarding the validity of Delphi studies, while acknowledging that measures can be taken to strengthen the validity, reliability and credibility of studies. Gnatzy *et al.* (2011) identifies how measures of independence can be tested using Chi-squared tests, and internal reliability can be assessed using the Interquartile Range. The interquartile range in particular is adopted for use in this study.

5.8.5 Consensus in Delphi Studies

Keeney *et al.* (2011) note that the Delphi method has grown in popularity in healthcare research in recent years. Delphi studies aim to gain a consensus of opinion or judgement from participants. Giannarou and Servas (2014) oberve that a common method to establishing consensus in Delphi studies does not exist and that many studies use measures such as frequency distributions, the standard deviation or the interquartile range. Following a review of 32 Delphi studies that examined the method utilised to obtain consensus, Giannarou and Servas (2014) recommends combinatory measures to measure consensus including the percentage of respondents in agreement being above a preset target percentage, a measure of

interquartile range and a measure of the standard deviation. A combinatory approach is adopted in this study to determine consensus opinion in Rounds 2 – 4. Initially, the researcher considered a percentage agreement target of 70% of participants in agreement with a rating of a particular competency statement. However, after reviewing this approach in the context of previous studies it was decided to utilise two main measures and consider also a third measure in establishing consensus. These measures are:

1) That at least 65% of participants are in agreement with a rating on a single point of the scale.
2) The interquartile range is less than or equal to 1.
3) The standard deviation score is less than 1.5.

5.9 Rationale for using Critical-Incident Interviews.

5.9.1. The Critical-Incident Technique.

The critical-incident technique (CIT) was originally developed by Flanagan (1954) where he discussed studies conducted in the Aviation Psychology Programme of the United States Air Force in World War II. Flanagan (1954, p. 327) described the purpose and application of the CIT as follows: "The critical incident technique consists of a set of procedures for collecting direct observations of human behavior in such a way as to facilitate their potential usefulness in solving practical problems and developing broad psychological principles". The CIT was originally utilised as a quantitative technique as part of a positivistic paradigm (Collis and Hussey, 2009; Bott and Tourish, 2016). However, more recently it; has been used in an inductive manner, as a qualitative technique, as part of an interpretivist paradigm (Druskat and Wheeler, 2003; Gremler, 2004; Sharoff, 2008; Bott and Tourish, 2016). Application of CIT features in research studies from many disciplines including leadership (Druskat and Wheeler, 2003; Ruiz *et al.*, 2014); nursing (Lewis *et al.*, 2010; Aveyard and Woolliams, 2006); marketing (Gremler, 2004); healthcare and clinical studies (Sharoff, 2008; Schluter *et al.*, 2008); and hospitality management (Tontini *et al.*, 2017; Swanson *et al.*, 2014) among others. The critical incident technique has also featured in competency research, see for example, (Lewis *et al.*, 2010; Ekaterini, 2011; Van Dun *et al.*, 2017; Found *et al.*, 2009).

The CIT is a flexible technique (Bott and Tourish, 2016) that can be applied to many forms of qualitative research study, and its use is well established in the health sciences (Fitzgerald *et al.*, 2008). Coetzer and Redmond (2011, p. 125) cite Chell (1998), as describing the CIT as 'a

qualitative interview procedure which facilitates the investigation of significant occurrences (events, incidents, processes or issues) identified by the respondent, the way the occurrences are managed, and the outcomes in terms of perceived effects'. The objective is to obtain the perspective of the research participant by asking them to recall a significant (critical) event and then asking that they describe their experience and their perceptions of the event. It is useful to provide a definition of a critical incident in order to avoid any confusion and to provide clarity during the interview (Bott and Tourish, 2016). Flanagan (1954) defines the term as:

> By an incident is meant any observable human activity that is sufficiently complete in itself to permit inferences and predictions to be made about the person performing the act. To be critical, an incident must occur in a situation where the purpose or intent of the act seems fairly clear to the observer and where its consequences are sufficiently definite to leave little doubt concerning its effects.

Terminology used when gathering research can also cause confusion, Schluter *et al.,* (2007) describe that the term 'incident' was misunderstood by the nurse participants in their study with a number of the interviewees responding that they had not been involved in an "incident". It can also be important to specify whether the incident is positive or negative (Bott and Tourish, 2016) or both (Druskat and Wheeler, 2003).

5.9.2. Approach to application of the Critical-Incident Technique.

The CIT is flexible in that it permits numerous data collection methods such as direct observation, interviews, group interviews, questionnaires and record forms (Flanagan, 1954). For the purposes of this study it was felt that direct observation would be problematic given the sensitive context of hospital settings. Group interviews also would not be feasible as it would prove difficult and expensive to schedule multiple interviewees at the same time. Questionnaires were considered at this stage, however as they had already been used in the earlier stage of the mixed methods research, it was decided that using a questionnaire approach again would not yield the same quality of data, and diversity of perspective, as a semi-structured interview approach. Questionnaires would also limit the ability of the researcher to probe deeper to understand the meaning of participant responses. Record forms were also ruled out as an approach because if first-hand recording is used the researcher is engaged in direct observation and as already indicated this would be problematic in hospital settings. Second-hand recording can also be used whereby research participants make regular recordings of

critical incidents as they occur, however, this would necessitate the researcher taking a more detached perspective and as a result the ability of the researcher to probe beyond initial participant response to obtain deeper meaning would be limited.

The approach selected to the critical incident technique for this research study was to use critical incident semi-structured interviews. This reflects the wider adoption of qualitative methods in social science research (Easterby-Smith *et al.*, 2018; Bott and Tourish, 2016). This approach has been adopted in previous studies (see for example: Druskat and Wheeler, 2003; Ellinger and Bostrom, 2002; Dasborough, 2006; Cope and Watts, 2000; Wolff *et al.*, 2002).

At the beginning of a critical-incident interview it is important to define what is meant by 'critical-incident'. A definition that draws on that provided by Flanagan (1954) and amended based on the findings of Schluter *et al.* (2007) will be used for this research:

> By an incident/event is meant any observable human activity that is sufficiently complete in itself to permit inferences and predictions to be made about the person performing the act. To be critical, an incident/event must occur in a situation where the purpose or intent of the act seems fairly clear to the observer and where its consequences are sufficiently definite to leave little doubt concerning its effects.

Participants will be asked to consider both negative and positive incidents/events on the basis that a positive occurrence might indicate the utilisation of a competency that had a positive impact; whereas a negative occurrence might indicate a situation where the utilisation of a competency did not have the desired impact, or may indicate a competency deficiency.

Interviewees will be posed the following question (See Appendix 9):

> Please describe a significant situation that occurred during your term as the [position title] of a lean project in this hospital and consider the outcome. A significant situation is a situation outside of routine events, which triggered/hindered progress towards completion of project outcomes. Please think of a situation that you can easily remember.

This type of opening questioning allows the researcher to identify behavioural themes (Bott and Tourish, 2016) and also allows the interviewee freedom to describe their practical experience as is necessary when a pragmatic approach is taken to methodological design (Easterby-Smith *et al.*, 2015). The use of semi-structured questions will provide some structure to open-ended responses; it is important to allow an open two-way conversation to occur whilst not leading the interviewee in any way (Bott and Tourish, 2016). Once the interviewee

describes a critical incident/event further probing questions will be asked to provide further clarity and depth (Schluter *et al.*, 2007; Bott and Tourish, 2016). The probes used will be generic in nature to avoid unnecessarily leading the interviewee and have been developed in a manner that reflects probes used in other studies (Druskat and Wheeler, 2003; Dasborough, 2006; Wolff *et al.*, 2002). Examples of the probes that will be used are:

- What happened next?
- Who was involved?
- What was the outcome?
- How would you describe your behaviour in managing this situation?
- How did you feel during this situation?
- Upon reflection, what behaviours contributed most to the outcome?
- What knowledge did you use this situation?
- Did you use any specific lean tools in this situation?
- Did you utilise any specific abilities in this situation?
- What would have made the outcome different?

The probes used will be influenced by the results of the Delphi technique component of the study and the results of the pilot study.

5.9.3. Sample size

The sample size used in the CIT component of this study will be determined by a number of incidents (Sharoff, 2008; Bott and Tourish, 2016). Flanagan (1954) states that there is no simple way to determine sample size when using the CIT and this is typically determined by saturation, when the addition of further interviews is not yielding many further new incidents to the data that will be analysed. However, Sharoff (2008) notes that as is similar with other qualitative studies the sample size for a study using the CIT is usually quite small. Previous studies such as Klendauer *et al.* (2009) conducted 64 interviews until a saturation point was reached. Van Dun *et al.* (2017) conducted 18 interviews as part of a mixed method approach that also utilised delphi surveys and video analysis. Bott and Tourish (2016) in a study of leadership behaviours

of non-profit board directors, analysed 106 incidents from 53 interviews. The researcher conducted 17 critical incident interviews for this study. This sample size is small as is common with qualitative studies, however given that the critical incident interviews are only part of a broader mixed methods study that also includes a delphi survey, the researcher feels that it is a sufficiently large enough sample on which to base a data collection plan.

The occurrence of the Covid-19 pandemic impacted the ability of the researcher to conduct interviews in person with participants and the CIT interviews were conducted virtually via videoconferencing software. Archibald *et al.* (2019) identify a number of benefits of conducting interviews via digital technologies including cost-effectiveness and convenience. Braun *et al.*(2017) contend that online methods can complement and in some case improve upon traditional methods such as in-person interviews. Some practical and interactional concerns have been raised about utilising videoconferencing software for qualitative issues such as dropped call quality, pauses, buffering and difficulties in reading nonverbal cues (Seitz, 2016; Weller, 2017). To mitigate this concern the researcher ensured at the beginning of each interview that the connection was strong and sought to clarify responses on the rare occasions that call quality worsened. The interviews were conducted via Microsoft Teams software or Zoom software and recorded so that the researcher could replay interview segments at a later date if required.

Participants for the critical incident interviews were selected based on a number of carefully predefined criteria. These are:

1) The lean manager will have to have had at least six months experience of working with lean or process improvement work practices in a hospital environment.

2) The lean manager will have to have fully completed at least one lean improvement project or have a lead role in an ongoing improvement project.

3) The lean manager will be asked to rate the success of the lean project that they managed (as identified in the critical-incident interview) on a scale of 1-7. (7 indicating that the project was very successful, and 1 indicating the project was very unsuccessful).

The above criteria were developed after reviewing similar criteria used in other studies (Van Dun *et al.*, 2017) as a means of ensuring knowledgeable and experienced participants will be involved in the study. This follows a purposive sampling approach that select participants based on the qualities they possess (Etikan *et al.*, 2016; Teddlie and Yu, 2007). Contacts in

participating hospitals were identified from the broader role of the researcher as a co-lead of the Academy of Lean Enterprise Excellence at SETU.

5.9.4. Benefits and Limitations of the Critical-Incident Technique.

The CIT has many benefits. The inductive nature of the CIT means that respondents are not forced into a predefined framework thus allowing the respondent more latitude to fully describe their experience (Gremler, 2004). This less structured form of interview design allows for a richer narrative to be compiled that illuminates both contextual factors and behaviours pertaining to a critical incident thus facilitating a deeper understanding of the situation (Bott and Tourish, 2016). The CIT is also a flexible research instrument that can be utilised in a positivist or post-modern paradigm (Chell, 1998; Butterfield *et al.*, 2005). A significant advantage of the CIT is its connection to real-world problems (Vianden, 2012). CIT has the ability to identify effective, ineffective and missing practices (Schluter *et al.*, 2008). The CIT is also useful in the early stages of exploring an under -researched problem (Vianden, 2012).

There are also limitations with the CIT. Variation exists in the terminology associated with CIT including: critical incident analysis, critical event technique, critical incident report and critical incident reflection (Butterfield *et al.*, 2005). Inconsistent use of terminology associated with the technique can negatively influence its universal recognition and appreciation (Vianden, 2012). Other limitations arise from the potential misinterpretation and incorrect coding of incidents (Gremler, 2004; Vianden, 2012). Limitations of recall of incidents are also a factor requiring careful consideration (Chell, 1998; Gremler, 2004; Bott and Tourish, 2016). Flanagan (1954) recommends controlling this risk by utilising incidents that are fairly recent in the participants' experience. Schluter *et al.* (2007) suggests that limitations of recall can also be avoided by asking participants in advance to think of an incident to discuss during the interview. The CIT also relies in many ways on the interviewees' ability to tell a story, sometimes resulting in stories that lack the detail to generate a rich dataset (Vianden, 2012; Bott and Tourish, 2016).

5.9.5 Data Transcription and Analysis of Interviews.

The interviews were recorded using videconferencing technology. Permission was sought prior to the interviews regarding their recording. Once recorded the interviews were later transcribed. The transcription of recorded interviews can be a lengthy process however the researcher reduced the length of transcription time by utilising the automatic transcription features of the videoconferencing software. Once initial transcripts have been produced by the transcription software, the researcher played back the recording of each interview and checked it against the corresponding transcript for accuracy.

Flanagan (1954, p.344-345) describes a process of analysing data obtained from using CIT whereby incidents are sorted into categories that are related to the frame of reference selected. After initial tentative categories are established, additional incidents are classified into them. Categories are then redefined and modified as necessary. The number of categories chosen is a trade-off between specificity and generality (Bott and Tourish, 2016). When the themes and categories are well formed, they will be compared to the themes/categories identified from the literature (Butterfield *et al.*, 2005). The coding of data during CIT analysis can be both subjective and difficult (Sharoff, 2008).

Kumar (2011) identifies four steps when analysing the contents of an interview. Initially the main themes are identified. These themes are then assigned codes. Responses are then classified under the main themes. Once the interviews were coded, key issues from the research could be identified. The themes and responses are then integrated into the report (Kumar, 2011). The interviews were coded using QSR NVivo software (Version 12). Hoover and Koerber (2011) identify a number of benefits to using NVivo software including: efficiency through the automation of routine qualitative research tasks; multiplicity by providing a single location for all data sources; and transparency by providing ease of access to data and analysis in the nodes and queries features.

5.10 Operational Details.

A pilot study was conducted during July and August 2018. A pilot study can be described as a small-scale research project conducted before the full-scale study is commenced (Ismail *et al.*, 2018). Pilot studies are useful because they can provide advance warning of areas where the

potential research study could fail; where research protocols are not followed; or where proposed methods are not suitable (Van Teijlingen and Hundley, 2001).

5.10.1 Pilot Study

A pilot study was conducted with a hospital that was not participating in the main research study with the purpose of testing and refining the proposed research instruments. Two external consultants both with experience of advising on lean healthcare improvement initiatives also participated in the pilot study. The pilot study included two stages.

Firstly, a first-round pilot survey (See Appendix 10) was developed for the Delphi technique component of the main research study. Keeney *et al.* (2011) advise that the first-round questionnaire in a Delphi should always be piloted and such a pilot survey can be considered a crucial element of the design of the Delphi instrument (Novakowski and Wellar, 2008). A sample size of 10% of the intended target sample for the Delphi study is considered appropriate (Keeney *et al.*, 2011). This survey was administered to three individuals: a senior member of the management team of the hospital who also held a Masters Degree in Lean Healthcare; a consultant with senior management experience who worked with the hospital in developing and implementing their lean improvement initiatives and who also lectured on a Masters programme in Lean Healthcare; and a second consultant with experience of advising on lean improvement initiatives in hospitals who also held a Masters qualification in Lean Practice.

Responses to the pilot survey were analysed to identify if the data generated by the survey met the requirements of the research. This proved to be the case for all questions with the exception of question 5 on the survey which was misinterpreted by one participant and yielded little useful information across all responses.

> Question 5 on pilot survey:
> Please list the five competencies that you consider to be most important for managers of lean projects in Hospitals.

On reflection a decision was made to remove question 5 from the first-round survey. Participants were also asked to comment on the design of the survey. One participant

commented that the survey took a long time to complete but also reflected that they had not fully read and followed the instructions and also that they completed the survey over multiple sittings necessitating the rereading of instructions and questions. The other participants found the instructions to be clear and took approximately one hour to complete the survey. Although lengthy, this was considered reasonable for the first-round survey, as it contained many open-ended questions that needed to be considered carefully.

The second stage of the pilot study involved conducting two critical-incident interviews again reflecting approximately 10% of the sample size of the interview cohort in the main research study. Woolsey (1986) advises conducting a pilot of the interview questions included in a critical-incident interview and this is common practice in such studies, see for example (Holmberg *et al.*, 2020; Bott and Tourish, 2016). One participant was a member of the senior management team at the hospital with responsibility for quality improvement and operational excellence and the other participant was a mid-level manager of a support function who was a lead on a lean improvement initiative in that area. The interviews were conducted on site at the hospital on the same day. Both interviews were conducted in under an hour and proceeded without complication. Both participants considered that the material provided to them in adVance of the interview to be sufficient and effective in clearly explaining the purpose and structure of the interview. After analysing the data collected from the pilot interviews it was deemed that both instructions regarding the interviews and the schedule of interview questions utilised in the pilot interviews were suitable for the pilot study and did not require any adjustment.

5.10.2 Modified-Delphi Study

The modified-Delphi study contained four rounds, a qualitative first-round containing open-ended questions identifying competencies under a number of broad competency categories previously identified during a literature review, followed by three consecutive quantitative rounds where participants rated competencies on a 5-point scale. The operational details for the modified-Delphi are illustrated in table 5.3:

Table 5.3 Operational details for the Modified Delphi Study

Round	Dates during which this round was conducted.
1	December 2019 – March 2020
2	June 2020 – July 2020
3	December 2020 – January 2021
4	August 2021 – September 2021

5.10.3 Critical-Event Interviews

The interviews were conducted with 17 individuals who were either the project manager, or in a lead role, in a lean improvement project in an Irish public hospital. The researcher was cognisant of the possibility of conducting interviews with team members from lean improvement projects that would be representative of different operational levels in the organisation, it was decided to focus on lean improvement project managers or individuals in a lead role in lean improvement projects. This is line with the purposive sampling approach chosen for this research and represented the best opportunity to gather rich, contextual data to inform the research.

Interviews were conducted over a six-month period between May and November in 2020 (see Table 5.4) as dictated by each interviewee's availability.

Table 5.4 Schedule of interviews.

Code	Job Title	Date (2020)	Duration
Int. 1	Service Improvement Manager	24/08	52.26
Int. 2	Service Improvement Manager	04/09	57.39
Int. 3	Scheduled Care Lead	11/08	44.20
Int. 4	Service Improvement Manager	11/08	44.36
Int. 5	Consultant	10/09	68.58
Int. 6	Quality Improvement Coordinator	16/07	59.53
Int. 7	Radiology Services Manager	24/11	57.17
Int. 8	Business/Operations Manager Unscheduled Care	09/09	56.47
Int. 9	Lean Sigma Programme Co-ordinator	08/10	42.34
Int. 10	Human Resources Business Manager	25/11	37.53
Int. 11	Assistant Director Of Nursing	13/10	53.50
Int. 12	ENT Doctor	11/08	59.13
Int. 13	Purchasing Manager	12/11	63.22
Int. 14	Bed manager.	25/05	52.06
Int. 15	Head manager of a ward	28/10	58.36
Int. 16	Acting Deputy General Manager	24/08	48.36
Int. 17	Business Manager Scheduled Care	22/09	57.00

The interviewees came from diverse categories of hospital across eight different geographical sites including each regional hospital group in Ireland. It was important for researcher to be especially cognisant of the availability and time constraints of participants due to the increased burden on employees in the Irish health system during the Covid-19 pandemic.

5.11 Data Trustworthiness.

Plano Clark and IVankova (2016) assert that is important for researchers to identify and recognise their own approaches to assessing quality of their mixed method study in order to reinforce the accuracy and credibility of the inferences and outputs from their research. Mixed methods studies by their nature produce both thick and rich descriptive data resulting from a combination of the utilisation of quantitative and qualitative methods. Bryman *et al.* (2008) assert that it is important to focus on the quality of the collected data from the position of individual quantitative and qualitative approaches and consider factors such as the trustworthiness including the credibility confirmability, dependability and transferability of the data.

Lincoln and Guba (1985) provide a useful description of each of these terms as they pertain to qualitative data. Credibility involves establishing confidence in the truth of the findings for the persons and context in which the study was carried out. Transferability assesses how easily the findings of the research can apply to another group or context. Dependability relates to the level of confidence that the findings would be similar if repeated with the same people or context involved. Confirmability assess the neutrality of the findings in that they are representative of the participants and context of the study and not the biases and perceptions of the researcher.

5.11.1 Credibility.

Engles and Kennedy (2007) assert that credibility can be enhanced in Delphi studies by providing ongoing iteration and feedback to participants and by engaging in the use of other methods. During the Delphi study, the researcher conducted four rounds of surveys with the participants and provided summary feedback of the outcomes of each round alongside a research information sheet to each participant. The researcher also sought clarification from participants in cases where the rating provided significantly differed from the group median

rating in order to obtain a better understanding of the reason for the rating. The outcomes of the Delphi study were then considered against findings from critical-event interviews.

In qualitative studies credibility involves determining whether an accurate portrait of the research subject being explored is created (Miles *et al.*, 2014) thus addressing the fit between the perspectives of respondents and the researcher's representation of these (Tobin and Begley, 2004; Nowell *et al.*, 2017). To enhance the credibility of the study the researcher conducted seventeen critical-event interviews with knowledgeable participants with experience of lean improvement projects in a public hospital context. The data was analysed and transcribed using an established thematic analysis approach (see Chapter 8) facilitating themes to emerge from the dataset and further facilitating a cross-comparison of both methods utilised in this research.

Butterfield *et al.* (2015) recommends a number of ways to enhance the credibility of the CIT technique including audio-taping interviews, following the method's established protocols and obtaining advice from experienced practitioners. In preparation for the interviews, the researcher developed interview protocols based on established methods (Flanagan, 1954; Butterfield *et al.*, 2015) and obtained advice from a work colleague more experienced in the CIT method. The interview guide developed was tested and confirmed in a pilot study and later followed during the interview process. All interviews were recorded and transcribed. The transcribed interviews were checked against their corresponding recordings for accuracy.

This research approach that was informed by established theory, robustly designed and implemented in a systematic manner assisted the researcher in being aware of the possibility of personal bias and facilitated the presentation of unambiguous and accurate findings (Miles et al., 2014).

5.11.2 Transferability

Transferability in Delphi studies can be enhanced by verifying the applicability of Delphi findings (Keeney *et al.*, 2011). The inclusion of critical-event interviews in this study facilitated a comparison of practitioner opinion with the expert opinion expressed in the Delphi findings. However, it should be noted that difficulty in generalising results to a wider population is often cited as a limitation (Skulmolski, 2007; Neiderman *et al.*, 1991). It is acknowledged that this study should be verified before greater claims regarding the transferability of its findings can

be made. Skulmolski *et al.* (2007) observe that verification studies provide rich opportunities for further research.

The context of the critical-event interviews in this study reflects a healthcare context with a specific emphasis on Irish public hospitals. As is explained in Chapter 6 of this document the public healthcare systems in Ireland contains characteristics that are not typical of other healthcare systems. Similarly, the organisational context of hospitals contains characteristics such as power structure and political influence that differentiate hospitals from other organisational contexts. It is important to note this when considering the transferability of findings from this research. However, the creation of a narrative that reflects participant's experiences of managing lean improvements provide a rich and detailed account that can be analysed by readers and assist in their assessment of the generalisability of the findings of this study. Viergever (2019) argues that a degree of trustworthiness can be credited to the findings of a CIT study through the comparison and integration of subjective viewpoints of different observers. The findings of the interviews in this research (Chapter 8) may provide readers with insights regarding comptencies for managing lean improvement projects that can adapted, or applied, in other industry or organisational contexts

5.11.3 Dependability.

Lincoln and Guba (1985) contend that dependability in research studies can be enhanced by following established practices in the field. Dependability in Delphi studies can be enhanced by carefully considering the composition of the expert panel and include a range and representative sample of experts (Cornick, 2006). The Delphi panel in this study was chosen on a set of pre-established criteria based on experience and knowledge of lean in healthcare. Criteria were selected by identifying and following guidelines as recommended and identified in methodological research (Hasson and Keeney, 2000). A similar approach was adopted to the selection of participants in the critical-event interviews following established research practice (Bryman, 2008).

During the course of this study, the researcher provided a clear record of methodological choices, the approach taken to the Delphi study and the approach to the critical-event interviews. Clear operational details concerning the data collection and data analysis procedures are also provided. The Delphi surveys utilised, and schedule of interview questions and probes used in the critical-event interviews are included in the appendices of this document.

The research methods have been documented, conducted, and the findings of the research have been reported in a manner that facilitates replication and examination by other researchers (Creswell and Creswell, 2018).

The study also applies complementary data collection techniques thus facilitating triangulation and enhancing the dependability of the data by considering it from multiple sources including literature, established compotency models, expert opinion and interviews (Merriam, 1998; Creswell and Miller, 2000). The researcher was also guided by experienced research supervisors and feedback at interim quality checks such as the PhD transfer process and annual PhD progress reviews.

5.11.4 Confirmability

Creswell and Creswell (2018) argue that the nature of qualitative research means that risks of researcher bias exist, and that the researcher should take steps to minimise bias. According to Lincoln and Guba (1985) confirmability can be enhanced by a 'confirmability audit' that can be provided by the researcher providing a comprehensive research design outlining key decisions taken during the research process that includes justification of methods, sampling decisions, operational details for data collection and any instances where the researcher was aware of potential bias that may occur.

In Delphi studies researcher bias can be minimised by the inclusion of an open first round and confirmability is improved by providing a detailed account of the procedures of the Delphi study (Keeney *et al.*, 2011). The CIT technique by its nature affords a significant degree of freedom to the research participant in that they choose the incident(s) and describe them from their perspective thus limiting the researcher's subjectivity (Gremler, 2004; Vianden, 2012). However, it is possible for the researcher to misinterpret the participants account of the event or attribute data to an incorrect category or theme (Vianden, 2012). In this study the researcher tooks steps to minimise researcher bias by confirming with participants important aspects of their accounts and by reporting incidents using in vivo quotes from participants (Woolsey, 1986; Vianden, 2012).

In qualitative research, bias can be reduced by including detailed description of the phenomenon observed and documented. The incorporation of multiple perspectives can add to the effectiveness of qualitative reports (Armstrong, 2010). In this research the primary

perspective of the participant was from a manager/lead role of a lean improvement project in an Irish public hospital. However, the participants, although in a role as a project/manager lead, also either currently held another role with clinical or managerial responsibility or possessed significant experience in a clinical or managerial role. This facilitated the expression of multiple perspective in the findings of the research. Confirmability in critical event interviews can be enhanced by reporting detailed procedures for data collection, following established protocols for using the technique (Flanagan, 1954; Chell, 2004) and reporting detail descriptions of participant perspectives (Hua, 2015). Detailed procedures regarding the operationalisation of the CIT technique utilised in the study are included in this chapter, chapter 8 and the appendices section, of this document.

5.12 Reflexivity and researcher bias.

In qualitative research it is important for the researcher to consider reflexivity and acknowledge their role in the research. This involves examining their own feelings, reactions and motives and consider how these influence what they do or think in a situation. The researcher should remain reflexive regarding their own bias in the selection of participants, the formulation of research instruments and in the reporting and interpretation of results (Ismail and Taliep, 2020).

The researcher maintained their neutrality during the research process by following established research protocols as previously reported. In the Delphi study, distance was maintained from participants by facilitating an open first-round survey that generated the statements that were subsequently used in other rounds of the Delphi process. The critical-event technique was conducted by using an established interview protocol in the first instance, and by using probing questions in response to the participant's description of the critical event.

Research information sheets were provided to participants in advance of their participation and informed consent forms were also obtained. All data collected during this research was analysed, considered and presented fairly and equitably. Participation in research seminars and advice from the researcher's supervisors and other experienced researchers mitigated against potential unconscious and unintentional researcher bias.

5.13 Ethical Considerations.

A number of ethical issues were considered during this study including researcher competence, participant consent and withdrawal; and data collection and control. With regard to researcher competence the researcher was ably informed and guided by an experienced research supervisory team comprising two supervisors with significant research supervision experience. The researcher also attended research seminars in both quantitative and qualitative methods in the research seminar series provided by SETU; doctoral colloquia; and conferences (see Appendix 11).

With regard to participant consent and control, the researcher obtained ethical approval from the researcher's higher education institute SETU and also familiarised themselves with research policies and protocols of the Institute. In accordance with those policies regarding the participation of non-vulnerable adults, consent was obtained from participants in advance of their participation and participants were informed of their right to withdraw from the study should they choose to do so.

The researcher was also cognisant of their obligations regarding data collection and control. In accordance with General Data Protection Regulations (GDPR) and the Data Protection Policy of SETU the researcher ensured that all data was collected and processed fairly. The data collected was only used for the purpose intended, previously agreed with participants and in a lawful manner. During the research process the research ensured the data was kept up-to-date, accurate and complete. Interview data was stored securely on the researcher's laptop and these files are password protected. Access was solely restricted to the researcher and his supervisors. Data was managed and stored in compliance with the General Data Protection Regulation (GDPR) and SETU data protection policies. Data will be held for a period of at least 10 years after which it will be destroyed. The data will be retained by the researcher in a secure location for a reasonable, but not excessive time.

With regard to participant confidentiality all references to participants are anonymised using alphanumerical indicators and geographical locations are also anonymised. Neutral pronouns such as 'they/their' are used when referring to participants rather than 'he/she/him/her'.

5.14 Limitations of the Research Design.

The research design for this study was chosen based on a number of methodological decisions that are explained in the earlier sections of this chapter. The benefits and limitations of the mixed method approach have also already been described. Table 5.5 illustrates the key limitations of the research design. This table uses a "3C approach" which illustrates the concern regarding the research design, the cause of this concern, and the countermeasure adopted to mitigate against this concern. The "3C approach" is a method commonly used in continuous improvement activity that capturing issues or concerns occurring in day-to-day activities that highlights problems, encourage managers and teams to identify causes of these problems and develop countermeasures that remove or mitigate the concern (Radnor and Bucci, 2011).

The first concern centred on the time commitments involved with conducting a mixed methods research study. This is largely caused by the need to conduct both quantitative and qualitative methods in the same research design. Concerns also existed regarding the time necessary to complete the research given the part-time nature of the research study and the full-time work commitments of the researcher. However, these concerns were mitigated by the fact that the researcher availing of a semester long break from his work commitments to fully focus on his research. Also, the researcher's daily work as a lecturer in the Business School at SETU and as a co-lead of the Academy of Lean Enterprise Excellence at SETU mean that they encounter lean concepts, practice and literature on an ongoing basis.

A mixed method design also requires the researcher to be familiar with both quantitative and qualitative approaches, thus requiring the researcher to have expertise in both. This concern is reduced in this study as the researcher has already completed a Masters level research study that utilised quantitative methods. The concern is further mitigated as the researcher attended research seminars in both quantitative and qualitative methods in the research seminar series provided by SETU, doctoral colloquia, and conferences (See Appendix 11).

Another concern exists regarding potential bias from participants in the research study. This concern is mitigated by the use of both Delphi surveys with an expert panel and critical-incident interviews with practising lean managers. This mix of participants allows for a broader mix of perspectives to be gathered, reducing the risk of bias and allowing for triangulation to occur between the results of the quantitative and qualitative elements of the study. The use of purposive sampling in the study can also lead to bias if the experiences of participants are too similar. Again, the mix of participants utilised in the study mitigates against this potential bias.

Table 5.5 Key Limitations of the Research Design

Concern	Cause	Countermeasure
Time commitments associated with conducting a mixed methods study.	Mixed method studies can take longer to complete due to the combination of quantitative and qualitative elements. The PhD student's full-time work commitments and the part-time nature of the PhD studies.	The careful selection of sample size and the use of purposive sampling in both stages of the mixed methods will likely generate more useful data in a shorter space of time. The PhD student can avail of a full semester break from work duties during the research study. The PhD student's lecturing work encompasses theory and practice relevant to the research study.
Experience required to conduct mixed methods research.	Mixed methods research by its nature require familiarity with both qualitative and quantitative research methods.	The PhD student has already completed a Masters by research study that utilised quantitative techniques. The PhD student has attended research skills seminars organised by the Business School at SETU, along with other doctoral colloquia and conferences (See Appendix 11).
Potential bias from research participants and the smaller sample sizes used in this mixed method study.	The choice of a mixed methods approach to research design. The use of purposive sampling.	The use of surveys with expert panels and critical-incident interviews with lean managers allows for a broader range of perspectives to be gathered. Purposive sampling could potentially lead to bias if the experiences of participants are too similar. The mix of the expert panel to include academics, consultants and practitioners; combined with the interviews with practising managers of lean projects mitigate against such bias.

Source: developed by the researcher.

5.15 Conclusion.

This chapter explains the research methodology used in the study. The research question and sub-research questions adopted for the study were provided. The researcher adopted a middle ground philosophical position. A mixed methods approach using a Delphi study and critical-incident interviews was viewed as most appropriate to answering the research questions and sub-research questions. The next chapter presents an overview of the Irish healthcare sector which is the research context for this study.

CHAPTER 6: RESEARCH CONTEXT – IRISH HEALTHCARE SECTOR

6.1 Chapter Overview

In order to fully understand the findings from any research study it is necessary to comprehensively understand the research context. This is particularly relevant when the research design incorporates qualitative approaches, as is the case with this research study. Korstjens and Moser (2017) observe that qualitative research considers the natural contexts in which individuals or groups function in order to better understand real-world problems. In this study the research context is public hospitals in the Irish healthcare system. The Irish healthcare system comprises a mix of public and private funding and provision and is unusual in a European context as it does not provide universal, equitable access to primary or acute hospital care (Wren and Connolly, 2017). Recent healthcare reforms have moved to address this and in 2017 an all parliamentary party committee report entitled Sláintecare was published that detailed a need to move to a universal, high quality, single-tier health system for Ireland (Houses of the Oireachtas, 2017).

This chapter provides an overview of the healthcare system in Ireland describing recent reforms that are influencing health service provision in Ireland. The governance and regulatory structures influencing healthcare provision are also outlined, and the Irish hospital services structure, that provides the context for this research, is described comprehensively. The approach to quality improvement in Irish healthcare is also outlined explaining recent applications of Lean practice in the Irish healthcare system. Existing competency models used in the Irish public sector are also explored. The chapter concludes by examining developments in the Irish healthcare system that are likely to shape the future of healthcare service provision in Ireland.

6.2 Health Services in Ireland

The overarching bodies that govern the provision of health services in Ireland are the Irish Government and the Department of Health which has responsibility for key health policy decisions in Ireland. In 2020, €17.4 billion was allocated by the Irish government for the provision of public health services in Ireland. Ireland operates a two-tier health system that

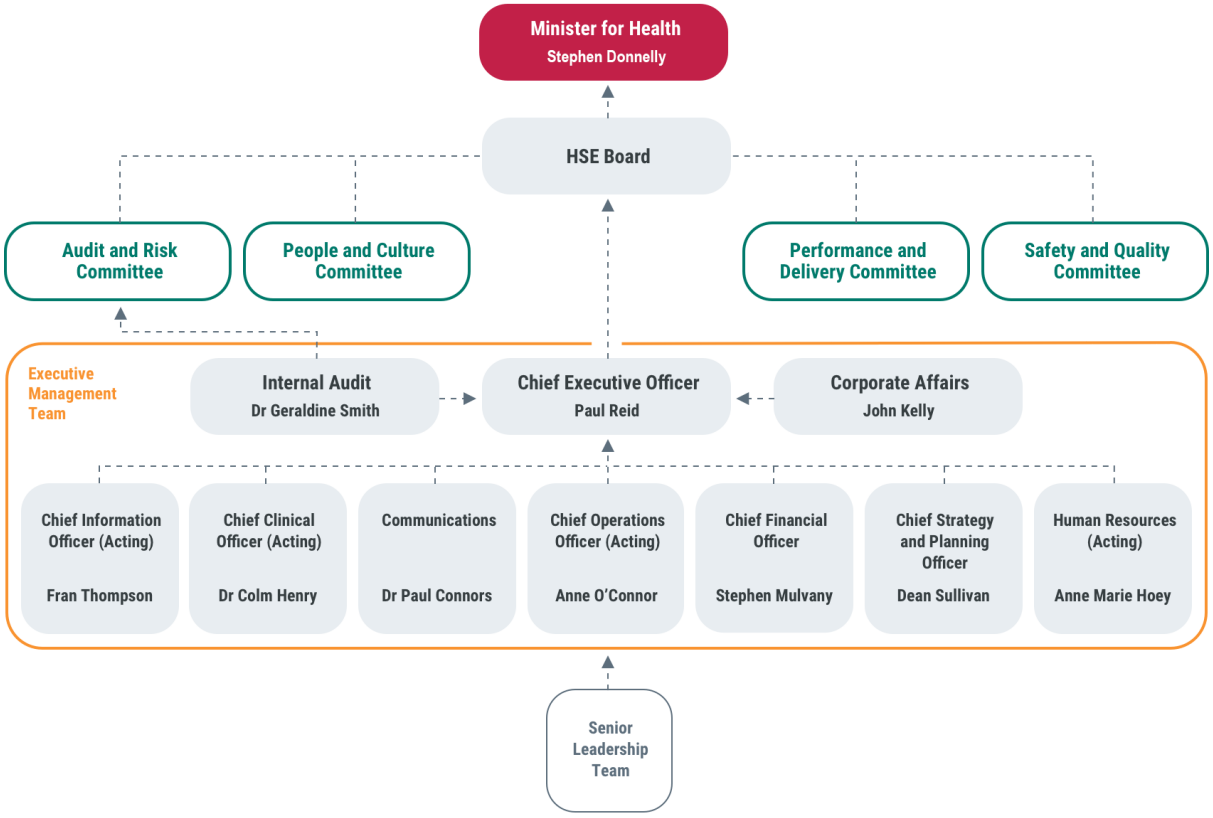
comprises public health services, provided by general practitioners (GP's), public health community services and public hospitals, and private hospitals that provide health services to patients who primarily have private medical insurance. There are no universal entitlements to healthcare in Ireland with eligibility for health services specified in the 1970 Health Act. This Act separates all residents into two categories: those with medical cards who have full eligibility (approx. 36%) and those without medical cards (approx. 64%) who have limited eligibility (HSE, 2016). Those with medical cards theoretically can access health services without charge, however long waiting lists for certain treatments result in a situation where people are often unable to access services within a reasonable time. The Committee on the Future of Healthcare in Ireland has described the need to establish a universal single tier service where patients are treated on the basis of health need rather than on ability to pay (Committee on the Future of Healthcare, 2017).

6.3 Health Service Executive.

The provision of health and personal social services from public funds for the Irish population is administered by the Health Service Executive (HSE). The HSE became fully operational in 2005 following its establishment from provisions in the Health Act 2004. It replaced the previous organising structure for health service in Ireland that comprised many regional health boards, agencies and other organisations. The HSE has an annual budget that exceeds €16 billion and is the largest employer in Ireland with 67,000 direct employees and a further 35,000 individuals employed by agencies funded by the HSE.

The HSE has a Code of Governance that sets out the principles, policies, procedures and guidelines that it utilises to manage and control its functions and enable its employees. The most recent Code of Governance for the HSE was approved by the Minister for Health in 2015. Engagement with public stakeholders is a priority for the HSE and there are four Regional Health Forums which include representatives from city and county councils in those regions. The current CEO of the HSE is Mr Paul Reid and the HSE board reports directly via its executive board to the current Irish Minister for Health, Mr Stephen Donnelly. Figure 6.1 provides an overview of the HSE organisational structure.

Figure 6.1 An overview of the HSE organisational structure.



Source: https://www.hse.ie/eng/about/who/ (last accessed 03/02/2021).

6.4 Irish Hospital Services Structure.

The Acute Hospitals Division of the HSE oversees the provision of safe, quality acute healthcare services to patients across Ireland. Hospital services in Ireland are provided by seven regional hospital groups that aim to deliver improved patient outcomes for service users. Each hospital group comprises a number of hospitals that provide acute care for patients and also maintain close relationships with various community-based healthcare and social services. One of the primary objectives of the hospital groups is to maximise the amount of quality care that can be provided by smaller local hospitals and community health services whilst ensuring that highly specialised, with more complex care being safely provided by larger hospitals. Table 6.1 illustrates the regional hospital groups in Ireland.

Table 6.1 Regional hospital groups in Ireland and the hospitals in each of those groups.

Ireland East Hospital Group	RCSI Hospitals Group	Dublin Midlands Hospital Group	University Limerick Hospitals Group	South/South-West Hospital Group	Saolta University Healthcare Group	Children's Healthcare Ireland
Mater University Hospital Dublin	Beaumont Hospital Dublin	St James's Hospital Dublin	University Hospital Limerick	Cork University Hospital	University Hospital Galway	CHI at Crumlin
St Vincent's University Hospital Dublin	Connolly Hospital Dublin	St Luke's Radiation Oncology Network	University Maternity Hospital Limerick	University Hospital Waterford.	Sligo University Hospital	CHI at Temple Street
Midland Regional Hospital Mullingar	Our lady of Lourdes Hospital Drogheda	Tallaght University Hospital Dublin	Ennis Hospital	University Hospital Kerry.	Letterkenny University Hospital	CHI at Tallaght
St Luke's General Hospital Kilkenny	Louth County Hospital Dundalk	Midlands Regional Hospital Tullamore	Nenagh Hospital	Mercy University Hospital	Mayo University Hospital	CHI at Connolly Blanchardstown
Wexford General Hospital	CaVan General Hospital	Naas General Hospital	Croom Hospital	South Tipperary General Hospital	Portiuncula University Hospital	
Our Lady's Hospital NaVan	Rotunda Hospital Dublin	Midlands Regional Hospital Portlaoise		Bantry General Hospital	Roscommon University Hospital	
St Columcille's Hospital Loughlinstown Dublin.	Monaghon Hospital	The Coombe Women & Infant University Hospital Dublin		South Infirmary Victoria University Hospital		
St Michael's Hospital Dun Laoghaire				Mallow General Hospital		
Cappagh National Orthopaedic Hospital				Lourdes Orthopaedic Hospital Kilcreene		
Royal Victoria Eye and Ear Hospital Dublin						
National Maternity Hospital Dublin						

Source: https://www.hse.ie/eng/services/list/3/acutehospitals/hospitalgroups.html (last accessed 03/02/2021).

6.5 Quality Improvement in Irish Health Services.

The HSE has a National Quality Improvement (NQI) Team whose chief objective is to support health services to lead sustainable improvements that provide better, safer healthcare.

The stated mission of the NQI is to:

> *"We work in partnership with staff and people who use our health and social care services to lead innovation and sustainable QI to achieve measurably better and safer care"*
>
> (Source: https://www.hse.ie/eng/about/who/qid/aboutqid/ last accessed 11/02/2021)

The NQI aims to achieve its mission by working with healthcare service providers in four key ways: partnering; enabling; demonstrating and championing. Table 6.2 provide more details on these functions.

Table 6.2 Key Functions of the National Quality Improvement Team.

NATIONAL QUALITY IMPROVEMENT TEAM			
Partner	**Enable**	**Demonstrate**	**Champion**
Work with and connect people across the system (service users, clinicians, managers and national bodies) to inform and align improvement.	Build capability for leadership and quality improvement through learning and development opportunities.	Use evidence to identify the need for, and demonstrate the impact of, QI.	Continually share information, evidence and learning to support people working in practice and policy to improve care.

(Source: https://www.hse.ie/eng/about/who/qid/aboutqid/ last accessed 11/02/2021).

A five-year strategic plan for improving quality in the Irish health services was published in January 2020. This strategic plan, developed by the National Quality improvement Team in collaboration with the HSE, is entitled: "By all, with all, for all: a strategic approach to improving quality 2020-2024*"* (HSE, 2020).

This strategy utilises as its foundation the six drivers for improving quality identified in a previous body of work conducted by the HSE that established a framework for improving quality in the Irish Health Service (HSE, 2016). The six drivers for improving quality are:

1. leadership for quality,
2. person and family engagement,
3. staff engagement,
4. use of improvement methods,

5. measurement for quality, and
6. governance for quality.

As a means of achieving the five-year strategic plan, the NQI Team have established seven programmes of work that provide support in measuring and improving QI systems; emphasise the importance of continuous improvement in delivering sustainable, high quality, care; promotion of learning and development opportunities; and connecting those trained in QI with ongoing research that informs the continual evaluation of improvement work. These programmes are illustrated in Table 6.3.

Table 6.3: Programme of work of the National Quality Improvement Team.

Programme	Objective
Sustainable QI Programme	Partner on sustainable improvements in quality.
School of QI Programme	Build capability for QI.
QI Connections Programme	Communicate and connect for QI.
Evidence for Improvement Programme	Use and generate evidence for learning and improvement.
Partnering with people who use Health Services programme.	Drive and promote true partnership with people who use health services.
Global Health Programme	Improve health and quality of healthcare in Ireland and in less developed countries.
Clinical Directorate Programme	To support the CD in the progression of the directorate model of care in hospital groups and community care.

(Source:https://www.hse.ie/eng/about/who/qid/strategic-plan-2019-2024/strategic-approach-2020-2024.pdf last accessed 11/02/2021).

Many different quality improvement methodologies are mentioned in the NQI strategy document including Microsystems, Lean, Six Sigma and the Associates in Process Improvement's Model for Improvement (HSE, 2020). The fact that Lean is specifically mentioned in the NQI strategy document stresses the importance of Lean as a methodology for achieving lasting continuous improvement.

6.6 Application of Operational Improvement and Lean in Irish Health Services.

Various initiatives with a focus on operational improvement have been launched in the Irish Health Services including the Irish Hospital Redesign Programme and the National Patient Flow Improvement Programme. The Irish Hospital Redesign Programme was established in 2014 and led by Dr Tony O'Connell, based around his experiences of the Australian healthcare system (Mulholland, 2019). Initially deployed at Tallaght University this programme sought to realign hospital services so that each patient journey could be recognised as safe and of the highest quality (Tallaght University Hospital, 2014). The programme achieved results across a number of metrics including resource efficiency; patient throughput; better ward processes and improved patient referral times. Despite this success the programme was discontinued and not extended beyond Tallaght Hospital.

In 2015, the Health Business Services division of the HSE, issued a proof of concept tender entitled *"Scientific management practices in healthcare to tackle patient flow: Proof of concept"* (HSE, 2015).

This formed the basis of the National Patient Flow Improvement Programme that was launched in 2016. This programme included University Hospital Galway and University Hospital Limerick as its pilot sites and employed GE Healthcare Finnamore on a consultancy basis to support the programme (Nash *et al.*, 2017). The first stage of this programme was completed in March 2018, and according to the Head of the Special Delivery Unit of the HSE, proof of concept was obtained, however, the report from phase 1 of the programme outlined that further support from Government would be required alongside greater resourcing to enable change (Mulholland, 2019).

The aforementioned programmes, in combination with the strategy document of the National Quality Improvement Team in the HSE (see section 6.5), all reference the role of Lean methodologies in contributing to improvement activity within the Irish health services. This is recognised in several aspects of a broader Lean and operational excellence ecosystem that exists in Ireland that encompasses educational institutions and exemplar organisations in other industries. Several Irish higher education institutions have established specialist educational programmes in the Lean healthcare space, with others offering programmes in Lean Enterprise Excellence and Lean practice. Some Irish hospitals have created their own academies such as the Mater Lean Academy (partnering with UCD Health Systems) and CUH Lean Innovation Centre (partnering with CIT).

6.7 Competency Models.

There are several competency models that have been adopted by various disciplines that are integral to healthcare. These competency models tend to be focused on particular healthcare specialisms, roles or education and training programmes.

National projects have been commissioned to develop competency models for specific healthcare roles such as the Irish national study on the Competency Model for Nursing Management that focused on developing competencies for nurse manager roles at three different levels (McCarthy and Fitzpatrick, 2009). Competency frameworks have also been established to guide education in clinical effectiveness (Lehane *et al.*, 2018). The HSE has also developed competence frameworks around specific models of care, such as the Palliative Care Competence Framework that describes core competencies and discipline specific competencies for twelve health and social care disciplines (Palliative Care Competence Framework Steering Group, 2014).

The efficient running of Irish healthcare system is also dependent on the effectiveness of non-clinical support and administrative staff. The HSE is the largest employer in Ireland, employing 126,689 people in whole time equivalent (WTE), or permanent, roles in January 2021. This included 17,922 WTE employees in health and social care professional roles including management, administrative/supervisory and clerical roles. A further 19,932 WTE employees performed management and administrative roles in a support, maintenance or technical function. Competency models also exist for Irish public sector such as the PAS Civil Service Competency Model that identify competencies for a number of public sector roles such as Principal Officer, Assistant Principal, Higher Executive Officer, Executive Officer, Administrative Officer and Clerical Officer.

The 2020-2024 strategic plan developed by the National Quality Improvement Team of the HSE identifies a School of QI Programme with the purpose of developing a person-centred culture of learning and development (HSE, 2020, p. 11). This involves commissioning QI learning and development opportunities and engaging with key stakeholders including people who use and deliver health services. This includes collaborating with colleges, academic bodies and other educators and advocates working within the health services. Within the School of QI Programme three key processes are outlined (HSE, 2020):

1. Support all staff to have up to date improvement knowledge and skills which they can use in their day to day work.
2. Engage with champions, facilitators and educators to support the development of a culture that is person centred and seeks to continually improve and innovate.
3. Align, influence and integrate the School of QI learning programmes with other HSE programmes that build quality, safety and leadership capability

Although there are competency models that are applied in the Irish healthcare services in various clinical, managerial and public sector roles, there is no dedicated competency model that is targeted towards the management of Lean improvement projects in Irish hspitals.

6.8 Future Health in Ireland and the role of Lean.

According to the most recent population census the population in Ireland is still growing and as of 2016 stands at 4.76 million, representing a growth rate of 3.8% during the previous ten years. During 2006-2015, the over-65 population increased by 29.5%. During the same time acute inpatient hospital beds decreased by 13% (Department of Health, 2016). A 2017 Royal College of Physician's of Ireland (RCPI) report observed that Irish hospitals are charged with an impossible task: demand for services exceeds capacity to deliver (RCPI, 2017, p. 10). The same report recommends a number of changes including using and optimising data to better plan services, developing healthcare leaders, supporting healthcare staff, and developing stronger capacity in primary and community care settings (RCPI, 2017).

The National Quality Improvement Team of the HSE has recognised the importance of robust quality improvement activity as being central to the delivery of improved and include Lean practices as part of an improvement toolkit that can assist in achieving this (HSE, 2020). The importance of supporting, enabling and developing healthcare staff and reducing the burden of excessively administrative processes that are not fit for purpose has also been identified (RCPI, 2017; HSE, 2020). It is evident that Lean can, and is, playing a role in improved healthcare delivery across many healthcare processes such as: improved treatment room layout (Boyle, 2021); improved rates of day of surgery admission (Brown *et al.*, 2019); improving PPE supply chain demand (Sheehan *et al.*, 2020); improving hip fracture patient pathways (Murphy *et al.*, 2019); improving patient therapy time in stroke patients (Connolly *et al.*, 2020); and optimising nursing time in day care units (Davies *et al.*, 2019).

However, challenges still remain. Research estimates that almost two-thirds of initiatives in healthcare experience implementation failure resulting in a 'quality chasm' (Braithwaite *et al.*, 2018; Graban, 2019). This can also be seen in Ireland where programmes such as the Irish Hospital Redesign Programme and National Patient Flow Improvement, despite showing promising results, have been discontinued or stalled. Graban (2019) describes the potential for Lean to help deliver lower costs and increased value in healthcare processes and assist in breaking down silos in hospital systems. This requires a support structure that develops Lean leaders who recognise that many of the challenges they face are strategic and adaptive in nature and that by developing and empowering people to drive improvement activity beyond a project focus, can deliver more sustainable systemic results (Graban, 2019; McNamara and Teeling, 2019).

6.9 Chapter Summary.

This chapter has described the Irish Healthcare context and the structure of the Irish hospital system. The role of lean and other CI methodologies is Irish healthcare has also been explored, describing previous operational improvement initiatives in the Irish hospital system and recent application of lean across various healthcare processes. Various competency models in healthcare service provision and public sector administrative and managerial support services have also been discussed. The HSE strategy for quality improvement in healthcare has also been presented identifying that key elements of this strategy pertain to the development of improvement capability within the Irish healthcare service. It is noted that currently that a competency model to support lean improvement activity in Irish hospitals does not exist. The next chapter presents the findings of this research study.

Chapter 7 Findings from the Modified Delphi Study.

7.1 Chapter Overview.

This findings chapter is structured to align with the different stages of the mixed-methods approach to data collection that was adopted for this research.

In this chapter, the findings from the modified Delphi component of the research are presented, commencing with a profile of the participants in the expert panel and then presenting the results of each round of the modified Delphi. In chapter 8, the findings from the critical event interviews is presented by describing the themes that emerged during the interview process.

7.2 Delphi Study Participants.

The participant pool for the research was selected using the criteria and procedures outlined in Chapter 5 (see p.92). A total of 62 individuals were sent invitations to participate in the study with the intention of composing an expert panel of between 12-15 participants. Some of those that were invited to participate indicated their inability to do so due to work/personal commitments. Others indicated that they no longer worked in the Lean healthcare sector and ruled themselves out of participating. A small number of those invited to participate in the study did not respond to the invitation.

A final participant pool of 20 individuals agreed to participate in the expert panel. The panel included 11 male and 9 female participants from 8 countries.

The participants included academics, consultants offering lean healthcare services and healthcare practitioners. The participants also represented various roles in their organisations and possessed significant experience of the application of Lean practice in healthcare.

Table 7.1 provides a geographical breakdown of the country of residence for the expert panel.

As illustrated in Table 7.2, the participants in the Delphi study represented different backgrounds with 5 participants identifying as academics; 2 participants identifying as consultants; 6 participants identifying as healthcare practitioners; 2 participants identifying as fulfilling practitioner and academic roles; 4 participants identifying as fulfilling practitioner and consultant roles; and one participant identifying as a consultant academic role.

Table 7.1 Geographical Profile of Participants in the Modified Delphi.

Country	Number
Ireland	**7**
United Kingdom	**4**
Australia	**2**
Denmark	**2**
USA	**2**
Brazil	**1**
Canada	**1**
South Africa	**1**

Table 7.2 presents an overview of the broad participant profile in the Delphi study.

Table 7.2 Professional profile of participants in the Delphi study.

Participant Profile	Number
Academic	5
Consultant	2
Practitioner	6
Practitioner/Academic	2
Practitioner/Consultant	4
Consultant/Academic	1

7.3 Findings from the Round 1 Survey

The Round 1 survey see Appendix 3 contained ten questions in total. The first four questions of the survey were open-ended questions that asked participants to comment on the values, knowledge, skills and behaviours that managers of Lean projects in hospitals need to have to be considered effective. Questions 5-10 of the first-round survey presented participants with six competency categories that were identified from a review of the literature (See Chapter 4). Under each competency category participants were asked to generate at least two competencies. Participants were also provided with the opportunity to identify each competency category as not being applicable if that was their opinion.

A robust approach was adopted to analysing the responses to the first-round responses. This approach was adapted from established literature pertaining to qualitative analysis (Braun and Clark, 2006; Maguire and Delahunt, 2017; Burnard (1991) cited by Keeney *et al.*, 2011; Creswell and Creswell, 2018; Keeney *et al.*, 2011). Table 7.3 illustrates the approach adopted (see p. 123).

The responses to questions 1-4 were coded using an Initial Coding approach (Saldana, 2016) that adopted a line-by-line open coding method of breaking the data down into discrete parts, closely examining them and then comparing them for similarities and differences.

Question 1 asked respondents to identify what *values* do managers of Lean projects in hospitals need to hold to be effective? Question 2 asked respondents to identify what *knowledge* do managers of Lean projects in hospitals need to have acquired to be effective? Question 3 asked respondents what *skills* do managers of Lean projects in hospitals need to practise to be effective? Question 4 asked respondents what *behaviours* do managers of Lean projects in hospitals need to exhibit to be effective?

Questions 1-4, as is the nature of open-ended questions, generated a lot of data that needed to be captured, sorted, coded and further refined removing data items that were duplicated across responses. All 20 panel members returned the first-round survey however one respondent did not answer questions 5-10 on the survey. Although this respondent chose not to answer questions 5-10 on the survey, they provided detailed responses to questions 1-4 of the survey that included useful information concerning their opinion regarding the behaviour, knowledge, skills and values relevant to managers of Lean improvement projects and as such the research included this information in the analysis of replies to those questions.

Table 7.3 Approach to Analysing Round 1 of the Delphi Study

STEP	DESCRIPTION
1. Familiarising the researcher with the data.	All survey responses read independently of each other to get a sense of the type of data generated by the respondents.
2.Organise and prepare the data for analysis.	All survey responses given unique identifiers, printed, prepared and stored for analysis. A spreadsheet file created to record researcher impressions of the data.
3. Read all responses thoroughly and make notes.	All survey responses read thoroughly, and notes made on printed survey responses and recorded in spreadsheet file.
4. Coding of data into themes.	Responses to each question read thoroughly to identify keywords indicating competency themes and entered into spreadsheet file.
5. Categorising data.	Separating coded data into the competency categories as identified by the survey respondents.
6. Generating and refining competency statements.	Examining responses to identify competency statements in each competency category.
7. Identifying statements that are similar	Examining responses and group similar responses together to be considered for collapsing into one statement.
8. Collapse similar statements.	Collapse similar statement into one statement for inclusion in Round 2 of the Delphi.
9. Compile final list of statements.	Compile final list of statements under each competency category.
10. Review all data analysed to check for completeness.	Repeat steps 3-9 above again to double-check each step again and make refinements
11. Prepare final list of competency categories and statements.	Prepare final list of competency categories and statement for inclusion in Round 2 survey of the Delphi.

A master spreadsheet was created to fully capture the response of each participant under each question. These data from responses were then collated in relation to each question and analysed for repetition and similarity.

Table 7.4 indicates the number of raw codes that were generated from the responses to questions 1-4 of the Round 1 survey.

Table 7.4 - The number of data items generated from questions 1-4 of the Round 1 survey.

Stage of Analysis	Q1 - Values	Q2 - Knowledge	Q3 - Skills	Q4 - Behaviours
Initial number of Raw Codes Generated	136	140	161	115
Raw codes sorted with duplicates removed.	110	97	104	89

Appendix 12 illustrates the initial codes generated from Questions 1-4 (following a sorting exercise where duplicates were removed). The openness of these questions allowed the respondents the maximum freedom to express their thoughts, opinions and observations regarding the values, knowledge, skills and behaviours exhibited by managers of Lean projects in hospitals.

Questions 5-10 of the first-round Delphi survey requested participants to identify at least two or more competencies under each of six competency categories that were identified from a detailed analysis of the Lean and healthcare management literature (See Table 4.6). The six competency categories identified were: Leadership; Hospital Management and Healthcare Environment; Business Skills; Relationship Management; Professional Ethics and Social Responsibility; and Lean Management.

The analysis of question 5-10 of the first-round Delphi survey involved a number of steps. Firstly, the competency statements from each respondent were collected. Then these statements were sorted, and similarities were identified and considered for removal of duplicate statement, and/or merging of highly similar statements into one statement. Following this the competency items were sorted into categories (sub-categories under each competency category). These were then further collapsed and reorganised into sub-categories within each competency category. Finally, a list of competency statements was identified under each category. Table 7.5 illustrates this process showing the number of competency statements that were

Tables 7.5 Number of Competency Statements considered under each Competency Category at each stage of analysis.

Stage of Analysis	Leadership	Hospital Management and Healthcare Environment	Business Skills.	Relationship Management	Professional Ethics and Social Responsibility	Lean Management
Statements Collected	51 statements.	31 statements.	38 statements.	44 statements.	28 statements.	40 statements.
Statements sorted and similar statements identified.	51 statements. 20 similarities identified.	31 statements, 12 similarities identified.	38 statements, 18 similarities identified.	44 statements, 18 similarities identified.	28 statements, 18 similarities identified.	40 statements, 17 similarities identified.
Statements sorted into categories.	51 statements, 20 similarities identified. 8 categories.	31 statements, 12 similarities identified. 4 categories.	38 statements, 18 similarities identified. 7 categories.	44 statements, 18 similarities identified, 4 categories.	28 statements, 18 similarities identified. 4 categories.	40 statements, 17 similarities identified. 7 categories.
Statements further collapsed and reorganised.	51 statements, 20 similarities identified. 8 categories, 18 competencies identified as belonging to or duplicated in other categories.	31 statements, 12 similarities identified. 4 categories. 6 competencies identified as belonging to or duplicated in other categories.	38 statements, 18 similarities identified. 7 categories, 6 competencies identified as belonging to or duplicated in other categories.	44 statements, 18 similarities identified, 4 categories. 8 competencies identified as belonging to or duplicated in other categories.	28 statements, 18 similarities identified. 4 categories, 1 competency identified as belonging to or duplicated in other categories.	40 statements, 17 similarities identified. 7 categories, 10 competencies identified as belonging to or duplicated in other categories.
Competency statements under each competency category finalised.	11 statements, 3 categories.	10 statements, 3 categories.	17 statements, 4 categories.	17 statements, 4 categories.	12 statements, 3 categories.	25 statements, 6 categories.

considered under each competency category at each stage of the process, the number of similarities/commonalities that occurred, the number of categories identified and the final number of competency statements identified in each category.

One respondent did not answer questions 5-10 of the first-round survey. Nineteen respondents identified competencies under the Leadership competency category and under the Relationship Management competency category. Seventeen respondents identified competencies under the Hospital Management and Healthcare Environment category, with two respondents indicating that this category was not applicable. Seventeen respondents identified competencies under the Business Skills category, with one respondent indicating that this category was not applicable and another respondent indicating that they did not fully understand what business skills covered. Fifteen respondents identified competencies under the Professional Ethics and Social Responsibility category, with four respondents indicating that in their opinion that this competency category was not applicable. Seventeen respondents identified competencies under the Lean Management category, with two respondents identifying that this competency category was not applicable.

Participants were afforded the opportunity to include additional competency categories not identified in the round-one survey however no participant chose to do this. A small number of participants identified competency statements that they chose not to include under the six competency categories identified. These additional competency statements, upon examination and analysis, were very similar to competencies identified by other respondents that were included under the six competency categories included in the survey.

To add further clarity regarding the process illustrated in Table 7.5, an example of unique, but similar competency statements from the Leadership category are illustrated below:

Leads with humility.	Lean managers often need to lead with no authority, therefore need to be able to engage others without the power that comes from authority.
Humble.	Demonstrates leadership qualities and exhibits behaviours conducive to a lean environment such as trust, integrity, honesty and respect for people.
Humble inquiry.	Ask questions to help people learn more about the problems they are trying to solve.
Humility	It's not about you – it's about them & the improvements & changes the team are implementing. The manager's job is to facilitate and assist the team in whatever way they can to achieve their project goals. The team will quickly identify if their manager is only in it for the glory!

When considering the above unique statements proposed by respondents these were merged and collapsed into a single competency statement that is included in the Leadership and Skills Behaviour sub-category in the Leadership competency category.

Leads with humility.	Demonstrates a willingness to seek input, actively listen to others, understand other viewpoints and learn from others.

Some competency statements identified by respondents were included in other categories. For example, some respondents indicated competency statements in the Hospital Management and Healthcare environment category similar to those identified in the Leadership competency category. For example, the competency statement below was identified by a respondent in the Hospital Management and Healthcare environment category:

Practices standard work for management	Has clear standard work for daily management.

This statement is considered to be very similar to statements identified by respondents in the Lean Management competency category:

Visible leadership.	Maintains a regular presence at the "Gemba", seeking to understand process issues first-hand and regularly attending morning meetings.

In summary, 92 competency statements were identified in six competency categories. Strong support was shown for the competency categories with all categories achieving at least a 75% approval rate from the expert panel participants. Following analysis of the competency statements identified by respondents under the Lean management competency category, a number of the competency statements identified with broader continuous improvement practices associated with quality management, six sigma and other continuous improvement approaches. To better reflect this the title of the Lean Management competency category will be retitled to the Managing Continuous Improvement competency category for the remaining rounds of the Delphi study. Once finalised the 92 competency statements were considered against the raw codes generated from the analysis of questions 1-4 of the round-one survey to ensure that the competency statements accurately reflected the value, knowledge, skills and behaviours identified by respondents. The final competency statements identified under each competency category following the full analysis of the Round 1 survey responses are illustrated in the following pages.

COMPETENCY CATEGORY 1: LEADERSHIP		
L1	Leads by example.	Demonstrates leadership qualities and exhibits behaviours conducive to a lean environment such as trust, integrity, honesty and respect for people.
L2	Leads with humility.	Demonstrates a willingness to seek input, actively listen to others, understand other viewpoints and learn from others.
L3	Articulates mission and shared vision.	Articulates the vision, mission and objectives of the organisation and demonstrates an ability to actively engage in the policy deployment process aligned to a shared vision for the organisation.
L4	Visible leadership.	Maintains a regular presence at the "gemba", seeking to understand process issues first-hand and regularly attending morning meetings.
L5	Leads with consistency	Demonstrates a consistent approach to leadership that reflects the underpinning values of the organisation and embraces standard leader work.
L6	Engages in participatory decision-making.	Encourages decision-making through consultation with others based around team problem solving.
L7	Creates a psychologically safe environment.	Develop an environment that is psychologically safe, allowing people to contribute ideas and insightful observations without fear of criticism or reproach.
L8	Encourages staff commitment.	Demonstrates an ability to achieve results through people by motivating and empowering subordinates.
L9	Leads with transparency.	Leads transparently, effectively communicating to others about progress, possible problems and planned changes.
L10	Change Leadership.	Demonstrates ability to identify potential areas of change, challenge the status quo, and lead teams to develop effective, workable solutions in a lean environment.
L11	Engages in pragmatic decision-making	Encourages decision-making based on available evidence and choosing to move forward rather than wait for optimal conditions.

COMPETENCY CATEGORY 2: HOSPITAL MANAGEMENT AND HEALTHCARE ENVIRONMENT		
H1	Understands the regulatory environment.	Understands the role of government, regulatory, professional and accreditation bodies.
H2	Understands the political environment and health system drivers.	Understands the role of national policy, demographics, societal changes and public sector funding on the healthcare environment.
H3	Understands the inter-relationships between different hospital functions and units.	Demonstrates knowledge of the internal structures of the organisation and an awareness of the needs of internal customers. Understands that interdependencies occur within the hospital system and that a change in one area may have an impact in another part of the system.
H4	Understands the resource implications of improvement decisions.	Understands the need to balance priorities in a resource constrained environment and demonstrates an ability to make effective resource deployment decisions.
H5	Demonstrates knowledge of hospital practices.	Demonstrates knowledge of professional and clinical practices and behaviours in different departments of the hospital.
H6	Appreciates patient value.	Demonstrates an ability to identify activities that add value for patients and understands the concept of patient-centred care.
H7	Understands patient safety systems within the clinical environment.	Understands the reporting mechanisms within risk management and clinical governance structures when managing activities within clinical environments.
H8	Communicates effectively with stakeholders.	Develops an awareness of the “different languages” in a hospital and can communicate effectively with the different stakeholders regarding improvement activities and how they add value.
H9	Understands the people element	Needs to understand the impact any planned change will have on the internal stakeholders (staff) and on the external stakeholders (patients and families).
H10	Develops others.	Develops and implements practices that coach and develop other colleagues and team members.

COMPETENCY CATEGORY 3: BUSINESS SKILLS		
B1	Understanding data.	Understanding data on a scientific and technical level and appreciates the difference the difference between financial data and healthcare data.
B2	Uses appropriate data for decision-making.	Sources, understands and analyses both qualitative and quantitative data from internal and external sources to support effective decisions.
B3	Utilising data as a basis for measuring improvement.	Using data and statistical techniques to understand variation and the impact of proposed improvement.
B4	Collects first-hand data.	Engages in Gemba walks, morning meetings and performance review meetings to obtain first-hand accounts of operational performance problems as they arise.
B5	Understands operational management.	Understands the demand profiles on services and demonstrates an ability to effectively manage operations and the roles of people and technology in relation to processes.
B6	Uses visual management to improve performance.	Creates a visual management system for front line teams to track and improve performance.
B7	Identifies and solves process problems.	Demonstrates an ability to use lean tools and techniques such as Value Stream Mapping to identify improvement opportunities and generate process improvement solutions.
B8	Understands contracting and procurement processes.	Understands the importance of managing supplies across the organisational network and the contracting process in developing and maintaining relationships with suppliers.
B9	Financial management.	Understands, effectively uses and effectively communicates financial data.
B10	Measures key performance indicators as defined by organisation strategy.	Demonstrates an awareness of organisational and national key performance indicators and measures contribution towards achieving organisational goals and objectives.
B11	Understands budgeting processes.	Ensures projects are managed efficiently and within allocated budgets.
B12	Resource Management.	Plans, organises, effectively and manages the resources of the organisation.
B13	Business case development.	Demonstrates an ability to interpret and use financial information to support development of a business case and demonstrate financial impact of planned improvements.
B14	Aligns project and corporate goals.	Demonstrates an ability to identify projects and actions that will meet and achieve corporate goals and strategic direction of the organisation.
B15	Project Management.	Demonstrates an ability to resource, manage and deliver projects.
B16	Meetings Management.	Demonstrates an ability to effectively chair and manage project meetings in a consistent fashion.
B17	Demonstrates commitment by delivering tangible wins.	Utilises the achievement of milestone targets to build momentum and maintain buy-in from the project team

COMPETENCY CATEGORY 4: RELATIONSHIP MANAGEMENT		
R1	Identifies stakeholders.	Identifies stakeholders to ensure the right people are involved in improvement activity, including those outside of their own organisation/usual networks.
R2	Maintains stakeholder relationships.	Collaborates with others to maintain effective relationships with internal and external stakeholders.
R3	Displays gratitude	Shows appreciation to stakeholders for their contribution.
R4	Understands and acknowledges power dynamics.	Demonstrates awareness of power dynamics and appropriately engages with the right people in the right order to bring about discussion, especially in relation to change.
R5	Partners in the value stream.	Ensure partners in other parts of the value stream are actively engaged and collaborated with to ensure that they are aware of work underway and progress to allow them to understand potential changes and impacts.
R6	Maintains or develops relationships with similar areas of focus both inside and outside of the organization.	This will be helpful for the team to go and see others perform similar work so they can learn new approaches/methods.
R7	Acknowledges that everyone is important.	Demonstrates that everyone's opinion and ideas are valued.
R8	Works effectively with teams.	Develops and can work effectively with teams.
R9	Creates behavioural expectations.	Communicates and reinforces to team members know what behaviours are expected of them.
R10	Creates cross disciplinary links.	Establishes connections that span professional silos, creating links that are meaningful for all.
R11	Ensures collaborative working.	Involve a broad range of people regularly and whenever feasible to ensure buy-in so that progress and results represent a group effort.
R12	Communication skills.	Demonstrates an ability to communicate in written and verbal communication formats.
R13	Communicates progress.	Shares progress with all internal and external stakeholders as well as with other colleagues across the health care system.
R14	Respect others.	Understands how to engage with people, how to speak about people when they are not present, and how to address inadequacies in performance.
R15	Displays empathy and understanding.	Demonstrates an ability to have empathy for others and seeks to understand the impact their decisions and the project/transformation will have on all people involved, both directly and indirectly.
R16	Active listening.	Listens to others and actively hear their ideas and suggestions.
R17	Manages conflict.	Seeks to understand reasons for conflict between parties and manages this through discussion, mediation, negotiation and communication.

COMPETENCY CATEGORY 5: PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY		
P1	Demonstrates professional conduct and expects professional conduct from others.	Demonstrates an ability to conduct themselves in a competent, professional manner and acts with integrity. Expects a high level of integrity from the people they work with.
P2	Demonstrates commitment to agreed values and behaviours.	Acts consistently reflecting agreed values. Commits to embracing agreed behaviours and challenges compliance when behaviours are not aligned with the values of the organisation.
P3	Ethical project delivery.	Implements meaningful change, seeking the most efficient processes to bring the greatest value to the customer.
P4	Encourages ethical behaviour.	Demonstrates transparency in decision making and uses ethical and moral standards to make sound and fair decisions that include participants perspectives and considerations.
P5	Is inclusive and respectful.	Is inclusive and collaborative, respecting the team, past experiences, the patients and the environment.
P6	Acknowledges social context.	Demonstrates an awareness of the socioeconomic context of the organisation and does not seek to income generate from those who cannot afford to pay.
P7	Demonstrates social awareness.	Demonstrates an ability to look outwards, learning about and appreciating others in their diversity, views and needs in an open a collaborative way.
P8	Support others and is mindful of the needs of staff.	Constantly celebrates the good work of the team and is aware of the interests and needs of staff members. Coaches and mentors others in their development.
P9	Confronts skills gaps.	Where coaching and mentoring isn't working, has the courage to identify staff where performance management is required, with the potential that should the performance approach not work, utilises the HR process to remove or redeploy staff.
P10	Principle based	Consistent in their values and principles and demonstrates courage in adhering to these.
P11	Technical and professional expertise.	Competent in using the project tools and has professional expertise in the project subject. Engages with training and developments opportunities as applicable.
P12	Awareness of scope of practice.	Does not suggest that staff members exceed their scope beyond established professional and personal competence.

COMPETENCY CATEGORY 6: MANAGING FOR CONTINUOUS IMPROVEMENT.		
M1	Customer focused.	The manager should understand the tremendous responsibility entrusted to them by patients. They are the reason we have jobs and it's our responsibility to make things better for them by providing value to them as customers.
M2	Involves patients, carers, and service users.	Adopts an empathetic approach that views healthcare services from the service-users perspective. Seeks the involvement of service users in service redesign.
M3	Gathers customer feedback.	Develops "voice of the customer" techniques to capture feedback from patients and internal customers.
M4	Deploys the lean management system.	Manages according to the principles of lean – providing clarity of direction, understanding current state, root cause analysis, creation of target conditions, delivery.
M5	Able to select and apply appropriate lean methods and tools.	Demonstrates a deep understanding the allows the manager to plan a project and select and use the best tools and methods for the purpose.
M6	Balances the application of standard work with experimentation.	Recognises the importance of consistent adherence to agreed best practice, whilst simultaneously encouraging experiments to find better ways.
M7	Meetings management.	Ensure meetings are productive, efficient and not just talking shops that run over time without any agreed actions.
M8	Identifies and eliminates waste.	Demonstrates a strong desire to identify, eliminate and prevent the recurrence of waste.
M9	Understands Continuous Improvement Culture	Creates an attitude of improvement and demonstrates determination to achieve agreed target conditions.
M10	Manages Continuous Improvement.	Understand the components of a continuous improvement system including harvesting opportunities and how to commission and monitor projects to improve performance.
M11	Advocates a GEMBA culture.	Create a strong link between staff and management by bringing management to Gemba and giving voice to day-to-day staff problems.
M12	Demonstrates a commitment to stability.	Understands that reducing variation in fundamental to quality, safety, and improvement. Strives to improve the stability of processes.
M13	Able to select and apply appropriate quality methods and tools.	Demonstrates an ability to select and apply appropriate quality methods and tools, such as root-cause analysis and Six Sigma, to better understand process variation, engage in problem solving and recognise improvement opportunities.
M14	Demonstrate patience and a tolerance for failure.	Builds psychological safety in the context of experimentation, understanding that failure can be part of problem solving and recognises that problem solving is a process that requires creativity and idea generation.

M15	Adopts a systematic problem-solving approach.	Demonstrates knowledge of established continuous improvement cycles such as PDSA and DMAIC and can apply these.
M16	Understands Value Added Analysis.	Develops lean culture which uses value-added and nonvalue-added time study analysis.
M17	Mapping processes.	Demonstrates an ability to conduct process mapping and Value Stream Mapping with the active involvement of staff, capturing and analysing current state data to identify improvement opportunities. Evaluates future state data to understand the impact that actions taken have had on value stream performance.
M18	Change management.	Develops guidelines to identify change needed and understands the reasons why change is necessary. Seeks to understand barriers to change from the perspective of others and takes action to address these.
M19	Visualises performance.	Understands how to make process performance and abnormalities visible and actionable.
M20	Setting up and constructively using visual management boards	Understands that data-driven feedback is essential to learning, accountability and improvement. Uses the concepts of daily operations, status at a glance, performance improvement and continuous improvement huddles.
M21	Directly observes process activity.	Adopts the practice of Gemba walks to see what is happening in processes.
M22	Shares feedback.	Communicates feedback with relevant stakeholders in a non-judgmental way.
M23	Plans for sustainability.	Develops action plans that seek to sustain improvements and seeks to leverage project benefits by sharing learnings and knowledge with others.
M24	Acts as a coach and mentor to others.	Demonstrates an ability to coach others to identify and solve problems rather than just solve problems themselves.
M25	Promotes training and education.	Encourages participation in training and education programmes that support a sustained organisational approach to Lean Management.

7.4 Findings from the Round 2 Survey.

Round 2 of the Delphi study took the form of a survey that presented participants with the six competency categories and corresponding competency statements identified in the Round 1 survey and requested that participants rate each individual competency statement on a scale of 1-5 in terms of importance with a rating 1 indicating highest importance, and a rating of 5 indicating least importance. Respondents were provided with instructions on how to complete the survey which included the rating scale shown below:

Figure 7.1 Rating scale that accompanied the Round 2 Survey.

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

The purpose of the scale shown above was to distinguish between those competencies identified as "Expert" and critical for Lean improvement project success, from those identified as "Core" and necessary for Lean improvement project success; or those identified as "Supplementary" and necessary for Lean improvement project success but used either frequently/infrequently; and those identified in the "Remove" category and as not useful for Lean improvement project success.

Sixteen participants from the 20-member expert panel completed the Second-Round survey, indicating a response rate of 80% which can be considered as a satisfactory response rate for a study of this nature. In an analysis of 31 studies where the Delphi method was used to achieve consensus in core outcome set development, Gargon *et al.* (2019) identified a range of response rates of 45%-100% across the studies with a typical overall response rate of 80% or higher. Four participants indicated their intention to withdraw from the study due to work/personal commitments and escalating workplace challenges due to the Covid-19 pandemic.

The responses to the second-round survey were analysed using the statistical analysis software, SPSS ver. 24. Descriptive statistics were calculated for each competency statement including the mean, median and standard deviation for each competency statement with the objective of achieving a consensus among participant responses. An initial consensus rate of 65% was established prior to the distribution of the second-round survey. Based on a response rate of sixteen responses, it was deemed that once eleven respondents agreed on a rating, consensus would have been achieved.

Descriptive statistics for each of the six Competency Categories and competency statements within each category are illustrated in the table below. Each category is presented in order from left-to-right in table Table 7.6 with L1-L11 representing the leadership competencies; H1-H10 representing the hospital management and healthcare environment competencies; B1-B17 representing the business skills competencies; R1-R17 representing the relationship management competencies; P1-P12 representing the professional ethics and social responsibilities competencies; and M1-M25 representing the managing continuous improvement competencies.

For each competency statement the following information is presented:

1) % agreeing on the highest competency rating.
2) The median rating for competency statement.
3) The interquartile range for each competency statement.
4) The standard deviation for each competency statement.

Consensus is indicated when the percentage of respondents agreeing with a competency statement is greater than 65% and also where the interquartile range for that competency statement is less than or equal to 1. The interquartile range (IQR) is a measure of where the middle fifty lies in a data set. It is a measure of where the bulk of the values are in a data set and can be calculated by subtracting the first quartile from the third quartile. In Delphi studies using a 5-point scale (as is used in this study) an IQR of less than or equal to 1 indicates consensus (Hackett *et al.*, 2006; Geist, 2010; Giannarou and Servas, 2014).

The standard deviation (SD) is also presented as a measure of the variation or dispersion around a set of values. A low standard deviation indicates that the values tend to be close to the mean of the set, while a high standard deviation indicates that the values are spread out over a wider range. In Delphi studies using a 5-point scale (as is used in this study) a SD of less than 1.5 commonly indicates consensus (Christie and Barela, 2005; Giannarou and Servas, 2014).

Table 7.6 – Descriptive statistics for Round 2 of the Delphi study.

Com.	% Agree	Median	IQR	SD		Com.	% Agree	Median	IQR	SD		Com.	% Agree	Median	IQR	SD
L1	87.5	1.00	0	.561		R1	56.3	1.00	1	0.910		M1	56.3	1.00	1	0.816
L2	50	1.00	1	.640		R2	37.5	2.00	2	0.834		M2	62.5	1.00	1	0.828
L3	37.5	2.00	2	1.146		R3	43.8	2.00	2	0.799		M3	50	2.00	1	0.799
L4	37.5	2.00	2	0.799		R4	37.5	2.00	2	0.834		M4	50	2.00	2	0.862
L5	43.8	2.00	2	1.134		R5	37.5	2.00	2	0.941		M5	56.3	3.00	2	0.900
L6	56.3	2.00	1	0.640		R6	43.8	3.00	2	1.033		M6	31.3	2.00	2	1.047
L7	62.5	1.00	1	0.834		R7	50	2.00	1	0.724		M7	37.5	2.00	2	0.834
L8	43.8	2.00	1	0.775		R8	62.5	1.00	1	0.828		M8	50	2.00	1	0.884
L9	62.5	2.00	1	0.640		R9	31.3	2.00	2	0.990		M9	50	2.00	1	0.724
L10	43.8	2.00	2	0.834		R10	43.8	3.00	1	0.910		M10	43.8	2.00	2	0.834
L11	50	2.00	1	0.676		R11	31.3	2.00	1	0.986		M11	56.3	1.00	1	0.900
						R12	37.5	2.00	2	1.033		M12	62.5	1.00	2	0.900
H1	43.8	4.00	1	0.910		R13	50	3.00	1	0.737		M13	37.5	2.00	2	0.961
H2	43.8	4.00	1	0.976		R14	37.5	2.00	2	0.915		M14	68.8	1.00	1	0.834
H3	43.8	2.00	2	0.990		R15	50	2.00	1	0.704		M15	50	2.00	1	0.884
H4	37.5	2.00	2	1.060		R16	43.8	2.00	1	0.775		M16	31.3	2.00	2	0.941
H5	75	3.00	0	0.834		R17	31.3	2.00	3	1.187		M17	62.5	1.00	1	0.828
H6	56.3	1.00	1	0.640								M18	37.5	2.00	2	0.884
H7	43.8	3.00	1	0.743		P1	56.3	1.00	1	0.737		M19	56.3	1.00	1	0.961
H8	56.3	2.00	1	0.704		P2	43.8	2.00	2	0.834		M20	68.8	1.00	1	1.047
H9	56.3	2.00	1	0.516		P3	43.8	2.00	2	0.834		M21	62.5	1.00	1	0.976
H10	37.5	2.00	2	1.060		P4	50	2.00	1	0.617		M22	37.5	2.00	2	0.799
						P5	50	2.00	1	0.724		M23	43.8	2.00	2	0.834
B1	62.5	2.00	0	0.799		P6	31.3	3.00	2	1.387		M24	50	2.00	1	0.724
B2	43.8	2.00	2	0.862		P7	31.3	3.00	1	1.183		M25	43.8	3.00	1	0.743
B3	37.5	2.00	2	0.834		P8	31.3	2.00	2	0.990						
B4	50	2.00	1	0.632		P9	37.5	3.00	3	1.246						
B5	43.8	3.00	1	1.060		P10	43.8	2.00	1	1.100						
B6	50	2.00	1	0.724		P11	37.5	2.00	2	0.834						
B7	50	2.00	2	1.033		P12	37.5	2.00	2	1.265						
B8	50	3.00	1	0.737												
B9	43.8	3.00	1	1.033												
B10	50	3.00	2	0.884												
B11	50	3.00	2	0.976												
B12	37.5	2.00	2	1.033												
B13	37.5	3.00	2	0.941												
B14	37.5	2.00	2	0.834												
B15	56.3	3.00	1	0.743												
B16	43.8	2.00	2	0.834												
B17	43.8	2.00	1	0.799												

One competency in the leadership competency category achieved a consensus in excess of 65% and an interquartile range of less than or equal to 1. Fourteen of the 16 respondents rated the first competency in the leadership competency category, L1, at an expert rating indicating the competency is considered critical for Lean improvement project success. The mean for the L1 competency was 1.19 and the standard deviation was .544 both indicating a strong tendency towards the expert rating.

Similarly, in the hospital management and healthcare environment competency category, only one competency achieved a consensus rating of greater than 65%, with 75% of the respondents rating the H5 competency statement in the supplementary and used frequently point of the rating scale. The H5 competency statement also had an interquartile range score of 0. The mean of the H5 competency was 2.88, with a corresponding median of 3 and a standard deviation of .834, indicating a strong tendency for agreement around the third point of the 5-point rating scale.

There was a much broader range of ratings indicated by respondents across the ten competency statements in the hospital management and healthcare environment competency category with a number of competency statements achieving ratings in the supplementary part of the rating scale.

None of the competency statements in the business skills competency category achieved a consensus from respondents in the second-round survey. The B1 competency statement was the closest to achieving consensus with 10 of the 16 respondents rating this as “Core” on the rating scale. One respondent neglected to enter a rating against the B12 competency statement.

None of the competency statements in the relationship management competency category achieved consensus in the round 2 survey. The R8 competency statement was closest to achieving consensus with 10 of the 16 respondents rating this as “Expert” on the rating scale.

Twelve statements were considered in the professional ethics and social responsibility competency category. None of the twelve competency statements achieved a consensus rating from respondents. The P6, P7 and P12 competency statements were rated in all 5 rating categories with the P8, P9 and P10 competency statements rated in four of the five-point rating scale.

In the managing continuous improvement competency category, two competency statements achieved a consensus rating of 68.75% with 11 of the 16 respondents rating the statement as

"Expert" on the rating scale. Competency statement M14 rated a median score of 1.00, an interquartile range of 1, and a standard deviation of .834, indicating broad consensus and low variation around the consensus rating of 1, "Expert" on the rating scale. Competency statement M20 had a median of 1.00, an interquartile range of 1, and a standard deviation of 1.025 indicating a broad consensus and reasonably low variation around the consensus rating of 1, "Expert" rating on the rating scale. There was a broad acceptance of the competency statements in this category from respondents with none of the respondents rating any of the statements in this category a 5, "Remove" rating on the rating scale. Most of the competency statements were rated in the first three categories of the rating scale by respondents with one respondent indicating a rating of 4, "Supplementary but used infrequently", against 9 of the 25 competency statements in the category. Two respondents indicated a rating of 4, "Supplementary but used infrequently" against the M6 competency statement.

In summary, only 4 competency statements in the round 2 survey achieved a consensus rating. These competency statements are listed in Table 7.7 below:

Table 7.7 – Competencies achieving consensus in Round 2 of the Delphi Study

Code	Rating	Competency Name	Competency Description
L1	Expert	Leads by example	Demonstrates leadership qualities and exhibits behaviours conducive to a lean environment such as trust, integrity, honesty and respect for people.
H5	Used frequently	Demonstrates knowledge of hospital practices.	Demonstrates knowledge of professional and clinical practices and behaviours in different departments of the hospital.
M14	Expert	Demonstrates patience and a tolerance for failure.	Builds psychological safety in the context of experimentation, understanding that failure can be part of problem solving and recognises that problem solving is a process that requires creativity and idea generation.
M20	Expert	Setting up and constructively using visual management boards	Understands that data-driven feedback is essential to learning, accountability and improvement. Uses the concepts of daily operations, status at a glance, performance improvement and continuous improvement huddles.

These statements, although included in the third-round survey, will indicate that consensus has been achieved. Chronbach alpha coefficients were calculated to assess internal reliability consistency for each category scale. The following chronbach alpha coefficients passed the reliability test achieving a coefficient score above 0.7 - Leadership scale: 0.809; Business Skills scale: 0.85; Relationship Management scale: 0.843; Professional Ethics and Social

Responsibility scale: 0.774; Managing Continuous Improvement scale: 0.921. The Hospital Management and Healthcare Environment scale had a chronbach coefficient of 0.623 indicating that scale is of debatable reliability. However, in exploratory studies such as this one a chronbach coefficient of greater than 0.6 can be deemed as acceptable.

7.5 Findings from the Round 3 Survey.

The third-round survey of the Delphi study sought to establish greater levels of consensus among participants for each of the competency statements included in the survey. Four statements achieved consensus in the second-round survey. These are included in the third-round survey with an indication that no further action is required from participants regarding these statements as consensus has already been achieved. The third-round survey (see Appendix 6) presents the Delphi panel participants for each competency statement: the median score from the second-round survey, their rating from the second-round survey and an option for them to change their rating should they choose to do so. Participants were provided with clear survey instructions that included a summary of the results from the second-round survey. It was also stressed to participants that they were not obligated in any way to adjust their rating from the previous round.

A total of 14 of the 16 remaining participants from the second round decided to participate in the third-round survey resulting in a response rate of 87.5%. Two respondents declined to participate in the third-round survey citing work obligations as a factor impeding their participation. In the third-round survey consensus will be applied in a similar manner to the second-round survey where consensus is considered achieved when 65% of respondents agree on a rating for the competency statement and the interquartile range for the competency statement is less than or equal to 1. The standard deviation will be also be presented as a measure of the variation or dispersion around a set of values.

Table 7.8, overleaf, presents the descriptive statistics and the rating frequencies for the competency statements in Round 3 of the Delphi study. The third-round results for each competency category will be presented in turn.

One competency statement in the Leadership category, L1, had achieved a consensus rating in the second-round survey. Of the 10 remaining competency statements in this category, a further 5 competency statements (L6, L7, L8, L9 and L11) achieved a consensus rating in excess of 65% and also had an interquartile range of less than or equal to 1, thus achieving consensus in the third round. A further five competencies (L2, L3, L4, L5 and L10) did not achieve the required consensus rating and will be presented to participants again for further consideration. It is worth noting that the third-round standard deviation scores for competency statements in this category, particularly in those statements achieving consensus, decreased from the standard deviation scores recorded in the second round.

Table 7.8 – Descriptive statistics for Round 3 of the Delphi study.

Com.	% Agree	Median	IQR	SD		Com.	% Agree	Median	IQR	SD		Com.	% Agree	Median	IQR	SD
L1	Consensus achieved in Round 2					**R1**	85.7	1.00	0	0.825		**M1**	85.7	1.00	0	0.363
L2	64.3	1.00	1	0.497		**R2**	85.7	2.00	0	0.363		**M2**	92.9	1.00	0	0.267
L3	57.1	2.00	1	0.663		**R3**	64.3	2.00	1	0.579		**M3**	64.3	2.00	1	0.646
L4	42.9	2.00	1	0.727		**R4**	78.6	2.00	0.25	0.426		**M4**	64.3	2.00	1	0.760
L5	57.1	2.00	1	0.514		**R5**	85.7	2.00	0	0.616		**M5**	57.1	3.00	1	0.852
L6	85.7	2.00	0	0.363		**R6**	71.4	3.00	0	0.730		**M6**	50	2.00	1	0.864
L7	92.9	1.00	0	0.267		**R7**	71.4	1.00	1	0.469		**M7**	57.1	2.00	1	0.663
L8	71.4	2.00	1	0.469		**R8**	92.9	1.00	0	0.267		**M8**	64.3	1.00	1	0.646
L9	78.6	2.00	0.25	0.426		**R9**	71.4	2.00	0.25	0.535		**M9**	64.3	1.00	1	0.497
L10	50	2.00	1	0.633		**R10**	64.3	2.00	1	0.726		**M10**	71.4	2.00	0.25	0.535
L11	78.6	2.00	0	0.475		**R11**	64.3	2.00	1	0.726		**M11**	85.7	1.00	0	0.579
						R12	78.6	2.00	0	0.679		**M12**	85.7	1.00	0	0.363
H1	78.6	4.00	0	0.475		**R13**	50	3.00	1	0.633		**M13**	71.4	2.00	0	0.555
H2	71.4	4.00	0.25	0.535		**R14**	78.6	2.00	0.25	0.426		**M14**	Consensus achieved in Round 2			
H3	64.3	2.00	0.25	0.785		**R15**	78.6	2.00	0.25	0.426		**M15**	50	1.50	1	0.519
H4	71.4	2.00	0	0.731		**R16**	64.3	2.00	1	0.497		**M16**	71.4	2.00	0	0.555
H5	Consensus achieved in Round 2					**R17**	64.3	2.00	0.25	0.616		**M17**	78.6	1.00	0.25	0.745
H6	100	1.00	0	0.000								**M18**	64.3	2.00	0.25	0.616
H7	64.3	2.00	1	0.497		**P1**	78.6	1.00	0.25	0.426		**M19**	71.9	1.00	1	0.469
H8	78.6	2.00	0	0.475		**P2**	64.3	2.00	1	0.579		**M20**	Consensus achieved in Round 2			
H9	100	2.00	0	0.000		**P3**	50	2.00	1	0.633		**M21**	78.6	1.00	0.25	0.611
H10	57.1	2.00	1	0.801		**P4**	78.6	2.00	0.25	0.426		**M22**	85.7	1.00	0	0.363
						P5	85.7	1.00	0	0.363		**M23**	92.9	1.00	0	0.267
B1	92.9	2.00	0	0.267		**P6**	71.4	3.00	0.25	0.825		**M24**	71.4	2.00	1	0.469
B2	71.4	2.00	0.25	0.534		**P7**	50	2.00	1	0.941		**M25**	71.4	2.00	0.25	0.535
B3	78.6	2.00	0	0.475		**P8**	71.4	2.00	1	0.469						
B4	57.1	1.00	1	0.514		**P9**	50	2.00	1	0.756						
B5	64.3	2.00	1	0.579		**P10**	64.3	2.00	1	0.497						
B6	64.3	1.00	1	0.497		**P11**	78.6	2.00	0.25	0.426						
B7	57.1	1.00	1	0.756		**P12**	50	3.00	1	0.975						
B8	78.6	3.00	0.25	0.611												
B9	71.4	3.00	0.25	0.535												
B10	71.4	2.00	0	0.555												
B11	64.3	3.00	1	0.497												
B12	92.9	2.00	0	0.267												
B13	50	3.00	1	0.756												
B14	85.7	2.00	0	0.363												
B15	50	2.50	1	0.646												
B16	64.3	2.00	1	0.579												
B17	78.6	2.00	0	0.475												

The next competency category to be considered is the hospital management and healthcare environment category. One competency statement, H5, in the category had already achieved consensus in the second round of the delphi study. A further six competencies (H1, H2, H4, H6, H8 and H9) achieved consensus in the third-round survey with two competencies (H6 and H9) achieving unanimous consensus from the 14 respondents. Three competency statements (H3, H7 and H10) did not achieve a consensus rating in the third round. The standard deviation scores for the competency statements in this category were also quite low, with all being <1, indicating a low variation from the mean score. Most of the competency statements in this category were rated a score of 1 or 2 on the rating scale in the "Expert" and "Core" dimensions of the scale with less than 10% of the ratings entered at points 3 or 4 on the rating scale.

In the business skills category 9 of the 17 competency statements (B1, B2, B3, B8, B9, B10, B12, B14 and B17) achieved a consensus rating of greater than 65% and an interquartile range score of less than or equal to one. Eight competency statements (B4, B5, B6, B7, B11, B13, B15 and B16) did not achieve consensus in this round and will be sent to participants for further consideration. A broader range of ratings were recorded across the competency statements in this category with ratings recorded on points 1-4 of the rating scale.

In the relationship management category of the third-round survey 11 of the 17 competency statements (R1, R2, R4, R5, R6, R7, R8, R9, R12, R14, R15) achieved a consensus rating greater than 65% and an interquartile score of less than or equal to 1. Six competency statements (R3, R10, R11, R13, R16 and R17) achieved a consensus rating of <65% and were returned to participants for further consideration. A significant movement towards consensus was achieved in the third-round survey in this category with 11 of the competency statements that achieved consensus recording a consensus of >70%. Again, a decreasing trend occurred in the standard deviation scores between rounds 2 and 3, indicating a reduction in the variation around the mean score for each competency statement as the rounds progress.

In the professional ethics and social responsibility category, six of the twelve competency statements in this category achieved a consensus rating of >65% from respondents and also achieved an interquartile range score of 1 or less. Six statements in this category achieved a consensus rating of less than 65% and were returned to participants in a fourth-round survey in an effort to achieve greater consensus. The standard deviation scores of competency statements in this category decreased between the second and third round of the Delphi study. The standard

deviation scores in this category were slightly higher, although still <1, than the competency statements in other categories, reflecting a slightly broader set of ratings across the rating scale.

In the final competency category of the third-round survey, 25 competency statements were considered by respondents. Two competency statements, M14 and M20, in this managing continuous improvement competencies category had already achieved consensus in the second-round survey and were not further considered by respondents in the third-round survey. Of the remaining 23 competency statements in this category, 14 (M1, M2, M10, M11, M12, M13, M16, M17, M19, M21, M22, M23, M24, M25) achieved a consensus rating of >65% in the responses to the third-round survey and also had interquartile range scores of less than or equal to 1. Nine competency statements achieved a consensus rating of <65% and these competency statements were returned to respondents in the fourth-round survey for further consideration. The standard deviation scores of the competency statements in the managing continuous improvement category significantly reduced between round two and round three of the Delphi study indicating that respondent opinions tended to converge during the third round.

Overall, the responses from the third-round survey indicated a significant increase in consensus from the second-round with consensus now attained for 55 competency statements, with 37 competency statements requiring further consideration in the fourth-round of the Delphi study. Table 7.9 illustrates those competency statements in each category that have achieved consensus after three rounds of the Delphi study.

A chronbach alpha coefficient for each category scale was calculated to test for internal consistency and reliability. The chronbach coefficents for each category scale in the round 3 survey are: Leadership category – 0.709; Hospital Management and Healthcare Environment category – 0.538; Business Skills category – 0.792; Relationship Management category – 0.858; Professional Ethics and Social Responsibility category – 0.716; Managing Continuous Improvement category – 0.873. All category scales, with the exception of the Hospital Management and Healthcare Environment category, had chronbach coefficient values of greater than 0.7 indicating acceptable reliability. The Hospital Management and Healthcare Environment category had the lowest chronbach alpha coefficient value of 0.538. However, competency statements H5, H6 and H9 had zero variance and were removed from the scale. This left seven items in the category. Where there are less than 10 items in a scale, a crhonbach alpha coefficient value of greater than 0.5 is considered acceptable.

Table 7.9 – Competencies achieving consensus in Round 3 of the Delphi Study

Code	Rating	Competency Name	Competency Description
COMPETENCY CATEGORY 1: LEADERSHIP			
L1	Expert	Leads by example	Demonstrates leadership qualities and exhibits behaviours conducive to a lean environment such as trust, integrity, honesty and respect for people.
L6	Core	Engages in participatory decision-making.	Encourages decision-making through consultation with others based around team problem solving.
L7	Expert	Creates a psychologically safe environment.	Develop an environment that is psychologically safe, allowing people to contribute ideas and insightful observations without fear of criticism or reproach.
L8	Core	Encourages staff commitment.	Demonstrates an ability to achieve results through people by motivating and empowering subordinates.
L9	Core	Leads with transparency.	Leads transparently, effectively communicating to others about progress, possible problems and planned changes.
L11	Core	Engages in pragmatic decision-making	Encourages decision-making based on available evidence and choosing to move forward rather than wait for optimal conditions.
COMPETENCY CATEGORY 2: HOSPITAL AND HEALTHCARE ENVIRONMENT			
H1	Supplementary - Used infrequently	Understands the regulatory environment.	Understands the role of government, regulatory, professional and accreditation bodies.
H2	Supplementary - Used infrequently	Understands the political environment and health system drivers.	Understands the role of national policy, demographics, societal changes and public sector funding on the healthcare environment.
H4	Core	Understands the resource implications of improvement decisions.	Understands the need to balance priorities in a resource constrained environment and demonstrates an ability to make effective resource deployment decisions.
H5	Used frequently	Demonstrates knowledge of hospital practices.	Demonstrates knowledge of professional and clinical practices and behaviours in different departments of the hospital.
H6	Expert	Appreciates patient value.	Demonstrates an ability to identify activities that add value for patients and understands the concept of patient-centred care.
H8	Core	Communicates effectively with stakeholders.	Develops an awareness of the "different languages" in a hospital and can communicate effectively with the different stakeholders regarding improvement activities and how they add value.
H9	Core	Understands the people element.	Needs to understand the impact any planned change will have on the internal stakeholders (staff) and on the external stakeholders (patients and families).

Table 7.9 contd. – Competencies achieving consensus in Round 3 of the Delphi Study

Code	Rating	Competency Name	Competency Description
COMPETENCY CATEGORY 3: BUSINESS SKILLS			
B1	Core	Understanding data.	Understanding data on a scientific and technical level and appreciates the difference the difference between financial data and healthcare data.
B2	Core	Uses appropriate data for decision-making.	Sources, understands and analyses both qualitative and quantitative data from internal and external sources to support effective decisions.
B3	Core	Utilising data as a basis for measuring improvement.	Using data over and statistical techniques to understand variation and the impact of proposed improvement.
B8	Supplementary – Used Frequently	Understands contracting and procurement processes.	Understands the importance of managing supplies across the organisational network and the contracting process in developing and maintaining relationships with suppliers.
B9	Supplementary – Used Frequently	Financial management.	Understands, effectively uses and effectively communicates financial data.
B10	Core	Measures key performance indicators as defined by organisation strategy.	Demonstrates an awareness of organisational and national key performance indicators and measures contribution towards achieving organisational goals and objectives.
B12	Core	Resource Management.	Plans, organises, effectively and manages the resources of the organisation.
B14	Core	Aligns project and corporate goals.	Demonstrates an ability to identify projects and actions that will meet and achieve corporate goals and strategic direction of the organisation.
B17	Core	Demonstrates commitment by delivering tangible wins.	Utilises the achievement of milestone targets to build momentum and maintain buy-in from the project team
COMPETENCY CATEGORY 4: RELATIONSHIP MANAGEMENT			
R1	Expert	Identifies stakeholders.	Identifies stakeholders to ensure the right people are involved in improvement activity, including those outside of their own organisation/usual networks.
R2	Core	Maintains stakeholder relationships.	Collaborates with others to maintain effective relationships with internal and external stakeholders.
R4	Core	Understands and acknowledges power dynamics.	Demonstrates awareness of power dynamics and appropriately engages with the right people in the right order to bring about discussion, especially in relation to change.
R5	Core	Partners in the value stream.	Ensure partners in other parts of the value stream are actively engaged and collaborated with to ensure that they are aware of work underway and progress to allow them to understand potential changes and impacts.
R6	Supplementary – Used Frequently	Maintains or develops relationships with similar areas of focus both inside and outside of the organization.	This will be helpful for the team to go and see others perform similar work so they can learn new approaches/methods.
R7	Expert	Acknowledges that everyone is important.	Demonstrates that everyone's opinion and ideas are valued.
R8	Expert	Works effectively with teams.	Develops and can work effectively with teams.
R9	Core	Creates behavioural expectations.	Communicates and reinforces to team members know what behaviours are expected of them.

Table 7.9 contd. – Competencies achieving consensus in Round 3 of the Delphi Study

Code	Rating	Competency Name	Competency Description
COMPETENCY CATEGORY 4: RELATIONSHIP MANAGEMENT continued			
R12	Core	Communication skills.	Demonstrates an ability to communicate in written and verbal communication formats.
R14	Core	Respect others.	Understands how to engage with people, how to speak about people when they are not present, and how to address inadequacies in performance.
R15	Core	Displays empathy and understanding.	Demonstrates an ability to have empathy for others and seeks to understand the impact their decisions and the project/transformation will have on all people involved, both directly and indirectly.
COMPETENCY CATEGORY 5: PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY			
P1	Expert	Demonstrates professional conduct and expects professional conduct from others.	Demonstrates an ability to conduct themselves in a competent, professional manner and acts with integrity. Expects a high level of integrity from the people they work with.
P4	Core	Encourages ethical behaviour.	Demonstrates transparency in decision making and uses ethical and moral standards to make sound and fair decisions that include participants perspectives and considerations.
P5	Expert	Is inclusive and respectful.	Is inclusive and collaborative, respecting the team, past experiences, the patients and the environment.
P6	Supplementary – Used Frequently	Acknowledges social context.	Demonstrates an awareness of the socioeconomic context of the organisation and does not seek to income generate from those who cannot afford to pay.
P8	Core	Support others and is mindful of the needs of staff.	Constantly celebrates the good work of the team and is aware of the interests and needs of staff members. Coaches and mentors others in their development.
P11	Core	Technical and professional expertise.	Competent in using the project tools and has professional expertise in the project subject. Engages with training and developments opportunities as applicable.
COMPETENCY CATEGORY 6: MANAGING FOR CONTINUOUS IMPROVEMENT			
M1	Expert	Customer focused.	The manager should understand the tremendous responsibility entrusted to them by patients. They are the reason we have jobs and it's our responsibility to make things better for them by providing value to them as customers.
M2	Expert	Involves patients, carers, and service users.	Adopts an empathetic approach that views healthcare services from the service-users perspective. Seeks the involvement of service users in service redesign.
M10	Core	Manages Continuous Improvement.	Understand the components of a continuous improvement system including harvesting opportunities and how to commission and monitor projects to improve performance.
M11	Expert	Advocates a GEMBA culture.	Create a strong link between staff and management by bringing management to Gemba and giving voice to day-to-day staff problems.
M12	Expert	Demonstrates a commitment to stability.	Understands that reducing variation in fundamental to quality, safety, and improvement. Strives to improve the stability of processes.
M13	Core	Able to select and apply appropriate quality methods and tools.	Demonstrates an ability to select and apply appropriate quality methods and tools, such as root-cause analysis and Six Sigma, to better understand process variation, engage in problem solving and recognise improvement opportunities.
M14	Expert	Demonstrates patience and a tolerance for failure.	Builds psychological safety in the context of experimentation, understanding that failure can be part of problem solving and recognises that problem solving is a process that requires creativity and idea generation.

Table 7.9 contd. – Competencies achieving consensus in Round 3 of the Delphi Study

Code	Rating	Competency Name	Competency Description
COMPETENCY CATEGORY 6: MANAGING FOR CONTINUOUS IMPROVEMENT continued			
M16	Core	Understands Value Added Analysis.	Develops lean culture which uses value-added and nonvalue-added time study analysis.
M17	Expert	Mapping processes.	Demonstrates an ability to conduct process mapping and Value Stream Mapping with the active involvement of staff, capturing and analysing current state data to identify improvement opportunities. Evaluates future state data to understand the impact that actions taken have had on value stream performance.
M19	Expert	Visualises performance.	Understand how to make process performance and abnormalities visible and actionable.
M20	Expert	Setting up and constructively using visual management boards	Understands that data-driven feedback is essential to learning, accountability and improvement. Uses the concepts of daily operations, status at a glance, performance improvement and continuous improvement huddles.
M21	Expert	Directly observes process activity.	Adopts the practice of Gemba walks to see what is happening in processes.
M22	Expert	Shares feedback.	Communicates feedback with relevant stakeholders in a non-judgmental way.
M23	Core	Plans for sustainability.	Develops action plans that seek to sustain improvements and seeks to leverage project benefits by sharing learnings and knowledge with others.
M24	Core	Acts as a coach and mentor to others.	Demonstrates an ability to coach others to identify and solve problems rather than just solve problems themselves.
M25	Core	Promotes training and education.	Encourages participation in training and education programmes that support a sustained organisational approach to Lean Management.

7.6 Findings from the Round 4 Survey.

The fourth-round survey was the final round of the Delphi study component of this research. The fourth-round survey (see Appendix 7) presents the Delphi panel participants for each competency statement with: the median score from the third-round survey, their rating from the third-round survey and an option for them to change their rating should they choose to do so. Participants were also provided with additional information that included an interquartile range (IQR) score and a standard deviation (SD) score for each competency statement. The provision of additional descriptive statistics concerning each competency enabled participants to understand their rating in relation to the median rating for each competency statement. Participants were provided with clear survey instructions that included a summary of the results from the third-round survey. It was also stressed to participants that they were not obligated in any way to adjust their rating from the previous round. Similar to the third-round survey; a total of 14 participants (all of the 14 remaining participants from the third round) decided to participate in the fourth-round survey resulting in a response rate of 100%.

In the fourth-round survey consensus will be applied in a similar manner to the third-round survey where consensus is considered achieved when 65% of respondents agree on a rating for the competency statement and the interquartile range for the competency statement is less than or equal to 1. The standard deviation will be also be presented as a measure of the variation or dispersion around a set of values.

Table 7.10, overleaf, presents the descriptive statistics and the rating frequencies for the competency statements in Round 4 of the Delphi study. The fourth-round results for each competency category will be presented in turn and following that those statements not achieving consensus after the fourth-round will also be presented. Following analysis of the fourth-round response, participants were contacted where their ratings represented an outlier from the median score to better understand the reasoning for not following the consensus rating.

In the Leadership competency category, a further 3 competency statements (L2, L5 and L10) achieved consensus by virtue of having achieved a consensus rating of greater than 65% and also an interquartile range score of less than or equal to 1. Two competency statements (L3 and L4) at consensus rating of 64.3% narrowly missed achieving consensus. The standard deviation scores for all remaining statements in this category reduced in the fourth-round thus indicating reduced dispersal of values around the mean.

Table 7.10 – Descriptive statistics for Round 4 of the Delphi study.

Com.	% Agree	Median	IQR	SD		Com.	% Agree	Median	IQR	SD
L2	100	1.00	0	0		R3	64.3	2.00	1	0.579
L3	64.3	2.00	1	0.579		R10	78.6	2.00	0	0.475
L4	64.3	2.00	1	0.497		R11	78.6	2.00	0	0.663
L5	71.4	2.00	1	0.469		R13	50	2.00	1	0.756
L10	85.7	2.00	0	0.363		R16	64.3	2.00	1	0.497
						R17	78.6	2.00	0	0.475
H3	85.7	2.00	0	0.392						
H7	85.7	2.00	0	0.363		P2	71.4	2.00	1	0.469
H10	57.1	2.00	1	0.611		P3	85.7	2.00	0	0.392
						P7	71.4	2.00	0.25	0.914
B4	71.4	1.00	1	0.469		P9	71.4	2.00	0.25	0.699
B5	85.7	2.00	0	0.363		P10	71.4	2.00	1	0.469
B6	78.6	1.00	0.13	0.372		P12	57.1	3.00	1	0.775
B7	71.4	1.00	0.63	0.738						
B11	71.4	3.00	1	0.469		M3	71.4	1.00	1	0.633
B13	71.4	3.00	1	0.469		M4	71.4	1.00	0.63	0.608
B15	64.3	2.00	0.63	0.541		M5	71.4	3.00	0.25	0.825
B16	78.6	2.00	0	0.475		M6	57.1	2.00	1	0.829
						M7	78.6	2.00	0	0.475
						M8	78.6	1.00	0.25	0.611
						M9	78.6	1.00	0.25	0.426
						M15	57.1	1.00	1	0.457
						M18	78.6	2.00	0	0.475

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In the hospital management and healthcare environment category, seven competencies had achieved consensus following the third-round survey. In the fourth-round survey a further two competency statements (H3 and H7) achieved consensus; with only one competency statement in this category not achieving consensus and ending the Delphi process rating with an agreement level of 57.1%.

In the business skills competency category, a nine competency statements had achieved consensus following the third-round survey. Eight competency statements in this category were returned to participants for their consideration in the fourth-round survey. Of these eight competency statements, a further seven statements (B4, B5, B6, B7, B11, B13 and B16) achieved consensus in the fourth-round survey having satisfied the consensus criteria. One competency statement in this category (B15) failed to achieve the required consensus score, with 64.3% agreeing on a "Core" rating for this competency.

Eleven competency statements had achieved consensus in the relationship management competency category following the third-round survey. Six competency statements were re-examined by participants in the fourth-round of the Delphi study; with a further three competency statements (R10, R11 and R17) each achieving a consensus "Core" rating from 78.6 of the panel members. A further three competency statements did not achieve consensus with statement R3 and R16 achieving an agreement score of 64.3%, and one statement R13 achieving an agreement score of 50%.

In the professional ethics and social responsibility category, six competency statements achieved consensus following the third-round survey. A further six competency statements were returned to participants for their consideration with five statements (P2, P3, P7, P9 and P10) achieving an agreement rating of >65% in the fourth-round survey. One competency statement (P12), failed to achieve consensus achieving an agreement rating of 57.1%.

Sixteen competency statements in the managing continuous improvement category achieved consensus in the third-round survey. Nine competencies were returned to participants for their consideration in the fourth-round survey. A further seven competencies (M3, M4, M5, M7, M8, M9 and M18) in this category reached consensus in the fourth-round achieving an agreement rating of >65% and an IQR score of less than or equal to 1. Two competency statements, M6 and M15, failed to achieve consensus with an agreement rating of 57.1%.

At the conclusion of the four rounds of the Delphi study, a total of ten competency statements failed to achieve consensus. These are presented in Table 7.11 below:

Table 7.11 Competencies not reaching consensus following the fourth-round of the Delphi study.

L3	Articulates mission and shared vision.	Articulates the vision, mission and objectives of the organisation and demonstrates an ability to actively engage in the policy deployment process aligned to a shared vision for the organisation.
L4	Visible leadership.	Maintains a regular presence at the "gemba", seeking to understand process issues first-hand and regularly attending morning meetings.
H10	Develops others.	Develops and implements practices that coach and develop other colleagues and team members.
B15	Project Management.	Demonstrates an ability to resource, manage and deliver projects.
R3	Displays gratitude	Shows appreciation to stakeholders for their contribution.
R13	Communicates progress.	Shares progress with all internal and external stakeholders as well as with other colleagues across the health care system.
R16	Active listening.	Listens to others and actively hear their ideas and suggestions.
P12	Awareness of scope of practice.	Does not suggest that staff members exceed their scope beyond established professional and personal competence.
M6	Balances the application of standard work with experimentation.	Recognises the importance of consistent adherence to agreed best practice, whilst simultaneously encouraging experiments to find better ways.
M15	Adopts a systematic problem-solving approach.	Demonstrates knowledge of established continuous improvement cycles such as PDSA and DMAIC and can apply these.

It is important to note that just because the competency statements illustrated above did not achieve consensus does not mean that these competencies are not pertinent to managing lean improvement projects; but rather that the participants in the Delphi study could not agree to an agreement level of >65% on a rating level for these competencies. In fact, five of these competency statements (L3, L4, B15, R3 and R16) achieved an agreement rating of 64.3% just below the consensus level of greater than or equal to 65%. These statements also achieved IQR scores of less than or equal to 1 and SD scores of less than 1, which are commonly agreed measures of consensus on a 5-point scale such as the one used in this research. The median rating of one of the competency statements (M15) indicated an "Expert" rating with 57.1% of participants agreeing with this rating. Seven of the competency statements (L3, L4, H10, B15, R3, R13 and R16) had a median rating of "Core", with five of these statements (L3, L4, B15, R3 and R16) having an agreement rating of 64.3%; two statements (H10 and M6) having an agreement rating of 57.1%; and one statement R13 having an agreement rating of 50%. One competency (P12) had a median rating of "Supplementary but used frequently" and an agreement rating of 57.1%. These competency statements will not be discounted from the

competency model for failing to reach a consensus agreement rating of greater than or equal to 65%; but are considered further in combination with findings from the interview stage of the research.

Following the fourth-round survey participants who had indicated a rating for competency statements that were outliers from the consensus rating, or who had not changed their rating for competency statements from their third-round rating, were contacted via email to explain their reasons for indicating a rating different from the consensus rating. For example, one respondent who indicated in relation to competency statement L4 (Visible Leadership) chose to keep a fourth-round rating of "Expert" and not choose the group median rating of "Core" by indicating *"This is essential both to support staff and for leaders to learn how the organization truly functions"*. Similarly, the same participant maintained an "Expert" rating for the competency statement H10 (Develops others) and not choose the group median rating of "Core" indicating that in their opinion "*There are two reasons we use Lean: 1) to improve performance and 2) to develop people. This therefore is critical".* Also in relation to competency statement B11 (Understands budgeting processes) this participant indicating a rating of "Expert", in contrast to the group median rating of "Supplementary and used frequently", stating that in their opinion "*Identifying and eliminating waste is an important aspect of Lean*".

Another participant, in relation to competency statement P12 (Awareness of scope of practice), chose to maintain their rating of "Core" in the fourth-round diverging slightly from the group median rating of "Supplementary but used frequently" commenting that:

> The reason I've given that rating to Scope of Practice is because of the potential harmful consequences of operating outside of your scope of practice. When a healthcare professional provides treatment / care etc they are operating within a defined scope that is policy driven, evidence based and which they have received the appropriate training for. To operate outside of your scope of practice is not only jeopardising your professional registration but it may also lead to an adverse or harmful outcome for the patient.

One participant in relation to the same competency statement indicated a rating of "Remove" for this statement. When contacted for clarity of their reasoning for this rating they commented

> My belief is that lean works in a truly learning organisation. This competency suggests that people should be encouraged to work within personal competence. The learning organisation would advocate that very individual should aspire to bettering themselves. This competence seems to reinforce the status quo. This I disagree with.

Also, in the Professional Ethics and Social Responsibility competency category, in relation to competency statement P7 (Demonstrates Social Awareness) another participant indicated a rating of "Remove". However, when clarification was sought from this participant, they indicated that upon reconsidering this competency that they would like to change their rating to an "Expert" rating commenting that:

> ……that lean projects are not run as strict top-down projects. There is a large element of negotiation between the lean coach/consultant and the ward (both manager and employees). This means that the lean coach/consultant must be able to work with and appreciate the particular situation of the ward. Dialogue is important and it must be mutually respectful with interest in learning and understanding each other. I perceive this as your description of social awareness. Without such social awareness it's hard to move projects forward.

These ratings and commentary will be considered further in combination with the findings from the interview stage of the research to identify if further support for these opinions emerges from the engagement with lean healthcare practitioners on the ground in Irish hospitals.

7.7 Summary and refined competency model.

In total 92 competency statements were identified in the first round of a Delphi study with 20 participants who had expertise in Lean healthcare. These competency statements were then further examined in three further surveys rounds with participation in the survey decreasing to 16 participants in the second round and stabilising at fourteen participants in the third and fourth round surveys.

At the conclusion of the Delphi study, 82 (89%) of the competency statements had achieved a consensus rating whereby >65% of the participants had agreed on a rating and the corresponding interquartile range score was less than or equal to one.

These statements are presented in the following pages, listed in order of their consensus median score on the rating from 1 - 5.

The findings from the Delphi study will be further considered later in Chapter 8, in comparison with the finding from the critical incident stage of the research.

Table 7.12 - COMPETENCY CATEGORY 1: LEADERSHIP			Rating
L1	Leads by example.	Demonstrates leadership qualities and exhibits behaviours conducive to a lean environment such as trust, integrity, honesty and respect for people.	Expert
L2	Leads with humility.	Demonstrates a willingness to seek input, actively listen to others, understand other viewpoints and learn from others.	Expert
L7	Creates a psychologically safe environment.	Develop an environment that is psychologically safe, allowing people to contribute ideas and insightful observations without fear of criticism or reproach.	Expert
L5	Leads with consistency	Demonstrates a consistent approach to leadership that reflects the underpinning values of the organisation and embraces standard leader work.	Core
L6	Engages in participatory decision-making.	Encourages decision-making through consultation with others based around team problem solving.	Core
L8	Encourages staff commitment.	Demonstrates an ability to achieve results through people by motivating and empowering subordinates.	Core
L9	Leads with transparency.	Leads transparently, effectively communicating to others about progress, possible problems and planned changes.	Core
L10	Change Leadership.	Demonstrates ability to identify potential areas of change, challenge the status quo, and lead teams to develop effective, workable solutions in a lean environment.	Core
L11	Engages in pragmatic decision-making	Encourages decision-making based on available evidence and choosing to move forward rather than wait for optimal conditions.	Core

Table 7.12 contd. - COMPETENCY CATEGORY 2: HOSPITAL MANAGEMENT AND HEALTHCARE ENVIRONMENT			Rating
H6	Appreciates patient value.	Demonstrates an ability to identify activities that add value for patients and understands the concept of patient-centred care.	Expert
H3	Understands the inter-relationships between different hospital functions and units.	Demonstrates knowledge of the internal structures of the organisation and an awareness of the needs of internal customers. Understands that interdependencies occur within the hospital system and that a change in one area may have an impact in another part of the system.	Core
H4	Understands the resource implications of improvement decisions.	Understands the need to balance priorities in a resource constrained environment and demonstrates an ability to make effective resource deployment decisions.	Core
H7	Understands patient safety systems within the clinical environment.	Understands the reporting mechanisms within risk management and clinical governance structures when managing activities within clinical environments.	Core
H8	Communicates effectively with stakeholders.	Develops an awareness of the "different languages" in a hospital and can communicate effectively with the different stakeholders regarding improvement activities and how they add value.	Core
H9	Understands the people element	Needs to understand the impact any planned change will have on the internal stakeholders (staff) and on the external stakeholders (patients and families).	Core
H5	Demonstrates knowledge of hospital practices.	Demonstrates knowledge of professional and clinical practices and behaviours in different departments of the hospital.	Supp. Useful Frequently
H1	Understands the regulatory environment.	Understands the role of government, regulatory, professional and accreditation bodies.	Supp. Useful Infrequently
H2	Understands the political environment and health system drivers.	Understands the role of national policy, demographics, societal changes and public sector funding on the healthcare environment.	Supp. Useful Infrequently

Table 7.12 contd. - COMPETENCY CATEGORY 3: BUSINESS SKILLS			Rating
B4	Collects first-hand data.	Engages in Gemba walks, morning meetings and performance review meetings to obtain first-hand accounts of operational performance problems as they arise.	Expert
B6	Uses visual management to improve performance.	Creates a visual management system for front line teams to track and improve performance.	Expert
B7	Identifies and solves process problems.	Demonstrates an ability to use lean tools and techniques such as Value Stream Mapping to identify improvement opportunities and generate process improvement solutions.	Expert
B1	Understanding data.	Understanding data on a scientific and technical level and appreciates the difference the difference between financial data and healthcare data.	Core
B2	Uses appropriate data for decision-making.	Sources, understands and analyses both qualitative and quantitative data from internal and external sources to support effective decisions.	Core
B3	Utilising data as a basis for measuring improvement.	Using data over and statistical techniques to understand variation and the impact of proposed improvement.	Core
B5	Understands operational management.	Understands the demand profiles on services and demonstrates an ability to effectively manage operations and the roles of people and technology in relation to processes.	Core
B10	Measures key performance indicators as defined by organisation strategy.	Demonstrates an awareness of organisational and national key performance indicators and measures contribution towards achieving organisational goals and objectives.	Core
B12	Resource Management.	Plans, organises, effectively and manages the resources of the organisation.	Core
B14	Aligns project and corporate goals.	Demonstrates an ability to identify projects and actions that will meet and achieve corporate goals and strategic direction of the organisation.	Core
B16	Meetings Management.	Demonstrates an ability to effectively chair and manage project meetings in a consistent fashion.	Core
B17	Demonstrates commitment by delivering tangible wins.	Utilises the achievement of milestone targets to build momentum and maintain buy-in from the project team	Core
B8	Understands contracting and procurement processes.	Understands the importance of managing supplies across the organisational network and the contracting process in developing and maintaining relationships with suppliers.	Supp. Used Frequently
B9	Financial management.	Understands, effectively uses and effectively communicates financial data.	Supp. Used Frequently
B11	Understands budgeting processes.	Ensures projects are managed efficiently and within allocated budgets.	Supp. Used Frequently
B13	Business case development.	Demonstrates an ability to interpret and use financial information to support development of a business case and demonstrate financial impact of planned improvements.	Supp. Used Frequently

Table 7.12 - COMPETENCY CATEGORY 4: RELATIONSHIP MANAGEMENT			Rating
R1	Identifies stakeholders.	Identifies stakeholders to ensure the right people are involved in improvement activity, including those outside of their own organisation/usual networks.	Expert
R7	Acknowledges that everyone is important.	Demonstrates that everyone's opinion and ideas are valued.	Expert
R8	Works effectively with teams.	Develops and can work effectively with teams.	Expert
R2	Maintains stakeholder relationships.	Collaborates with others to maintain effective relationships with internal and external stakeholders.	Core
R4	Understands and acknowledges power dynamics.	Demonstrates awareness of power dynamics and appropriately engages with the right people in the right order to bring about discussion, especially in relation to change.	Core
R5	Partners in the value stream.	Ensure partners in other parts of the value stream are actively engaged and collaborated with to ensure that they are aware of work underway and progress to allow them to understand potential changes and impacts.	Core
R9	Creates behavioural expectations.	Communicates and reinforces to team members know what behaviours are expected of them.	Core
R10	Creates cross disciplinary links.	Establishes connections that span professional silos, creating links that are meaningful for all.	Core
R11	Ensures collaborative working.	Involve a broad range of people regularly and whenever feasible to ensure buy-in so that progress and results represent a group effort.	Core
R12	Communication skills.	Demonstrates an ability to communicate in written and verbal communication formats.	Core
R14	Respect others.	Understands how to engage with people, how to speak about people when they are not present, and how to address inadequacies in performance.	Core
R15	Displays empathy and understanding.	Demonstrates an ability to have empathy for others and seeks to understand the impact their decisions and the project/transformation will have on all people involved, both directly and indirectly.	Core
R17	Manages conflict.	Seeks to understand reasons for conflict between parties and manages this through discussion, mediation, negotiation and communication.	Core
R6	Maintains or develops relationships with similar areas of focus both inside and outside of the organization.	This will be helpful for the team to go and see others perform similar work so they can learn new approaches/methods.	Supp. Used Frequently

Table 7.12 - COMPETENCY CATEGORY 5: PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY			Rating
P1	Demonstrates professional conduct and expects professional conduct from others.	Demonstrates an ability to conduct themselves in a competent, professional manner and acts with integrity. Expects a high level of integrity from the people they work with.	Expert
P5	Is inclusive and respectful.	Is inclusive and collaborative, respecting the team, past experiences, the patients and the environment.	Expert
P2	Demonstrates commitment to agreed values and behaviours.	Acts consistently reflecting agreed values. Commits to embracing agreed behaviours and challenges compliance when behaviours are not aligned with the values of the organisation.	Core
P3	Ethical project delivery.	Implements meaningful change, seeking the most efficient processes to bring the greatest value to the customer.	Core
P4	Encourages ethical behaviour.	Demonstrates transparency in decision making and uses ethical and moral standards to make sound and fair decisions that include participants perspectives and considerations.	Core
P7	Demonstrates social awareness.	Demonstrates an ability to look outwards, learning about and appreciating others in their diversity, views and needs in an open a collaborative way.	Core
P8	Support others and is mindful of the needs of staff.	Constantly celebrates the good work of the team and is aware of the interests and needs of staff members. Coaches and mentors others in their development.	Core
P9	Confronts skills gaps.	Where coaching and mentoring isn't working, has the courage to identify staff where performance management is required, with the potential that should the performance approach not work, utilises the HR process to remove or redeploy staff.	Core
P10	Principle based	Consistent in their values and principles and demonstrates courage in adhering to these.	Core
P11	Technical and professional expertise.	Competent in using the project tools and has professional expertise in the project subject. Engages with training and developments opportunities as applicable.	Core
P6	Acknowledges social context.	Demonstrates an awareness of the socioeconomic context of the organisation and does not seek to income generate from those who cannot afford to pay.	Supp. Used Frequently

Table 7.12 - COMPETENCY CATEGORY 6: MANAGING FOR CONTINUOUS IMPROVEMENT.			Mean
M1	Customer focused.	The manager should understand the tremendous responsibility entrusted to them by patients. They are the reason we have jobs and it's our responsibility to make things better for them by providing value to them as customers.	Expert
M2	Involves patients, carers, and service users.	Adopts an empathetic approach that views healthcare services from the service-users perspective. Seeks the involvement of service users in service redesign.	Expert
M3	Gathers customer feedback.	Develops "voice of the customer" techniques to capture feedback from patients and internal customers.	Expert
M4	Deploys the lean management system.	Manages according to the principles of lean – providing clarity of direction, understanding current state, root cause analysis, creation of target conditions, delivery.	Expert
M8	Identifies and eliminates waste.	Demonstrates a strong desire to identify, eliminate and prevent the recurrence of waste.	Expert
M9	Understands Continuous Improvement Culture	Creates an attitude of improvement and demonstrates determination to achieve agreed target conditions.	Expert
M11	Advocates a GEMBA culture.	Create a strong link between staff and management by bringing management to Gemba and giving voice to day-to-day staff problems.	Expert
M12	Demonstrates a commitment to stability.	Understands that reducing variation in fundamental to quality, safety, and improvement. Strives to improve the stability of processes.	Expert
M14	Demonstrate patience and a tolerance for failure.	Builds psychological safety in the context of experimentation, understanding that failure can be part of problem solving and recognises that problem solving is a process that requires creativity and idea generation.	Expert
M17	Mapping processes.	Demonstrates an ability to conduct process mapping and Value Stream Mapping with the active involvement of staff, capturing and analysing current state data to identify improvement opportunities. Evaluates future state data to understand the impact that actions taken have had on value stream performance.	Expert
M19	Visualises performance.	Understand how to make process performance and abnormalities visible and actionable.	Expert
M20	Setting up and constructively using visual management boards	Understands that data-driven feedback is essential to learning, accountability and improvement. Uses the concepts of daily operations, status at a glance, performance improvement and continuous improvement huddles.	Expert
M21	Directly observes process activity.	Adopts the practice of Gemba walks to see what is happening in processes.	Expert
M22	Shares feedback.	Communicates feedback with relevant stakeholders in a non-judgmental way.	Expert
M23	Plans for sustainability.	Develops action plans that seek to sustain improvements and seeks to leverage project benefits by sharing learnings and knowledge with others.	Expert
M7	Meetings management.	Ensure meetings are productive, efficient and not just talking shops that run over time without any agreed actions.	Core

M10	Manages Continuous Improvement.	Understand the components of a continuous improvement system including harvesting opportunities and how to commission and monitor projects to improve performance.	Core
M13	Able to select and apply appropriate quality methods and tools.	Demonstrates an ability to select and apply appropriate quality methods and tools, such as root-cause analysis and Six Sigma, to better understand process variation, engage in problem solving and recognise improvement opportunities.	Core
M16	Understands Value Added Analysis.	Develops lean culture which uses value-added and nonvalue-added time study analysis.	Core
M18	Change management.	Develops guidelines to identify change needed and understands the reasons why change is necessary. Seeks to understand barriers to change from the perspective of others and takes action to address these.	Core
M24	Acts as a coach and mentor to others.	Demonstrates an ability to coach others to identify and solve problems rather than just solve problems themselves.	Core
M25	Promotes training and education.	Encourages participation in training and education programmes that support a sustained organisational approach to Lean Management.	Core
M5	Able to select and apply appropriate lean methods and tools.	Demonstrates a deep understanding the allows the manager to plan a project and select and use the best tools and methods for the purpose.	Supp. Used Frequently

Chapter 8 - Findings from the Critical-Incident Interviews.

8.1 Chapter Overview

The second research objective of this study sought to examine the competencies for managing Lean improvements projects in Irish public hospitals from a practitioner perspective. The method employed to achieve this objective was the critical incident technique (Flanagan, 1954). Interviews were conducted with 17 individuals who had a leading role in managing or leading lean improvement projects in a hospital environment. These individuals had varying roles that included roles directly linked to a quality or lean improvement context; administrative or managerial roles; nursing, medical or consultant roles; and business support roles such as supply chain and human resource roles. Table 7.3.1 illustrates the roles of the interviewee participants.

Table 8.1 Roles of the interviewees participating in the critical incident interview stage of the research.

Interviewee 1	Service Improvement Manager
Interviewee 2	Service Improvement Manager
Interviewee 3	Scheduled Care Lead
Interviewee 4	Service Improvement Manager
Interviewee 5	Consultant
Interviewee 6	Quality Improvement Coordinator
Interviewee 7	Radiology Services Manager
Interviewee 8	Business/Operations Manager Unscheduled Care
Interviewee 9	Lean Six Sigma Programme Co-ordinator
Interviewee 10	Human Resources Business Manager
Interviewee 11	Assistant Director of Nursing
Interviewee 12	ENT Doctor
Interviewee 13	Purchasing Manager
Interviewee 14	Bed Manager
Interviewee 15	Head Manager of a Ward
Interviewee 16	Acting Deputy General Manager
Interviewee 17	Business Manager Scheduled Care

Due to the potential negative connotations attached to the term "incident" in a medical or hospital environment, the researcher chose to use the word "event" to replace the word incident thus avoiding any potential confusion or misunderstanding by the interviewees; many of whom would be encountering this technique for the first time. Initial plans to hold face-to-face interviews at the hospital sites had to be adapted as the national response to the Covid-19 virus pandemic prevented the researcher from meeting interviewees in person. Instead interviews were conducted in an online format using MS Teams software. This facilitated face-to-face interviews in a virtual environment and they were recorded and later transcribed. NVivo qualitative data analysis software was then utilised to assist in the coding of data and to enable the identification and analysis of themes derived from the coded data.

Participants in the interviews were invited to recall critical events in lean improvement projects that they identified as being significant in either positively, or negatively, impacting on the progress of that improvement project. These critical events gathered from the interviews span a wide range of topics including conflict with key project stakeholders, lack of support in time or other resources, effective and ineffective communication strategies adopted, engagement with project members, project planning/management and difficulties with technology or equipment. In total 39 critical events were identified from the 17 interviews with most interviewees identifying at least two events that occurred during the lean improvement project that they discussed. The response to each was captured, discussed and analysed with a view to determining whether the actions taken resulted in either an effective, partially effective or ineffective resolution. These critical events and response outcomes are illustrated in Table 8.2 below:

Table 8.2 Critical Events identified during discussions with interviewees

Event	Description	Valence
CE1	Lack of engagement at the mid-point of a rapid improvement event.	Effective
CE2	Industrial relations issues with senior leadership team	Ineffective
CE3	Interruption of workshop event standard work exercise by a member of the senior leadership team. This disrupted momentum in the workshop event and encouraged negativity towards it.	Ineffective
CE4	Ineffective initial design of value statement for the service.	Effective
CE5	Lack of engagement after a rapid improvement event as evidenced by a poor progress report indicating a lack of work done.	Effective

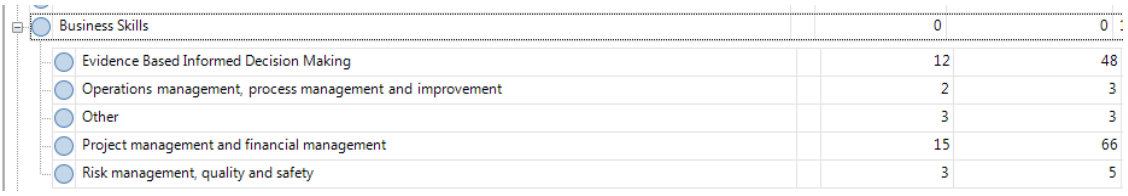
CE6	Collecting, managing and utilising data from patient journeys and operational performance	Effective
CE7	Transferring/creating ownership in the project team	Effective
CE8	Encountering lack of engagement and resistance at initial project meeting and responding to an individual who was attempting to control and commandeer project meetings/workshops.	Effective
CE9	Reporting on project outcomes and communicating project progress during an improvement week	Effective
CE10	Holding a planning meeting before going on site.	Effective
CE11	Dealing with resistance from a department manager regarding the timing of activities of staff in their department.	Partially effective.
CE12	Conflict between workshop facilitator and key team member during a rapid improvement event	Partially effective.
CE13	Sustaining standard work for data entry and standardising equipment used across the extended value stream.	Effective.
CE14	Ensuring the standard operating procedures are adopted by all system users in the value stream.	Effective
CE15	Resistance from key stakeholder in a department that was identified as a bottleneck to patient flow in an operating theatre.	Ineffective
CE16	Delays at higher levels of management signing a memorandum of understanding with consultants resulted in training being cut short	Ineffective
CE17	Technology and equipment constraints were elevated following a machine breakdown negating the impact of a scheduling/patient flow improvement project.	Effective
CE18	Organisation of a celebratory QI event generated better than expected interest and enthusiasm.	Effective
CE19	Difficulty in obtaining data from external stakeholders in the value stream delayed the development and analysis of the current state of the process.	Ineffective
CE20	Communicating with a junior consultant who was the consultant lead on a medical cohorting project.	Effective
CE21	A failure to mediate conflict between two senior members of staff resulted in one person disaffected and disengaged from the team.	Ineffective
CE22	Having a multi-disciplinary team collect, analyse and communicate data regarding PPE usage to senior management briefings.	Effective
CE23	Failure to challenge national centralised decisions more robustly.	Ineffective
CE24	End-user accounts of the end-user experience triggered a need and desire to improve the process.	Effective
CE25	Failure to realise a project team should have been put in place to support the execution of the new process	Ineffective.

CE26	Recognition of project progress important in driving the project on and sustaining progress.	Effective
CE27	It was necessary to remind the team to fully consider value to the customer when analysing and improving the process.	Effective
CE28	The inclusion of an external organisation in the improvement process facilitated benchmarking of a process highlighting the potential for improvement.	Effective
CE29	A successful pilot study proved that a proposed improved treatment room layout led to a significant reduction in process time.	Effective
CE30	Key stakeholder kept cancelling meetings and delaying things. As a result the project in that area did not complete and ran out of time.	Ineffective
CE31	Formulation of a project team to support the implementation of a stock IT system based on consumption using scanning technology.	Effective
CE32	Presentation of master data to project stakeholders that demonstrated how a new system would work in practice and demonstrating outputs from the new system	Effective
CE33	Dissatisfaction and angst at the end of the project from some members of the team regarding their roles post project implementation resulted in one team member leaving.	Ineffective
CE34	Promises made regarding protected time for improvement project activity were not honoured.	Ineffective
CE35	Not defining roles and responsibilities of a critical team member at the beginning of the project.	Ineffective
CE36	Business case for minor funding to support project implementation was rejected	Effective
CE37	Machinery unreliable due to regular breakdown with no option for replacement because of the costs involved. Staff in the department were disgruntled and anxious regarding uncertainty about the stability of their jobs	Ineffective
CE38	Devising a policy regarding the cohorting of surgical patients to a surgical ward that was agreed upon by stakeholder and approved by the executive management team.	Effective.
CE39	Failure to create an SOP on an agreed process from a RIE.	Ineffective.

Following the identification of critical events, the interview transcripts were coded using NVivo software. As the initial step in the coding process the interview transcripts were read in full and coded on a line-by-line basis to identify key words, phrases and abstracts in each transcript. This provided the researcher with an overall sense of the data elements and themes that were emerging from the data collected. Then a coding framework based on parent-child relationships was created in NVivo using “Nodes” and “Sub-nodes” where relevant.

Figure 8.1 illustrates a cropped screenshot of the NVivo software illustrating the various nodes and sub-nodes utilised under the *Business Skills* competency category to code the interview data. The sub-nodes of the Business Skills node are illustrated along their occurrence in files and the total number of references made.

Figure 8.1 Business Skills Node and Sub-nodes.



Business Skills	0	0
Evidence Based Informed Decision Making	12	48
Operations management, process management and improvement	2	3
Other	3	3
Project management and financial management	15	66
Risk management, quality and safety	3	5

In order to identify and categorise competencies emerging from the interview data, data was coded in two distinct ways. Data was coded more specifically under themes represented by the categories and sub-categories that were identified from the review of the literature (see Table. 4.6) allowing for the identification of "Other" categories as appropriate that were referenced by interviewees but not included in the initial coding framework. Data was also coded under KSAO nodes to collect data relating to each competency characteristic. This "KSAO" data was later compared against the competencies identified from the "Themed" data to check for completeness and accuracy.

Each of the six themes used to categorise the competencies determined from the interview data are presented in turn in the following section.

8.2 Theme 1 - Leadership.

Under the Leadership theme the interview transcripts were considered in the context of a numbers of sub-categories. Each of these will be examined in turn.

Leadership Skills and Behaviour.

The importance of strategic alignment was a prominent feature of the interview discourse with a number of interviewees stressing its importance in securing focus and commitment. Interviewee 9 recognised it as a key success factor in the project's success commenting that:

> It was the first time in the organisation ever that everybody was aligned to the one goal, and we all knew what that goal was… everyone in the organisation, for the first time ever, understood the mission and the goal of the executive management team. (Int. 9)

Interviewee 6 reflected that this would be an area that they would have handled differently in their improvement project recognising the importance of allowing the project team and project leader to express their vision clearly and utilise this clarity as a source of encouragement:

> That's what I would do differently. I would let them express… let the project team and the project leader express their vision and try and encourage… it was the thing we didn't do enough of was to keep the vision – the North Star – in our focus. (Int. 6)

Providing clarity around the project goals was a concurrent theme to that of strategic alignment and also important to project success. Interviewee 3 preferred to seek this clarification in the early planning stages of an improvement project to seek early consensus and avoid any potential misunderstanding around project objectives.

> I wanted a very clear… from the message that we were delivering, that it was… that what we were going down to is what we were going to achieve; we were all delivering the same message. That there didn't seem to be any caveats or another agenda to it. (Int. 3)

Failure to achieve such clarity around project goals proved to be an impediment in some projects and in some cases acting as a significant obstruction to project progress. Interviewee 16 indicated that ineffective communication with staff led to a lack of understanding of what the project was trying to achieve:

> And it… realistically, it… this comes down to communication, how you're communicating. But I don't think the staff understood that… what we were trying to do. And they couldn't see the benefits.... (Int. 16)

Another theme that emerged as being critical to project success was the ability to engage with key stakeholders. Several interviewees discussed the importance of having senior management support or having a project sponsor, with this being critical in some cases. Interviewee 6 described the support of a senior clinician as being instrumental to their ability to progress the project.

> It was his idea, his baby, and he was very supportive. I could go to him and ring him at any stage when I was having struggles. I think I would have thrown in the towel after the first twelve months only for that. (Int. 6)

Interviewee 3 stressed the importance of executive support to the project success:

> Success for any project is from the top down and the bottom up, and our executive team solely supported. And I reported into the CEO and the chief clinical director and I reported for my time to the chief clinical director. And I have the utmost of respect, and the reason why it was so successful is, it was so supported by the executive team in hospital. (Int. 3)

Conducting a stakeholder analysis and spending time with key stakeholders proved to be extremely impactful also. Interviewee 3 recognised the importance of being aligned with key stakeholders and allowing their support to positively influence the momentum of projects. Similarly, Interviewee 8 recognised the importance of engaging with stakeholders and that it may be necessary to adapt your communication style depending on who you are communicating with.

> I really understood the importance of why you need to come up with several different ways of telling the story to get through to them. (Int. 3)

Interviewee 1 also stressed the importance of engaging with key stakeholders, reflected that she needed to have spent more time with senior management and other stakeholders at the beginning of the project in the pre-planning stage.

> I would have understood their personalities more and be able to better anticipate, engage some of the behaviours. Which is equally as important, because then you can manage a room better. (Int. 1)

The nature of communicating lean methodology and improvement opportunities also emerged as a theme. The mindsets involved with lean thinking and clinical practice have similarities but are different. It is important to understand processes and systems from a clinical and a patient perspective and how these can be considered in combination with lean methodology. Interviewee 13 expressed the importance of demonstrating the project and its potential to clinical stakeholders at a formal presentation:

> The integrity of the data was massively impressive, and also visually, for presenting to clinicians. And if you're trying to sell the system to people, this is a key piece, a key day to reach and to be able to demonstrate this piece. (Int. 13)

An ability to interact with stakeholders and patients on the hospital floor and at a process level was also emphasised. Many of the interviewees referred to the importance of conducting Gemba walks and interacting with employees at the coalface.

> It's like Gemba; we went out there, we went into the areas. I met people I've never interacted with that before. And people respect that too, that you're just not standing up in an auditorium and giving out information and all these people have never seen you. We were in all the areas; we walked out of our way. (Int. 9)

Interaction with the members of the improvement team was also highlighted with Interviewee 8 stressing the need to be visible and be embedded in the team:

> ….you need to be accessible to people and you need to have – you need – I know everyone goes on about communication, but you have to be – you have to do some of the graft yourself. You have to be – embed yourself in the team. (Int. 8)

Leading Change

The importance of developing an ability to lead change and advocate for change was stressed by a number of interviewees. Interviewee 15 reflected on her experiences and viewed the role as one of advocacy:

> I have been an advocate and would try lead them through their QI. I've been on multiple QI teams when I think about it. (Int. 15)

Interviewee 2 describes a process of communicating and encouraging team member involvement and taking care not to overly take control of doing the work but rather letting the team realise that they need to own the change.

> So, you're saying by you communicating, listen, look, it's not about me doing the work necessarily but you need to get more involved, that they also realised that they could get their team more involved as well. (Int. 2)

Similarly, Interviewee 11 describes a process of nudging and encouraging team members to be more involved and to be inclusive of all of the participants in the process.

> It was about prompting them and encouraging them as well. That's very important, for the facilitator to take notice of who's talking and not just of the content of what they're saying but to be inclusive of everybody that is there. (Int. 11)

The need to challenge the improvement team was also described extensively. Interviewee 1 described instigating a call to action by challenging the current processes and performance.

> We can't sit here and accept this as what it is. How are we going to move it forward? (Int. 1)

> You guys, you can do better than this. This is not… you're not giving this everything. You're sitting there; you're being passive on this. Pushed back at them and challenged them a bit to get a bit of fire in their belly. (Int. 1)

Some interviewees explained that challenging and encouraging the team members to develop proactive solutions can be a gradual process. Interviewee 11 described a process of getting the team members to open up and contribute to the improvement process.

> As the days went on, you could see it. We still… you'd be pushing boundaries a little bit, going, 'But why…' when you say, 'But why can't you do that?' to whoever's saying. And they're like, 'I suppose, yeah.' They did start opening up a lot more, and that's exactly it. (Int. 11)

An understanding of the process of managing change also was referenced by a number of participants with some interviewees referring to change models, such as Kotter's 8-Step Process (Int. 6) and other change management and culture tools (Int. 1). This included understanding stakeholders needs and effectively communicating with stakeholders. Interviewee 3 highlighted the importance of identifying key stakeholders and spending some time with them and the importance of understanding stakeholder needs commenting that:

> I did a bit of a stakeholder analysis, a matrix to see who did I need to watch out for and who I didn't, and who I could lean on for support and who would work with and who my resisters would be. So, I had a bit of an insight into that before, and I did a stakeholder interview as well with people as well, and even a common courtesy call. (Int. 3)

Similarly, Interviewee 5 mentioned the importance of liaising with stakeholders outside of the hospital in the broader health system describing a time when he invited stakeholders to the ward coffee room at the hospital to discuss roles and responsibilities across the health service value stream and recognising an opportunity to move some in-hospital activities to external stakeholders thus freeing up clinician time and increasing the number of patients treated.

Interviewee 7 highlighted that an appreciation of reactions to change can be important from both a team/department perspective and a broader stakeholder perspective.

> There are some members of any team in any department, even members outside the team, that don't particularly like change. Change is very difficult. I find it very difficult. People tend to find it very difficult in the public sector. I don't know why. The concept of change is very difficult for some people. It's very important to be able to manage change; change management is very important. And people tend to be – some people, not all people but some people tend to be inherently suspicious of change in that it's a reflection on – that the way you were doing it was incorrect or wrong. (Int. 7)

The importance of alignment also featured in discussions during the interviews. Interestingly alignment featured as an important factor in both successful and less successful projects. Interviewee 9 highlights the criticality of understanding how the project aligns with the strategic mission and goals of the organisation.

> And everyone in the organisation, for the first time ever, understood the mission and the goal of the executive management team. And that's why everybody got involved, and it was the first time that there was so much change in a short period of time. Because we're known for not being good at change and being difficult to change. (Int. 9)

Conversely, Interviewee 2, lamented that more time should have been spent on defining the scope of the project and ensuring broader alignment highlighting the while the team itself was aligned the broader organisation was not.

Obtaining management buy-in emerged as a critical success factor and was mentioned by many interviewees, including Interviewee 10 who stressed that you definitely need management buy-in and Interviewee 6 who stated that:

> I couldn't underline enough the importance of the management's understanding and the governance in bringing quality into the healthcare. (Int. 6)

Interviewee 17 commented that obtaining sign-off on a new policy proved to be crucial to their improvement efforts but also noted that it took almost 12 months to achieve this. Interviewee 12 also referred to the importance of, and difficulties in, acquiring senior management support.

> ….you need to get a high-level person in the hospital behind you and backing it. That's really difficult because there may… my perception is that there is… may not be much of a benefit to that high-ranking person to get heavily involved. Or they may be burnt out themselves or they may not have had the time. That'd be… that's a critical point. (Int. 12)

Building engagement at the team/department level also featured strongly in many of the interviews. Interviewee 2 commented of the importance of empowering people at the ward level and Interviewee 6 describing the importance of continually reinforcing to the team "*what is in it for them".* Clearly describing the rationale for the improvement also featured as an important issue and resonating with the team members in terms of them making a contribution and making a difference was considered important.

Interviewee 7 commented that:

> The biggest takeaway for me was that if you want to put a team together and do a real, meaningful quality improvement project, the changes you're going to make have to mean something to the staff that are involved in it. You'd have to either give them some more pride in what they do, some more expansion of their current role, some kind of win for them, as well as the outcome for the patients. Because you get more input from people when what they're achieving is meaningful to them. (Int. 7)

Similarly, Interviewee 17 describe the importance of instilling pride in the team's efforts:

> But when you make a change for the greater good, be it in enhanced roles or something that's meaningful to people, that they can see the change or they have pride in what they have just achieved, they're more likely to keep it up. (Int. 17)

Recognition of individual and team contributions was also described as being important. Many of the interviewees described improvement work as being seen as additional work alongside regular daily workloads. Interviewee 11 further described the importance of management formally recognising the efforts of individuals and teams, describing this as a constant process – "*But it's that constant… you need to acknowledge them at all stages"*.

Delegating responsibility for others to contribute ideas was also viewed as important. Interviewee 11 described the importance of listening to others and allowing other to contribute describing this as an exhausting process:

> Every day, it was exhausting, to try and motivate people to… not… to motivate and not so much influence, but you want them to come up with these ideas themselves and you're trying to push them to the boundaries. Because you don't want to put the idea… you might have the idea, but then you might want them to cultivate it themselves. And to try and get them to think in that way. (Int. 11)

Being able to delegate was identified by other interview participants also alongside the need to create ownership in the team. Interviewee 1 was of the opinion that the ownership is with the team and that as a manager you are there to guide them with your expertise and skills, but if they want to change, they need to own it. Interviewee 2 stressed the importance of communicating this to team:

> So, you're saying by you communicating, listen, look, it's not about me doing the work necessarily but you need to get more involved, that they also realised that they could get their team more involved as well. (Int. 2)

Interviewee 5 describes this as an ongoing process acknowledging that you *"have to own and live the system"* and that *"you've got to continue to drive it to maintain development"*. Similarly, Interviewee 3, describes the importance of spending the time with others and

"buying in more" whilst also being aware of your own behaviours and of not *"being dismissive"*.

Shaping Culture.

Reinforcing a lean culture was identified as being critical to success with many interviewees referencing the need for passion and commitment. Interviewee 9 viewed this as a difficult and lengthy task that required support and time.

> …the culture is really difficult to get it right when you're doing lean. And if anyone was to start the journey, I would be saying give themselves 10-15 years. (Int. 9)

Passion for sustaining improvements is required for lasting success. Interviewee 5 described an ongoing improvement initiative and his unwavering passion for it "*But to get that concept across over the last 10 years… even up until 3-4 years ago, I was almost like a heretic trying to get the vision across".* According to Interviewee 11, there has to be someone in the improvement team *"…who has that passion, or who wants to further it ...someone in the service unit…who continues to own it and drive it*". Interviewee 7 concurs with this indicating that they had "…*tried to harness the quality improvement in the hospital at a more grassroots level, using lean tools to encourage people to do various projects"*.

Some hospitals have adopted a coaching or advocacy approach to encouraging and promoting lean activity, whereby individuals work with colleagues on their improvement projects. Interviewee 15 described a process whereby support and guidance is provided to those undertaking quality improvement (QI) projects:

> A lot of the times, the people who are undertaking this QI, they'll come to me on the ward and I might be able to have that protected time of an hour to talk them through my project and advise them…..and it's something the QI lead in the hospital is fascinated with, and so am I, but I don't know is other people have that passion. You have to have some passion there with lean. (Int. 15)

Interviewee 6, similarly, describes a process of coaching others to take an improvement role:

> …I was coaching the person I felt that would be good in the role along and bringing him along in quality improvement projects…..and he actually won the post. (Int. 6)

In larger hospitals this is the only way a lean culture can be sustained. Interviewee 9 commented that no one person is going to change the culture of thousands of staff and described a system

where they had identified a cohort of individuals who would act as advocates for lean at a local level.

The importance of participative decision-making was also referenced as being significant. Interviewee 8 stressed the importance of allowing people develop their own ideas.

> "…. and it wasn't about bringing them into a room and telling them what to do or brainwashing them, or this is how we're going to do it. It's giving you the permission to come up with ideas and it can evolve as the weeks or months go along". (Int. 8)

Similarly, Interviewee 2 describes a *"leadership from the back piece"* – a process of allowing team members to step forward. This participative approach also needed in some instances to be protected from resistors - people who either did not want to change or could not envision the change. Sometimes viewpoints had to be challenged. Interviewee 11 described a situation where existing perceptions had to be challenged:

> And they will be saying, 'No, but we have to do it that way. We're not allowed do it.' And then we would challenge them and say, 'But what do you mean you're not allowed? Is it part of a code?' And when we looked back, there isn't; there's no part of the code. There's no part of the licence like that. It's just because it had always been done. (Int. 11)

The importance of allowing teams to see their decisions through was also identified as being important. Interviewee 6 describes a situation where they intervened in a decision with negative consequences:

> I probably guided it in one direction, and if I had let it go in the direction they wanted to and let them… because I didn't think… in my head, I thought the way they were going wasn't going to work. It was going to fail. And it was, it wasn't… you know you talk about smart, achievable, the achievable part, I didn't think it was going to be achievable. But I should have let them find that out for themselves instead of my knowledge, my prior knowledge trying to influence the way the project went. (Int. 6)

Interviewee 2 describes a different approach to a similar situation where they stood back and *"I gently… or I let the teamwork through that scenario".*

Being visible and engaged was also referenced as being important. Interviewee 15 commented that they would like to lead another QI at their hospital and also be part of other QI teams. Interviewee 6 commented on the importance of being seen at the Gemba and reflected that in the earlier parts of their project it did not happen enough:

> …the importance of maintaining contact on the Gemba, going out there and being part of that. Which I did subsequently, but in the first year, I… that didn't happen enough. (Int. 6)

Similarly, Interviewee 16, described the importance of getting out of the office and communicating with staff to let them know that they were valued, particularly in an area staffed by support staff.

> To try to – I don't know – get it across to them that they were recognised, and they were valued by the management. They weren't just support staff. (Int. 16)

Interviewee 2, describes the importance of regular meetings and being visible at these:

> I did either call in or try to attend the huddles every week. But I wasn't leading them; I was there as a member of the team. And supporting them, challenging, offering advice, support, challenge, guidance or whatever, but not in a leadership role. (Int. 2)

Other interviewees encouraged team members to be visible and make their work visible. Interviewee 3 describes encouraging team members to share their experiences:

> I told them they could go and do learning events, shared learning events. It doesn't always have to be… if they do a piece of work, share it, and build that culture of bringing the team together. (Int. 3)

Interviewee 13 also described the importance of sharing improvement work referencing a situation where plans for a new system and process was presented as a demonstration to end-users.

> You could feel the positive atmosphere in the... with the group when we put it up on the screen. And it was in relation to how this would have an impact on the organisation was massively positive for us. And then we knew we'd be able to present this to the clinicians up in theatre that would be working with the system and be able to demonstrate to them why we're doing what we're doing. And this is the result, and this is what can… we can achieve. (Int. 13)

8.3 Theme 2 – Hospital Management and Healthcare Environment

A second broad theme that emerged from an analysis of the interviews involved observation regarding competencies relating to hospital management and the healthcare environment. Competencies in this broader category were then further sorted into sub-themes including understanding value from a patient and internal customer perspective; understanding the hospital organisation and broader healthcare system; managing the healthcare workforce and human resource management.

Understanding value from a patient and internal customer perspective.

Several interviewees stressed the importance of understanding healthcare processes from a patient perspective. Interviewee 1 emphasised the need to appreciate things from a patient perspective referring to this as the "voice of the customer" and indicated that during their project patient surveys were carried out in advance of carrying out any process analysis. A similar process was described by Interviewee 14, who described discussion with both patients and the family members of patients when redesigning a process focused on patient discharge. Interviewee 8 stressed the importance of listening to the "voice of the patient".

> We did good preparation beforehand, getting the voice of the patient, the voice of the staff, the data. (Int. 8)

Many interviewees discussed the importance of understanding "patient journeys" and how the patient interacted with different services. Mapping patient journeys proved to be a popular method of gaining an understanding of the patient experience being referenced by a number of participants. Understanding and managing patient flow were also considered as being important in terms of analysing activity in improvement projects. Table 8.3 illustrates perspectives of a number of interviewees regarding understanding and managing patient journeys and patient flow.

Interviewee 1 underlined the importance of "laying the patient journey bare" and stressed the internal customer experience referring to a need to ask, "is this okay for the patient?". Further expanding on this point Interviewee 1 described a "hearts and minds piece" and again referred to the importance of the voice of customer and staff experience. Appreciating internal customers was also viewed as being important by other interviewees. For some interviewees this was critical, for example Interviewee 13 described a key communication exercise in their project wherein a new system and processes were demonstrated to end users to highlight improved effectiveness in meeting their needs. Similarly, Interviewee 5, describes how looking at a process from a broader perspective including actors along the extended value stream was crucial in establishing buy-in in redesigning post-surgery treatment of patients that ultimately resulted in reduced patient journey times and freed up resources enabling an increase in the number of patients treated.

Table 8.3 Interviewee reflections on utilising patient journeys and analysing patient flow.

Interviewee	Reflection on utilising patient journeys and analysing patient flow.
1	We would always ensure there would be good, strong data to support why change needs to happen, and use… it's the patient journeys and that hearts and minds piece. Is this okay for our patients? And lay the patient journey bare. I would find those very powerful. And patient experience as well.
2	And that when you go through to do your patient journeys, you are trying to get a representation of the main presentations that would go through the organisation on a day-to-day basis. Then those patient… so you roughly identify, you need a patient journey in, we'll say… for this particular organisation, we needed some of the patient journeys to go through the medical admissions unit into the wards, on a particular pathway. We needed that same journey on a different pathway; we needed people to go directly to the ward.
3	Within any hospital setting… and people probably underestimate the value of having… I know there is designated quality teams, but for this hospital, a patient flow improvement team, looking at improvements in processes and flow, was hugely beneficial for our national colleagues.
14	These were all related to patient discharge and the processes that go with that, and identifying I suppose people who, or what the delays are in the system with getting people back home and discharged again. Our part was the information given though; you know. We did a survey and one of the findings was, in line with what the National patient satisfaction survey said, that a lot of people said they didn't have the information they needed going home.
7	We did a walk-through of the elements, say like a gemba type of thing, from say, attending clinic right through to the report from the diagnostics going to the referring clinician and the patient then being discharged or starting therapy or whatever
17	We do the prep work and the patient journeys, the staff journeys, and then look at your KPIs and your evidence-based data. And then come up with a plan: how are you going to do it. We had a vision, we know what you want to do, but how are you going to get there. And then you're talking about communication with all the stakeholders and the buy-in.

Interestingly, a number of interviewees that were involved in improvement projects in support functions rather than clinical or medical processes, did not mention the patient in any significant manner. Interviewee 16 used the term patient on three occasions; interviewee 13 used the term patient twice and interviewee 12 did not use the word patient at all. In fact, this was a common theme in improvement projects in areas that did not involve direct contact with patients. Nevertheless, the viewpoint of internal customers was stressed as important. Interviewee 16 described a situation where a cohort of staff communicated that they felt underappreciated and neglected by the organisation and that this had impacted on their engagement and satisfaction. Interviewee 12 described the importance of understanding how

end users interacted with an area and that this was integral in communicating improvements to end users and securing their buy-in. Similarly, Interviewee 7 described a situation where the different actors in process did not fully understand the end-to-end process and how by inviting their inputs resulted in greater understanding for all.

> There was a complete lack of understanding and – of even some of the high-level processes involved, or the nuances involved. Everybody – if it was part of a broader team, didn't have full knowledge of the process from start to finish. They only knew their own bits. It was very – it was a good educational experience for everyone to see the other side, myself included. (Int. 7)

Understanding the hospital organisation and the inter-relationships between different hospital functions and units.

A knowledge of the hospital organisation proved to be critical for many of the individuals being interviewed. For this issue was fundamental as they described a situation where many of the hospital process are "disconnected". Interviewee 1 describes a situation where in their project the whole team had never sat down together before:

> They never sat down as a… between nurses, surgeons and radiology, they never sat down as a team and had a meeting in a year and a half, to look at their service and see how they would bring it forward. And they had a lot of change from senior level as well within the hospital and within their directorate structure and that, so they were very disconnected. (Int. 1)

Similarly, Interviewee 2 described the importance of bringing in people from other disciplines and acknowledged that in their project they probably did not have as much input from medical personnel as they would have liked. Interviewee 2 also described the communications process with HSE central, referring to it as mainly electronic and disconnected.

> What you see with the HSE Central is that there's no connection with the organisation. It's largely through digital or electronic connections, templates or things, but there isn't a knowledge, an on the ground knowledge and support. They're very disconnected. (Int. 2)

Interviewee 3 described clinical knowledge of the area and knowledge of the hospital organisation as "essential". Interviewee 4 describes one of their key learnings as the need to have good preparation, a well-developed current state of the process, and a knowledge of roles and responsibilities of people impacting the project.

> The biggest learning, I learnt when I was working with lean and with these processes is the who, what, where, when and how, and roles and

> responsibilities. And within… I have found within the organisation – and even now I'm working on other sites – it is about clear, defined roles. It is about having a process in place. (Int. 4)

Interviewee 6 also referred the need to have different disciplines involved in the project describing the complexity of communication in the hospital system.

> … and that's created its own problems in terms of inefficiencies, or… it's a lack… it's the disjointed communication across the different disciplines if you know what I mean, and the different departments within the hospital as well. There's so many now involved in it. That's what causing the delay. (Int. 6)

The experience of involving other processes and disciplines in parts of the project was described as being advantageous by Interviewee 7. Even though the main elements of their project involved a core team, input was also sought from individuals with responsibilities in the broader process.

> It was a well-worth exercise to – for us to see from the time a patient comes to the clinic before they get to radiology, for us to see that piece. And it was equally advantageous for them to see what happens once a request is raised and sent to radiology. There was a complete lack of understanding and – of even some of the high-level processes involved, or the nuances involved. Everybody – if it was part of a broader team, didn't have full knowledge of the process from start to finish. They only knew their own bits. It was very – it was a good educational experience for everyone to see the other side, myself included. (Int. 7)

Interviewee 17 also referred to importance of having the right disciplines involved at the right stage of the project as their knowledge and suggestions can assist in analysis and problem-solving.

> And then with the lean, what I've found with the lean too… it's amazing. If you don't… it's amazing. When you get the right people around the table, you can manage to solve your own problems. With consult, because you'll hear… have an insight on what goes on down in ED or what goes on down in AMAU., or in turn, they're going to hear what you have to say. (Int. 17)

A similar perspective was held by Interviewee 8 who commented that it can be easy to overlook the valuable contribution of some people and noted that all staff including administrative and support staff can have a role to play in lean improvement activity.

Understanding how the broader Health System operates.

Some interviewees described the importance of understanding how the health system operates in a broader sense and identifying opportunities to leverage capabilities in the system. Interviewee 5 describes a situation of reaching outside the immediate organisation to individuals in the broader value stream to explore with them an opportunity to take on new roles in service provision. Seeing this as a win-win situation, an agreement and system was developed whereby clinical treatment would now be provided in the community thus relieving pressure on the hospital clinic. Interestingly, the same interviewee encountered resistance from some members of their professional organisation who had did want to see clinical service move from the hospital clinic to the community.

Other interviewees described frustration with centralised services in the HSE. Interviewee 9 described a situation whereby not enough support was being provided by a centralised function and stated that it was the knowledge and capability of the local team that ensured continued service provision by maximising resource efficiency and developing a local supply network external to the HSE system. Interviewee 6 also described broader issues beyond their sphere of control that necessitated having to work especially carefully with a heavily unionised cohort of support staff citing that broader institutional pressures had created mistrust and a lack of engagement.

> …that the mistrust of managers is huge. And there's years and years of cultural mistrust in the health service and it's very hard to pull that back. (Int. 6)

Frustration with the broader system was also described by Interviewee 12 who referred to a "*culture of complaining*" and how people learn to work around inefficiencies in the system rather than trying to fix the system.

> ….and it was a big culture of complaining about things. And with interns and doctors, they'll learn the system in the hospital, this… be it radiology, they'll learn the system. They'll learn tricks to deal with a dysfunctional system. They won't change the system, if that makes sense to you. Because they perceive they can't change it for what I was outlining earlier. (Int. 12)

Managing the health workforce.

An understanding of the health workforce was also described by the interview participants. Interviewee 13 referred to an ability to distinguish between when work could be completed by the core project team and when to bring in external expertise. An understanding how work is scheduled in clinical activities was also deemed as important.

> Certainly, leaning on skillsets and experience and expertise outside the project team, while keeping this project team tight-knit group. We were the project team, but it was needed to bring other skillsets in and people. And particularly the nursing, having an understanding of the way theatre works and the politics and who does what and who are the… who can we go to get information. There was a little bit of understanding even how the consultants work and how their schedule works and all this kind of stuff. (Int. 13)

Similarly, Interviewee 8 described a situation where consultants and their juniors were invited to explain their schedule and work to the broader process improvement team. It was communicated that the consultants and their juniors would meet in ED or MAU at eight-thirty or nine each morning. This is an official part of the junior doctor training. This led to a realisation by the ward management and bed management as to why consultants and their junior doctors were unavailable at this time.

> There was a bit of a lightbulb moment for some of the ward nurses and ward managers that the consultants had to… the consultants and their juniors had an agreement that they would meet at half eight or nine every morning in ED or MAU… Whereas the staff in the wards were dumbfounded as to why they couldn't get their doctors onto the ward at nine o'clock in the morning. So, there was lightbulb moments like that when you got the people into the same room and they went, 'That's why they do that,' as opposed to being… they're not doing their job or they're never here. (Int. 8)

Interviewee 14 also indicated that scheduling work activity had an influence on their project and not enough thought was put into assigning activity to roles indicating that this negatively impacted project outcomes. Subsequently, the advent of the Covid-19 pandemic meant that these issues were left unresolved.

> I suppose issues came up in the sense regarding who orders the folders; who puts information into the folders, you know those initial generic thing and who gives the patient and, you know, I suppose those things never got to be ironed out because there's just been so much over and over, you know? (Int. 14)

Resource acquisition and management.

The importance of securing and managing resources was also mentioned by interviewees. Some interviewees expressed frustration at obtaining resources. Interviewee 15 expressed frustration with obtaining financial resources to support their project describing a situation where they spent their own money to acquire some resources needed to get the project over the line.

> The funding was a big thing because the finance department said it wasn't required and there was certain budgets for the hospital, and they couldn't see the need for implementing it. But with my business case, it did highlight the positives of implementing something like this to the ward. (Int. 15)

Similarly, Interviewee 5 described difficulties with acquiring financial support for a software resource for their project, commenting that they had to resort to "subterfuge" to obtain the necessary resource. Securing protected time to work on improvement projects also emerged as an issue with some participants. Interviewee 12 commented that promises made on "protected time" were not upheld. Interviewee 6 also expressed frustration with allocating time to their improvement project indicating that it was difficult balance improvement work activity alongside normal work activity.

8.4 Theme 3 – Business Skills.

Another theme that emerged from an analysis of the interviews conducted was that of Business Skills. This broad category was then further subdivided into sub-categories including evidence based informed decision-making; operations and process management; risk and quality management; and project management and financial management.

Evidence Based Informed Decision Making.

The importance of being able to manage and analyse data emerged as a prominent theme in the business skills category. Interviewee 7 identified data as being the "crux" of any improvement project describing data collection and utilisation activities as essential.

> Absolutely essential, because data are the crux of any – you can't – you can't – you don't know where you are if you can't access the data. (Int. 7)

Interviewee 2 identified this as a skill gap in Irish hospitals acknowledging that capabilities in utilising, analysing and managing data are really important to improvements efforts and that capability deficits exist in these areas in the Irish healthcare system.

> The second really important piece is the data. And that's understanding… and that's probably… the service improvement team probably still carry a lot of the data piece. Because that is… that capability piece is a massive gap in Irish healthcare. Understanding what are the most critical components of that; whittling that down to just a few very simple messages around their, around their performance… (Int. 2)
>
> …..we haven't invested or trained up a lot of our staff to have a data capability. And that's even down to… what I mean by that is, a lot of our staff wouldn't have Excel capability. (Int. 2)

Consistency in capturing data was also described as important with some interviewees reflecting that inconsistent practices around data capture and utilisation can be frustrating.

> It was just a bit frustrating that you're dealing with a difficult group of people, some of whom are very good at… most of whom are very good at putting data in, but some of whom aren't for various reasons. They're on the wrong laptop or they haven't got a password or they're just too busy. (Int. 5)

Interviewee 11 commented that understanding how to capture the right type of data can be critical commenting that they were fortunate to have prior experience in data collection and collation.

> …we need to do this type of survey or we need to do this type of a questionnaire, and being very cautious about the type of questions and all that. Because otherwise I don't know where somebody would start. I was lucky I did have that data analysis and data collection and collating experience. (Int. 11)

Interviewee 10 also referred to deficiencies in their data collection activities describing their approach as "very green" and that they opted to carry out these activities manually when they should have used a system. Similarly, Interviewee 9, whilst acknowledging improvements have been made in data utilisation capabilities, there is still room for further development of capabilities in this area.

> We didn't have a lot of data five or six years ago. We have a lot of data, but I still think for the hospital and the HSE, they're learning how to use data properly. Data's not just for communicating a message. I still don't believe, for us here and possibly in the HSE, they know what to do with data and how to make improvements. (Int. 9)

Interviewee 12 described this as a learning curve during a multi-site improvement project indicating that the team improved this process as they from site to site.

> In each site, we improved how we captured data. Initially, we captured data through a face to face. In the third site, we did that all online and got them to do it themselves. We also improved our informatic displays, so we… making it easier. (Int. 12)

Other interviewees described situations where the data that is available has been collected for different uses commenting that variation exists in data collection and management procedures across the HSE and that this detracts from the quality of the data in certain use cases.

> It's so complicated, the HSE. Every department and every sub-department has its own way of collating its own data and there's no global, sensible version that you can all feed into and access the data from…They all gather their data completely differently. They might return it nationally, but not in any way that's meaningful to you for your project. It was – there's so many different means of data. (Int. 7)

The appropriate utilisation and analysis of data emerged as being critical to improvements in operational performance. Interviewee 1 describes that data are essential to understanding the current state of the process and it can be used to challenge existing performance levels. Similarly, Interviewee 2 discussed how data capabilities can be fundamentals to understanding performance levels and performance trends.

> And a lot of it down to operational performance, having that data, being very tuned to where your organisation is, where your organisation should be. A lot of that data capability. Because the systems aren't there to give people simple, straightforward information. They are often oblivious to how poor their performance is and how little improvement they're making. (Int. 2)

Communicating data effectively in terms of improvement activities was also identified as important as improvement activity can be new to members of the team and they may not be used to using data for improvement purposes.

> So, it's putting together that data and being able to present that data and analyse it, and then explain it to the people that are part of your rapid improvement event, what it means. Because I do think a lot of people are sitting down thinking, or they're pretending they know what they're… what you're talking about when you're presenting data, but a lot of times they don't. (Int. 11)

Other interviewees describing how presenting data can have a significant impact on obtaining supports for projects and for demonstrating the potential of performance. Interviewee 17 described the importance of using evidence-based data in the context of key performance indicators (KPIs).

> But we showed the data to support it getting it over the line. We showed the improvements that had been made, we showed the new initiatives that have been introduced. It was a win-win. And as well as that, we weren't trying to take over the whole hospital. It was… all we asked, 'Would you just give us one ward?' It wasn't that we were saying we want to run roughshod over the whole… we want it our way for the whole hospital. Just give… let's see how we get on with this. Let's see. (Int. 17)

Data measurement activity was also effectively utilised for process control. Effectively communicating hard facts based on data enables individuals to understand the reality of the situation. Interviewee 9 describes a situation where once accurate performance data was measured and communicated regularly that a sense of calm was created because individuals knew the process was under control. Interviewee 10 also referenced data communication when describing the importance of making data "visual" and more accessible to people than just presenting lists of data. Similarly, Interviewee 13 describes the importance of ensuring that data are visual for clinicians.

> The integrity of the data was massively impressive, and also visually, for presenting to clinicians. (Int. 13)

Operations Management and Process Management

Hospitals by their nature are complex work environments involving processes that are multi-disciplinary in nature that require the highest standard of quality. The necessity of understanding the patient journey and patient flow in hospital processes has already been presented in Table 8.3. This activity is critical in generating data and evidence concerning process performance and opportunities for process improvement.

A common theme that presented during the analysis of the interview transcripts was of the need to focus on operational performance and how that can be translated into improved performance. Interviewee 2 considered that their role as an improvement project manager involved them assisting others to better understand their level of operational performance and help them consider improvements to that performance.

> ….assessing a lot of the time their operational performance, helping them understand where they're at and then helping them agree a plan to improve that. (Int. 2)

Interviewee 3 described a similar perspective that builds upon performance data and evidence to monitor improved future performance, adding that sustaining performance is critical and often the most difficult to achieve.

> The biggest thing for any project is how you monitor your progress and your evidence and your sustainability. And sustainability the hardest thing to hold on to. So, meaningful metrics, presenting the metrics before your improvement, and showing the metrics afterwards and through the way. (Int. 3)

Some interviewees described how process improvement activity assisted in increasing capacity in hospital operations thus alleviating pressures on queues and waiting lists and increasing patient throughput. For example, Interviewee 5 described how by reconfiguring a process so that most post-operative treatment was handled in the community, time and resource were freed up for patient surgery.

> …it has certainly made life an awful lot easier for me. Instead of going down and doing a post-operative clinic on a Friday afternoon, I started doing a surgery session on a Friday afternoon. And that enabled me to do an extra six or seven patients on a Friday afternoon. (Int. 5)

Similarly, Interviewee 17 described how developing a process for managing the routing and cohorting of surgical patients and having this approved by senior management, prevented the unnecessary assignment of medical patients to surgical beds thus improving throughput and flow of surgical patients. In some cases, a better understanding of how scheduled work activity and work patterns was impacting on critical operations allowed for a recognition of how reorganising work activity could lead to improvement. Interviewee 5 described how better understanding the factors affecting medical porter availability and making minor changes to established work procedures meant that availability could be increased resulting in faster surgical suite turnaround and greater throughput of surgical patients. Another project involved better understanding treatment room layouts and improving operations design in treatment rooms thus making it easier to find work equipment and materials and avoid wasted time searching for these items.

The visualisation of performance metrics and management of daily improvement was described by a number of interviewees as being critical to operational performance and something that hospitals needed to improve upon.

> I've also more and more convinced around the management of daily improvement as well. And having those management for daily… whatever those daily improvement systems. That's definitely something we need to get better at. (Int. 2)

Interviewee 11 describes the development of visual management boards to track operational performance and combining this with team huddles whereby management and employees come together to review operational performance and recognise items that need to be prioritised for action. Similarly, Interviewee 2 describes a daily management system built around ward boards, navigational hubs and management "mission control". Daily performance can be tracked at the ward boards with items being actioned for discussion at the navigation hub and escalated to senior management for immediate attention where necessary. Interviewee 12 referenced a need for senior management to better understand the nature of improvement work describing meetings where approval for improvement work would be granted but no other support provided.

> You would think critical moments in the project would have been the meeting with senior management. And fortunately or unfortunately, I found those interactions… while they said 'Oh yes, go ahead, no objections,' it… and that was all the meeting consisted of. There was no support given. There was marginal enthusiasm for it. (Int. 12)

Project management and financial management.

Findings reveal that project management activities play a key role in the success of lean improvement projects in hospitals. This section examines the importance of focus at different stages of the project management process particularly in the planning stage of project management. Interviewee 15 reflecting on their project indicated that in hindsight they should have spent more time in the pre-planning and planning stage noting that they did not give this stage "enough attention and detail". A similar opinion was voiced by Interviewee 2 who also acknowledged that more work could have been done in the preparation of the project, particularly in defining project goals.

> ….would have done more work in the preparation. We would have… understanding what we were really going after. That needed to happen with the key people on the team and it needed to happen particularly with the management team. (Int. 2)

Interviewee 1 also stressed the importance of this stage observing the importance of proper preparation, planning and pre-engagement with stakeholders commenting that "if you haven't

done your planning and prep, you're not at the races". This opinion was shared by Interviewee 8 who felt that in their project that "good preparation was key". This was also a factor for Interviewee 4 who described issues around conflict and resistance with team members during a rapid improvement event that could have been addressed in preparation for the project and reflected in future that they would be more "hands on" in the preparation stage.

> If I was doing that event again, I would definitely be more hands on in the prep, and spend more time in the different departments before the week and involve them a bit more with the prep. And that would have avoided some of the issue that happened in the week. (Int. 4)

Interviewee 3 spoke extensively regarding project management activities and in particular gaining consensus on the vision and goals of the project at the project outset and then developing a clear project charter that is agreed upon and clearly outlines roles and the goal statement. This was an issue for other participants also. Interviewee 8 reflected that more honesty could have been exercised at the commencement of the project noting that:

> And maybe more honesty at the kick-off, more identification of the roles, and honesty around the outcome for resources at the end of the project. (Int. 8)

Transparency around project support was identified as a significant issue with Interviewee 14 commenting that people's involvement or lack of involvement in the project was "directly linked to the allocation of protected time". This view was shared by Interviewee 5 who was critical of the time allocated for their project from its outset, noting that this was further exacerbated by having to fit their project activity around their clinical duties.

> Absolutely insufficient. And I said it from the get go. I said it… the minute… after I got the job and they started to tell me what was involved, I said, 'I'm not going to be able to do this in the hours that I've been given, no way'. (Int. 5)

Interviewee 15 indicated that the time allocated to their project acted as a constraint and meant that they could take "a deeper dive" into certain aspects of project. Also, team members were constantly being pulled away to carry out clinical duties meaning that they had to become more involved and ended up doing a lot of the work themselves.

Managing the project team itself emerged as a significant issue in the interview findings. Interviewee 2, similar to Interviewee 15, reflected that they did far too much themselves and identified that they needed to communicate to the project team that they needed to get more involved. Similarly, Interviewee 10 noted that it needs to be a "group effort" and Interviewee

11 described a process of dividing the project team into smaller groups and encouraging them to develop their own insights and suggestion and communicate them back to the larger group. Interviewee 7 reflected that it can be difficult to get commitment from individuals in roles external to the direct focus of the project as they can be sceptical of improvement project activity:

> A lot of projects in health start and they don't complete, so there's a bit of reticence to get involved in things, because people find these projects aren't completed, or they are and there's no change made. (Int. 7).

Building engagement with the team was viewed as critical with other interviewees noting team members need to feel connected with the project:

> Then when you're going about a project, don't just pull people in. The… it's better if they can self-select onto it, if they put up their hand for it, have an interest in it. And from my perspective or participants' perspectives, you need to have a direct connection with the project, that you can follow through on a daily basis. (Int. 8)

Interviewees also noted a need for project management training at the project manager level and at the team member level. Interviewee 5 reflected that project management skills are critical to the role and that they developed these as they went along:

> …..that's the role, is project management. But I wasn't… hadn't been fully trained as a project manager at that stage. This was the training exercise. (Int. 5)

Interviewee 13 observed a requirement to support team members and upskill them, commenting that it could be useful to bring operational people in at an earlier stage of the project if possible. Other interviewees with established service improvement roles described a system whereby project management skills are developed incrementally by firstly observing and participating in a project as team member, then leading another project and then facilitating and assisting in other project deliveries. This indicates a more robust approach to developing project management capability is being utilised as some hospitals.

8.5 Theme 4 – Relationship Management

The theme of relationship management featured strongly during the interviewees with participants referencing issues such as building and managing relationships; communication and negotiations skills; conflict management and managing teams.

Building and Managing relationships

The capacity to build trust resonated with many interviewees, with some viewing this as critical to project success. Interviewee 3 recognised the need to build trust with the team from the outset of their project.

> ….I knew from the outset that I needed to get engagement and I needed to build a bit of trust with this team……And for me to be able to be successful in the project, they needed to trust me. (Int. 3)

When reflecting on their improvement project, Interviewee 3 attributed gaining trust with key stakeholders as being critical.

> So, it was trust and spending time with them, which is the biggest element. (Int. 3)

Interviewee 10 expressed that well-developed trust between the team created momentum and a willingness to change and strive for improvement.

> Everyone was there to make it better. And the fact that we – it's just – and the trust. It was good trust. I don't know how that – it was – people were willing to change. (Int. 10)

Conversely, Interviewee 6, describes a situation where a deterioration in trust lead to a relationship becoming fractured and reflected that they could have been more open-minded.

> But that relationship became more… there was lack of trust between both of us, on both sides. And we lost that. And I blame myself as much as… because I got frustrated. I think I wasn't maybe as open minded as I needed to be. And definitely, it was just to be… to keep an open mind to try and separate your personal feelings from the professional ones. (Int. 6)

A lack of trust can hold projects back, according to Interviewee 9, referencing that when the Covid-19 outbreak struck that people did not trust the system and became afraid and that fear spilled over and impacted other activities.

> What was holding us back at times is just trust, is trying to build trust in a system that… and fear. People were scared to be unprotected and people were really nervous. And it was trying to overcome that fear and build the trust again in a system (Int. 9).

Developing deeper relationships with the improvement team also emerged as a significant factor. Interviewee 3 stresses the importance of spending time with the team and with the stakeholders; indicating that it was important to understand their approach to processes.

> I'm going to have to base myself in these sites two days a week. I need to start formulating relationships. I need to start working with them. I need to start going into theatre and looking at the processes and get a greater understanding (Int. 3)

Similarly, Interviewee 4 acknowledged the relationship component of the improvement project and purported that engagement with people form a larger part of the project than just the application of tools.

> …. the engaging people is so much more a part of the improvement than just applying the tools. (Int. 4)

Other participants commented how their work leading the improvement team assisted in developing their capability in building relationships.

> I got good at building relations. I got good at getting people involved, buying in, participating. I got good at all of that. At this stage, I like the final piece of kicking on for sustainable outcomes. (Int. 7)

Being visible as contributing to, and being part of team, was also considered to be important with Interviewee 17 stressing the need to be seen and that the team members want and need to see project manager participation. Interviewee 16 describes how repeatedly visiting the team members and communicating with them in person assisted in breaking down barriers and initial mistrust from the team that had carried over from the effect of a poor relationship between the department and a previous manager.

> And sometimes I would have gone down and I would have got a very frosty reception. But that was one thing that I kept at and I kept doing. But… and this is another twelve months down the line. I would have a much different relationship with them now. And they would be more trustful of me now because we probably have had a lot of frank conversations. And they know that I'd come down. And they know that if I know something's happening or something is changing, or… if I have information. I will come and I will speak to them, and I'll come myself rather than sending the message, that they have access to me rather than sending the message through the manager. (Int. 10).

Being able to communicate and empathise with project participants is also considered important and involves treating them with respect and understanding their approach.

> ….to empathise with the ward sister, the ward nurses and the care staff. And you're trying to say… they've got their own setup in each ward. (Int. 12)

Similarly, Interviewee 7, opined that you need to respect others by guiding them rather giving them orders and that as a project manager you to work alongside the team.

> You're not there to throw out orders to people or divide the workload. You're there to participate. You're there to guide, but you're there to do the heavy lifting as well, along with the team. (Int. 7)

Interviewee 4 emphasised the importance of actively listening to others' perspectives.

> It is… listening is definitely a big piece. And listening to everybody involved and getting the different perspectives. (Int. 4)

A similar perspective was shared by Interviewee 11 who described listening to others as being important alongside allowing others to contribute their thoughts and ideas. Interviewee 9 concurred with this stating:

> You do have to listen to people and let them explain their situation. So, when going into areas like the ICU and the emergency department in particular, you have to make sure you listen. (Int. 9)

> And I firmly believe some people are better at listening than others. If you don't give people the opportunity to say their piece, you'll get nothing out of them. (Int. 9)

Interviewee 8 when asked, was also of the opinion that being a good listener is important, but also identified that it is useful to communicate back what you have heard to be sure that you have understood correctly what was communicated.

> I would. I do think I would be a very good listener. I do listen and don't jump in, but I'm getting much better at feeding back what they're saying to get them to move on a bit. (Int. 8)

Conversely, Interviewee 6 described the negative impact on their project of senior management who would not listen to their concerns.

> The managers at the top, the director of nursing, she was… there were… all this information was coming from her and it wasn't being… they weren't listening to our concerns. (Int. 6)

Communication and negotiation skills

The importance of effectively communicating with stakeholders has already been discussed under the Leadership category earlier in this chapter. Interviewees also commented on the frequency and intensity of these communications, identifying that in certain circumstances the lean improvement manager needs to be able to read the situation and adjust their

communication style accordingly. For example, Interviewee 2 indicated that detailed discussion around the performance metrics that would be tracked occurred in their project.

> There was a lot of discussion in the event, so our team would be very good at having detailed discussion about metrics and getting agreement from people about what they're going to track. (Int. 2).

Interviewee 15 stressed the importance of speaking to people on an individual basis. In some situations it was necessary to do this with individuals who were resistant to the improvement activity. Interviewee 4 described a situation where it was necessary to speak with an individual on a one-to-one basis in an effort to allay their concerns about the project.

> So, I had a couple of conversations with her to bring her down and to explain what it was we were doing, and to try and take the personal piece out of it. So, we did move forward, but there was still a resistance within that particular department. As we went ahead with the improvement, there was still that defensiveness about, we don't need you to come in and tell us how to do our work. (Int. 4)

Similarly, Interviewee 6 described issues with one particular individual during their project with whom communications could have been better and reflected that there is a need to separate personal feelings from professional ones.

> And definitely, it was just to be… to keep an open mind to try and separate your personal feelings from the professional ones. (int. 6)

Interviewee 11 described a need to be open and fair to all project participants and to ensure all perspectives were heard.

> It was important to communicate openly and fairly with them all, because there was so many different teams being represented. (Int. 11)

Furthermore, Interviewee 11 described the importance of being able to effectively communicate data and explaining what this data means.

> So, it's putting together that data and being able to present that data and analyse it, and then explain it to the people that are part of your rapid improvement even, what it means. Because I do think a lot of people are sitting down thinking, or they're pretending they know what they're… what you're talking about when you're presenting data, but a lot of times they don't. And it's the way that the facilitator explains it. It's so important. It's so important. (int. 11)

Similarly, Interviewee 8 described how they improved at explaining things to people on an individual basis and ensuring that before an improvement event that people knew what to expect and what would be happening during that event.

Interviewee 9 also stressed the importance of communication and felt that it was essential to project success and regularly repeating communications in different formats is useful.

> communication is the key to everything, because out of communication, you've got things like flow, or say flow on the wards and flow better, just better flow, huddles, multidisciplinary teamwork. Get all of that, all of the communication. So, they're vital to any project. (Int. 9)

Similarly, Interviewee 16 underlined the importance of being persistent in communicating with the project team and in ensuring that team meetings occurred and went ahead.

> But one of the things I did keep doing was, I kept going back. I kept talking. I tried to keep communicating. The team meetings, trying to make sure they were going ahead, tried to update if I had any information. (Int. 16)

For Interviewee 12 the timing and the manner of the communication were also important indicating that sometimes that the recipients of the communication needed to visualise the situation to understand it.

> …my behaviour would have been first selecting the right time to talk to them. And sometimes it almost gave them… you have to tell them some bit of information and say, 'I'll come back and I'll re-explain it again.' Or then that you would say, show them pictures, show them the data and then invite them to look at the ward if it was across the way from them or whatever, to see how it works. So, they could see it that way. (Int. 12)

Other interviewees described a process of negotiating with and persuading project team members to become engaged in the improvement effort. Interviewee 1 indicated that at times they used bargaining and persuasion to "pull them along sometimes". Similarly, Interviewee 13 referenced the importance of bringing everyone onboard to what you are trying to achieve in the improvement project and that this can be achieved through effective, frequent communications. Also, Interviewee 13, stressed the need of involving participants by listening to their ideas and obtaining their input on how to move things forward.

> Whereas you need to explore everything; you need to tease out the ideas, and you need to get a consensus as such to move forward. (Int. 13)

Conflict Management

The ability to deal with conflict also emerged as a theme. This particularly presented when dealing in situation where there was resistance to change. Some interviewees referenced situation where strong individuals tried to steer the improvement effort towards their own

agenda and that this required an intervention on their part. For example, interviewee 3 highlighted a situation where one individual tried to control an improvement workshop necessitating her intervention by spending time with this person on a one-to-one basis and providing reassurances that the purpose of the improvement project was not to change everything but rather involved them working together to identify problems and try to find solutions to them.

> 'This is all part of this. This is all part of us working together. And we might be able to fix a lot of your problems whilst we're working here.' (Int.3)

According to Interviewee 4 this involves "managing the room" and identifying tensions and when people are uncomfortable and not allow that one person who is a very strong personality derail the process and affect everybody else. Sometimes conflict can arise from pre-existing tensions that have nothing to do with the improvement efforts but need to be identified and managed by the project manager.

> And sometimes, there's… it can be personality clashes as well, which you just have to work… navigate your way around as well. Within that particular team, there were definitely tensions historically between team members that had nothing to do with the improvement event and nothing to do with anything that we were doing. They're just pre-existing tensions, which you also have to navigate, and you only pick up on them as you go along. (Int. 4)

Other interviewees identified that they were unprepared for when conflict arose in their project and acknowledged that they had no training in conflict management but learned this as they went along. Interviewee 6 described being unprepared for conflict that arose during their project and that they found this very hurtful.

> I was getting sucked into conflict with her because… and it was just because the hurt. Some of the things that were said to me and about me and behind my back were very hurtful, about the motive behind the change and the lack of trust… (Int. 6)

Interviewee 8 provided a similar account of an incident in their project where two strong personalities clashed and upon reflection they regretted not interceding.

> There was… this is a small thing but it's a big thing. I remember something that didn't go well. There was an interaction between two staff, where one of them… this was in the room. One of them lost the rag and the other was quite upset. I know the sensei was moving around, but I'm… I'd be a quiet enough person, and sorry that I didn't intervene. (Int. 8)

Some interviewees described situations where they needed to find common ground between clashing personalities. Interviewee 13 described that by identifying that two warring individuals

both had a passion for cricket and revealing this to them, that they managed to get both individuals talking and eventually developing a common bond. According to Interviewee 17 it is important to acknowledge conflict and work through the issues.

> At least you know what the issues are. And let's talk about them. You mightn't like what you're hearing, and they mightn't like what you're telling them, but at least… let's talk about it. (Int. 17)

After encountering substantial resistance to improvements in their project that emanated from historically poor industrial relations, Interviewee 16, identified that more formal interventions and education were required.

> What we tried to do with that was to… some communication, some mediation with them and some education sessions around dignity at work and working together and teamworking. (Int. 16)

Managing teams.

Several interviewees described the importance of being able to both develop teams and manage teamwork. Interviewee 7 described teambuilding as an important skill that they developed during their blackbelt training and likewise Interviewee 13 also identified skills in "team formulation" and felt that these were one of their strengths and are "crucial" at early stages of the project.

> Just to say to you, if you had any of the wrong people on that project team, that was going to fall down, and the project would fall down. So, that's why it's so important to have the right people on the team. (Int. 13)

Similarly, Interviewee 17, referenced the importance of team composition and how having the right people involved can assist improvement efforts.

> And then with the lean, what I've found with the lean too… it's amazing. If you don't… it's amazing. When you get the right people around the table, you can manage to solve your own problems. (Int. 17)

Interviewee 10 identified that they adopted a "partnership approach" to their improvement project and that this involved "working together to find a solution". Similarly, Interviewee 4 asserted that it is important to hear opinions from all team members and not just allow strong personalities dominate.

> To try and name the other team members, and to make sure that you share the voices. Just because one person is very vocal and very upset, that doesn't mean that that's the predominant feeling of the whole team. (Int. 4)

Building a cohesive team going forward was also identified by Interviewee 10 who recognised that they would be moving on from the project once completed but other team members would still be working together afterwards and needed to do this effectively going forward.

> And there's a bit about protecting people going forwards. When the improvement event is over, I can leave; I'm only linking back occasionally. But these people have to work together all the time, so it's a bit about protecting people as well. (Int. 10)

Working with team members can involve a variety of skills. Those referenced included negotiation skills (Int. 1); coaching skills (Int. 2, Int. 4 and Int. 6); mentoring (Int. 4); Training (Int. 4) and the ability to deal with difficult situations (Int. 12).

8.6 Theme 5 – Professional Development, Ethics and Social Responsibility.

The theme of professional development strongly resonated with interview participants with interviewees referencing both their own learning and development and also the development of others through coaching, mentoring and training. Interestingly topics pertaining to ethics and social responsibility did not feature strongly in the interview discussions with very few participants referring to ethical concerns and only some participants describing situations concerning broader societal issues. A text query search of the phrases "ethics" and "social responsibility" of the interviews generated zero incidences of each segment of text.

Learning and professional development was mentioned by many of the interviewees as being a significant factor and outcome of their involvement in lean improvement project activity. The interviewees had varying educational backgrounds with some individual having undertaken specific education and training in lean thinking and practice. Six participants referenced specific lean training undertaken in a "belt" programme and four interviewees had completed postgraduate education in programmes in lean practice or management. The interviewees came from diverse backgrounds including clinical (both nursing and medical consulting roles); managerial and administrative/support roles.

A number of interviewees referenced their own professional development and learning as being a significant experience for them during their lean improvement project. Interviewee 6 described how a management consultant highlighted to them that their own personal development during the project was going to be key. Reflecting on the project the same individual indicated that although the project itself was not fully successful in terms of its

outcomes, it could be rated as very successful in terms of the learning attained during the project. Interviewees 8 and 17 both agreed with this viewpoint describing significant learning attained during their projects. Similarly, Interviewee 13 described a personal need for ongoing learning both from education and practical experience observing:

> You're learning from people. You're listening to people. And that's why it's fantastic, the education piece now, because for… if you ask me…. There's someone coming to me and saying, 'What am I missing out not taking on education?' The vast amount of knowledge and theory and interesting articles, and let's get some buy into. You've to continuously keep listening and viewing and reading, with just… [inaudible] you can't put your feet up and do nothing. (Int. 13)

Interestingly the importance of coaching others was also referenced by others with interviewee 8 identifying that stronger coaching might help improve project outcomes.

> … but from my own personal development point of view, I would love to kick it on a bit more in terms of outcomes. Maybe stronger coaching to move it on. (Int. 8)

This was also identified by Interviewee 4 who described how managing people in project teams is different to managing people who are your direct reports and that a more influencing, coaching, or mentoring style was more appropriate.

> But managing your own staff and your own department is a completely different skill to managing people who aren't your direct reports and working with different teams. And you're managing people's behaviours in a different way, where you have no line managed responsibility for them. So, it's that, and that piece around influencing and coaching and mentoring and training. (Int. 4)

Similarly, Interviewee 6 describes how they provided coaching to team members bring them through "the tools and techniques" and Interviewees 9 and 15 discussed how they provide mentoring and advisory supports to other colleagues undertaking lean improvement projects.

Themes of being confident, dedicated and resilient also emerged from the interview discussion. Interviewee 15 described the importance of being "confident in the future" and of how their project required a significant investment of her own personal time and energy. Similarly, Interviewee 4 described a time commitment to the project and determination to keep the project on course identifying that there is a sense of personal responsibility when you are a project lead. Interviewee 4 also stressed the importance of being able to optimise and manage your own time.

> And particularly, for thinking of lean and value add, there's a big piece around how you use your time to be of maximum value for the organisation. (Int. 4)

Interviewees 13 and 17 both stressed the importance of being calm and of listening to people's perspectives. Dealing with frustration was also referenced by some interviewees, particularly when dealing with resistance from colleagues on the project team. Interviewee 1 describes being frustrated by resistant colleagues by acknowledging that "of course, sometimes you get angry at them in your own head" and how one person can sometimes change the whole dynamic in a room. Interviewee 4 stressed the importance of listening first in situation where individuals are resistant to the improvement process and taking the time to consider the source of the resistance.

> Everybody's there with a certain amount of willingness. So, listening's probably more important in the first instance to try and get… because sometimes the thing that blew up, what's on the face a bit isn't actually what's behind it. (Int. 4)

Interviewee 6 described similar frustrations with managing resistant people stating that she found it very stressful to the point that they "actually gave up several times". Reflecting on their project, Interviewee 6, acknowledged that they became frustrated and could have been more open to the perspectives of colleagues.

> And I blame myself as much as… because I got frustrated. I think I wasn't maybe as open minded as I needed to be. And definitely, it was just to be… to keep an open mind to try and separate your personal feelings from the professional ones. (Int. 6)

Similarly, Interviewee 11 also discussed the importance of being open and neutral when engaging with others on improvement projects.

> One of the key things is that, you can't go in with your bias or pre-conceived assumptions about any area. I knew a lot of the participants in it and I might have dealt with some of them in the past or worked with… not worked with some of them but you'd be in correspondence with them. But you have to leave all that aside, so, it's very important to be neutral, to have that neutral opinion as well, because otherwise it'll influence who you do let talk and who doesn't talk. (Int. 11)

8.7 Theme 6 – Managing Continuous Improvement.

The final theme that emerged from the analysis of the interviews was that of managing for improvement. Participants identify a number of concepts in this broader theme including understanding value from a customer/patient perspective; apply lean principles and practice; mapping and improving processes; measurement and control of key performance indicators; improvement methodologies and change management.

Understanding value from a customer/patient perspective.

Understanding value from a customer perspective is a central concept in lean thinking. Organisations that are engaged in analysing their activities to find opportunities for improvement should always consider processes from a customer perspective and ask does this activity add value for the customer?" Interestingly some participants identify that can be a challenge for those involved in lean improvement projects. Interviewee 11 recounts a situation during an improvement event that the people involved had to be encouraged to view the process from a customer perspective.

> 'But you are thinking of the value to you. This is the value to your customer.' And they weren't seeing that at all. And the minute they started getting that, it was almost like a moment where they went, 'Oh, right, we are only thinking of ourselves, that we need to do this, we need to do that.' But what value does that add to your candidate or your service manager? They're your customers. (Int. 11)

For many interviewees this involves understanding the "voice of the patient". Table 8.4 illustrates perspectives from participants regarding collecting data concerning the patient perspective.

Obtaining patient perspective and understanding healthcare processes from a patient flow perspective is a critical component of applying lean thinking in hospitals. Table 8.3 p.180 illustrates the importance of understanding value from a patient flow perspective and how this can underpin the process of conducting patient journey and understanding patient flow.

Table 8.4 Participant approaches to obtaining patient perspectives.

Interviewee	Comment on obtaining patient perspective.
1	"…we did patient surveys in advance"
3	'This is ridiculous. There has to be a better way of doing this. .. to try and reduce the footfall in the hospital, and also to reduce the waiting time of the patients.
7	When you ask somebody, who had no lean training how can you possibly lean something that involves – the human is the – the patient and their presentation is the client.
8	We did good preparation beforehand, getting the voice of the patient, the voice of the staff, the data.
11	The principle here is the value to the customer. You're always thinking about the value to the customer, the patient or your client. People do forget about it and you have to remind them.
14	….in our group, we interviewed patients from across the board, so we interviewed patients; the majority were in-patient, and from both surgical, medical and care for the elderly wards. There was also all a hands-on approach to interviewing day case patients who confirmed as well that even as a day case patient, people didn't feel they got as much information they needed.
17	Exactly, with the best outcome for the patient. And with – and people don't get credit enough – best outcome for staff as well. Staff feel valued. They can… they're very highly skilled staff. There's great satisfaction to know that they're managing the patient appropriately.

Mapping and Improving Processes

Participants identified approaches to mapping processes that built on the data collected during patient journeys. Interviewee 10 describes a process mapping activity involving the team that consisted of mapping out the individual steps in the process and identifying improvements:

> We mapped out the process, so we had big, long sheets, and we mapped out the process and all the different steps. We may have – I can't remember the exact figures now but there may have been 60-70 steps, and then we got it down to about 23. (Int. 10)

Interviewee 4, similarly, describes utilising process maps, chart flow maps and collecting and measuring data in relation to the process. This facilitates a gap analysis between a current and improved state process map. A similar approach is described by interviewee 7 identifying that a simple pen and paper approach often works best

> We went for some of the very basic visual ones like mapping out the current status or the current process. Having a look at future state, current state and mapping them out in – just using a pen and a few bits of paper, nothing fancy

Others identified a more expansive approach involving value stream mapping. Interviewee 11 who identified a process of using value stream analysis to identify opportunities for improvement that form the basis of rapid improvement events.

> ….we did a five-day value-stream analysis at the end. What followed from the value-stream analysis, we decided that we would need two rapid improvement events. (Int. 11)

Visualisation of process maps and value stream mapping was identified as being useful in laying the process bare and identifying waste.

> but when you see it cold, you're like, 'That's a lot of different things.' And you think – when – before you see it on paper, you're thinking, you have to do that and you have to do that. But then as you plot it out, you're like, 'Well, really, do you have to do that.' And you see – the duplication becomes clearer. (int. 10)

> That element of waiting is gone, so that waste stream has been almost completely eliminated. (Int. 7)

The act of mapping processes encourages involvement and engagement from stakeholders allowing different perspectives to be heard around improvement opportunities. Interviewee 6 described a process of encouraging all stakeholders to participate and vote for the improvement opportunities that they preferred:

> And we did a town hall meeting first with all the staff. We listed out all the issues that were causing problems and we did a big… a tree diagram. And then we did the dot voting exercise on that, where everybody got their five dots to pick the project that they wanted to work on. (int. 6)

Visualisation of process maps can also expose knowledge gaps of stakeholders in relation to process/value stream activity.

> Everybody – if it was part of a broader team, didn't have full knowledge of the process from start to finish. They only knew their own bits. It was very – it was a good educational experience for everyone to see the other side, myself included. (Int. 7)

Application of Lean Principles and Practice

As a preceding action to process mapping and value stream mapping activity, data regarding current performance must be obtained. Several participants directly described conducting Gemba walks to gather observations and data. Interviewee 2 described how they were significantly influenced by the occurrence of an important Gemba visit by senior management and that upon reflection that they overreacted to this by taking on too much responsibility for

the project when this could have been shared by the larger project team. Interviewee 1 describes following the steps of the patient as they navigate the process and review the notes taken regarding patients to better understand the process.

> Do a gemba and pull the patient's notes and look through the different steps and understand the steps and which ones are critical. And understand the hospital process is incredibly important as part of that, and appreciate the patient journey and what are their anxieties. (Int. 1)

Similarly, Interviewee 6 stressed the importance of maintaining contact at the Gemba and stated that they should have been more visible in at the coalface in the first year of their project. According to Interviewee 7 improvement ideas can sometimes come to light during Gemba activity that are not part of the project brief:

> Some changes outside of the project, outside the target of the project were made by observations from – via the gemba. Why were ere we still accepting paper requests, because they can go missing. And somebody – a junior member of the team can come down and put it in a place it shouldn't be and it's lost. (Int. 7)

Developing a structured approach to activity through the use of established lean and continuous improvement methodologies is also recognised as being a core element of lean cultural transformations. Structured approaches can be useful in highlighting variation in operational activity.

In terms of regulating work activity in operational areas 5S or 6S is a lean approach that is commonly used to maintain orderly work areas and highlight deviations from the required standard. This formed the basis of the project implemented by Interviewee 15 and was based on the well-organised ward concept of the Productive Ward concept that has been adopted by some NHS hospitals in the UK. Interviewee 2 commented that 6S is useful in developing lean capability and capacity. Interestingly in one project the principles of 5S were mainly applied in the project as part of a common-sense approach to organising and improving work activity in treatment rooms with Interviewee 12 acknowledging that they were only aware of the 5S methodology following the conclusion of their project.

> But to be honest, I unconsciously would have been doing all those things without even knowing it. And that's the truth of the matter is. These 5Ss only often came up after the project… (Int. 12)

Kanban and pull systems were also mentioned by some participants with Interviewee 9 indicating that Kanban was utilised to control the flow of materials to the hospital wards and Interviewee 6 described how Kanban boards were going to be used to control and direct patient flow from operating theatre to day wards.

A structured approach to problem-solving and the recognition of improvement opportunities is also recognised as being important to developing a lean culture and improvement capabilities in organisations. Interviewees 4, 8, 11, 14 and 17 described utilising the A3 approach to structured problem solving; and interviewee 9 mentioned that their organisation applied the Six Sigma DMAIC approach in their improvement activity and interviewee 12 applied the Deming PDSA approach during their project. Several interviewees mentioned a variety of quality improvement tools such Pareto charts; control charts; statistical process control; flowcharts and trend analysis. Interviewee 7 viewed the use of lean tools as being critical as they are so visual and communicate process data.

> But it's the use of the tools that won people over in the finish. It was – because some of them are so visual. (Int. 7)

Similarly, Interviewee 4 viewed knowledge of and competency in lean tools as important to improvement projects.

> you definitely have to have an understanding of the tools, the methodology and how you're going to apply them and how you apply them to different scenarios. That technical knowledge and competency is very important. (Int. 4)

Interestingly, the level of formal lean training varied greatly amongst participants with 11 of the 17 interviewees indicated that they some form of lean or quality improvement training. Three participants had undertaken lean blackbelt training (one participant was currently completing master blackbelt training); two participants had completed lean green belt training; and one participant had completed yellow belt training. Some of the belt training received by participants was delivered in partnership with Irish higher education institutions. A further three participants had received training with Cardiff University to either a bronze or silver standard. One participant received lean training from a consultancy service that was retained by the hospital group and another referenced quality improvement training also delivered by a consultant.

Interestingly few participants mentioned standard work and standard operating procedures (SOPs), which is unusual given that the development of standard work is one of the fundamental pillars of improvement methodologies, including lean. For interviewee 17 the development of an SOP was critical to the progression of their project and they reflected that a delay in seeking executive sign-off of the SOP hindered the speed at which the project progressed.

> …we should have had that SOP and got it signed off in the management team on Monday. That was the deal breaker, without a shadow of a doubt. (Int. 17)

However, other than Interviewee 17, only two other participants mentioned standard work, and that was mentioned in the context of a RIE workshop training event by Interviewee 1 and in the context of improved SOPs around supervision by Interviewee 16.

Measurement and Control of Key Performance Indicators

Although standard work in relation to operational processes did not feature significantly during the interviews; the need to develop standards and consistency around managing for daily improvement and standard leader work did feature in the interview discourse. According to Interviewee 2 managing for daily improvement was something that needed to improve.

> I've also more and more convinced around the management of daily improvement as well. And having those management for daily… whatever those daily improvement systems. That's definitely something we need to get better at. (Int. 2)

Furthermore, Interviewee 2 described a system whereby performance metrics are captured at wards boards. These are then fed into a navigational hub and then reported to executive management for action. Interviewee 11 described a similar process in a HR support function.

> So, we put together the idea of having HR huddles. It's almost like the safety huddle in a clinical area; it's a HR huddle. And we designed it in a way that they have their visual management board. It's for the HR huddle, where they come together once a day and they say, 'Right, these are all the campaigns we have in progress. This is the one that we need to prioritise this week. We need to get these people processed. (Int. 11)

Interviewee 10 also explained that a metrics-based system is utilised that is visual; encompasses a weekly reporting structure and an escalation process for flagging items for senior management attention. A need for easily understood, accessible and meaningful metrics was stressed by interviewee 7 who preferred to use simple targets that everyone understands.

> We looked at very simple targets that everyone understands. We looked at the complaints the department was receiving, the numbers of patients on the outpatient waiting lists, the number of oncology patients, the number of bed days we were able to free up. We looked at very tangible things that had meaning for people. (Int. 7)

Similarly, Interviewee 17 stressed the importance of tracking KPIs and evidence-based data and that these are discussed at daily multidisciplinary huddles where items could be actioned if necessary. Following up on the outcomes of RIEs was also stressed with both Interviewees 8 and 17 outlined a process of 30-60-90 day reviews to monitor project progress.

Change Management

The need for skills in managing change also featured strongly during the interviews with many participants citing competencies in change management as being an important skillset for manager of lean improvement projects. According to Interviewee 1, the ability to use change management tools I conjunction with lean tools was desirable.

> …for me, it's about using lean but about using other kind of change management and culture management tools as well with it. The lean tools are great, but you have to intertwine them with a culture of change management. (Int. 1)

Similarly, Interviewee 2 recognised the importance of change management skills being utilised in tandem with project management skills, people skills and facilitation skills.

> But the project management piece in itself will not… is very… has a very limited value, unless it's been supplemented with the change management and the people and facilitation skills. (Int. 2)

Other interviewees mentioned the use of specific change models such as the Change Accreditation Process (CAP) model (Int. 3); Kotter's 8-Step model (Int. 6)

According to Interviewee 7, people are not very good at change in the public sector and they stressed the importance of developing skills in managing change. Interviewee 13 expressed a similar sentiment, acknowledging that people tend to fear change and that reassurance may need to be provided to individuals who are genuinely wary of the change.

> There was a lot of fear of the change. There was apprehension about… and I understand a lot of… there's a lot of pieces on change, but the piece around fear is probably the biggest piece, and reassurance. (Int. 13)

The nature of the healthcare system can also be a factor. According to Interviewee 12, people in the healthcare system can get used to its dysfunctional tendencies and rather than trying to change and improve processes, they instead develop workarounds and tricks to deal with the dysfunctional system.

> They'll learn tricks to deal with a dysfunctioning system. They won't change the system, if that makes sense to you. Because they perceive they can't change it. (Int. 12)

8.8 Changes to competency statements following a cross-method comparison of the findings.

The competency statements identified in the Delphi study were largely supported by the analysis of the interviews conducted with lean improvement project managers in hospitals. Some minor changes in the rating of some competency statements are made as a result of the interview findings. Also, some competency statements that did not achieve consensus in the Delphi study, when considered against the analysis of the interviews, are now reconsidered for inclusion in the competency model.

In the Leadership category, two competency statements L3 “Articulates mission and shared vision” and L4 “Visible leadership” narrowly missed achieving a “Core” consensus rating from the Delphi with 64.3% of panel participants agreeing this rating. In the case of both competencies 12 participants rated these competency statement as either “Expert” or “Core”. Based on the emphasis placed on alignment of project goals with organisational strategy and goals; and the importance of visible leadership; as expressed during the interviewees; it is considered important to include these in the Leadership competencies at a “Core” rating.

Only one competency statement in the Hospital Management and Healthcare Environment did not achieve consensus in the Delphi panel. This was H10 “Develops others” achieved a consensus rating of 57.1% at a “Core” rating which is below the target consensus rating of 65%. However, this competency statement had an interquartile range of 1 and a standard deviation of 0.611, both of which indicate a tendency for consensus at a “Core” rating. Also, 92.9% of participants rated this competency at either an “Expert” or “Core” rating. Given that many of the interviewees described activity involving mentoring, coaching, developing and being advocates to others; it is important to reconsider this competency statement and based on a

combination of the findings from both stages of the research this competency statement is included at a "Core" rating.

When considering the importance placed on project management activities at various stages of the project by the interviewees, competency statement B15 "Project management" needs to be reconsidered in capturing the breadth and depth of project management activity required by the lean improvement project manager role. This competency statement narrowly missed achieving consensus at a "Core" rating following the conclusion of the fourth round of the Delphi study. However, 71.4% of participants rated this competency at either an "Expert" or "Core" rating. After considering the opinions of the interview participants this statement will be included at a "Core" rating in the Business Skills category.

In the Relationship Management category, to reflect the emphasis on building relationships described by the lean improvement project managers during the interviews the competency statement R2 "Maintains stakeholder relationships" will be included at an "Expert" rating rather than a "Core" rating. Three competency statements in this category did not achieve consensus during the four rounds of the Delphi study. Two of these statements R3 "Displays gratitude" and R16 "Actively listening" achieved a 64.3% consensus at a "Core" rating with corresponding interquartile range scores of 1 and standard deviation scores of 0.579 and 0.479 respectively. The themes of gratitude and active listening featured strongly in the interviews. Competency statements R3 "Displays gratitude" (92.8% of respondent indicated a rating of Expert or Core) and R16 "Active listening" (100% of respondents indicating a rating at Expert or Core) only narrowly missed consensus at a "Core" rating. Both competencies were also referenced by interviewees as being significant to lean improvement project outcomes, these statements will be included as "Core" in the Relationship Management category.

Competency statement R13 "Communicates progress" also did not achieve consensus by the conclusion of the fourth round of the Delphi study. However, this was identified by all participants at either a "Core" rating (6 participants) or a "Supplementary" rating (7 participants indicating that the competency was necessary and useful frequently, and one participant indicating that competency was necessary and useful less frequently). The importance of communicating progress did emerge as a theme during the interviews. For example, Interviewee 9 describes the importance of regular, repeating communications and communication being the "key to everything". Based on the opinions of both the Delphi panel participants and the interviewees, competency statement R13 will be included at

"Supplementary (3)" rating indicating that this competency is necessary for lean improvement project success and useful frequently.

In the Professional Ethics and Social Responsibility category, one competency statement P12 "Awareness of scope of practice" did not achieve consensus after the fourth round of the Delphi panel. This competency statement suggested that managers *do not suggest that staff members exceed their scope beyond established professional and personal competence*. In response to this statement 57.1% rated this competency at 3 (Supplementary). The interquartile range for this statement was 1 and the corresponding standard deviation was 0.775. This statement had a breadth of responses in the fourth round with one rating at one, four ratings at two, seven ratings at 3, one rating at 4, and one rating at 5. However, following correspondence with two participants, they indicated opposing views at either end of the scale and indicating different interpretations of the competency statement. One highlighted the dangers of operating outside of your scope of practice in a healthcare context and appeared to be viewing the statement from a healthcare practitioner perspective. The other participant viewed the competency from learning and development perspective in a lean context and indicated that every individual "should be aspiring to better themselves". During the interviews, a number of interviewees referenced the need to challenge members of their improvement project teams and indicated it was necessary to encourage them to use new skills such as process mapping and value stream mapping and also consider developing capabilities in areas such as performance measurement and data analysis. Upon considering both the Delphi panel and interviewee perspectives on this competency statement, it is more prudent to reflect a lean improvement context and not include this statement in this category.

Interviewees describe a range of lean tools in use including process mapping, value stream mapping, 5S/6S, Kanban, pull systems, and visual management. For some interviewees the use of lean tools and methodologies are important to project success. Interviewee 7 indicated that "it's the use of the tools that won people over in the finish" and Interviewee 4 stated that "you definitely have to have an understanding of the tools, the methodology and how you're going to apply them and how you apply them to different scenarios". Interestingly the Delphi panel rated competency statement M13 "ability to select and apply appropriate quality methods and tools" at a "Core" rating and competency statement M5 "ability to select and apply appropriate lean methods and tools" at a "Supplementary – Used frequently" rating. Given the prevalence of lean tools and methodologies used by interviewees during their projects both these competency statements are included at a "Core" rating. These competency statements are

merged into one statement “ability to select and apply appropriate lean and/or quality methods and tools” to simplify this competency category.

Two competency statements, M6 “Balances the application of standard work with experimentation”, and M15 “Adopts a systematic problem-solving approach”, did not achieve a consensus rating following the fourth round of the Delphi survey with 57.1% of the panel participants rating these statements at a “Core” rating in the case of M6 and at an “Expert” rating in the case of M15. When these statements are examined further, 12 participants of the Delphi panel rated M6 as either “Expert” or “Core”, with two participants rating the competency as “Supplementary”. The application of standard work was mentioned by some interviewees. Similarly, the need for experimentation was also referenced by interviewees in the context of identifying improvements and allowing team members vocalise their ideas for improvement. The competency M6 will be included at a “Core” rating in the Managing Continuous Improvement category. The competency M15 was rated at an “Expert” rating by 8 of the panel participants with the remainder of the participants rating this statement at a “Core” rating. Systematic problem-solving approaches such as PDSA, DMAIC and A3 problem solving, were mentioned by many interviewees and seem to be a central activity upon which to base improvement activity.

8.9 Competency sub-categories identified under each domain.

Following best practice in competency modelling (see Chapter 4), it is important to create competency sub-categories in each competency category. This facilitates better understanding of the competency model. Six competency categories were identified in the first round of the Delphi study. When compared with the interview data it was determined that the competency categories identified by the Delphi participants reflected the perspectives described during the interviews and there was no need to alter the titles of the competency categories. An analysis of the interview data resulted in the discovery of a number of recurring themes in each competency category. These themes were considered in relation to the competency statements in the Delphi and a number of sub-categories were created based on an analysis of both sets of data. Table 8.5 illustrates the competency sub-categories identified. These sub-categories are included in the model presented in Chapter 9.

Table 8.5 The Competency Sub-Domains identified under each domain.

Competency Domain	Delphi Findings	Interview Themes	Competency sub-domain
Leadership	11 competency statements identified.	Leadership Skills and Behaviour. Leading Change. Shaping Culture.	Leadership Skills and Behaviour. Leading Change. Shaping Culture.
Hospital Management and Healthcare Environment	10 competency statement identified.	Understanding Value from a patient/customer perspective. Understanding the hospital organisation and the inter-relationship between units. Understanding how the broader Health System operates. Managing the health workforce. Resource acquisition management.	Understanding Value from a patient/customer perspective. Understand the Hospital Organisation and the broader Health system. Manages the Health Workforce.
Business Skills	17 competency statements identified.	Evidence-based Informed Decision-making. Operations and Process Management. Project and Financial Management.	Evidence-based Informed Decision-making. Operations and Process Management. Project and Financial Management.
Relationship Management.	17 competency statements identified.	Building and managing relationships. Managing teams. Communication and negotiation skills. Conflict management.	Developing and managing relationships. Managing teams. Communication and negotiation skills. Conflict management.

Professional Ethics and Social Responsibility.	12 competency statements identified.		Professionalism. Professional Development. Social Responsibility.
Managing Continuous Improvement.	25 competency statements identified.	Understands Value from a Patient/Customer perspective. Application of Lean Principles and Practices. Mapping and improving processes. Measurement and control of KPI's. Change management.	Understands Value from a Patient/Customer perspective. Applies Lean practices and tools. Mapping and improving processes. Measuring and managing performance. Managing change and continuous improvement.

The researcher wanted to avoid the creation of too many competency sub-categories in each competency category. In considering the optimum amount of competency sub-categories the findings presented in Chapters 7 and Chapter 8 were considered alongside best practice in competency modelling (see Chapter 4). To avoid unnecessarily creating too much segmentation of each category it was decided 3 or 4 competency sub-categories would be the optimum amount. One exception to this occurred within the Managing continuous improvement competency category where five competency sub-categories were created. This was necessary due to the high number of competency statements included in this category.

8.10 Chapter Summary.

This chapter presented the findings from the critical-event interviews. In summary, variations did exist between the interview data and the Delphi study data in terms of the emphasis placed on individual competency statements. This necessitated a re-examination of some competency statements that did not achieve consensus after the conclusion of the Delphi study. Also some competency statements were re-rated based on a comparision of both sets of data. The final competency model is presented and discussed in the next chapter.

Chapter 9 – Discussion.

9.1 Introduction.

The previous two chapters presented the findings from a modified Delphi study and 17 critical-event interviews, permitting themes and insights to emerge with respect to the research questions. This chapter begins by restating the research aim and questions. Answers to the research questions are then provided, highlighting the key findings emerging from the empirical research and critically assessing these taking into account the source literature. The next section presents *a posteriori* developments from the field research. Contributions to the knowledge base are then outlined. Following that a number of methodological issues are considered including the limitations and strengths of the methodology. The final section in this chapter discusses a conceptual model developed from the research and outlines implications for policy and practice. The chapter then concludes by summarising the relevance of the chapter for the thesis.

9.2 Research Aim and Questions.

At this point in the thesis it is useful to remind the reader of the aim and the objectives of the research. The research sought to identify competencies for managing lean projects in hospitals, and evaluate the perceived significance and impact of these competencies on lean project outcomes

In order to address this research problem two research questions were developed:

Research Question One

What are the competencies required to manage lean projects in Irish hospitals?

Research Question Two

Which competencies are most important in managing lean projects in Irish hospitals, and why are these competencies perceived to be most important?

Each of these research questions will now be answered in turn.

9.3 Answer to Research Question 1

This section uses the field evidence to answer the first research question that was established for the study. This question was:

> What are the competencies required to manage lean projects in Irish hospitals?

9.3.1 Summary of key findings and illustration of the refined competency model.

To address this question a four-round Delphi study was conducted with a panel of knowledgeable respondents in the area of lean healthcare. On conclusion of the fourth-round of the Delphi study 82 competencies had attained consensus with ten competency statements failing to reach consensus. Critical-event interviews were also carried out with 17 individuals in a project manager or lead role of a lean improvement project in Irish public hospitals. An analysis of these interviews identified common themes that emerged regarding the management of lean improvement projects.

A comparison analysis of the findings of the Delphi study with findings of the critical-event interviews was conducted. This analysis found that findings from the interviews strongly supported the 82 competency statements identified by the Delphi study. A further number of competencies that failed to achieve consensus in the Delphi study were reconsidered and included in the refined competency model.

A total of 90 competency statements are included in this model across six competency domains. Each competency domain has been sub-divided into competency sub-domains, grouping competency statements that share similar characteristics and observable behaviours that represent proficiency in the competency.

Campion *et al.* (2011) recommends including an indication of the relative importance of each competency statement to a particular role. Further guidance is provided in relation to each competency statement regarding the relative criticality of each competency statement in relation to the role of managing lean improvement projects in Irish hospitals by providing a rating at either Expert, Core, Supplementary and used frequently, or Supplementary and used infrequently. Table 9.1 presents the refined competency model. A title, description and rating is provided for each competency statement in the model.

Table 9.1- COMPETENCY DOMAIN 1: LEADERSHIP			Rating
Competency Sub-Domain: Leadership Skills and Behaviour			
L1	Leads by example.	Demonstrates leadership qualities and exhibits behaviours conducive to a lean environment such as trust, integrity, honesty and respect for people.	Expert
L2	Leads with humility.	Demonstrates a willingness to seek input, actively listen to others, understand other viewpoints and learn from others.	Expert
L3	Articulates mission and shared vision.	Articulates the vision, mission and objectives of the organisation and demonstrates an ability to actively engage in the policy deployment process aligned to a shared vision for the organisation.	Core
L5	Leads with consistency	Demonstrates a consistent approach to leadership that reflects the underpinning values of the organisation and embraces standard leader work.	Core
Competency Sub-Domain: Leading Change.			
L8	Encourages staff commitment.	Demonstrates an ability to achieve results through people by motivating and empowering subordinates.	Core
L9	Leads with transparency.	Leads transparently, effectively communicating to others about progress, possible problems and planned changes.	Core
L10	Change Leadership.	Demonstrates ability to identify potential areas of change, challenge the status quo, and lead teams to develop effective, workable solutions in a lean environment.	Core
L11	Engages in pragmatic decision-making	Encourages decision-making based on available evidence and choosing to move forward rather than wait for optimal conditions.	Core
Competency Sub-Domain: Shaping Culture			
L7	Creates a psychologically safe environment.	Develops an environment that is psychologically safe, allowing people to contribute ideas and insightful observations without fear of criticism or reproach.	Expert
L4	Visible leadership.	Maintains a regular presence at the “Gemba”, seeking to understand process issues first-hand and regularly attending morning meetings.	Core
L6	Engages in participatory decision-making.	Encourages decision-making through consultation with others based around team problem solving.	Core

Table 9.1 contd. - COMPETENCY DOMAIN 2: HOSPITAL MANAGEMENT AND HEALTHCARE ENVIRONMENT			**Rating**
Competency Sub-Domain: Understanding Value from a Patient/Customer perspective.			
H6	Appreciates patient value.	Demonstrates an ability to identify activities that add value for patients and understands the concept of patient-centred care.	Expert
H7	Understands patient safety systems within the clinical environment.	Understands the reporting mechanisms within risk management and clinical governance structures when managing activities within clinical environments.	Core
Competency Sub-Domain: Understanding the Hospital Organisation and broader Health system.			
H3	Understands the inter-relationships between different hospital functions and units.	Demonstrates knowledge of the internal structures of the organisation and an awareness of the needs of internal customers. Understands that interdependencies occur within the hospital system and that a change in one area may have an impact in another part of the system.	Core
H4	Understands the resource implications of improvement decisions.	Understands the need to balance priorities in a resource constrained environment and demonstrates an ability to make effective resource deployment decisions.	Core
H8	Communicates effectively with stakeholders.	Develops an awareness of the "different languages" in a hospital and can communicate effectively with the different stakeholders regarding improvement activities and how they add value.	Core
H5	Demonstrates knowledge of hospital practices.	Demonstrates knowledge of professional and clinical practices and behaviours in different departments of the hospital.	Supp. Useful Frequently
H1	Understands the regulatory environment.	Understands the role of government, regulatory, professional and accreditation bodies.	Supp. Useful Infrequently
H2	Understands the political environment and health system drivers.	Understands the role of national policy, demographics, societal changes and public sector funding on the healthcare environment.	Supp. Useful Infrequently
Competency Sub-Domain: Manages the Health Workforce			
H9	Understands the people element	Needs to understand the impact any planned change will have on the internal stakeholders (staff) and on the external stakeholders (patients and families).	Core
H10	Develops others.	Develops and implements practices that coach and develop other colleagues and team members.	Core

Table 9.1 contd. - COMPETENCY DOMAIN 3: BUSINESS SKILLS			Rating
Competency Sub-Domain: Evidence-based Informed Decision-making			
B4	Collects first-hand data.	Engages in Gemba walks, morning meetings and performance review meetings to obtain first-hand accounts of operational performance problems as they arise.	Expert
B6	Uses visual management to improve performance.	Creates a visual management system for front line teams to track and improve performance.	Expert
B7	Identifies and solves process problems.	Demonstrates an ability to use lean tools and techniques such as Value Stream Mapping to identify improvement opportunities and generate process improvement solutions.	Expert
B1	Understanding data.	Understands data on a scientific and technical level and appreciates the difference the difference between financial data and healthcare data.	Core
B2	Uses appropriate data for decision-making.	Sources, understands and analyses both qualitative and quantitative data from internal and external sources to support effective decisions.	Core
B3	Utilising data as a basis for measuring improvement.	Using data and statistical techniques to understand variation and the impact of proposed improvements.	Core
Competency Sub-Domain: Operations and Process Management.			
B5	Understands operational management.	Understands the demand profiles on services and demonstrates an ability to effectively manage operations and the roles of people and technology in relation to processes.	Core
B10	Measures key performance indicators as defined by organisation strategy.	Demonstrates an awareness of organisational and national key performance indicators and measures contribution towards achieving organisational goals and objectives.	Core
B12	Resource Management.	Plans, organises, effectively and manages the resources of the organisation.	Core

Competency Sub-Domain: Project and Financial Management.			
B14	Aligns project and corporate goals.	Demonstrates an ability to identify projects and actions that will meet and achieve corporate goals and strategic direction of the organisation.	Core
B15	Project Management.	Demonstrates an ability to resource, manage and deliver projects.	Core
B16	Meetings Management.	Demonstrates an ability to effectively chair and manage project meetings in a consistent fashion.	Core
B17	Demonstrates commitment by delivering tangible wins.	Utilises the achievement of milestone targets to build momentum and maintain buy-in from the project team.	Core
B8	Understands contracting and procurement processes.	Understands the importance of managing supplies across the organisational network and the contracting process in developing and maintaining relationships with suppliers.	Supp. Used Frequently
B9	Financial management.	Understands, effectively uses and effectively communicates financial data.	Supp. Used Frequently
B11	Understands budgeting processes.	Ensures projects are managed efficiently and within allocated budgets.	Supp. Used Frequently
B13	Business case development.	Demonstrates an ability to interpret and use financial information to support development of a business case and demonstrate financial impact of planned improvements.	Supp. Used Frequently

Table 9.1 contd. – COMPETENCY DOMAIN 4: RELATIONSHIP MANAGEMENT			Rating
Competency Sub-Domain: Developing and managing relationships.			
R1	Identifies stakeholders.	Identifies stakeholders to ensure the right people are involved in improvement activity, including those outside of their own organisation/usual networks.	Expert
R2	Maintains stakeholder relationships.	Collaborates with others to maintain effective relationships with internal and external stakeholders.	Expert
R4	Understands and acknowledges power dynamics.	Demonstrates awareness of power dynamics and appropriately engages with the right people in the right order to bring about discussion, especially in relation to change.	Core
R5	Partners in the value stream.	Ensure partners in other parts of the value stream are actively engaged and collaborated with to ensure that they are aware of work underway and progress to allow them to understand potential changes and impacts.	Core
R10	Creates cross disciplinary links.	Establishes connections that span professional silos, creating links that are meaningful for all.	Core
R6	Maintains or develops relationships with similar areas of focus both inside and outside of the organisation.	This will be helpful for the team to go and see others perform similar work so they can learn new approaches/methods.	Supp. Used Frequently
Competency Sub-Domain: Managing teams			
R7	Acknowledges that everyone is important.	Demonstrates that everyone's opinion and ideas are valued.	Expert
R8	Works effectively with teams.	Develops and can work effectively with teams.	Expert
R11	Ensures collaborative working.	Involve a broad range of people regularly and whenever feasible to ensure buy-in so that progress and results represent a group effort.	Core

Competency Sub-Domain: Communication and negotiation skills.			
R3	Displays gratitude	Shows appreciation to stakeholders for their contribution.	Core
R9	Creates behavioural expectations.	Communicates and reinforces to team members know what behaviours are expected of them.	Core
R12	Communication skills.	Demonstrates an ability to communicate in written and verbal communication formats.	Core
R14	Respect others.	Understands how to engage with people, how to speak about people when they are not present, and how to address inadequacies in performance.	Core
R16	Active listening.	Listens to others and actively hear their ideas and suggestions.	Core
R13	Communicates progress.	Shares progress with all internal and external stakeholders as well as with other colleagues across the health care system.	Supp. Used Frequently
Competency Sub-Domain: Conflict management.			
R15	Displays empathy and understanding.	Demonstrates an ability to have empathy for others and seeks to understand the impact their decisions and the project/transformation will have on all people involved, both directly and indirectly.	Core
R17	Manages conflict.	Seeks to understand reasons for conflict between parties and manages this through discussion, mediation, negotiation and communication.	Core

Table 9.1 - COMPETENCY DOMAIN 5: PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY			Rating
Competency Sub-Domain: Professionalism.			
P1	Demonstrates professional conduct and expects professional conduct from others.	Demonstrates an ability to conduct themselves in a competent, professional manner and acts with integrity. Expects a high level of integrity from the people they work with.	Expert
P5	Is inclusive and respectful.	Is inclusive and collaborative, respecting the team, past experiences, the patients and the environment.	Expert
P2	Demonstrates commitment to agreed values and behaviours.	Acts consistently reflecting agreed values. Commits to embracing agreed behaviours and challenges compliance when behaviours are not aligned with the values of the organisation.	Core
P3	Ethical project delivery.	Implements meaningful change, seeking the most efficient processes to bring the greatest value to the customer.	Core
P4	Encourages ethical behaviour.	Demonstrates transparency in decision making and uses ethical and moral standards to make sound and fair decisions that include participants perspectives and considerations.	Core
P10	Principle based	Consistent in their values and principles and demonstrates courage in adhering to these.	Core
Competency Sub-Domain: Professional Development.			
P8	Support others and is mindful of the needs of staff.	Constantly celebrates the good work of the team and is aware of the interests and needs of staff members. Coaches and mentors others in their development.	Core
P9	Confronts skills gaps.	Where coaching and mentoring isn't working, has the courage to identify staff where performance management is required, with the potential that should the performance approach not work, utilises the HR process to remove or redeploy staff.	Core
P11	Technical and professional expertise.	Competent in using the project tools and has professional expertise in the project subject. Engages with training and developments opportunities as applicable.	Core
Competency Sub-Domain: Social Responsibility.			
P7	Demonstrates social awareness.	Demonstrates an ability to look outwards, learning about and appreciating others in their diversity, views and needs in an open a collaborative way.	Core
P6	Acknowledges social context.	Demonstrates an awareness of the socioeconomic context of the organisation and does not seek to income generate from those who cannot afford to pay.	Supp. Used Frequently

Table 9.1 contd. – COMPETENCY DOMAIN 6: MANAGING FOR CONTINUOUS IMPROVEMENT.			Mean
Competency Sub-Domain: Understands Value from a customer/patient perspective.			
M1	Customer focused.	The manager should understand the tremendous responsibility entrusted to them by patients. They are the reason we have jobs and it's our responsibility to make things better for them by providing value to them as customers.	Expert
M2	Involves patients, carers, and service users.	Adopts an empathetic approach that views healthcare services from the service-users perspective. Seeks the involvement of service users in service redesign.	Expert
M3	Gathers customer feedback.	Develops "voice of the customer" techniques to capture feedback from patients and internal customers.	Expert
Competency Sub-Domain: Applies Lean practices and tools.			
M4	Deploys the lean management system.	Manages according to the principles of lean – providing clarity of direction, understanding current state, root cause analysis, creation of target conditions, delivery.	Expert
M8	Identifies and eliminates waste.	Demonstrates a strong desire to identify, eliminate and prevent the recurrence of waste.	Expert
M11	Advocates a Gemba culture.	Create a strong link between staff and management by bringing management to Gemba and giving voice to day-to-day staff problems.	Expert
M14	Demonstrate patience and a tolerance for failure.	Builds psychological safety in the context of experimentation, understanding that failure can be part of problem solving and recognises that problem solving is a process that requires creativity and idea generation.	Expert
M15	Adopts a systematic problem-solving approach.	Demonstrates knowledge of established continuous improvement cycles such as PDSA and DMAIC and can apply these.	Expert
M5	Able to select and apply appropriate lean and/or quality methods and tools.	Demonstrates a deep understanding the allows the manager to plan a project and select and use the best tools and methods for the purpose.	Core

Competency Sub-Domain: Mapping and Improving Processes			
M12	Demonstrates a commitment to stability.	Understands that reducing variation is fundamental to quality, safety, and improvement. Strives to improve the stability of processes.	Expert
M17	Mapping processes.	Demonstrates an ability to conduct process mapping and Value Stream Mapping with the active involvement of staff, capturing and analysing current state data to identify improvement opportunities. Evaluates future state data to understand the impact that actions taken have had on value stream performance.	Expert
M19	Visualises performance.	Understand how to make process performance and abnormalities visible and actionable.	Expert
M21	Directly observes process activity.	Adopts the practice of Gemba walks to see what is happening in processes.	Expert
M6	Balances the application of standard work with experimentation.	Recognises the importance of consistent adherence to agreed best practice, whilst simultaneously encouraging experiments to find better ways.	Core
M16	Understands Value Added Analysis.	Develops lean culture which uses value-added and non-value-added time study analysis.	Core
Competency Sub-Domain: Measuring and managing performance.			
M9	Understands Continuous Improvement Culture	Creates an attitude of improvement and demonstrates determination to achieve agreed target conditions.	Expert
M20	Setting up and constructively using visual management boards	Understands that data-driven feedback is essential to learning, accountability and improvement. Uses the concepts of daily operations, status at a glance, performance improvement and continuous improvement huddles.	Expert
M22	Shares feedback.	Communicates feedback with relevant stakeholders in a non-judgmental way.	Expert
M23	Plans for sustainability.	Develops action plans that seek to sustain improvements and seeks to leverage project benefits by sharing learnings and knowledge with others.	Expert

Competency Sub-Domain: Managing change and continuous improvement.			
M7	Meetings management.	Ensure meetings are productive, efficient and not just talking shops that run over time without any agreed actions.	Core
M10	Manages Continuous Improvement.	Understand the components of a continuous improvement system including harvesting opportunities and how to commission and monitor projects to improve performance.	Core
M18	Change management.	Develops guidelines to identify change needed and understands the reasons why change is necessary. Seeks to understand barriers to change from the perspective of others and takes action to address these.	Core
M24	Acts as a coach and mentor to others.	Demonstrates an ability to coach others to identify and solve problems rather than just solve problems themselves.	Core
M25	Promotes training and education.	Encourages participation in training and education programmes that support a sustained organisational approach to Lean Management.	Core

Campion *et al.* (2011) identify the importance of considering the granularity of competency models and indicate that they should have at least two levels and include a small number of impactful categories that include a small number of more specific competencies. The final list of competencies identified under the six overarching competency domains were analysed and grouped together under appropriate competency sub-domains. Figure 9.1 illustrates the six competency domains in the competency model.

Figure 9.1 Competency model for managing lean improvements project in hospitals.

The competency model presented in table 9.1 provides a range of competencies identified from the field evidence relevant to the role of managing lean improvement projects in hospitals, some of which concur with competencies identified from the literature and others that address capability gaps identified by both the literature and field evidence. This model also contains a number of omissions and contradictions when considered against established healthcare leadership and healthcare management competency models.

A thematic representation of the key issues of this research is presented consistently throughout this thesis. A similar approach is now taken in this chapter to assess how these findings compare to those of the existing research presented in the literature review.

9.3.2 Theme 1 - Leadership themes identified in the research.

Leadership behaviours and competencies in lean management system are identified in many studies as positively affecting organisational outcomes (Emiliani, 2003; Emiliani and Stec, 2005; Seidel *et al.*, 2017; Mazur *et al.*, 2012). The competency statements included in the Leadership competency domain were reflected in the lean healthcare literature; in the broader lean literature; in the healthcare management literature and in established healthcare management competency models such as the ACHSM model. Table 9.2 illustrates each competency statement in the Leadership domain and reported occurrence of this competency or similarly themed competency as it occurs in a lean healthcare context or a broader healthcare management context.

Table 9.2 illustrates evidence in the lean healthcare competency literature that indicates support for the Leadership Domain competency statements in both the focal lean healthcare literature and the broader healthcare management literature. Further evidence of support exists in the broader lean literature (for example Van Dun *et al.*, 2017; Emiliani, 2003; Emiliani and Stec, 2005; Kelly, 2016).

Whilst appropriate to draw inferences from the broader lean literature regarding general leadership competencies, one should consider the nature of these studies. Emiliani (2003) provides general guidance on leadership competencies but does not empirically test this guidance. Kelly (2016) offers useful descriptive evidence from a manufacturing organisation based on a single-site case study that may not be readily transferable to a healthcare context. Van Dun *et al.* (2017) whilst adopting a mixed methods design, with similar elements to this study that include a Delphi study and critical incident interviews, draws from a different context that focuses on effective lean middle managers in a consultancy organisation. Seidel *et al.* (2017) identify 16 leadership competencies identified as being relevant to the implementation of lean systems. This list incorporates many of the competencies identified in the findings such as ‘Leads with consistency’ and ‘Leads with transparency’.

Competencies not identified in the findings are also included such as 'Manage with emphasis on value flow rather than on isolated operations' and 'Stabilise processes'. The context of the research by Seidel (2017) is more broad-based, included mainly large-sized manufacturing organisations and focused on the implementation of lean systems. These are interesting omissions in light of the findings of Poksinka *et al.* (2013, p.894) who observed that lean healthcare implementations in their study were like 'isolated islands' in the broader healthcare system often initiated locally by healthcare unit managers. Although not generally the case in the findings of this research, two interviewees indicated that their lean projects were self-initiated.

Table 9.2 A comparison of the Leadership Competency Domain with Lean Healthcare literature and Healthcare Management literature.

Competency	**Studies with a lean healthcare context**	**Healthcare management context**
Leads by example	Régis *et al.*, 2019; Van Elp *et al.*, 2021	ACHSM, 2016
Leads with humility.	Poksinka *et al.*, 2013	ACHSM, 2016.
Articulates mission and shared vision.	Régis *et al.*, 2019; Mazur *et al.*, 2012; Souza et al. 2019.	ACHSM, 2016
Leads with consistency.	Régis *et al.*	ACHSM, 2016
Encourages staff commitment.	Hilton and Sohal, 2012; Poksinka *et al.*, 2013; Mazur et al., 2012; Souza *et al.* 2019.	Herd *et al.* 2016, ACHSM 2016, Liang *et al.*, 2013
Leads with Transparency.	Régis et al. 2019	ACHSM, 2016
Change Leadership.	Hilton and Sohal, 2012;	Herd *et al.* 2016, ACHSM 2016
Engaged in pragmatic decision-making.	Mazur *et al.* 2019.	Liang *et al.* 2013.
Creates a psychologically safe environment.	Poksinka *et al.*, 2013; Mazur *et al.* 2019.	ACHSM, 2016
Visible leadership.	Régis *et al.* 2019; Souza *et al.*, 2019	
Engages in participatory decision-making.	Mazur *et al.*, 2012	ACHSM, 2016; Herd *et al.* 2016

Source: developed by the researcher.

Broad based evidence from the healthcare management literature such as the studies by Liang *et al.* (2013) and Herd *et al.* (2016) speak to competencies from a healthcare manager

perspective. The ACHSM model (2016) also adopts a broader healthcare management perspective but is useful as it identifies general healthcare management competencies across a number of domains. It is interesting to note that many of the competency statements identified in the findings in the Leadership domain also feature in the Leadership domain in the ACHSM model. However, when simlarities occur sometimes the language used to describe the competency statement is different, for example the competency 'Engages in Participatory decision-making' in this study is similar to the competency 'Encourages decision-making' in the ACHSM model. This model also contains similar competency sub-domains – Leadership skills and behaviours, Influences organisational climate, and Leading change – to those contained in the Leadership domain in this study. However, the ACHSM model also includes competencies such as 'Balances competing organisational priorities' not identified in the findings in the Leadership domain in this model.

The lean healthcare literature provides a closer comparison in terms of context. Poksinka *et al.* (2013) in a multi-level analysis of lean leader competencies identified similar competencies in healthcare organisations to those identified in this study including the importance of visible leadership, change leadership and encouraging staff commitment. Interestingly, Poksinka *et al.* (2013) reported frustrations from unit-level managers in their study regarding obtaining support and vision from senior management. The same frustrations were also expressed by some interviewees in the findings of this research. A limitation of the Poksinka *et al.* (2013) study regarding its applicability to this study is that only one in five of the case study organisations in the study was a hospital organisation.

Other competency statements identified in the Leadership domain such as 'Articulates mission and shared vision', 'Encourages staff commitment', and 'Engages in participatory decision-making' are identified by Mazur *et al.* (2012) in their study of lean participants involved in lean implementation in three rural hospitals where they recommend developing a clear vision and strategy for lean implementations that involve large numbers of frontline employees who engage in RIEs and are supported by investment in training and development. Mazur *et al.* (2019) in a study investigating a healthcare professional's transition to lean thinking investigated psychological safety as an individual characteristic that influences an individual's readiness to participate in lean improvement programmes. Whilst not identifying a statistical validity for the inclusion of psychological safety in their survey scale, Mazur *et al.* (2019)

argued face validity as the psychological safety subscale was directly drawn from previously validated research.

Interestingly the concept of psychological safety was not referenced directly in the lean leadership literature. The interviewees did not specifically mention a psychologically safe environment during the interviews, however, the importance of providing a safe environment for others was stressed. For example, Interviewee 17 described the importance of conducting improvement events in a structured and safe environment and Interviewee 11 discussed the need to encourage others to contribute and share their ideas at project discussions. Van Dun *et al.* (2017) does note that honesty and candour are important in building trust and developing psychological safety.

Souza *et al.* (2019) in an action research study of the role the lean healthcare project leader identified competencies such as 'Gemba presence' and 'Systemic vision' that are similar to the competencies 'Visible leadership' and 'Articulates mission and shared vision' in the Leadership domain in the findings. The limitation of the Souza *et al.* (2019) research study is that it focused on a single organisation and the findings may not be easily transferrable. Regis *et al.* (2019) conducted case study research to investigate the development of a methodology for lean implementation also describes behaviours that can be compared to the competencies 'Leads by example', 'Articulates mission and shared vision' and 'Visible leadership' in the findings. Regis *et al.* (2019) identify a limitation in their study regarding the generalisability of their results and they also acknowledge parts of their proposed implementation methodology need to be tested.

The discussion above illustrates broad-based support for the competency statements in the Leadership competency domain in the findings. It is acknowledged the Leadership competencies identified in the findings are more narrowly focused than some identified in the broader-based lean literature such as the Seidel *et al.* (2017) study. However, the competencies in the Leadership domain add value in that they provide focus at the role of the Lean project leader/manager, and offer more depth than other studies such as that reported by Souza *et al.* (2019) by way of providing clearly titled competency statements, descriptions of those statements and an indication of the relative importance for lean improvement project success.

9.3.3 Theme 2 – Hospital Management and Healthcare Environment.

One competency statement, H6 "Appreciates patient value", achieved a consensus rating of "Expert" in the Delphi study component of this research. This perspective was shared by the interviewee participants with many interviewees describing the need to consider processes and improvement activities from a patient perspective. Interviewees 1 and 14 described obtaining the "voice of the customer" via patient surveys and Interviewee 8 described preparation activities in their improvement project that involved obtaining the "voice of the patient". Interestingly, the terms 'patient' nor 'value' did not feature in the ACHSM model (2016), instead this model uses the terms 'consumers' and 'health outcomes'. Similarly, many of the healthcare leadership and management competency studies identified in the literature (Chapter 3) in hospital settings do not mention the terms 'patient' or 'value' (Liang *et al.*, 2013; Citaku et al., 2012; Hazelbaker, 2013; Kang, 2012; Pillay, 2008). An exception to this is the Kronenburg (2014) study that utilised a descriptive survey to assess the opinion of healthcare managers/professionals regarding the relative importance of predetermined competencies that included the competency 'Quality assessment for patient care improvement'. The lean healthcare competency studies that focused on hospitals also do not mention the terms 'patient' or 'value' and use the term 'customer' instead (Hilton and Sohal, 2012; Souza *et al.*, 2018; Regis *et al.*, 2019). Although a minor difference in terminology the terms 'patient' and 'value' more accurately reflect the lean healthcare context and definition, as in Lawal *et al's* (2014) definition of lean developed following a systematic review of the lean healthcare context.

Understanding processes from a patient journey perspective also resonated during the interviews with several interviewees discussing the importance of understanding the patient journey and patient flow. Patient safety also was a concern at this stage of the analysis. Interviewee 1 described a questioning approach that involved checking during the mapping of the patient journey whether each step was okay for the patient. Interviewee 11 echoed this need for safety referring to the importance of including safety huddles in a clinical setting and suggested that these should also be included in other processes such as HR processes. The participants in the Delphi panel also concurred with the importance of patient safety and provided a consensus rating of "Core" for the competency H7 "Understands patient safety systems within the clinical environment". These perspectives reflect similar competencies

pertaining to patient safety, customer voice and quality and safety of patient contained in the ACHSM Management Competency Framework (2016).

The importance of recognising the perspective of stakeholders and communicating with stakeholders, as discussed in section 7.4.1 featured strongly in the interviews. This perspective was shared by the Delphi panel who rated H8 "Communicates effectively with stakeholders" as "Core" and necessary for lean improvement project success. The theme of stakeholder engagement also featured prominently in the ACHSM Management Competency Framework (2016) and in research pertaining to the NHS in the UK, Papadopoulous (2011) described the importance of developing "favourable" networks to support continuous improvement activity. Several studies in healthcare management competency literature mention competencies in this area (Liang *et al.*, 2013; Liang *et al.*, 2017; Herd *et al.* 2016; Kronenburg, 2014).

Similarly, an understanding of the broader hospital function and units was also considered important in the findings with interviewees (3, 4, 6, 7, 17) describing the complexity of communications in hospitals and the need to have different disciplines and roles involved. This perspective was shared by the Delphi participants who provided a consensus rating of "Core" for competency statement H3 "Understands the inter-relationships between different hospital function and units". Similarly, the Delphi panel also provided rating of "Supplementary and used frequently" for competency statement H5 "Demonstrates knowledge of hospital practices". Interestingly some of the studies in the literature identified knowledge gaps in knowledge of the health system. In a study to identify future competencies of medical residents in healthcare management, Berkenbosch *et al.* (2013) identified that Australian participants indicated a need for better knowledge in how specialist departments were organised, and that participants in the Netherlands indicated that their knowledge of how the broader health system operates could be improved.

The findings illustrate consensus ratings of "Supplementary but useful infrequently" to the competency statements H1 "Understands the regulatory environment" and H2 "Understands the health system drivers". An understanding of how the broader health system operates was referenced by some interviewees but not extensively. The ACHSM model (2016) also reflects knowledge of the broader health system to be important including a specific competency statement on this issue – 'Understands and considers the impact of the wider health system structure, funding and organisation on the health on the unit, organisation and system'.

The competency statements included in the Hospital Management and Healthcare Environment Domain are supported in the healthcare management competency literature, but do not feature as significantly in the Lean competency literature. The model in this study adds value in this domain by including a clear focus on creating value for the patient and stressing the importance of understanding the inter-relationships between hospital functions and between stakeholders in the broader health system. Similarly, Mazur *et al.* (2019) comment on the phenomenon they observed of informal networks being utilised to disseminate lean knowledge throughout the organisation and create enthusiasm for lean improvement efforts.

9.3.4 Theme 3 – Business Skills

Activity involving data collection, data utilisation, data management and data driven decision-making featured as a theme in both the Delphi panel and interviews. The ability to utilise data featured in the competencies identified in the findings with competency statements B1 "Understanding data"; B2 "Uses appropriate data for decision making"; and B3 "Utilising data as a basis for measuring improvement" being rated as "Core" and necessary for lean improvement project success. The utilisation of process data are also identified as a key input into process control and improvement activities such as visual management. This is reflected in competency statement B6 "Uses visual management to improve performance". Competency statement B10 "Measured key performance indicators as defined by organisation strategy" and B14 "Aligns project and corporate goals" also reflects the importance of measuring key organisational and national KPIs in order to track performance towards the achievement of organisational goals and objectives. Collected data are also an input into essential process improvement activities such as process mapping and value stream mapping.

Utilising data for process improvement, performance improvement and control features significantly in the literature underlying the significance of competencies pertaining to use of data for evidence-based decision making (Schattenkirk, 2011; ACHSM, 2016; Kelly, 2017; Liang *et al.*, 2013; Liang *et al.*, 2017; Poksinka *et al.*, 2013; Regis *et al.*, 2019). There are many similarities between the model presented in Table 9.1 and the healthcare management and lean literature. However, there are important and subtle differences also. The competency statements including in the findings are more consistent with a lean context using terms such as 'visual management', 'Gemba', and 'Value Stream Mapping'.

Project management activities were identified as being a significant factor in lean improvement project success in the findings. Competency statements B15 'Project management', B16 'Meetings management' and B17 'Demonstrates commitment to delivering tangible wins' reflect the importance of effectively managing project meetings; measuring project progress and encouraging buy-in from the project team. Competency statements B9 "Financial management", B11 "Understands Budgeting Processes", and B13 "Business case development" achieved a consensus median rating of 3 by the Delphi panel indicating that these competencies are supplementary and frequently useful for lean improvement project success. The experiences shared by the interviewees concurs with this rating as these competencies, although not extensively mentioned during the interviews, when raised were significant in progressing project activity in a meaningful manner.

Competencies in the areas of Project Management and Financial Management also feature in established competency models for healthcare service management (ACHSM, 2016), the healthcare management literature (Huq, 2006; Kang, 2012; Liang *et al.*, 2013; Liang *et al.*, 2018) and the lean competency literature (Souza *et al.*, 2018; Regis *et al.*, 2019). The competencies included in the 'Project and Financial Management' sub-domain in Table 9.1 are very similar to those in the literature. However, a more detailed reference to structured project management is mentioned in the Souza *et al.* (2018) and Regis *et al.* (2019) studies. Although not included in the 'Project and Financial Management' sub-domain in the model illustrated Table 9.1, reference to structured project-based problem-solving such as PDCA and DMAIC is included elsewhere in the 'Managing for Continuous Improvement' Domain.

9.3.5 Theme 4 – Relationship Management

Developing and managing relationships with others featured as a central theme in both the Delphi study and the critical event interviews. A number of competency statements (R1, R2, R4, R5, R7, R14, R15) identified in the findings capture the need to develop trust, have empathy with others and manage relationships. The need for involvement and engagement in lean initiatives by management stakeholders has already been stressed in other studies (Poksinka *et al.*, 2013; Liang *et al.*, 2013; Van Dun *et al.* 2017; Van Beers *et al.*, 2021; Mazur *et al.*, 2012; ACHSM, 2016; Furukawa and Cunha, 2011). However, wth the exception of the ACHSM (2016) model that includes a 'Relationship Management' sub-domain in a 'Relationship and Communication' domain, most other studies do not include the same level of detail as is

included in the model in Table 9.1, for example the Furukawa and Cunha (2011) refer to a 'Teamwork' competency and Souza *et al.* (2018) describe an 'Interpersonal Relationships' competency. The findings in this study add value in the Relationship Management Domain by clearly emphasising the importance of identifying stakeholders and maintaining relationships with stakeholders in the *extended value stream*. This perspective is broader and more detailed than similar perspectives in the literature and adds greater specificity when considering competencies involving stakeholder engagement and management.

The ability to work effectively with team members also resonated with interviewees and the Delphi panel. Competency statement R8 "Develops and works effectively in teams" achieved an "Expert" consensus rating; and competency statements R9 "Creates behavioural expectations"; R11 "Ensures collaborative working"; R12 "Communication skills" and R17 "Manages conflict" achieved a "Core" consensus rating from the Delphi panel. Competencies in interpersonal, communication and teamworking skills have been identified in the literature (Furukawa and Collins, 2011; Kang *et al.*, 2012; Emiliani, 2003; Kelly, 2016; Herd *et al.*, 2016; Souza *et al.*, 2018) and follow a similar pattern to that described in the findngs.

Working with other disciplines and obtaining the perspectives of others also featured in the findings with competency statements R10 "Creates cross disciplinary links" at a "Core" consensus rating and R6 "Maintains or develops relationships with similar areas of focus both inside and outside of the organisation" at a "Supplementary" consensus rating. Again, this reflects competencies identified in others studies in the healthcare management literature and lean management literature such as 'systemic vision' (Souza *et al.*, 2018), 'maintains effective stakeholder relationships' (ACHSM, 2016) and 'interdepartmental collaboration' (Naik *et al.*, 2012).

The themes of gratitude and active listening featured strongly in the interviews. For example, Interviewee 4 describes the importance of 'listening to everyone involved and getting the different perspectives' and Interviewee 11 describing '…a need to acknowledge them at all stages'. Competency statements R3 "Displays gratitude" and R16 "Active listening" are included as "Core" in the Relationship Management domain. Active listening is identified by Van Dun *et al.* (2017) as an effective lean middle manager behaviour. Listening and responding skills also feature in the ACHSM model (ACHSM, 2016). Herd *et al.* (2016) describe 'building a culture of connection and purpose' emphasising the importance of recognizing effective performance, being available for others and being positive role models. The competency

statement R13 ‘Communicates progress’ is included in the model illustrated in Table 9.1 at a ‘Supplementary (3)’ rating indicating that this competency is necessary for lean improvement project success and useful frequently. Again, strong similarities exist as regards active listening, diplaying gratitude and communicating progress to those identified in the literature.

Although the Relationship Management domain contains many competencies that are similar to those identified in other studies, the competency statements identified in the findings of this research are more comprehensive and provide greater specificity than similar competency statements included in the healthcare management literature and lean management literature. They also speak to the more expansive, boundary spanning nature of a lean approach, extending beyond professional siloes and considering the extended value stream, whilst incorporating core lean principles such as ‘respect for people’.

9.3.6 Theme 5 – Professional Development, Ethics and Social Responsibility.

Two competency statements in the Professional Development, Ethics and Social Responsibility category attained consensus at an “Expert” rating at the conclusion of the Delphi study. The competencies captured in these statements P1 “Demonstrates professional conduct and expects professional conduct from others” and P5 “Is inclusive and respectful” also featured strongly in the interviews (Int. 4, 14, 15, 16). Themes involving professionalism and being inclusive and respectful are seen as being core principles of lean (Emiliani, 2003; Emiliani and Stec, 2005). These themes are referenced in different ways in the literature. For example, Seidel *et al.* (2017, p.2171) describe a leadership competency that:

> Develops actions that, based on ethical principles, respect the community, the environment and the workers’ safety.

Van Dun *et al.* (2017) refer to ‘honesty’, ‘trust’, and ‘candour’ as desirable attributes of effective lean middle managers and ‘responsibility’ to be part of the core lean value set. A limitation of the model is that though it gives guidance on appropriate behaviours regarding lean implementation, does not offer guidance on linking these to strategy deployment (Hines *et al.*, 2020) or on measuring behaviours regarding their frequency of use or impact (Hines *et al.*, 2022). However, competency statement P2 ‘Demonstrates commitment to agreed value and behaviours’ does highlight the importance of acting in a way that reflects agreed values.

Themes of consistent behaviour also emerged in the findings. Competency statements P3 “Ethical project delivery”; P4 “Encourage ethical behaviour”; P7 “Demonstrates social

awareness" and P10 "Principle based" achieved a consensus rating of "Core" from the Delphi panel participants and deemed necessary for lean improvement project success. The need to consistently apply lean practices and principles is emphasised in the literature (Emiliani, 2003; Kelly, 2016) as was the need to subjugate one's one interests to the broader group interests (Van Dun *et al.*, 2017; Seidel *et al.*, 2017). These statements are similar to common themes relating to professionalism expressed in competency models. For example, the ACHSM (2016) model includes competency statements such as 'Commitment to competency, integrity and altruism' and 'Commitment to ethical conduct'.

Many interviewees referenced an openness to personal development and engaging with training opportunities. In total 11 interviewees described participation in training and development opportunities in either lean and/or quality improvement approaches. Many interviewees also had engaged in professional development opportunities in healthcare leadership, healthcare management and change management. The importance of professional development is also recognised in the competency model in Table 9.1. Competency statements, P11 'Technical and professional expertise', P8 'Supports others and is mindful of the needs of staff' and P9 'Confronts skills gaps' are included at a 'Core' rating in the model. Many interviewees mentioned the need for supporting staff in their improvement activities, particularly in relation to mentoring and coaching others (Int. 1, 2, 4 and 9). Some interviewees did identify deficiencies in certain areas, for example Interview 2 described a need to train individuals in data management and data analysis capabilities. This was also referenced by Interviewee 3 identifying a need to align changes in projects and processes and thought it would be beneficial to have a "data person" assigned to lean improvement teams. The concept of developing others through training, coaching and mentoring features strongly in the literature (Found *et al.*, 2009; Hilton and Sohul, 2012; Poksinka *et al.*, 2013; Seidel *et al.*, 2017; Mazur *et al.*, 2012; Al-balushi *et al.*, 2014; Souza *et al.*, 2018; Herd *et al.*, 2016).

Competency statement P6 "Acknowledges social context" is in included in the competency model identified in the findings at a rating of 'Supplementary'. This indicates that this competency is necessary for lean improvement project success and is frequently useful. This competency describes an ability to demonstrate an awareness of the socioeconomic context of the organisation and does not seek to income generate from those who cannot afford to pay. The socioeconomic context did not significantly feature in the interview stage of the research. However, some interviewees did allude to some socioeconomic benefits attributed to patients as a result of improved processes arising from lean improvement project activity. For example,

Interviewee 5 describes how the redesign of a surgical pathway allowed patients to have a post operation follow-up appointment in the community rather than in a hospital. This reduced travelling time and expense for the patient whilst also alleviating pressure on resource constrained surgical staff and facilities. This competency is not clearly identifiable in the literature or in other competency models such as the ACHSM model. It is also interesting given the existing dual nature of the health system in Ireland and current government strategy that seeks changes in this area (See Chapter 6).

The Professional Ethics and Social Responsibility Domain does contain competency similar to those identified in prior studies. However, it also includes concepts that are not specifically stated elsewhere such as 'Demonstrates commitment to agreed value and behaviours' and 'Acknowledges Social Context'. This domain also brings together under a lean focus a number of competencies that are individually mentioned in previous studies, but are not collectively presented elsewhere.

9.3.7 Theme 6 – Managing for Continuous Improvement.

The Managing for Continuous Improvement Domain in Table 9.1 includes 24 competency statements describing competencies specifically dealing with lean management and continuous improvement. This is a significant change from the healthcare management literature that typically contains more generalised competencies associated with leading and managing change and improving business processes (for example ACHSM, 2016; Herd *et al.*, 2016; Liang *et al.*, 2013) and reflects the change in managerial mindsets that is demanded of lean implementations in healthcare (Spagnol *et al.*, 2013; Mazur *et al.*, 2019) as lean is generally not widely understood by all actors in the healthcare system (Waring and Bishop, 2010; Roemeling *et al.*, 2017).

Competency statements M1 "Customer focused"; M2 "Involves patients, carers and service users" and M3 "Gathers customer feedback" are included at an 'Expert' rating in the findings. This echoes an emphasis on competencies pertaining to customer needs and to patient needs in the broader lean leadership literature (Emiliani and Stec, 2004; Seidel *et al.*, 2017). However, these are not as extensively mentioned in the lean competency literature that is more closely focused at middle managers or project managers. Van Dun *et al.* (2017) do refer to customer focus in their study but do not mention this as a significant managerial value in their findings.

Souza *et al.* (2018) do not mention customers or patients in their findings but include more general terms such as 'focus on results'.

Competency statements M8 "Identifies and eliminates waste"; M16 "Understands Value Added Analysis"; M17 "Mapping processes" and M12 "Demonstrates a commitment to stability" are included at an expert rating in the competency model developed from the findings. Activity regarding understanding and managing processes are similarly expressed in the literature (Huq, 2006; Kelly, 2016; Schattenkirk, 2012; Seidel *et al.*, 2017; Regis *et al.*, 2019) but again not mentioned explicitly in lean competency studies (Van Dun *et al.*, 2017; Souza *et al.*, 2018).

Competency statements M11 "Advocates a Gemba culture" and M21 "Directly observes process activity" are included at an 'Expert' rating in the findings. Both these competency statements refer to the activity of managers directly observing processes and giving voice to staff perspectives at operational level. The conducting of Gemba walks is identified in the lean literature as being an important activity (Emiliani and Stec, 2004; Kelly, 2017; Van Dun *et al.*, 2017; Souza *et al.*, 2018; Regis *et al.*, 2019).

Competency statements M4 "Deploys the lean management system" and M9 "Understands continuous improvement culture" achieved a consensus rating of "Expert" from the Delphi panel participants. Competency statement M10 "Manages continuous improvement" achieved a consensus rating of "Core" from the Delphi panel participants. The competency statement M15 "Adopts a systematic problem-solving approach" is also included in the competency model at an "Expert" rating. Structured approaches to continuous improvement were extensively mentioned by the interviewees. These approaches included the A3 approach to structured problem solving (Interviewees 4, 8, 11, 14 and 17); Six Sigma (Int. 9); PDSA cycles (Int. 12) and lean/quality improvement tools (Interviewees 2, 4, 7, 12 and 15). The prevalence of these structured problem-solving methodologies and practices are evidence that the interviewee participants view a continuous improvement culture as important for lean improvement project success. Competencies pertaining to continuous improvement are also extensively mentioned in the lean competency literature (Seidel *et al.*, 2017; Van Dun *et al.*, 2017; Souza *et al.*, 2018; Regis *et al.*, 2019).

This is also reflected in the response to the competency statements M14 "Demonstrates patience and a tolerance for failure" included at a rating of "Expert", and M6 "Balances the application of standard work with experimentation" included at a rating of "Core", in the model developed from the findings. The ability to learn from mistakes and failures is referenced in

other studies (Emiliani, 2003; Huq, 2006), but interestingly not specifically mentioned in the lean competency literature (Van Dun *et al.*, 2017; Souza *et al.*, 2018; Regis *et al.*, 2019) even though this literature does refer to structured problem-solving and continuous improvement.

The findings describe a range of lean tools in use including process mapping, value stream mapping, 5S/6S, Kanban and pull systems, and visual management. For some interviewees the use of lean tools and methodologies are important to project success. Interviewee 7 indicated that "it's the use of the tools that won people over in the finish" and Interviewee 4 stated that "you definitely have to have an understanding of the tools, the methodology and how you're going to apply them and how you apply them to different scenarios". Interestingly the Delphi panel rated competency statement M13 "ability to select and apply appropriate quality methods and tools" at a "Core" rating and competency statement M5 "ability to select and apply appropriate lean methods and tools" at a "Supplementary – Used frequently" rating. Given the prevalence of lean tools and methodologies used by interviewees during their projects both these competency statements are included at a "Core" rating. These competency statements are merged into one statement "ability to select and apply appropriate lean and/or quality methods and tools" to simplify this competency domain. Knowledge and application of lean and quality tools features strongly in the literature (Huq, 2006; Kelly, 2016; Seidel *et al.*, 2017; Materla and Cudney, 2017; Souza *et al.*, 2018; Regis *et al.*, 2019).

Competency statements M19 "Visualises performance" and M20 "Setting up and constructively using visual management boards" also were viewed as essential and rated at "expert" in the model developed by the findings. These competencies are not specifically referenced in some studies examining lean competencies such as Seidel *et al.* (2017), Van Dun *et al.* (2017) and Souza *et al.* (2018). However, the use of visual management is more generally referenced in the lean literature (Poksinka *et al.*, 2013; Kelly, 2017) and specifically in some studies examining frameworks for lean implementation in hospitals (Regis *et al.*, 2019).

Change management was also a topic that resonated in the findings. Competency statement M18 "Change management" received a rating "Core" following the completion of the fourth round of the Delphi study. Part of managing change in a continuous improvement context involves developing plans for sustainability. The Delphi panel rated competency statement M23 "Plans for sustainability" at an "Expert" rating. This perspective was also shared by interviewees with some interviewees, for example, Interviewee 3 described as the most important part of any project

> … the biggest thing for any project is how you monitor your progress and your evidence and your sustainability. And sustainability the hardest thing to hold on to. (Int. 3)

Competencies relating to change management are present in other healthcare competency models (ACHSM, 2016; Stefl, 2008) and a focus on change management is identified in the healthcare management competency literature (Herd *et al.*, 2016; Liang *et al.*, 2013) and the lean competency literature (Seidel *et al.*, 2017; Van Dun *et al.*, 2017; Regis *et al.*, 2019), although not specifically mentioned mentioned in the Souza *et al.* (2018) study examining the competencies of the lean healthcare project leader. Planning for the sustainability of lean projects and change is also not mentioned extensively in the literature with the exception of the Regis *et al.* (2019) study that identifies continuous improvement cycles that are embedded into "organizational routine" influencing the way that workers think and behave.

Competency statements M24 "Acts as a coach and mentor to others" and M25 "Promotes training and education" were rated as "Core" by the Delphi panel. Similarly, many of the interviewees described the importance of coaching others. Interviewee 8 when reflected on their project thought that stronger coaching might helped to progress the project and interviewee 4 described a coaching or mentoring style as being appropriate to managing people in project teams. As already identified in section 9.2.5 themes of coaching, training and mentoring are prevalent in the literature and are seen as essential to success of lean implementation in healthcare settings (Mazur *et al.*, 2012; Al-balushi *et al.*, 2014; Souza *et al.*, 2018; Regis *et al.*, 2019).

The addition of the Managing for Continuous Improvement Domain, although containing competencies identified in previous studies examining lean leadership in a general sense and more specifically examining lean leadership in a healthcare context, adds significant value in that it includes a wider range of competencies that strongly emphasise a patient/customer context; speak to the importance of visualising performance; underline the importance of experimentation and failure in improvement work; and identifies the need to plan for sustainability when managing improvement.

9.4 Answer to Research Question 2

This section uses the field evidence to answer the second major research question that was established for the study. This question was:
Which competencies are most important in managing lean projects in Irish hospitals, and why are these competencies perceived to be most important?

A total of 39 critical events were identified during the interview stage of this research. Of these, the managerial actions taken in 23 events were identified as being effective in successfully progressing the lean improvement project. These are illustrated in Table 9.3.

Table 9.3 Critical events positively impacting on lean improvement project success.

Event	Description
CE1	Lack of engagement at the mid-point of a rapid improvement event.
CE4	Ineffective initial design of value statement for the service.
CE5	Lack of engagement after a rapid improvement event as evidenced by a poor progress report indicating a lack of work done.
CE6	Collecting, managing and utilising data from patient journeys and operational performance
CE7	Transferring/creating ownership in the project team
CE8	Encountering lack of engagement and resistance at initial project meeting and responding to an individual who was attempting to control and commandeer project meetings/workshops.
CE9	Reporting on project outcomes and communicating project progress during an improvement week
CE10	Holding a planning meeting before going on site.
CE13	Sustaining standard work for data entry and standardising equipment used across the extended value stream.
CE14	Ensuring the standard operating procedures are adopted by all system users in the value stream.
CE17	Technology and equipment constraints were elevated following a machine breakdown negating the impact of a scheduling/patient flow improvement project.
CE18	Organisation of a celebratory QI event generated better than expected interest and enthusiasm.
CE20	Communicating with a junior consultant who was the consultant lead on a medical cohorting project.
CE22	Having a multi-disciplinary team collect, analyse and communicate data regarding PPE usage to senior management briefings.
CE24	End-user accounts of the end-user experience triggered a need and desire to improve the process.
CE26	Recognition of project progress important in driving the project on and sustaining progress.
CE27	It was necessary to remind the team to fully consider value to the customer when analysing and improving the process.
CE28	The inclusion of an external organisation in the improvement process facilitated benchmarking of a process highlighting the potential for improvement.
CE29	A successful pilot study proved that a proposed improved treatment room layout led to a significant reduction in process time.
CE31	Formulation of a project team to support the implementation of a stock IT system based on consumption using scanning technology.

CE32	Presentation of master data to project stakeholders that demonstrated how a new system would work in practice and demonstrating outputs from the new system
CE36	Business case for minor funding to support project implementation was rejected
CE38	Devising a policy regarding the cohorting of surgical patients to a surgical ward that was agreed upon by stakeholder and approved by the executive management team.

As part of the critical-event interview process each individual was asked to rate the success of their project on a scale of 1-7, with a score of 7 indicating that the project was very successful in achieving its objectives and 1 indicating that the project was very unsuccessful in achieving its objectives. The researcher recognises that this type of scoring system has some scope for interviewee interpretation and variation in scores between interviewees. However, the scale does provide greater internal strength when comparing scores for each respective interviewee. It is useful to compare more successful projects to less successful projects to ascertain if there were certain competencies that contributed to project outcomes in more successful projects than less successful projects. Some projects had externally validated their success by mediums such as a written account of the project being published in an academic journal; the project being presented at an international conference; or the project receiving recognition from senior executive teams either regionally or nationally. It is also worth noting that the Covid-19 pandemic occurred during the period of time that the data collection for this research was conducted, this impacted some projects that were ongoing as resources were diverted to combating the exceptional challenges posed to the Irish health service by the pandemic.

An analysis of the critical events sought to identify competencies most commonly reported as having a significant impact on project outcomes. Appendix 13 presents the most prominent competencies identified in the narrative of these critical events and identified by interviewees as being influential to project outcomes in either an effective, partially effective or ineffective manner. These competencies are presented in common and occurring themes below:

9.4.1 Stakeholder management and engagement.

The necessity to engage with project stakeholders in a meaningful manner presented in several of the critical events. In some projects this involved taking a proactive approach and conducting a stakeholder analysis and interviewing stakeholders as part of the project planning process.

> I did a bit of a stakeholder analysis, a matrix to see who did I need to watch out for and who I didn't, and who I could lean on for support and who would work with and who my resisters would be. So, I had a bit of an insight into that before, and I did a stakeholder interview as well with people as well… (CE8)

This facilitated an opportunity to observe the key stakeholders to the project and observe the extent of their interest and engagement, allowing potential resistance to the project being identified and prepared for. As a result of this stakeholder analysis the project manager identified a need to be based on the relevant project sites on two days per week in order to formulate relationships and build engagement.

Building engagement with the key clinical lead proved to be critical in some projects and spending time with them to be sure that they understand the reason for the improvement project. Physicians play a central role in lean implementations and negative reactions on their part can create barriers to successful implementation (Fournier *et al.* 2021; Fournier and Jobin, 2018; Leite *et al.*, 2022; Akmal *et al.*, 2022). By developing deeper relationships, it became easier to identify areas where members of the project team or broader hospital needed to communicate with the clinical lead on a clinical basis.

> But we worked closely with him. He felt the need to understand things, but that was good. He stayed going until he understood.
> And then because I had been involved in other events and been working in the organisation, I felt I was able to bring people in when needed to explain how it might work or how it might look. (CE20)

In some cases, a lack of engagement needed to be identified and countered by challenging participants to become more involved and communicating with them based on data the need for improvement.

> We had gone through the lean introduction and introduced them to the concepts and all of that. And we were at the stage on day three where you're trying to get them into the future state and where we're going to with it. And I was leading it, and we were at the point of saying, 'This is what we've agreed, so are we happy with this?' And you're literally standing in a room and there is silence. Nobody is speaking. (CE1)

In this situation a junior nurse provided an opinion based on performance data that sparked a conversation and debate amongst the broader team allowing the project lead to encourage and guide the other team members to becoming more involved.

Abilities to engage with stakeholders and build trust are identified in many of the interviews reporting lean improvement project success. The ability to gauge stakeholder interest is identified as being significant as well as developing trusting relationships with stakeholders. For some interviewees this involved building trusting relationships.

> And it is about the trust element, because everyone thinks someone else is out for something. When you build that relationship with them, it's worth it, because

> that's what success is, because they trust you. And you follow up and you follow through. (Int. 3)

In the literature stakeholder engagement is reported in different ways. Van Dun *et al.* (2017) refer to relations-oriented behaviours and report in their study that effective lean middle managers demonstrate significantly more positive relations-oriented behaviours than either less effective lean middle managers or middle manager who are not involved in lean initiatives. This supports the findings of this study where effective outcomes were reported in critical events where managers were able to positively engage with stakeholders in a meaningful manner. Souza *et al.* (2018) also refer to interpersonal relationship competencies and identifies the importance of engaging with project stakeholders. Interestingly, Seidel *et al.* (2016) do not identify either stakeholder engagement nor interpersonal relationships in the list of competencies identified in their study though they do include the competency "identify what adds value to internal and external clients" suggesting some level of stakeholder engagement.

9.4.2 The utilisation of data as evidence to inform decision making.

A common theme that emerged in the analysis of the critical events was that of the ability of project team members to utilise data effectively to assist in progressing the lean improvement project. This was especially important where the project momentum is stalling. In one project the data was used to challenge the team members regarding their current performance and encourage them to do better.

> And for me, we had to do a bit of a… we had to play on the hearts and minds a bit and give them their data and say, 'This is what you're seeing. These are the numbers. Tell me this is okay and that's fine. I'll leave. If you're not okay with it, do we need to do something about this? (CE1).

Kronenburg (2014), in a study investigating management competencies for healthcare managers, identifies that 60% of participants rated the competency of statistical analysis and application as either very important or important, yet 40% rated their preparation in this area as either poor or fair. Interviewee 2 identified data capabilities as being critical and felt that in many cases these were largely carried out by the service improvement team and not as evident in the broader team membership. Data capabilities were identified as lacking within the Irish healthcare system, particularly around the areas of tracking and measuring performance. As a result of this many areas are not even fully aware of how poor their performance is. Often the service improvement team need to gather and present the data to illustrate this to the project team before they fully understand it. This can lead to contentious conversations.

> And that's understanding… and that's probably… the service improvement team probably still carry a lot of the data piece. Because that is… that capability piece is a massive gap in Irish healthcare. Understanding what are the most critical components of that; whittling that down to just a few very simple messages around their, around their performance. (CE2)

In terms of skills attributes identified by interviewees self-reporting very successful lean improvement projects, a number of themes also emerged including data utilisation and analysis and adequate project planning. Data utilisation and analysis was identified as an important and desirable capability for lean improvement project success.

> And a lot of it down to operational performance, having that data, being very tuned to where your organisation is, where your organisation should be. A lot of that data capability. Because the systems aren't there to give people simple, straightforward information. They are often oblivious to how poor their performance is and how little improvement they're making. (Int. 2)

This was a problem in some of the lesser successful projects where interviewees discussed a learning curve in terms of their data capabilities. In the healthcare management competency literature, Liang *et al.* (2013) found that evidence-based informed decision making was an essential competency for the top three levels of community health service managers. Similarly, evidence-based informed decision making features as a sub-domain in ACHSM (2016) competency model. However, this does not feature as strongly in the lean competency literature and is not specifically described in the Seidel *et al.* (2017) study of lean leadership competencies, nor in the Van Dun *et al.* (2017) study investigating value and behaviours of effective lean middle mangers. It is also not mentioned in the Souza *et al.* (2018) study investigating competencies of the lean healthcare project leader, although this study does describe the use of some lean/quality tools that infer the use of data and evidence to inform descisions such as root cause analysis.

Communicating performance data in a realistic and impactful way can be effective in obtaining senior management involvement. In one project it was instrumental in securing senior management involvement as it laid bare the importance of the situation.

> Doing that presentation of data and the information and being honest of the actual situation we were in. The fact that we had, probably for the first time in my experience, a complete multidisciplinary approach, in the sense that we've done lots of projects in the past where you would struggle to get a consultant to be interested and to be on board. Because they are genuinely really busy. (CE22)

This resulted in several senior managers supporting the project and also stressing the importance of the project to other members of the senior management team in the hospital.

Utilising data collection to facilitate the monitoring and tracking of performance was also identified as being critical. This often provides the foundation for the critical improvement activity by identifying performance gaps and quantifying the success of process improvement activity. It can also lay the foundation for consistent management practice and behaviours such as managing for daily improvement and utilising performance dashboards.

> they have… and that's what we've tried to build with these two events. It's that daily management piece. So, you have the navigational hub. You have the ward board. The ward boards, we'll say, would be the fundamental piece. That would feed into the navigational hub. The navigational hub would feed into the management team or the mission control or whatever. And then that's the piece that happens every day. The metrics continue to be tracked and monitored. (CE7)

Interviewee 2 identified that where a visual daily management system has been elevated to a highly functional level in hospitals it has made a huge difference. Regis *et al.* (2019) identify the importance of tracking performance indicators with visual controls, audits and standardisation assists in the development of process owners and a lean culture that sustains improvement activity.

9.4.3 Project management skills.

In the field research, project management skills, particularly around the planning of the project were considered to be important to project success. Interviewee 3 discusses the importance of planning the project, conducting stakeholder analysis and developing a clear, aligned vision for the project.

> Really having a project charter and having the agreed… who owns this from the very beginning and what the problem is and what the goal statement is. And making sure that that's very clear from the onset. (Int. 3)

In less successful projects, some interviewees acknowledged deficiencies in project management skills identifying either that they were learning as they were going along, or that they inadvertently jumped too far ahead in the project planning.

> Yeah, because that's the role, is project management. But I wasn't… hadn't been fully trained as a project manager at that stage. This was the training exercise. (Int. 6)
>
> It's about getting everybody on board at the beginning. It's about setting out your stall. It was… I jumped to step four or five. I missed out some of the beginning

> steps that there should… I would do differently if I was to do something like this again. (Int. 16)

These findings concur with those in previous studies. Souza *et al.* (2018) and Regis *et al.* (2019) found that project management training and competencies are essential foundations on which to structure lean healthcare improvement programmes. In particular the importance of following a structured project management methodology focused on results is mentioned in both studies.

Several interviewees stressed the need to create ownership in the project team recognising that in some cases the project manager or service improvement lead may not always continue with the project. For some this involved the creation of mechanisms such as managing for daily improvement systems to empower individuals at an operational level to escalate important issues and take actions when required.

> And for the most part, most stuff can be handled at the ward level. And most of the action can happen at the ward level. And if the team are talking and planning and actioning together, then things tend to happen a lot faster and better. (CE7)

Schultz *et al.* (2019) identify that well-defined and well-trained project management methods at the individual project level in hospitals facilitate the successful implementation of innovations and empower employees to pursue additional improvement initiatives.

For some this needs to occur at the team formation stage identifying the skillsets required and selecting team members that best meet those skillsets.

> …the formulation of the project team was crucial at that stage. And that's an interesting piece and I enjoyed that piece. That's where I feel I feel I've got skillsets. (CE31)

Interviewee 13 identified that they had relied on their previous experience of working in teams where they had seen thing go right and go wrong, and they purposefully selected individuals they felt had the rights skills and right personality for the team. In their opinion this facilitated buy-in, involvement and dedication to the team effort. Regis *et al.* (2019) stress the importance of lean staff identifying employees with potential to lead lean improvement activities thus amplifying an improvement culture.

9.4.4 Reporting success and obtaining recognition.

Reporting on project outcomes and receiving recognition for the improvement efforts carried out can also be beneficial for both the project improvement team and the larger organisation by way of highlighting improvement activity and the potential results that can be achieved. Al-balushi *et al.* (2014) identify that communicating progress and exhibiting work effort are essential contributors to measurement and reward systems that when aligned to lean objectives are important readiness factors for lean implementations.

Interviewee 3 identified this as being very important and discussed the organisation of an improvement week that allowed for extensive communication of improvement activity to the broader hospital.

> So, one thing that I felt that would be really beneficial for this group would to be have a report out, where… they have never done anything about it, so it's collectively. Even we had a week, an improvement week, where we looked at bringing the team together…. and they were working very closely together for a rapid improvement week, and we had a report out every day. And then we, at the end of the week, had a big report out. (CE 19)

This event was open to all and attended by senior management. Feedback regarding the event described it as being phenomenal. Following the improvement week event, a recommendation was made to develop more shared learning events and build a culture of bringing improvement teams together as a way of sustaining improvement activity in a broader sense.

The importance of recognition events was also referenced by Interviewee 7 who identified the positive benefit of presenting at such events. The organisation of a recognition event in their hospital attracted better than expected interest and increased enthusiasm. This led the hospital to host another event which was equally successful.

> We got 80+ posters, proper posters, proper QI improvements, to some of the small but all of them really meaningful, either for the staff, the patients, the layout of departments – unbelievable. (CE18)

When reflecting on these events Interviewee 7 opined that not enough was being done to harness the power of these events at senior corporate level stressing that there was an '*absence of proper quality people per department, or per directive, or per division'.* Celebrating success strengthens commitment to change (Graber and Kilpatrick, 2008). Recognition has been identified as a key factor in demonstrating respect for people, a core pillar of lean management (Hines, 2021). Interestingly, recognition does not feature as a significant factor or competency in previous lean leadership studies (Emiliani, 2003; Seidel *et al.*, 2017) or in studies investigating the role of lean healthcare project leader (Souza *et al.,* 2018) and lean healthcare

implementation frameworks (Regis *et al.*, 2019). Competencies identified in the findings in this study such as "Displays gratitude" and "Communicates progress" highlight the importance of recognising the work effort of others in influencing the success of lean improvement programmes.

9.4.5 Utilising standard work practices.

The importance of creating standardised work practices for data processing activity can be essential for all healthcare practices. Data accuracy and integrity is important from a clinical treatment perspective, a process efficiency perspective and a patient perspective in terms of GDPR. Competencies involving the development and sustaining of standardised work practices emerged as a theme in some projects. In one project where the extended value stream was utilised to optimise value for the patient and optimise hospital resources, data entry became an issue as the process now spanned multiple stakeholders each of whom might have different hardware and differing constraints around IT capability and time. This meant that a lack of consistency around data entry occurred and negatively impacted process efficiency and effectiveness.

> Probably the most frustrating part of the whole process was the data-entry process, and we're still wrestling with that. (CE13)

These concerns were addressed by extensively communicating with stakeholders and clearly identifying and stressing the need for robust data entry procedures. Administrative support also needed to be provided to stakeholders with routine issues such as accessing, inter alia, the IT system or remembering passwords.

The introduction of standard work in terms of improved policy and procedures by its nature involves changing generally accepted practices. For some stakeholders this can be difficult to accept, and it is often the case that work practices and behaviours will revert to old habits. In some projects, persistence in obtaining senior management support for new policies was instrumental in gaining acceptance for new standard operating procedures.

> We were going around and around and around with this, and eventually, we managed to devise a policy that we brought to the executive management team. And we got it signed off that no… only surgical patients were to be admitted to the surgical ward. (CE38)

Sustaining standardised work practices can be difficult. Interviewee 5 commented that they had to force stakeholders to use the new system and standard operating procedures by taking strong

measures by refusing to accept patients that had not been processed in the correct manner. This strongly encouraged all stakeholders to follow the newly devised policy and procedures.

> I said to them 'I will not operate on any patient who is not on the electronic patient record. You want your patient on, put them up on the system.' (CE14)

Commitment to lean initiatives from external stakeholders can be vital to successful lean implementation (Naik *et al.*, 2012) due to the complex, integrated and mutli-disciplinary nature of healthcare processes. The findings identified impediments to progressing lean improvement projects relating to failure to adopt standard work practices at various levels in the hospital organisation and in some cases with partners in the value stream. This is not explicitly referenced in the lean competency literature, although it is implicitly inferred in some studies. For example, Seidel *et al.* (2017) describe a competency "Use continuously lean practices and principles" and Van Dun *et al.* (2017) identify that effective lean middle managers more consistently apply more positive-relations oriented behaviours. Interestingly, Van Dun *et al.* (2017) call for future research to chart the type of positive, relations-oriented behaviours in various standard work settings. The competency statements "Demonstrates a commitment to stability" and "Balances the application of standard work with experimentation" included the findings of this research speak to the importance of utilising standard work to reduce variation without compromising inventiveness and improvement.

9.4.6 Understanding the voice of the customer.

Viewing processes from a customer, patient or end user perspective is one of the central tenets of lean healthcare practice (Womack and Jones, 2003; Young and McClean, 2009; Papadopoulos *et al.*, 2011; Al-balushi *et al.*, 2014). Many interviewees described the importance of the patient perspective during their interview discussions. For example, in one project, viewing a recruitment process from a candidate experience proved to be instrumental in highlighting problems and inefficiencies in the process. Even though managers in the organisation were aware that the process was flawed there was a reluctance to consider changing or improving it.

> But hearing it from the candidate experience and the – how it made them feel, and the issues they encountered, that was – for me, that was critical. (CE24)

Interviewee 11 identified that even during improvement events, people can be caught up in viewing processes solely from an organisational perspective and not consider the patient perspective.

> And it was funny because even one… the team leader as well. It was… everybody was almost thinking like that. They forgot about the lean. The principle here is the value to the customer. (CE27)

By changing the viewpoint improvement opportunities rise to the surface and process inefficiencies are exposed. This naturally leads people to question current business-as-usual practices and can energise the improvement team.

> ‘Maybe we could cut that out now,' and people were coming up going, 'You know what we're also doing? We're doing that and we don't need to be doing that.' Even things outside of our process that were indirectly affecting things, they were thinking, 'We don't need to do that,' and we felt the energy coming back every day, that people were coming with more ideas of how you can do things different. (CE27)

The project manager can also challenge team members to push the boundaries of their thinking and to frame things from a perspective that has the patient at its core.

> Can we look at this again? Do we think this is the best we can do? Or is this the best for what we want for our unit and our patients?' And I said, 'There's no patient mentioned in this.' (CE4)

Challenging team members in this manner leads to a more robust of identifying improvement opportunities and possibly digging deeper than initially recognised solutions to uncover improvement opportunities of greater significance.

Section 9.3.7 has already identified that a stronger customer/patient focus appears in this study when compared to previous studies examining lean competencies at the middle manager level (Van Dun *et al.*, 2017) and at the lean healthcare project manager level (Souza *et al.*, 2018). More explicit reference to the terms “customer” and “patient” are included in the competency statements included in the model identified in the field research (See Table 9.1).

9.5 A Posteriori Developments

This section presents two *a posteriori* developments that emerged from the field research. Whilst not directly related to the research objectives presented in the research methodology chapter, these developments closely impact the competencies of lean project improvement managers and add clarity to the field of enquiry.

9.5.1 Management structure.

Management structures in healthcare organisations that are typically hierarchical and functional in nature can act as a barrier to lean implementations (Costa *et al.,* 2015; Poksinka, 2010; de Souza and Pidd, 2011).

Some interviewees were critical of the overall support provided in the public hospital system.

> But there's a big push in the HSE with quality, and like there's a lot of these… there's a quality office or something like that as well. There's… and then there's clinical directors of quality. And they talk… there's a lot of stuff that… my perception is, there's a lot of stuff that's documented on these different things. But when it comes to the face of it, on the coal front, there's very little support for us. (Int. 12)

The relationship management competency domain (See Table 9.1) contains two competency statements at an expert level that involve identifying and managing relationships with stakeholders and also two competency statements at a core level that involve acknowledging power dynamics in the hospital organisation and acting as a partner in the value stream. Senior hospital managers and senior clinicians have powerful influence on change processes in hospitals. Studies have established a strong relationship between managements systems and lean programme success (Noori, 2015) and that executive commitment both at hospital and departmental levels is critical for successful lean transformation (Naik *et al.,* 2012).

It is important that lean improvement initiatives are underpinned by a visible commitment from senior hospital leaders in the management and clinical structures in the hospital. Mazur *et al.* (2012) identify that hospital managers must lead from the front by visibly demonstrating their ongoing commitment to lean. At the project level managers require the support of influential stakeholders in the management structure. A number of interviewees who identified their lean improvements as being very successful and described significant support either at the executive level or from senior clinical leads. It is advised that hospital organisations seeking to implement lean initiatives as a means of achieving strategic objectives consider its systemic implications and develop strong advocates for lean at senior executive and senior clinician levels. In some projects the provision of senior management support in terms of executive sign-off proved critical in creating momentum in their project.

> … they had it in black and white from the executive management team. Namely, the clinical director and the general manager signed off, so they had a directive….and that was the driving force. (CE38)

The creation of a managerial role dedicated to quality/lean improvement is also desirable dependent on the size and resource of the hospital. A position wholly dedicated to quality/lean

improvement emphasises its importance and assists in garnering organisational support at all levels.

9.5.2 Provision of supports.

Mazur *et al.* (2012) advocate the provision of broad-based training and supports to complement lean implementations and to commit a large number of frontline employees to participate in rapid improvement events as early as possible in lean implementations. Similarly, Al-Balushi *et al.* (2012) find that the encouragement and involvement of staff in lean activity is best achieved through the provision of training. Interestingly, an absence of senior management support proved to be an impediment in the advancement of some projects, sometimes in the provision of supports such as training.

> Because of delays at the higher-up level, they didn't start. They were late starting, and they only gave us 12 weeks, whereas we were meant to get six months of their time, where they came every week and spent a day with me, with us. And so that was cut short. (CE16)

It is advisable for senior hospital management to consider the provision of training to all employees to encourage broad-based support of, and participation in, lean improvement activities. This could occur at different levels. For example, knowledge-based training creating awareness of the fundamentals of lean could be made available to all employees utilising existing training and development platforms in hospitals. More advanced, practical training could be provided to members of lean improvement project teams. Advanced training modules designed to match the various competency domains in the competency model could be provided to managers/leads of lean improvement projects and to co-ordinators of lean improvement activity in hospitals.

Lean improvement projects involve a considerable investment from the project team in terms of their time and work effort. Several interviewees mentioned the importance of supports in progressing their projects. For some this involved the provision of minor financial support for materials that were required for the project. After an initial rejection, the project manager identified that they needed to be persistent to obtain the required resources.

> I put in a business case for €2,000, which, in the days of healthcare, is nothing to a hospital. And that was for shelving and to clear a room, and that got rejected. And the only reason I got it was, I was persuasive. I was knocking on people's doors and they gave it to me in the end. (CE36)

Whilst acknowledging that hospital organisations operate in resource-constrained environments, it is important that lean initiatives are supported by specific sources of funds that can be allocated to improvement projects that might require capital funding (Mazur *et al.*, 2012; Naik *et al.*, 2014).

Funding implications of staffing improvement activity should also be considered. A number of interviewees raised the issue of protected time as a support for lean activity. Guarantees by management that time would be allocated for employees who engage in lean improvement projects were not always honoured thus necessitating the project manager to commit their own personal time to overseeing the completion of the project. Mazur *et al.* (2012) identifies time as a critical factor that limits ability in developing a deep appreciation of lean practice and in applying this knowledge to make improvements. Hospitals are complex and busy work environments where professionals are often too busy to combine their normal day-to-day duties with an additional workload relating to improvement activity. It is important that hospital management fully respect the importance of lean improvement work and the individuals that undertake it, by allocating resources, including time, to support lean improvement projects.

9.6 Discussion of Conceptual Framework and Competency Model.

Following from the findings presented in Chapters 7 and 8 and discussion above, the author proposes a Conceptual Framework that includes the competency model previously described. This is presented in Figure 9.4.

As a reminder to the reader the visual map presented in Figure 1.1 is again presented below illustrating the relationships between the hospital/healthcare context and demand and supply/resourcing conditions. This visual map presents the tensions encountered by hospital organisations in responding to increased demands on their services from growing, ageing populations with complex care needs whilst utilising a resource base that faces many constraints in terms of funding, capacity and human resources. In response to these tensions, hospitals are adapting their strategic approaches to include value-based models of service provision in a resource efficient manner. The application of lean management in hospitals is an approach that aims to deliver services that offer increased value to patients and customers whilst minimising wastes in service provision. Drawing from influences in the management literature including the resource based view; dynamic capability theory; human resource

development; competency theory and lean management, the author proposes a conceptual framework that illustrates the competency model developed from the field evidence.

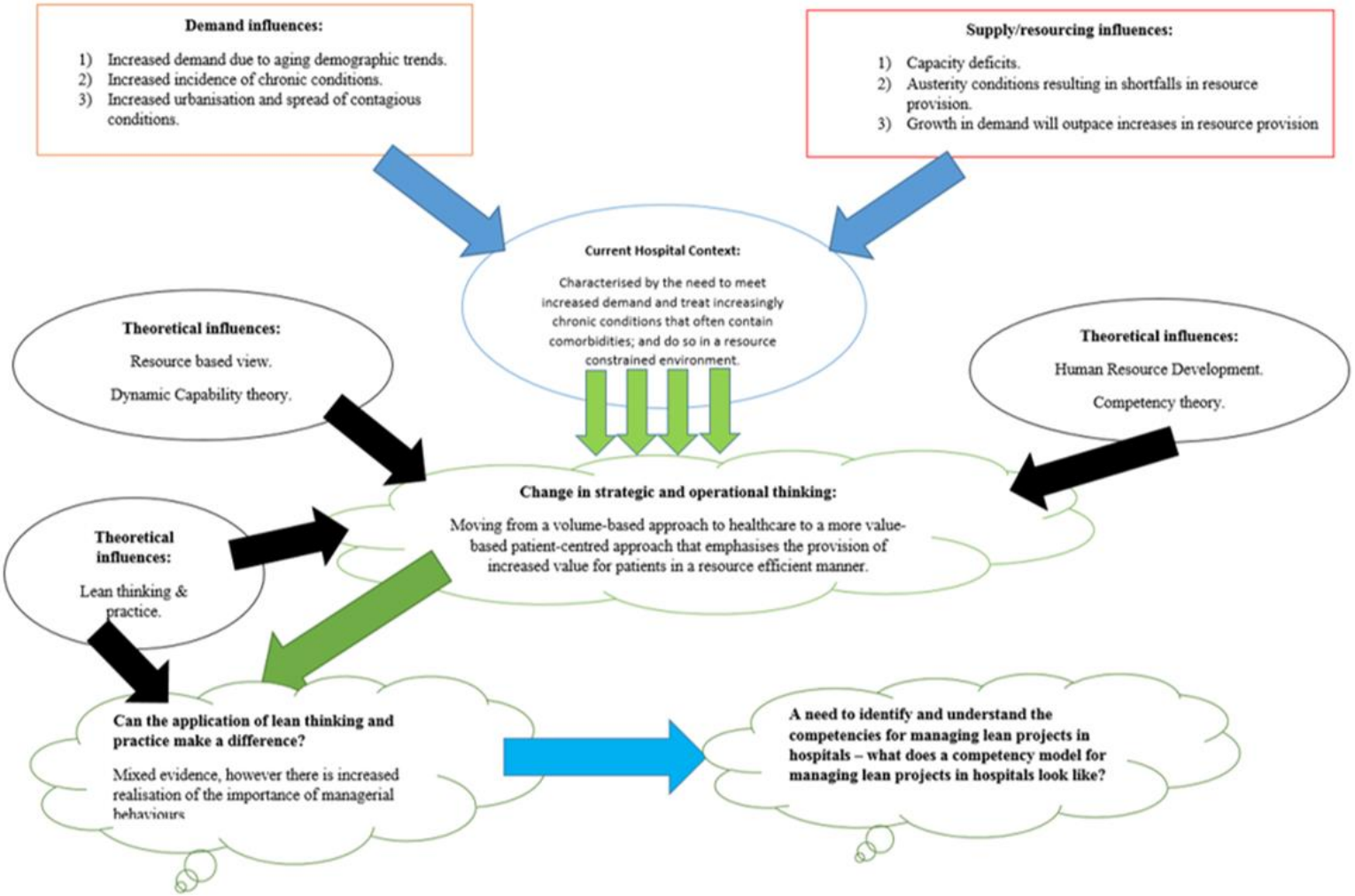


Figure 1.1 Visual map of healthcare challenges, operational context and theoretical influences shaping the direction of the research.

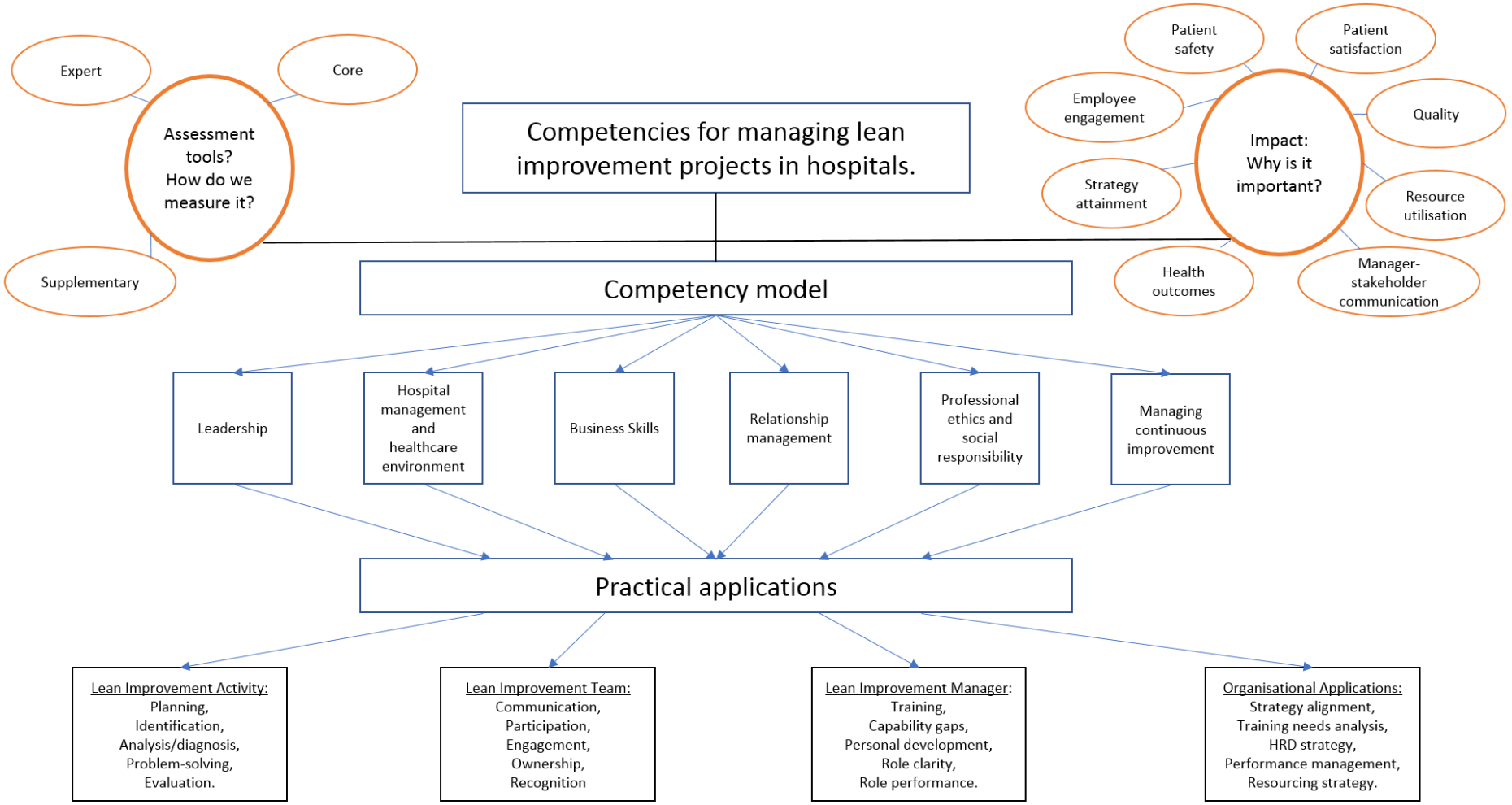


Figure 9.4 Conceptual Framework illustrating the Revised Competency Model.

The Resource-Based View (RBV) examines strategic resources and the capabilities to develop and deploy these resources over time (Barney, 1991; Barney and Clark, 2007; Sirmon *et al.*, 2007). Bryson *et al.* (2007) concludes that RBV is potentially useful in the public sector. Studies have also explored its application to the healthcare sector (Burton and Rycroft-Malone, 2014; Ferlie *et al.*, 2015) and specifically human resources in the healthcare system (Klemlink Yingling, 2020). Human resources are a critical resource in the management of organisations and when considering human resources from an RBV perspective, consideration should be given to their development and understanding their contribution to the strategic capabilities of the organisation. RBV is often cited as the foundational theory for Human Resource Development (HRD) theory (Allen and Wright, 2006; Nyberg *et al.*, 2014; Kaufman, 2015). The modernisation of the public sector has led to broader consideration of the human resource stock at the organisational level of analysis (Snell *et al.*, 2001; Ployhart *et al.*, 2009). The context of this research examines the use of lean as a strategic lever to both achieve increased patient satisfaction (by adding value to patient services) and resource efficiency (by eliminating unnecessary waste and increasing capacity) in public hospitals. In order to achieve this, it is important to consider human resource development requirements of such a lean strategy and how lean capabilities can be developed within a hospital workforce and how a large number of frontline employees can be engaged in improvement projects (Mazur *et al.*, 2012).

The link between organisational competence and competencies at the individual level is established (Garavan and McGuire, 2001; Capelli and Crocker-Hefter, 1996; Haland and Tjore, 2006). Competency models provide a link to relate individual to core competency (Rothwell and Lindbohm, 1999) and to link individual roles to strategic objectives (Lucia and Lepsinger, 1999; Gangani et al., 2006). Chapter 4 of this thesis presents a comprehensive synthesis of previous research examining healthcare management competencies and lean leadership/management competencies as a precursor to identifying competencies for managing lean improvement projects in hospitals. Established competency frameworks such as the Master Health Service Competency Framework (ACHSM, 2016) provide guidance on the language and nature of competencies used with the healthcare sector. This analysis formed the basis of the competency model presented in Table 9.1 of this chapter which was then further developed by the field evidence of this research.

The competency model developed considered the role of the manager of lean improvement projects in Irish hospitals and forms the central component of the conceptual framework

illustrated in Figure 9.3 in summary form highlighting the six competency domains identified. In total 90 competency statements are included in the model across the six domains. Although some similarities exist between the competency domains and existing competency frameworks and models, variations also exist in the emphasis placed on certain competency sub-domains and on individual competency statements within these domains. Unique to this model is the inclusion of a Managing Continuous Improvement competency domain that provides a focus on the inclusion of specific competencies relating to lean management.

Each individual statement is rated at either an Expert, Core, Supplementary and useful frequently, or Supplementary and useful infrequently level, as illustrated in the top-left of Figure 9.3. These rating levels provide guidance on the relative criticality of each competency statement with regards to lean improvement project success. This can be useful from an organisational perspective in designing training and coaching interventions for employees and in evaluating performance of employees by establishing proficiency in and frequency of use of competencies in performance appraisals (Campion *et al.,* 2011). From an individual perspective the rating levels of competency statements are useful in terms of developing proficiency in individual competencies by focussing an individual's attention on certain skills, abilities and behaviours in relation to their criticality to lean improvement project success.

The top right of Figure 9.3 illustrates the potential impact of the model in a number of areas of critical importance to hospital organisations in areas such as patient safety, patient satisfaction, health outcomes and quality. The model includes competency statements that specifically emphasise the importance of considering patient and customer perspectives and incorporating these perspectives in the analysis of processes when investigating improvement opportunities that can lead to improved quality and better health outcomes. Similarly, a number of competency statements in the model describe the importance of engaging others in improvement projects and in encouraging other to practice lean. In this regard, actively communicating with stakeholders is important. The competency model provides guidance regarding the skills and abilities to improve communication with stakeholders and manage stakeholder relationships. Lean, by its nature, if implemented effectively, delivers returns in terms of maximising resource efficiency. A number of the Interviewees describe how redesigning processes during lean improvement activity enabled processes to be streamlined, capacity to be freed up and resource utilisation to be minimised. Competency models can be useful in connecting individual roles to organisational strategic objectives (Campion *et al.*,

2011). Competency statements in the model, such as L3 – Articulates mission and shared vision, reinforce an emphasis on linking improvement efforts at the project level to broader organisational and national strategic objectives, thus creating meaning for employees involved in improvement activity.

The bottom component of the conceptual framework describes applications of the competency model at different levels. At the improvement activity level guidance is provided around the planning of improvement projects utilising structured problem-solving improvement methods that involve the application of lean tools and techniques combined with evidence-based decision making.

At the improvement team level, more "softer" elements of the lean approach can be emphasised to include competencies involving communication, engagement, recognition and development. This aligns with recent developments in lean thinking to include mechanisms for understanding the people dimension of lean (Hines *et al.*, 2020; Hines, 2021).

At the lean improvement manager level, the competency model identifies competencies pertaining to the role of a manager of a lean improvement project in hospitals. This provides clarification on competencies suited to this role and as such can be useful in developing training supports, identifying capability gaps, in better understanding personal development opportunities, in providing role clarity and in measuring role performance.

Similarly, at the organisational level the competency model can inform activities in human resource development, training and performance management. The competency model also provides an opportunity for improved resource utilisation by informing the development of managers who are well versed in the diverse competencies required for the role. This should assist lean improvement project managers in hitting the ground running when engaging in lean improvement activity and contribute effectively to attaining the strategic objectives of the organisation.

9.7 Methodological contributions.

One of the key considerations in Delphi studies is determining consensus. The methodological literature contains many different methods of assessing consensus including the median, interquartile range, standard deviation, percentage of experts responding to a category or agreeing with a rating and other measures such as Kendall's co-efficient of concordance. However, there is no one best way identified in the literature for assessing consensus (Hsu, 2007; Keeney *et al.*, 2010). Giannarou and Servas (2014) recommended considering three measures in combination to ensure consensus: the percentage of respondents in agreement being above a preset target %, a measure of interquartile range and a measure of the standard deviation. This study produces a methodological contribution by testing consensus in the Delphi component of this rsearch by considering these three different measures to determine that consensus is reached when:

1) The perentage of respondents agreeing on an individual category/rating is greater than or equal to 65%.
2) The interquartile range is less than or equal to 1.
3) The standard deviation is less than or equal to 1.5.

Consensus would have been achieved more quickly if one measure such as the interquartile range was used in isolation. Findings from the field research (Chapter 7) indicated that a number of statements had not achieved consensus following the fourth round of the Delphi and needed to be considered further in conjunction with evidence from the critical-event interviews. The outcome of the Delphi supports Giannarou and Servas (2014) assertion that the three combinatory measures be utilised together so that consensus is ensured.

A second methodological contribution involved the use of critical-event interviews to substantiate the findings of the Delphi study. Previous literature have warned against over relying on so-called lean experts (Hicks *et al.*, 2009; Van Dun *et al.*, 2017). By conducting critical-event interviews with individual project managers/leads of lean improvement projects it was possible to further consider the competency statements that achieved consensus in the Delphi study through a pragmatic lens identifying what appears to work best in practice in hospitals thus providing an objective account of reality (Viergever, 2019). A number of competency statements that had not achieved consensus in the Delphi study were reconsidered (See Chapter 8) once compared against the findings from the critical-event interviews leading to the inclusion of some statements that had previously been excluded and the re-rating of other statements in therms of their criticality to lean improvement project success. The combination of the Delphi technique and critical-incident technique can be considered a useful combination in identifying competencies and should be considered as an option in future research studies investigating managerial competencies.

9.8 Contribution to Theory.

9.8.1 Contribution to Foundational Literature.

The foundational literature of this research examined RBV theory as a useful lens through which to examine lean management as a form of operations management research. Although the origins and early foundations of RBV are firmly based in a private industry context, Bryson (2007) conclude that RBV theory is applicable in the public sector. The application of RBV in healthcare has been established (Newbert, 2007; Ferlie *et al.,* 2015) and VRIN resource creation can be considered in quality improvement in a healthcare context (Burton and Rycroft-Malone, 2014). Arbab-Kash *et al.* (2014) conclude that in the presence of a highly regulated external environment, the relevance of RBV theory becomes more apparent for healthcare strategists seeking to leverage internal resources when pursuing strategic advantages. Danese *et al.* (2015) contend that RBV is a useful lens to understand the core competences and synergies between 'hard' and 'soft' lean practices required to maintain the benefits of lean implementations.

Figure 1.1, revisited in this chapter, highlights the dynamic challenges facing hospitals in the current healthcare environment and identified lean as a potential strategy for maximising patient value and minimising resource costs. This research proposes that when undertaking a lean strategic initiative, hospitals should consider how to optimise human resource as key internal resources, in this case the lean project manager, in the context of combining this with other available resources.

HRD Theory is also considered in this context, an in particular how to leverage human resources to maximise their benefit to an organisation and more effectively support lean implementations in hospitals. A shift to strategic HRD is reported in the literature (Corley and Eades, 2006; Rigg *et al.,* 2007; Sambrook 2009; McKenzie *et al.*, 2012) with a focus on aligning strategy, people and performance. The findings of this research suggest that it is not simply enough to identify and deploy lean improvement project managers without considering how this can be combined with other resources such as financing lean projects, providing lean training and allocating time for lean activity. Mazur *et al.* (2012) consider the provision of appropriate support such as training provision and the allocation of time to work on lean activities. This research asserts the lean project managers are a critical resource in lean implementation and therefore it is important to understand what is required of the lean project

manager in supporting organisational strategy. The competency framework illustrated in figure 9.3 illustrates how the revised competency model (Table 9.1) could be utilised in developing capability at the lean project manager level thus assisting in the achievement of improved project outcomes.

9.8.2 Contribution to Background Literature.

The practice of competency modelling for clinical and practitioner roles in healthcare is commonplace and well established. However, for management and leadership competencies that exceed the normal role of the physician or medical practitioner, competency models are often not present and deficient (Pillay, 2008; Dickinson *et al.,* 2013; Kuhlman and von Knorring, 2014; Pihlainen *et al.,* 2016). The findings regarding managerials skills in healthcare in the literature are often fragmented and inconsistent (Chaudry *et al.,* 2008; Fanelli *et al.,* 2020). This study makes a contribution to the hospital management literature by providing a synthesis of previous studies (see Table 3.2) investigating leadership and managerial competencies in hospital settings. These are further combined into competency domains and sub-domains and were subsequently presented at a research conference and formed the basis of a peer-reviewed article published in the International Journal of Organizational Anaysis (Walsh *et al.,* 2020).

The competency literature asserts that there is value in identifying how often a competency would need to be practised before it could be linked to outstanding performance (McClelland, 1998; Boyatzis, 2008; Spencer *et al.,* 2008) and there have been calls to further test and refine competency models in hospitals settings (Liang *et al.,* 2018). The competency model illustrated in Table 9.1 contributes here on both fronts. By including a rating system for the assessment of competencies in the Delphi study, and further considering the ratings of these statement in light of the field evidence from the critical-incident interviews, it was possible to further delineate the relative importance of each competency statement at Expert, Core and Supplementary ratings. This provides guidance to future end-users of the model and assists in identifying which competencies require the greatest proficiency and frequency of use.

9.8.3 Contribution to Focal Literature.

Table 9.4 illustrates the contributions of this research to the focal literature by examining the findings of the research in relation to the criticism/gap in the lean and lean healthcare literature and identifying the level of contribution made.

Table 9.4 Contribution to the Focal Literature.

Lean criticism/gap	Contribution	Level of contribution
A better understanding of the role of the lean project manager in hospitals is needed.	A comprehensive competency model is presented that includes 90 competency statements that offers multiple perspectives on the role.	Significant – the model provides a detailed insight into the role of lean improvement project manager that builds on and furthers previous research.
Tools approach to lean implementation and lean improvement project delivery.	A broader multi-faceted perspective offered that is greater than a pure lean tools focus.	Significant - Suggests that tools are not enough and need to be augmented by other competencies.
Focus on the patient/customer.	The competency model emphasises the patient by establishing that the patient in the central focus of improvement activity.	Significant – a number of competency statements at the highest rating of "Expert" emphasise the patient perspective.
Lack of a focus on people.	The competency model emphasises that people are at heart of lean.	Good - Competency statements pertaining to people and stakeholder relationships resonate throughout the competency model putting people at the heart of lean.
Negative people aspects and poor communication and leadership.	The competency reinforces the need to respect people and create a psychologically safe environment.	Good – Multiple competency statements speak to respecting individuals and developing others.
Implementation approach.	Recognises the role of the lean improvement project manager in assisting lean implementation at multiple levels.	Good – several competency statements emphasis the multi-level focus of the lean improvement project manager.
Focus on operational/project level.	Aspects of the model specify competencies pertaining to strategy deployment and recognises a strategic orientation.	Limited.

Developed by the researcher.

A significant contribution has been made to the understanding of competencies relevant to the role of the lean project manager in hospitals. A gap exists in the literature in this area and previous studies such as Souza *et al.* (2018) have limitations in that they are narrowly focused and focused on a single site. A contribution is made here by the development of a comprehensive, multi-faceted, competency model (See Table 9.1) for the lean projet manager

role. This model contains competency statements across a number of categories incorporating 'hard' competencies (in lean and quality tools and techniques and evidence based informed decision-making) and 'soft' competencies (in relationship management, communication and stakeholder engagement). This reflects the evolution of lean towards an implementation approach that is much broader than tools & techniques alone, incorporating cultural and behavioural elements that involve understanding the human element of lean implementation (Hines *et al.*, 2018; Hines, 2021).

Criticisms of lean implementations in healthcare have identified poor communication and a lack of leadership as an inhibitor (Grove *et al.,* 2010) and require a strategy built on capable leadership, the monitoring of behaviours and stakeholder engagement (McIntosh *et al.,* 2014). The competency model developed by this research firmly recognises the importance of leadership and offers guidance to the lean project manager regarding managing stakeholders engagement at multiple levels. Also, the importance of being consistent in the approach to lean by developing regular, repeating behaviours is emphasised. The role of the project manager in the implementation approach and the organisational supports the role requires are also identified thus adding clarity for hospitals embarking on lean implementations (Mazur *et al.*, 2012; Regis *et al.,* 2019). However, the overall focus on a single role limits the contribution regarding organisation-wide lean implementations in hospitals.

9.9 Contribution to Knowledge.

9.9.1 Identification of a multi-faceted skillset required to manage lean improvement project activity in hospitals.

In developing a competency model for managing lean improvement projects in hospitals, this research exposes the multifaceted roles of the lean improvement project manager that encompasses not only lean competencies but also considers complementary competencies in other areas such as relationship management and evidence-based decision-making that are also important in influencing lean improvement project outcomes. High-performing individuals in a lean improvement context do not solely rely on established lean tools, techniques and methodologies, but also consider these in conjunction with a broader repertoire of knowledges, skills, values, abilities and behaviours. The application of lean thinking requires the lean manager to fully appreciate the organisational context and understand how best to deploy their knowledge and abilities in that context. An appreciation of project stakeholder perspectives

and ideas can be important in uncovering improvement ideas and these can then be verified by utilising lean thinking and approaches.

The competency model proffered in this study includes 90 competency statements across six competency domains. An appreciation and consideration of this model encourages the lean improvement project manager to expand their thinking to consider improvement opportunities from multiple angles and adopt a more balanced perspective of the various factors that can influence lean improvement project success. The inclusion of a rating for each competency statement signifying its relative importance to lean improvement project success also provides guidance regarding essential competencies that should not be underestimated when engaging in lean improvement activity.

9.9.2 Identification of capability deficits in managing and conducting improvement activity in hospitals.

This study identified that capability deficits existed in certain key areas. In particular abilities concerning the collection and utilisation of data emerged as a theme in the research being identified by the Delphi panel and the interviewees. Of particular interest was the observation that data can observed on different levels. The competency statement "*Understanding Data - Understands data on a scientific and technical level and appreciates the difference between financial data and healthcare data*" encapsulates this and reflects that in hospital environments data can be collected and utilised in different ways by different disciplines. Many existing competency models for healthcare service managers such as the ACHSM (2016) model include competencies for evidence based decision-making and for understanding and utilising financial data, however these competencies refer to either a clinical perspective or a financial performance perspective. Of particular interest in this study is the perspective expressed by interviewees that competencies in utilising data to track and measure value stream/process performance were underutilised or deficient in lean improvement project teams. The competency sub-domain "*Evidence-based informed decision-making*" in this competency model seeks to address this deficiency by including competency statements designed regarding the collection and utilisation of data to better inform decision-making, reduce process variation and combined with competencies in the "*Measuring and managing performance*" sub-domain track and monitor operations performance in a robust manner.

9.9.3 The importance of acknowledging the softer elements of improvement activity such as maintaining stakeholder relationships.

The evolution of lean has involved a transition from operational-level tools driven implementations to more strategic, enterprise-wide, multi-level implementations that involve considerations of culture, systems, values and people (Hines *et al.*, 2018). An emergent theme in this research involved the appreciation of stakeholders at multiple levels throughout the organisation including the perspectives of patients/carers/customers/end users, senior management, middle management at both clinical and functional levels, improvement project team members, employees at an operational and external stakeholders such as suppliers and other partners/providers in the healthcare ecosystem.

Failure to fully appreciate stakeholder perspectives was cited as an impediment by many of the participants in this research and in some cases successful stakeholder engagement proved to be an instrumental factor in lean improvement project success. The importance of relationship building is identified as being part of an important behavioural repertoire that can create psychological safety and positively influence engagement in improvement activity (Van Dun *et al.*, 2017). Van Beers *et al.* (2021) posit that a combination of top-down and bottom-up approaches to lean implementation will result in more effective, sustainable hospital-wide improvement. The competency model developed in this study recognises the role of the lean improvement project manager in developing and maintaining relationships with organisational stakeholders at all levels. In a way the lean improvement project manager is at the mercy of existing power structures in the hospital organisation and although they may possess expert-based authority through their knowledge and practice of lean, they may not possess power-based authority to galvanise senior clinicians and other medical professions to fully engage with improvement activity. One way of dealing with this imbalance in authority is for lean improvement project managers to take time to perform a stakeholder analysis in the pre-planning phase of a lean improvement project and develop connections with influential stakeholders during the planning phase of the project. Relationships with stakeholders should be maintained throughout and after the project activity in order to maximise the results and learnings that can be gained. Netland *et al.* (2020) and Van Dun and Wilderom (2021) emphasise that top, middle and lower level management need to play an active part in lean implementations for them to be successful. The competency model developed in this study provides essential guidance for managers at mid-organisation level and emphasises the linkages to other levels in the organisation in terms of supporting an organisation wide lean strategy.

9.9.4 Identification of competencies for managing continuous improvement in hospitals.

The competency model developed in this study identifies a specific competency domain for managing continuous improvement. This domain contains five sub-domains and 24 competency statements that offer guidance on specific skills, abilities and behaviours pertaining to the management of continuous improvement activity in hospital environments. Previous studies have investigated the role of lean project leadership in a Brazilian hospital (Souza *et al.*, 2019) identifying skills of lean project leaders and matching them to 26 activities incorporated in a project management (DMAIC) framework. The model proffered by this study contains competency statements that are similar to those identified in the Souza *et al.* (2019) study such as maintaining a GEMBA presence, but also broadens the range of competency statements to include a sub-domain "Understands Value from a patient/customer perspective" that resonates with the true focus of a lean approach in creating value for the customer and also contains specific competency statements pertaining to change management and understanding the reason for change and underlying reasons for resistance to change. The mixed method format of this study to include insights from a Delphi panel adds a broader perspective than the Souza *et al.* (2019) study which was conducted in a single Brazilian hospital using an action research methodology. Also, this study included participants from a number of hospital organisations thus reducing the possibility of a single-site bias. The convergence of opinions and insights expressed by the Delphi panel and critical-event interviewees to an extent validated the applicability of the competency statements identified.

9.10 Chapter Summary.

This chapter presents a refined competency model that includes 90 competency statements across six competency domains. Answers to the research questions are provided and discussed in relation to the literature. Two *a posteriori* developments are presented describing management structure and supports for lean improvement initiatives. A conceptual framework illustrating the competency model and its applications are also discussed. Methodological contributions of this are presented and contributions to theory and knowledge are discussed. The next chapter concludes this dissertation by providing an overall summary of the research and its contributions; illustrating the limitations of the research and providing recommendations for future research and practice.

Chapter 10 – Conclusion and Recommendations.

10.1 Introduction.

The previous chapter utilised the empirical evidence from the fieldwork to answer the research questions that were established for the study. The purpose of this chapter is to describe implications of the research findings, and to present conclusions regarding the wider applications of this work. Reference pointers are used in this chapter to direct the reader to previous chapters, sections, figures and tables that act as source material that inform the conclusions and contributions of this research.

An initial exploration of the literature identified that competency theory can be considered to be part of the HRM domain with a focus on HRD considerations (McClelland, 1973; Boyatzis, 2008; Spencer and Spencer, 1993). Further linkages have been established between competency theory, HRD theory and the literature on RBV theory (Wernerfelt, 1984; Barney, 1991). Connections have also been established between individual-level competencies and organisation-level competencies (Garavan and McGuire, 1991; Gangani *et al.*, 2006; Salman *et al.*, 2020).

Lean is an established approach to the systematic elimination of waste in organisations and is more easily understood by organisational resources at all levels than other continuous improvement approaches (Antony *et al.*, 2019). Lean is a popular approach to improving healthcare processes (De Souza, 2009; D'Andreamatteo, 2015; Williams and Radnor, 2018) and can assist in addressing current healthcare challenges that involve addressing increasing demand for healthcare services whilst effectively utilising scarce resources in complex and fragmented systems (Williams and Radnor, 2018; Aitken *et al.*, 2021). Parallels have been drawn between lean and RBV theory, focusing on the optimisation of scarce resources and complementarity of resources (Gibbons *et al.*, 2012; Kumar and Sanchez Rodrigues, 2020).

Lean has evolved from its origins as a largely tools and techniques driven approach to a broader focus that embraces systems, people and culture that includes an emphasis on the learning and development of people (Hines *et al.*, 2020). Limited empirical research exists on the competencies for managing lean projects (Seidel *et al.*, 2017; Camuffo and Gerli, 2018). The training and development of people in lean alongside the creation of an internal lean team is identified as a contributing factor to the sustainability of lean in healthcare organisations (Henrique, 2020).

There are a number of sections to this chapter. Firstly, the author restates the research questions and presents a summary of the contributions that are described in Chapter 9. Limitations of the research are also discussed. The chapter continues by describing implications for practice and by offering recommendations for further research. This chapter and document conclude by presenting a critical reflection from the researcher on the PhD journey.

10.2 Thesis aim and research questions.

The objective of the research is to identify competencies for managing lean projects in hospitals and evaluate the perceived significance and impact of these competencies on lean project outcomes. In order to address this research problem two research questions are asked:

Research Question One

What are the competencies required to manage lean projects in Irish hospitals?

Research Question Two

Which competencies are most important in managing lean projects in Irish hospitals, and why are these competencies perceived to be most important?

The reader is directed to Figure 1.1 (Chapter 1) that presents a visual map depicting the challenges currently experienced by hospital organisations, the theoretical concepts influencing this research and the identification of the importance of better understanding the competencies required to manage lean improvement projects in hospitals. Figure 9.3 (Chapter 9) presents the conceptual framework developed for this study and includes the competency model derived from the empirical field evidence. The competency model includes 90 competency statements in six categories that are further sub-divided into sub-categories for ease of understanding and use. These competencies are further delineated by the application of a rating in terms of their criticality for lean improvement project success.

A number of contributions are identified by the researcher to theory, knowledge and practice. These contributions are explained in detail in Chapter 9 and a summary of these is provided in the next section of this chapter.

10.3 Summary of contributions.

This research addresses gaps in the literature concerning the development of management competency models in hospitals, and more specifically regarding the role of the lean improvement project manager in hospitals that utilise lean practices in their transformation efforts. The lean project leader can have a pivotal role in lean transformation in hospitals and the research would appear to show that training project leaders in lean practices enables them to deploy robust methods focused on results (Souza *et al.*, 2019). Further research is required to test and refine management competency models in hospitals (Liang *et al.*, 2018; Walsh *et al.*, 2020) and to further explore the role of lean project leadership in hospitals (Souza *et al.*, 2019). The competency model developed in this research addresses this research gap by providing detailed guidance on the competencies of the role of the lean project manager in hospitals and adds to the existing lean management and competency literature in this area.

There have been calls in the literature to further consider the application of RBV in the public sector (Bryson, 2007) and in healthcare (Newbert, 2007; Ferlie *et al.*, 2015; Burton and Rycroft-Malone, 2014; Arbab-Kash *et al.*, 2015). Similarly in the RBV literature there have been calls to explore RBV as a lens to further understand the competencies and synergies between 'hard' and 'soft' lean practices (Danese *et al.*, 2015). This research recommends that hospitals should consider how an internal resource, namely the human resource of the lean project manager, can be best leveraged and combined with other internal resources for maximum benefit. The competency model presented in this research sheds light on the hard and soft competencies applicable to the lean project manager and indicates their relative importance to project success. Mazur *et al.* (2012) recommends that hospitals encourage as many frontline professionals as possible to participate in RIEs in early stage lean implementations and also consider development of their human capital in supporting lean improvement initiatives. This research directly identifies competencies at the lean project manager role and highlights the importance of training and the provision of protected time as HRD supports to lean strategy.

As a precursor to the field research a synthesis of existing literature in healthcare management competency and lean management competency is provided and adds to the theoretical base in the literature. Again there have been concerns noted in the literature concerning further testing and refinement of competency models in hospital settings (Liang *et al.*, 2018). The competency model developed in this research (See Chapter 9) provides critical guidance on competencies

applicable to the lean project manager role in hospitals and considers these against field evidence from interviews with practitioners.

This model is a significant addition to the focal literature by contributing to and building upon previous research (Emiliani, 2003; Emiliani and Stec, 2004; Van Dun *et al.*, 2016; Seidel *et al.*, 2017; Souza *et al.*, 2018). The multi-faceted nature of the competency model described in Chapter 9 addresses many areas of concern highlighted in the literature including: leadership (Grove *et al*., 2010; Seidel *et al.*, 2017); evidence-based decision-making (Liang *et al.*, 2013; Kronenburg, 2014; Liang *et al.*, 2018); relationship management (McIntosh *et al.*, 2014); behavioural considerations (Hines *et al.*, 2020; Hines *et al.*, 2021); mapping patient flow (Regis *et al.*, 2019) and patient involvement in the co-creation of value (Williams and Radnor, 2018); and managerial mindsets demanded of lean in healthcare (Spagnol *et al.*, 2013; Waring and Bishop, 2018; Mazur *et al.*, 2019).

10.4 Limitations.

This research has several limitations. The study proposes a competency model for managers of lean projects in Irish hospitals and provides a conceptual framework that illustrates potential uses of the competency model in supporting organisational strategy. The competency model articulates a range of competencies that inform the role of the lean project manager in hospitals. The proposed model and framework are exploratory in nature, but provide a greater, contextualised understanding of the research questions. Future researchers applying this model should be aware that its development is informed by the voiced opinions of project managers/leads and service improvement managers in Irish hospitals, and thus differing contexts and roles may not produce the same results and outcomes.

The data that informs this study was gathered from a four-round Delphi technique and 17 interviews with managers/leads of lean projects in Irish hospitals. These methods were considered appropriate at the time to inform the study and given the restrictions influencing the research design decisions that included the research being conducted by a single researcher; limited access restrictions in hospitals; time constraints; and the experience of the researcher. Different research contexts may present different restrictions and thus alternative research techniques could be employed such as ethnography, case study research and action research. The utilisation of other techniques would add depth and perspective on the findings of this research.

The participants in the Delphi technique represented diverse backgrounds and therefore opinions expressed may not be fully representative of the research context. Also, Van Dun *et al.* (2017) caution against over-relying on experts and Keeney *et al.* (2006) note that experts may not be willing to share a view that differs from a majority of other experts and may change their opinion potentially excluding relevant information from the study. This research mitigates against these limitations by incorporating interviews with lean project managers/leads in Irish hospitals thus contextualising the research and seeking confirmation from practitioners on the ground. A further limitation of the findings of the Delphi study in this research is that competencies developed from the findings are based on existing and current knowledge, thus future competencies may not have been identified and the model may lose relevance as healthcare technologies and processes evolve, for example, the influence of digitalisation and Healthcare 4.0 technologies.

The critical-event interviews in the primary research in this study comprised of 17 interviews with project managers or lead roles in a lean improvement project in an Irish hospital. This unit of analysis was chosen by the researcher as the most likely source of potentially rich data to assist in answering the research questions while also acknowledging restrictions concerning time and access. The exclusion of individual team members in lean projects and senior management executives in this study also presents a limitation in that potentially broader perspectives are not explored. The interviewees represented diverse roles at the project manager/lead level in Irish public hospitals, and this may reduce the results external validity, although similar findings regarding some competencies have been identified in other studies (Souza *et al.*, 2018; Mazur *et al.*, 2012; Regis *et al.*, 2019; Liang *et al.*, 2013).

The findings of the critical-event interviews highlighted differences in the effectiveness of the management of critical events between more experienced (in terms of seniority and length of tenure) managers and less experienced managers. Some of the interviewees were relatively new to their role and relatively inexperienced in terms of their exposure to managing lean projects. The experience of managers was not part of criteria for the interview participant selection process and should be considered a limitation of the study.

The competency model and conceptual framework developed in this research provides guidance for future research and for management practice, however it is important to acknowledge that this is the first research study of this magnitude that has been undertaken by the researcher and as such this research serves as an apprenticeship for the researcher. It is not

claimed that the competency model presented in this study is definitive for the subject area but rather it is a useful guide for future research that would require empirical testing and development before its full application in an organisational or sectoral context.

10.5 Implications for Practice.

Tranfield and Starkey (1998, p.341) argue that the defining characteristic of management research is it's applied nature and that management research should attempt to improve both theory and practice. In this study the researcher adopts a pragmatic approach consistent with the 'pragmatic science' perspective proposed by Anderson *et al.* (2001) that combines scientific rigour alongside the engagement of a wider body of stakeholders in the knowledge production process. The findings of this research have practical relevance as well as contributing to existing theory.

10.5.1 Relevance to Hospital Organisations.

The key outcomes of this research are the development of a competency model for lean project managers in Irish hospitals and a conceptual framework illustrating how the model may be utilised within a strategic HRD context to support an organisation-wide lean implementation. The multi-faceted nature of the competency model highlights the complex nature of the lean project manager role and builds and develops competencies beyond those identified in previous studies (Souza *et al.*, 2018) and addresses the need for lean-specific training encompassing both hard and soft parameters (Spagnol *et al.*, 2013; Waring and Bishop, 2018; Mazur *et al.*, 2019; Hines *et al.*, 2020). The competency model provides guidance on 90 competencies that can be utilised by hospital organisation in the recruitment, selection, training and appraisal of project managers that form a central component of lean implementations.

Project managers themselves can utilise the competency model as part of a personalised training needs analysis to identify areas for personal and professional development thus enabling them to take proactive and focused action concerning their own training needs. Project managers can also utilise the model to identify potential capability deficits in their own team, or other stakeholders, and highlight opportunities for them to develop others through training and coaching. Hospital organisations can also utilise the competency model as a platform from which to develop a competency framework that identifies competencies across different levels in hospitals organisation, identifying proficiency levels at each organisational level thus

addressing the need for investing in training and capability development throughout the organisation (Mazur *et al.*, 2019; Van Beers *et al.*, 2021).

10.5.2 Relevance to the Irish public healthcare sector.

This research has identified capability deficits identified within the public hospital sector in Ireland. In particular competencies in data collection, data analysis, data utilisation and evidence-based informed decision-making were identified as being crucial to the progression of lean improvement projects and a variation in aptitudes in these competencies was reported by participants in the field research. These competencies have also been identified in other countries (Liang *et al.*, 2018; ACHSM, 2016). Specific training at a national level can be provided to strengthen competencies in these areas, perhaps leveraging existing resources such as corporate training intranets.

Participants in the interviewee stage also reported shortcomings in project management capabilities and in some instances where project management support was not delivered to the extent that was indicated by senior management prior to the project initiation. This warrants further investigation and senior management should consider the amount and types of project management support provided in lean implementations. Again, this has been identified as a consideration in other research studies (Souza *et al.*, 2018; Regis *et al.*, 2019). Similarly, the concept of protected time to work on lean improvement activities was identified as an issue by interviewees and should be considered as part of a support structure developed by senior management when considering lean implementations.

The field research also identified the importance of stakeholder relationships in lean implementations. The findings reference many critical events (See appendix 13) that involved issues with stakeholders such as misunderstanding regarding the importance of lean improvement work, or tensions regarding the impact of improvements. If lean implementation is being considered at a regional level (in a hospital group) or at a national level (in the public healthcare system), broad based training in the fundamentals of lean practice should be considered for all stakeholders. Again, existing resources such as corporate intranets can be leveraged to provide widespread training. More extensive training can then be provided where required to individuals more deeply involved in lean implementations. In combination, lean coaching and targeted professional development plans can be put in place to support lean

capability development in focused areas to assist in the achievement of positive lean improvement project outcomes.

10.5.3 Relevance to lean practitioners outside the healthcare sector.

Although the competency model and conceptual framework (See Chapter 9) developed by this research is derived from a specific focus on the healthcare sector and on public hospitals located in Ireland, the researcher believes that this research is valuable to practitioners outside the healthcare as it specifies competencies that are generalised in nature and thus applicable to any organisation. The Healthcare and Hospital Management category would need to be considered and replaced by a category and competencies more closely linked to the relevant industry sector and to the potential end-user organisation.

10.6 Recommendations for further research.

This research is geographically bounded in the Republic of Ireland and also within the healthcare sector, specifically focussing on public hospitals. Future research could adopt a similar approach to investigating competencies for managing lean improvement projects in other countries to further validate and develop this model, and potentially reveal cultural differences based on geography, thus answering the call for further research in this area (Souza *et al.*, 2018). The applicability of the competency model to sectors other than healthcare could also be researched to discover if the model can be empirically validated in other sectors and uncover any variations in competencies between sectors.

It would be interesting to obtain a more holistic perspective of the competency model and conceptual framework developed in this study by conducting research at, and gaining perspective from, different hierarchical levels in hospital organisations. This would assist in developing a broader competency framework for lean implementations in hospitals thus providing guidance at multiple hierarchical levels and levels of proficiency for each competency. Similarly, there is scope to test this model in other parts of the broader healthcare sector.

Future research could also seek to further validate, or indeed reject, the competency model through the application of additional research methods such as action research, direct observation and ethnographic studies. Future studies could also seek to validate the research

design used in this study including a Delphi study that assesses consensus using a combination of measures and critical-event interviews analysed using thematic analysis.

Although, not directly related to the aim of this research, *a posteriori* developments were identified concerning the efficacy of supports provided to assist lean implementations in hospitals. Future research could investigate the support structure that should be in place in order to assist lean implementation efforts in hospitals. This would answer calls for further research in this area (Mazur *et al.*, 2012; Stanton *et al.*, 2014).

10.7 Critical reflection.

My interest in this study stems from a twenty-year career in higher education that primarily consists of the provision of education to business students in operations management, quality management, lean thinking and other continuous improvement practices. Most recently my roles in the Academy of Lean Enterprise Excellence in the RIKON research centre, and as joint programme director of the Lean Enterprise Excellence programme portfolio, at SETU, have created an interest in understanding how organisational excellence is created, encouraged and sustained in various industries. I am fortunate through my work to have visited organisations that are recipients of the Shingo Prize for Operational Excellence. The observation of best practices at award-winning organisations in the manufacturing sector sparked an interest in the application of similar thinking and practices in other sectors. Of particular personal interest is the healthcare sector and my reading of the article 'Can lean save lives?' (Fillingham, 2007) led me to consider the application of lean thinking and practice in healthcare.

An initial consideration of the lean healthcare literature illustrated significant opportunities to deliver increased value to patients from the application of lean in healthcare, and at the same time highlighted frustration amongst those implementing lean healthcare initiatives at the difficulty in establishing lasting change in healthcare services. After attending many seminars discussing the application of lean in hospitals in Ireland, it seemed to me that despite offering significant promise at an operational level, not all lean projects delivered on their full potential and few successfully transferred local successes to the broader health system. Many of the seminars I attended were delivered by passionate, knowledgeable and enthusiastic individuals who were driven by a desire to improve healthcare service provision for patients yet they described frustration at not being able to do more and described difficulties in sustaining improvements. This led me to consider the importance of the role of the lean improvement

project manager and consider the competencies that could assist in shaping success in this role. Having witnessed how the role of the lean project manager had generated significant benefits in other sectors and organisations, I was interested in better understanding if a similar impact could be achievable in hospital organisations.

A more extensive and detailed review of the literature revealed the extent of the development of the application of lean in healthcare and surprised me by the depth and breadth of the research that existed in the field. At first it is humbling to realise how little one actually knows and somewhat overwhelming to consider the amount of research, knowledge and insight that is available for consideration. Having identified an under-researched area that provided a potential research gap to consider as the basis of this study, I was further excited by considering the foundational literature that would provide a theoretical base for the concepts I wanted to explore further. At this point in my journey I was faced with a number of potential foundational theories to consider and select from. This initially provided a challenge as decisions had to be made regarding which literature to include and exclude from the study. Indeed, and despite my best efforts, there was many an occasion when my reading strayed off topic and when encountering an interesting aspect of a previous study or article, I meandered down a path that whilst interesting, provided little clarity or benefit to the focus of my own research. This came to the fore when, following discussion with my supervisors, a whole chapter of what I considered well written and valuable work, needed to be reconsidered as it proved to be tangential to the aims of my research study. Although initially chagrined at the thought of excluding such detailed and time-consuming work, upon reflection, the realisation surfaced of the need to make some important choices in the literature base that was to lay the ultimate foundation for my research.

In hindsight this was a critical moment in my research journey as it brought focus to the shape and content of the literature review. I thoroughly enjoyed delving into the foundational theories of the resource-based view and was surprised at the connections that could be made between it and the evolution of lean. Utilising and combining internal resources, including human resources, forms a central component of a resource-based view perspective. Exploring the human resource development literature, again I was surprised at the connections between RBV and HRD, and HRD and the evolution of lean. Again, I reflected on the role of a lean project manager in a hospital environment, considered the challenges of the role and the supports available to those who rise to the challenges of lean implementations. Would it help to have a

better understanding of the competencies of a lean project manager in hospitals? I thought it would.

When considering my own competencies and expectations regarding my personal development during the PhD process, I was surprised at how much I enjoyed the seminars and training courses provided to support the PhD process. Being an experienced taught postgraduate dissertation supervisor, I had initially expected that this training would more confirm and extend my existing knowledge than develop my abilities in a significant way. This most definitely was not the case. It was surprising how significantly the doctoral endeavour forces you to question your ontological and philosophical views of the world (Burrell and Morgan, 1979). I thoroughly enjoyed considering the various research methods available to me and found the application of the Delphi technique and critical incident technique a rewarding experience. The process of interpreting the data collected was intriguing and absorbing, forcing a continual re-evaluation of finding as patterns in the data evolved and unfolded. I am more aware now of the value of such an iterative approach to research, continuously querying findings and being cognisant of potential researcher bias (Creswell and Creswell, 2018). This rigour will serve me well in future research endeavours.

I now fully realise the importance of specifying clear and focused research aims and objectives as a means of tethering the research study to a clear focus. Without these it would have been possible to stray into areas not centrally related to my study. Initially I had feared whether I had gathered enough data, however, I had more than enough data to work with, and the challenge became one of synthesis and relevance, working through the data and understanding how 'themes' emerge (Braun and Clark, 2006). The support of my supervisors, colleagues and other researchers was invaluable during this process and I was the fortunate benefactor of helpful advice and insight on numerous occasions.

There are many values of doctoral research that encompass differing perspectives from a traditional academic view of contributing to existing theory and knowledge, to more modern perspectives regarding contributing to management and professional practice (Anderson and Gold, 2019). I, tentatively, suggest that through this work I will achieve both and I hope that this research serves as a foundation and platform for further research activity that will inform my future research, supervision and teaching. The direction that I have received from my research supervisors during this PhD journey has been invaluable and developed in me a greater

appreciation of the supervisory process. Their patience, guidance and insights have contributed significantly to the quality of this research. When I reflect on the PhD experience as a whole, it has been rewarding in many ways, and now, perhaps most importantly, I have more confidence in my ability to conduct research in a rigorous manner and seek to publish and disseminate my work, confident in the knowledge that the competencies I have attained during this process provide a solid foundation from which I can develop further as a researcher.

References:

Abernathy, W.J., and Clark, K. (1982) *The Competitive Status of the US Auto Industry: A Study of the Influences of Technology in Determining International Industrial Competitive Advantage*. National Academy Press, Washington, DC.

Abernathy, W.J., Clark, K.B., and Kantrow, A.M., (1981) 'The new industrial competition', *Harvard Business Review* (September–October), Vol. 59, No. 5, pp. 68-81.

Ab Latif, R., Mohamed, R., Dahlan, A. and Nor, M.Z.M. (2016) 'Using Delphi technique: making sense of consensus in concept mapping structure and multiple choice questions (MCQ)', *Education in Medicine Journal*, Vol. 8, No. 3, pp. 89-98.

Achanga, P., Shehab, E., Roy, R. and Nelder, G. (2006) 'Critical success factors for lean implementation within SMEs', *Journal of Manufacturing Technology Management*, Vol. 17, No. 4, pp. 460-471.

Ackerly, D.C., Sangvai, D.G., Udayakumar, K., Shah, B.R., Kahlman, N.S., Cho, A.H., Schulman, K.A., Fulkerson, W.J. and Dzau, V.J. (2011) 'Training the next generation of physician-executives: an innovative residency pathway in management and leadership', *Academic Medicine*, Vol. 86, No. 5, pp. 575-579.

Adner, R., & Helfat, C. E. (2003) 'Corporate effects and dynamic managerial capabilities', *Strategic Management Journal*, Vol. 24, pp. 1011-1025.

Agripino, M., Cathcart, T. and Mathaisel, D. (2002), 'A lean sustainment model for military systems', *Acquisition Review Quarterly*, Vol. 9, Fall, pp. 275-296.

Agut, S. and Grau, R. (2002) 'Managerial competency needs and training requests: The case of the Spanish tourist industry', *Human Resource Development Quarterly*, Vol. 13, No. 1, pp. 31-51.

Aherne, J. and Whelton, J. (2010) *'Applying Lean in Healthcare: A Collection of International Case Studies'*, Productivity Press, Taylor and Francis, New York.

Aitken, J., Esain, A. E., and Williams, S. (2021) 'Management of complexity in the care ecosystem', *Supply Chain Management: An International Journal*, Vol. 26 No. 4, pp. 481-494.

Akao, Y. and Mazur, G. (2003) 'The leading edge in QFD: Past, present and future', *The International Journal of Quality & Reliability Management*, Vol. 20, No. 1, pp. 20-35.

Akmal, A., Foote, J., Podgorodnichenko, N., Greatbanks, R., and Gauld, R. (2022) 'Understanding resistance in lean implementation in healthcare environments: an institutional logics perspective', *Production Planning & Control*, Vol. 33, No. 4, pp. 356-370.

Al-Balushi, S., Sohal, A. S., Singh, P. J., Al Hajri, A., Al Farsi, Y.M., and Al Abri, R., (2014) 'Readiness factors for lean implementation in healthcare settings – a literature review', *Journal of Health Organization and Management*, Vol. 28, No. 2, pp. 135 – 153.

Alfes, K., Truss, C. and Gill, J. (2010) 'The HR manager as change agent: evidence from the public sector', *Journal of Change Management*, Vol. 10, No.1, pp. 109–127.

Allen, M. R. & Wright, P. M. (2006) 'Strategic management and HRM', *CAHRS Working Paper*, #06-04, Ithaca, NY: Cornell University, School of Industrial and Labor Relations, Center for Advanced Human Resource Studies.
http://digitalcommons.ilr.cornell.edu/cahrswp/404/

Alsem, K. J., Kostelijk, E. (2008) 'Identity based marketing: a new balanced marketing paradigm', *European Journal of Marketing*, Vol. 42, No. 9/10, pp. 907 – 914.

Amit, R. and Schoemaker, P. J. H. (1993) 'Strategic Assets and Organizational Rent', *Strategic Management Journal*, Vol. 14, No. 1, pp. 33-46.

Anand, G., and Kodali, R. (2010) 'Development of a framework for implementation of Lean manufacturing systems', *International Journal of Management Practice*, Vol. 4, No. 1, pp. 95-116.

Anderson, N., Herriot, P., and Hodgkinson, G. P. (2001) 'The practitioner-researcher divide in industrial, work and organizational (IWO) psychology: Where we are now, and where do we go from here?', *Journal of Occupational and Organizational Psychology*, Vol. 74, No. 4, pp. 391–411.

Andersson, R., Eriksson, H. and Torstensson, H. (2006), 'Similarities and differences between TQM, six sigma and lean', *The TQM Magazine*, Vol. 18 No. 3, pp. 282-96.

Angelis, J., Conti, R., Cooper, C. and Gill, C. (2011) 'Building a high-commitment lean culture', *Journal of Manufacturing Technology Management*, Vol. 22, No. 5, pp. 569-586.

Antony, J., Rodgers, B. and Gijo, E. V. (2016) 'Can Lean Six Sigma make UK public sector organisations more efficient and effective?', *International Journal of Productivity & Performance Management*, pp. 995-1002.

Antony, J., Sunder M., V., Sreedharan, R., Chakraborty, A. and Gunasekaran, A. (2019) 'A systematic review of Lean in healthcare: a global prospective', *International Journal of Quality & Reliability Management*, Vol. 36 No. 8, pp. 1370-1391.

Arbab Kash, B., Spaulding, A., D. Gamm, L., and Johnson, C. (2014) 'Healthcare strategic management and the resource based view', *Journal of Strategy and Management*, Vol. 7, No. 3, pp. 251-264.

Archibald M. M., Ambagtsheer R. C., Casey M. G. and Lawless M. (2019) 'Using Zoom Videoconferencing for Qualitative Data Collection: Perceptions and Experiences of Researchers and Participants', *International Journal of Qualitative Methods*, Vol 18, pp. 1-8. doi:10.1177/1609406919874596

Arlbjørn, J.S., Freytag, P.V. and Damgaard, T. (2008) 'The beauty of measurements', *European Business Review*, Vol. 20 No. 2, pp. 112-27.

Armstrong, C. E., & Shimizu, K. (2007) 'A review of approaches to empirical research on the resource-based view of the firm', *Journal of Management*, Vol. 33, No. , pp. 959-986.

Armstrong, J. (2010) **'**Naturalistic Inquiry', In N. J. Salk (ed.): *Encyclopedia of research design* Thousand Oaks, CA: Sage publications, (pp.880-885).

Arthur, J. B. (1994) 'Effects of human resource systems on manufacturing performance and turnover', *Academy Of Management Journal*, Vol. 37, No. 3, pp. 670-687.

Atallah, L., Lo, B. and Yang, G.Z. (2012) 'Can pervasive sensing address current challenges in global healthcare?', *Journal of epidemiology and global health*, Vol. 2, No. 1, pp.1-13.

Atkinson, P. (2004) 'Creating and implementing lean strategies', *Management Services*, Vol. 48, No. 2, pp. 18-33.

Australian College of Health Service Management (2016) *ACHSM Master Health Service Competency Framework.* Available online at: https://achsm.org.au/Documents/Education/Competency%20framework/2016_competency_framework_A4_full_brochure.pdf (last accessed June 6th, 2018).

Aveyard, H. and Woolliams, M. (2006) 'In whose best interests? Nurses' experiences of the administration of sedation in general medical wards in England: An application of the critical incident technique', *International Journal of Nursing Studies*, Vol. 43, No. 8, pp.929-939.

Bach, S. and Kessler, I. (2007) HRM and the new public management. In The Oxford handbook of human resource management, ed. Peter Boxall, John Purcell, and Patrick M. Wright, 469–488. Oxford: Oxford University Press.

Baird, L., Meshoulam, I., and DeGive, G. (1983) 'Meshing human resources planning with strategic business planning: A model approach', *Personnel*, Vol. 60, No. 5, pp.14-25.

Bakke, E. W. (1958) *The Human Resources Function*, New Haven: Yale Labor Management Center.

Ballé, M. and Régnier, A., (2007) 'Lean as a learning system in a hospital ward', *Leadership in health services*, Vol. 20, No. 1, pp.33-41

Barney, J. B. (1986) 'Strategic factor markets: expectation, luck and business strategy', *Management Science*, Vol. 32, No. 10, pp. 1231-1241.

Barney, J. B. (1991) 'Firm resources and sustained competitive advantage', *Journal of Management*, Vol. 17, No. 1, pp. 99-120.

Barney, J. B. (1995) 'Looking inside for competitive advantage', *The Academy of Management Executive*, Vol. 9, No. 4, pp. 49-61.

Barney, J. B., and Wright, P. (1998) 'On becoming a strategic partner: The role of human resources in gaining competitive advantage', *Human Resource Management*, 37, 31–46.

Barney, J. B. (2001) 'Is the Resource-Based "View" a Useful Perspective for Strategic Management Research? Yes', *The Academy of Management Review*, Vol. 26, No. 1, pp. 41-56.

Barney, J. B. and Arikan, A. M. (2001) 'The resource based view: origins and implications', in M. A. Hitt, R. E. Freeman, J. S. Harrison, (eds) *The Blackwell Handbook of Strategic Management*, Oxford: Blackwell, pp.124-188.

Barney, J. B. and Clark, N. D. (2007) *Resource based theory: Creating economic rents and competitive advantage*, Oxford: Open University Press.

Bartram, D. (2005) 'The great eight competencies: A criterion-centric approach to validation', *Journal of Applied Psychology*, Vol. 90, No. 6, pp. 1185–1203.

Bateman, N., Hines, P. and Davidson, P. (2014) 'Wider applications for Lean: An examination of the fundamental principles within public sector organisations', *International Journal of Productivity and Performance Management*, Vol. 63 Issue: 5, pp.550-568.

Bates, R. A., Hatcher, T., Holton III, E. F., and Chalofsky, N. (2001) 'Redefining Human Resource Development: An Integration of the Learning, Performance and Spirituality of Work Perspectives, *Academy of Human Resource Development 2001 Conference Proceedings*, pp. 220-226.

Becker, B. E. and Huselid, M. A. (1998) 'High performance work systems: A synthesis of research and managerial implications', *Personnel and Human Resource Management*, Vol. 16, pp. 53-101.

Beer, M., Spector, B., Lawrence, P. T., Mills, D. Q., and Walton, R. E. (1984) *Managing Human Assets*, Cambridge Mass.: Free Press.

Ben-Tovim, D., Bassham, J., Bolch, D., Martin, M., Dougherty, M. and Szwarcbord, M. (2007) 'Lean thinking across a hospital: redesigning care at the Flinders Medical Centre', *Australian Health Review*, Vol. 31, No.1, pp. 10–15.

Bergenhenegouwen, G. J, Horn, H. F. K., and Mooijman, E. A. M. (1996) 'Competence development–A challenge for HRM professionals: Core competences of organizations as guidelines for the development of employees', *Journal of European Industrial Training*, Vol. 20, No. 9, pp. 29–35.

Berke, D. (2005) 'Requirements for implementing a succession management system', *Mt.Eliza Business Review*, Vol. 7, pp. 44–49.

Berkenbosch, L., Bax, M., Scherpbier, A., Heyligers, I., Muijtjens, A.M.M. and Busari, J.O. (2013) 'How Dutch medical specialists perceive the competencies and training needs of medical residents in healthcare management', *Medical Teacher*, Vol. 35, No. 4, pp. 1090-1102.

Bernthal, P. R., Colteryahn, K., Davis, P., Naughton, J., Rothwell, W. J., & Wellins, R. (2004) *Mapping the future: Shaping new workplace learning and performance competencies.* Alexandria, VA: ASTD Press.

Bettis, R. A. and Hitt, M. A. (1995) 'The New Competitive Landscape', *Strategic Management Journal*, Vol. 16, Special Issue: Technological Transformation and the New Competitive Landscape (Summer, 1995), pp. 7-19.

Bhamu, J., and Singh Sangwan, K. (2014) 'Lean manufacturing: literature review and research issues', *International Journal of Operations & Production Management*, Vol. 34, No. 7, pp. 876-940.

Bhardwaj, A. and Punia, B.K. (2013) 'Managerial competencies and their influence on managerial performance: A literature review', *International Journal of Advanced Research in Management and Social Sciences*, Vol. 2, No. 5, pp.70-84.

Bhasin, S. (2012) 'Prominent obstacles to lean', *International Journal of Productivity and Performance Management*, Vol. 61, No. 4, pp. 403 – 425.

Bhasin, S. and Burcher, P. (2006) 'Lean viewed as a philosophy', *Journal of Manufacturing Technology*, Vol. 17, No. 1, pp. 56-72.

Bicheno, J. (2000) *The Lean Toolbox*, Buckingham: PICSIE.

Black, J. A. and Boal, K. B. (1994) 'Strategic resources: Traits, configurations and paths to sustainable competitive advantage', *Strategic Management Journal*, Vol. 15, Summer Issue, pp. 131-148.

Boaden, R. (1997) 'What is total quality management. . .and does it matter?', *Total Quality Management & Business Excellence*, Vol. 8 No. 4, pp. 153-71.

Boam, R. and Sparrow, P. (1992) *Designing and achieving competency: a competency-based approach to developing people and organizations.* UK: McGraw-Hill.

Borges, N.J. and Richard, G.V., 2018. Using the Delphi method to classify medical specialties. *The Career Development Quarterly*, Vol. 66, No. 1, pp.85-90.

Bortolotti, T., Boscari, S., & Danese, P. (2015) 'Successful lean implementation: organizational culture and soft lean practices', *International Journal of Production Economics*, Vol. 160, pp.182-201.

Boselie, P., Dietz, G. and Boon, C. (2005) 'Commonalities and contradictions in HRM and performance research', *Human Resource Management Journal*, Vol. 15, No. 3, pp. 67–94.

Bott, G. and Tourish, D. (2016) 'The critical incident technique reappraised: Using critical incidents to illuminate organizational practices and build theory', *Qualitative Research in Organizations and Management: An International Journal*, Vol. 11 No. 4, pp. 276-300.

Bowden, J. A. and Masters, G. N. (1993) *The implications for higher education of a Competency-based Approach to Education and Training.* Canberra: Australian Government Publishing Service.

Bowen, D. and Ostroff, C. (2004) 'Understanding HRM-firm performance linkages: the role of the 'strength' of the HRM system', *Academy of Management Review,* Vol. 29, No. 2, pp. 203–221.

Boyatzis, R.E. (1982) *The competent manager: a model for effective performance*. London: Wiley.

Boyatzis, R.E. (1992) 'Building on competence: The effective use of managerial talent', In G. Salaman (Ed.), *Human Resource Strategies*, London: Sage, pp.260-272.

Boyatzis, R.E. (2006) 'Intentional change theory from a complexity perspective', *Journal of Management Development,* Vol. 25 No. 7, pp. 607-623.

Boyatzis, R.E. (2008) 'Competencies in the 21st century', *Journal of management development,* Vol. 27, No. 1, pp.5-12.

Boyatzis, R. E. and Saatcioglu, A. (2008) 'A 20-year view of trying to develop emotional, social and cognitive intelligence competencies in graduate management education', *Journal of Management Development,* Vol. 27, No. 1, pp.92-108

Boyer, K. K. (1996) 'An assessment of managerial commitment to lean production', *International Journal of Operations & Production Management,* Vol. 16, No. 9, pp. 48-59.

Boyle, S., Tyrrell, O., Quigley, A. and Wall, C. (2021) 'Improving ward level efficiency using a modified treatment room layout according to Lean methodologies', *Irish Journal of Medical Science*. doi: 10.1007/s11845-021-02590-7.

Boyne, G. A. (2002) 'Public and Private Management: What's the difference?', *Journal of Management Studies*, Vol. 39, No. 1, pp. 97-122.

Brackett, T., Comer, L. and Whichello, R. (2013) 'Do Lean Practices lead to more Time at the Bedside?', *Journal of Healthcare Quality*, Vol. 35, No. 2, pp. 7-14.

Braithwaite, J., Churruca, K., Long, J.C., Ellis, L. A. and Herkes J. (2018) 'When complexity science meets implementation science: a theoretical and empirical analysis of systems change',

*BMC Med*icine, Vol. 16, No. 1, pp. 1-14. doi: 10.1186/s12916-018-1057-z. PMID: 29706132; PMCID: PMC5925847.

Brannick, M. T., Levine, E. L. and Morgeson, F. P. (2007) *Job and work analysis: Methods, research, and applications in human resource management* (2nd ed.). Los Angeles, CA: Sage.

Brannick, T. and Roche, W. K. (1997) *Business Research Methods*, Oak Tree: Dublin.

Braun, V., Clarke, V., & Gray, D. (2017) 'Innovations in qualitative methods'. In B. Gough (Ed.), *The Palgrave handbook of critical social psychology*. Basingstoke, England: Palgrave Macmillan, pp. 243–266.

Breen, W. J. (2002) 'Social Science and State policy in World War II: Human Relations Pedagogy and Industrial Training, 1940-1945', *Business History Review*, Vol. 76, No. 2, pp.233-266.

Broadbent, M., Weill, P., and Neo, B. S. (1999) 'Strategic context and patterns of IT infrastructure capability', *Journal of Strategic Information Systems*, Vol. 8, No. 2, pp. 157–187.

Brophy, M. and Kiely, T. (2002) 'Competencies: A new sector', *Journal of European Industrial Training,* Vol. 26, No. 2-4, pp. 165-176.

Brown, K., Waterhouse, J., and Flynn, C. (2003) 'Change management practices: Is a hybrid model a better alternative for public sector agencies?', *International Journal of Public Sector Management*, Vol. 16, No. 3, pp.230-241.

Brown, R., Grehan, P., Brennan, M., Carter, D., Brady, A., Moore, E., Teeling, S.P., Ward, M. and Eaton, D. (2019) 'Using Lean Six Sigma to improve rates of day of surgery admission in a national thoracic surgery department', *International Journal for Quality in Healthcare*, doi:10.1093/intqhc/mzz083.

Bruce, C. S. (1994) 'Research students' early experiences of the dissertation literature review', *Studies in Higher Education*, Vol. 19, No. 2, pp. 217–229.

Brunoro-Kadash, C. and Kadash, N. (2013) 'Time to care: a patient-centered quality improvement strategy', *Leadership in Health Services,* Vol. 26, No. 3, pp. 220–231.

Bruns, H. (2014) 'HR development in local government: how and why does HR strategy matter in organizational change and development?', *Business* Research, Vol. 7, No. ?, p. 1-49.

Bryman, A. (2008) *Social research methods. 3rd Edition*, Oxford University Press., New York.

Bryson, J. M., Ackermann, F., & Eden, C. (2007) 'Putting the resource-based view of strategy and distinctive competencies to work in public organizations', *Public administration review*, Vol. 67, No. 4, pp. 702-717.

Burack, E. H. (1986) 'Corporate Business and Human Resources Planning Practices: Strategic Issues and Concerns', *Organizational Dynamics*, Vol. 15, No. 1, pp. 73-87.

Burgess, N. and Radnor, Z. (2012) 'Service improvement in the English National health service: Complexities and tensions', *Journal of management & organization*, Vol. 18, No. 5, pp.594-607.

Burrell, G. and Morgan, G. (1979) *Sociological Paradigms and Organisational Analysis.* Burlington: USA, Ashgate Publishing Ltd.

Burton, C. R., & Rycroft-Malone, J. (2014) 'Resource based view of the firm as a theoretical lens on the organisational consequences of quality improvement', *International Journal of Health Policy and Management*, Vol. 3, No. 3, pp. 113-115.

Butterfield, L. D., Borgen, W. A., Amundson, N. E., and Maglio, T. A. (2015) 'Fifty years of the critical incident technique: 1954-2004 and beyond', *Qualitative Research*, Vol. 5, No. 4, pp. 475-497.

Calhoun, J.G., Dollet, L., Sinioris, M.E., Wainio, J.A., Butler, P.W., Griffith, J.R., Warden, G.L., and Rice, T. (2008) 'Development of an Interprofessional Competency Model for Healthcare Leadership', *Journal of Healthcare Management*,Vol. 53, No. 6, pp. 375-91.

Camardella, M. J. (2002) 'Legal considerations of a workforce reduction', *Employment Relations Today*, Vol. 29, No. 3, pp. 101-106.

Cameron, K. S. (1994) 'Strategies for successful organizational downsizing', *Human Resource Management*, Vol. 33, No. 2, pp. 189–211.

Campbell, D. and Cowton, C.J., (2015) 'Method issues in business ethics research: Finding credible answers to questions that matter', *Business ethics: A European review*, 24, pp.S3-S10.

Campion, M. A., Fink, A. A., Ruggeberg, B. J., Carr, L., Phillips, G. M., and Odman, R. B. (2011) 'Doing competencies well: Best practices in competency modeling', *Personnel Psychology*, Vol. 64, No. 1, pp. 225-262.

Camuffo, A. and Gerli, F. (2018) 'Modeling management behaviors in lean production environments', *International Journal of Operations & Production Management*, Vol. 38 No. 2, pp. 403-423.

Cappelli, P., & Crocker-Hefter, A. (1996) 'Distinctive human resources are firm's core competencies', *Organizational Dynamics,* Vol. 24, No. 3, pp. 7–22.

Capron, L., and Hulland, J. (1999) 'Redeployment of brands, sales forces, and general marketing management expertise following horizontal acquisitions: A resource-based view', *Journal of Marketing*, Vol 63, No. 2, pp. 41–54.

Carlborg, P., Kindström, D. and Kowalkowski, C. (2013), 'A lean approach for service productivity improvements: synergy or oxymoron?', *Managing Service Quality*, Vol. 23, No. 4, pp. 291-304.

Carmeli, A. and Schaubroeck, J. (2005) 'How leveraging human resource capital with its competitive distinctiveness enhances the performance of commercial and public organizations', *Human Resource Management,* Vol. 44, No. 4, pp. 391–412.

Catano, V. M., Darr, W. and Campbell, C. A. (2007) 'Performance Appraisal of Behavior-based Competencies: A Reliable and Valid Procedure', *Personnel Psychology*, Vol. 60, No. 1, pp. 201-230.

Chalofsky, N. (2007) 'The Seminal Foundation of the Discipline of HRD: People, Learning and Organizations', *Human Resource Quarterly*, Vol. 18, No. 3, pp. 431-442.

Chambers, C. A. (1963) 'Social service and social reform: A historical essay', *Social Service Review*, Vol. 37, No. 1, pp. 76-90.

Chassin, R. (2008) 'The six sigma initiative at Mount Sinai Medical Center', *Mount Sinai Journal of Medicine*, Vol. 75, No. 1, pp. 45–52.

Chell, E. (1998) Critical incident technique. In G. Symon & C. Cassell (Eds.), *Qualitative methods and analysis in organizational research: A practical guide* (pp. 51–72). Sage Publications Ltd.

Chell, E. (2014) 'The Critical Incident Technique: philosophical underpinnings, method and application to a case of small business failure', In: E. Chell and M. Karataş-Özkan (eds.) *Handbook of Research on Small Business and Entrepreneurship,* Ch. 7, pp. 106-129.

Chen, H. M. and Chang, W. Y. (2010) 'The essence of the competence concept: Adopting an organization's sustained competitive advantage viewpoint', *Journal of Management and Organization*, Vol. 16, No. 5, pp. 677-699.

Chen, H. and Naquin, S. S. (2006) 'An Integrative Model of Competency Development, Training Design, Assessment Center, and Multi-Rater Assessment', *AdVances in Developing Human Resources,* Vol. 8, No. 2**,** pp. 265-282.

Cheng, S.Y., Bamford, D., Papalexi, M. and Dehe, B. (2015) 'Improving access to health services – challenges in Lean application', *International Journal of Public Sector Management*, Vol. 28, No. 2, pp.121-135.

Chiarini, A. (2013) 'Building a Six Sigma model for the Italian public healthcare sector using grounded theory', *International Journal of Services and Operations Management*, Vol. 14, No. 4, pp.491-508.

Christensen, T. and Laegreid, P. (2001) *New Public Management: The Transformation of Ideas and Practice.* Aldershot: Ashgate.

Christie, C. A., and Barela, E. (2005) 'The Delphi technique as a method for increasing inclusion in the evaluation process', *The Canadian Journal of Program Evaluation*, Vol. 20, No. 1, pp. 105-122.

Christopher, M., & Towill, D. R. (2000) 'Supply chain migration from Lean and functional to agile and customisation', *Supply Chain Management: An International Journal*, Vol. 5, No. 4, pp. 206-213.

Citaku, F., Violato, C., Beran, T., Donnon, T., Hecker, K. and Cawthorpe, D. (2012) 'Leadership competencies for medical education and healthcare professions: population based study', *BMJopen*, available at: http://bmjopen.bmj.com/content/2/2/e000812.full.pdf+html?sid=9708ef34-d3a6-455a-a758-c0229ca04671 (accessed 13th April 2018).

Clarke, C. L., Reed, J., Wainwright, D., McClelland, S., Swallow, V., Harden, J., Walton, G. and Walsh, A. (2004) 'The discipline of improvement: something old, something new?', *Journal of Nursing Management*, Vol. 12, No. 2, pp. 85–96.

Coase, R. H. (1937) The Nature of the Firm, *Economica,* New Series, Vol 4., No. 16, pp. 386-405.

Coetzer, A. and Redmond, J. (2011) 'Decision making regarding employee access to training and development in medium-sized enterprises: A proposed study employing the Critical Incident Technique', *Small enterprise research*, Vol. 18, No. 2, pp.119-129.

Cole, B. (2011) *Lean-Six Sigma for the Public Sector: Leveraging Continuous Process Improvement to Build Better Governments.* US: ASQ Quality Press.

Collis, D. J. (1994) 'Research note: How valuable are organizational capabilities?', *Strategic Management Journal*, Vol. 15, Winter Special Issue, pp. 143-152.

Collis, J. and Hussey, R. (2009). *Business Research: A Practical Guide for Undergraduate & Postgraduate Students*. New York: Palgrave MacMillan

Collis, D. J. and Montgomery, C. A. (1995) 'Competing on Resources', *Harvard Business Review,* Vol. 73, No. 4, pp. 118-128.

Collis, D. J. and Montgomery, C. A. (1997) *Corporate strategy: resources and the scope of the firm*, Chicago: Irwin.

Combs, J., Liu, Y., Hall, A. and Ketchen, D. (2006) 'How much do high-performance work practices matter? A meta-analysis of their effects on organizational performance', *Personnel Psychology,* Vol. 59, No. 3, pp. 501-528.

Committee on the Future of Healthcare (2017) *Sláintecare Report*.

Connelly, L.M., Yoder, L.H. and Miner-Williams, D. (2003) 'A qualitative study of charge nurse competencies', *Medsurg Nursing*, Vol. 12 No. 5, pp. 298-306.

Conner, K. R. (1991) 'A Historical Comparison of Resource-based Theory and Five Schools of Thought within Industrial Organization Economics: Do we have a new Theory of the Firm', *Journal of Management*, Vol. 17, No. 1, pp. 121-154.

Connolly, K., Teeling, S. P. and McNamara, M. (2020) 'Live well after stroke', *International Practice Development Journal*, Vol. 10, No. 2, pp. 1-16.

Connor, T. (2002) 'The resource-based view of strategy and its value to practising managers', *Strategic Change*, Vol. 11, No. 6, pp. 307-316.

Cope, J. and Watts, G. (2000) 'Learning by doing – An exploration of experience, critical incidents and reflection in entrepreneurial learning', *International Journal of Entrepreneurial Behavior & Research*, Vol. 6 No. 3, pp. 104-124.

Cooper, K. (2000) *Effective Competency Modeling & Reporting: A Step-by-step Guide for Improving Individual & Organizational Performance*. US: Amacom.

Corley, A., and Eades, E. (2006) 'Sustaining critically reflective practitioners: competing with the dominant discourse', *International Journal of Training & Development,* Vol.10, No. 1, pp. 30–40.

Cornick, P. (2006) 'Nitric oxide education survey - Use of a Delphi survey to produce guidelines for training neonatal nurses to work with inhaled nitric oxide', *Journal of Neonatal Nursing*, Vol. 12, No. 2, pp. 62-68.

Costa, L. B., Filho, M. G., Rentes, A. F., Bertani, T. M., and Mardegan, R. (2017) 'Lean healthcare in developing countries: evidence from Brazilian hospitals', *The International journal of health planning and management,* Vol. 32, No.1, e99–e120.

Cowton, C.J. (1998) 'The use of secondary data in business ethics research', *Journal of Business Ethics*, Vol. 17, No. 4, pp.423-434.

Creswell, J. W. and Creswell, J. D. (2018) *Research Design : Qualitative, Quantitative, and Mixed Methods Approach*, Thousand Oaks, US: Sage Publications.

Creswell, J. W. and Miller, D. L. (2000) 'Determining Validity in Qualitative Inquiry', *theory into Practice*, Vol. 39, No. 3, pp. 124-130.

Crook, T. R., Ketchen Jnr., D. J., Combs, J. G. and Todd, S. Y. (2008) 'Strategic resources and performance: a meta-analysis', *Strategic Management Journal*, Vol. 29, No. 11, pp. 1141-1154.

Crosby, P. B. (1978) *Quality is Free: The Art of Making Quality Certain*, New York: McGraw Hill.

Cummings T. G. and Worley, C. G. (2008) *Essentials of organization development and change* (9th ed.), Cincinnati, OH: South-Western Publishing.

Currie, G., and Procter, S. (2001) 'Exploring the relationship between HR and middle managers', *Human Resource Management Journal*, Vol. 11, No. 3, pp. 53–69.

D'Andreamatteo, A., Ianni, L., Lega, F. and Sargiacomo, M. (2015) 'Lean in Healthcare: A Comprehensive Review', *Health Policy*, Vol. 119, pp. 1197-1209.

D'Aveni, R. A., Canger, J. M. and Doyle, J. T. (1995) 'Coping with Hypercompetition: Utilising the New 7S's Framework', *The Academy of Management Executive*, Vol. 9, No. 3, pp. 45-60.

Dahlgaard, J.J. and Dahlgaard-Park, S.M. (2006), 'Lean production, six sigma quality, TQM andcompany culture', *The TQM Magazine*, Vol. 18, No. 3, pp. 263-81.

Dale, B. G. and Plunkett, J. J. (1994) *Managing Quality 2nd ed.*, UK: Pearson Education Limited.

Dale, B., Van der Wiele, T., & Van Iwaarden, J. (2007). *Managing Quality, 5th Edition*, UK: Blackwell Publishing.

Danese, P., Manfè, V., & Romano, P. (2018) 'A systematic literature review on recent lean research: state-of-the-art and future directions', *International Journal of Management Reviews*, Vol. 20, No. 2, pp. 579-605.

Daouk-Öyry, L., Mufarrij, A., Khalil, M., Sahakian, T., Saliba, M., Jabbour, R. and Hitti, E. (2017) 'Nurse-Led Competency Model for Emergency Physicians: A Qualitative Study', *Annals of Emergency Medicine*, Vol. 70, No. 3, pp. 357-362.

Dasborough, M.T. (2006) 'Cognitive asymmetry in employee emotional reactions to leadership behaviors. *The Leadership Quarterly*, Vol. 17, No. 2, pp.163-178.

Davies, C., Lyons, C. and Whyte, R. (2019) 'Optimizing nursing time in a day care unit: Quality improvement using Lean Six Sigma methodology', *International Journal for Quality in Health Care*, Volume 31, Issue Supplement 1, December 2019, Pages 22-28.

Decock, L. and Douven, I., (2012) 'Putnam's internal realism: a radical restatement', *Topoi*, Vol. 31, No. 1, pp.111-120.

Deeds, D. L., DeCarolis, D., and Coombs, J. (2000) 'Dynamic capabilities and new product development in high technology ventures: An empirical analysis of new biotechnology firms', *Journal of Business Venturing*, Vol. 15, No. 3, pp. 211–229.

Delamare Le Diest, F., & Winterton, J. (2005) 'What is competence?', *Human Resource Development International*, Vol. 8, No. 1, pp. 27–46.

Delbridge, R., Turnbull, P., and Wilkinson, B. (1992) 'Pushing back the frontiers: management control and work intensification under JIT/TQM factory regimes', *New Technology, Work and Employment*, Vol. 7, No. 2, pp. 97-106.

Deloitte (2015) 2015 *Global Healthcare Outlook: Common Goal, Competing Priorities* [Online], Available at http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Life-Sciences-Health-Care/gx-lshc-2015-health-care-outlook-global.pdf (Last accessed June 21, 2022).

Deloitte (2018) *Global health care outlook: The evolution of smart health care*. [Online], Available at: https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Life-Sciences-Health-Care/gx-lshc-hc-outlook-2018.pdf (Last accessed June 21, 2022).

Deming, W. E. (1982). *Quality, Productivity and Competitive Position*, Cambridge, MA: MIT Press.

Deming, W. E. (1986) *Out of the Crisis,* Boston, Mass.: MIT Center for AdVanced Engineering.

Deming, W. E. (2000). *Out of the Crisis, 1st Edition*, Cambridge, MA: MIT Press.

Denscombe, M. (2008) 'Communities of practice: A research paradigm for the mixed methods approach', *Journal of mixed methods research*, Vol. 2, No. 3, pp.270-283.

Denzin, N. K., and Lincoln, Y. S. (Eds.). (1994). *Handbook of qualitative research.* Sage Publications, Inc.

Department of Health (2012) *'Future Health A Strategic Reform of the Health Service 2012-2015'*, Department of Health, Dublin.

Department of Health (2015) Health in Ireland – Key Trends 2015.

Department of Health (2016) Health in Ireland – Key Trends 2016.

Department of Health (2019) Annual Report 2019. Available at: https://www.gov.ie/en/publication/e4438-department-of-health-annual-report-2019/ (Last accessed May 23rd, 2022).

Department of Health (2021) Sláintecare Progress Report 2021. Available at: https://www.gov.ie/en/publication/9652b-slaintecare-progress-report-2021/ (Last accessed May 23rd 2022).

de Souza, L. (2009) 'Trends and approaches in lean healthcare', *Leadership in Health Services*, Vol. 22, No. 2, pp. 121 – 139.

de Souza L. and Pidd M. (2011) 'Exploring the barriers to lean health care implementation', *Public Money & Management*, Vol. 31, No. 1, pp. 59-66

De Treville, S., and Antonakis, J., (2006) 'Could lean production job design be intrinsically motivating? Contextual, configurational and levels-of-analysis issue', *Journal of Operations Management*, Vol. 24, No. 2, pp. 99–123.

Dickinson, H., Ham, C., Snelling, I. and Spurgeon, P. (2013) 'Medical leadership arrangements in English healthcare organizations: findings from a national survey and case studies of NHS Trusts', *Health Services Management*, Vol. 26 No. 4, pp. 119-125.

Dickman, H. (1984) 'Exclusive representation and American industrial democracy: An historical reappraisal', *Journal of Labor Research*, Vol. 5, No. 4, pp. 325-350.

Diefenbach, T. (2009) 'New public management in public sector organizations: The dark sides of managerialistic 'enlightenment', *Public Administration*, Vol. 87, No. 4, pp. 892-909.

Dierickx, I. and Cool, K. (1989) 'Asset stock accumulation and sustainability of competitive advantage', *Management Science*, Vol. 35, No. 2, pp. 1504-1511.

Donaher, K., Russell, G., Scoble, K. B., Chen, J. (2007) 'The Human Capital Competencies Inventory for Developing Nurse Managers', *The Journal of Continuing Education in Nursing*, Vol. 38, No. 6, pp. 277-283.

Dooley, L.M. (2004) 'AHRD and ASTD: Competitors or Collaborators?', *Human Resource Development Quarterly*, Vol. 15, No. 4, pp. 359-361.

Draganidis, F. and Mentzas, G. (2006) 'Competency based management: a review of systems and approaches', *Information Management & Computer Security*, Vol. 14, No. 1, pp. 51-64.

Dreyfus, C. R. (2008) 'Identifying competencies that predict effectiveness of R&D managers', *Journal of Management Development*, Vol. 27, No. 1 pp. 76 – 91.

Drisko, J. (2014) 'Competencies and their assessment', *Journal of Social Work Education*, Vol. 50, No. 3, pp. 414-426.

Drotz, E., and Poksinska, B., (2014), 'Lean in healthcare from employees' perspectives', *Journal of Health Organization and Management*, Vol. 28, No. 2, pp. 177-195.

Drucker, P. F. (1954) *The Practice of Management*, New York: Harper & Brothers.

Druskat, V.U. and Wheeler, J.V. (2003) 'Managing from the boundary: The effective leadership of self-managing work teams', *Academy of Management Journal*, Vol. 46, No. 4, pp.435-457.

Dubois, D.D. (2002) 'What are competencies and why are they important?', *Career Planning and Adult Development Journal*, Vol. 18, No. 4, pp. 1–7.

Dunford, B. B., Snell, S. A. and Wright, P. M. (2001) 'Human resources and the resource-based view of the firm', *CAHRS Working Paper Series*, (CAHRS Working Paper #01-03). Ithaca, NY: Cornell University, School of Industrial and Labor Relations, Center for AdVanced Human Resource Studies. http://digitalcommons.ilr.cornell.edu/cahrswp/66

Dyer, L. (1983) 'Bringing human resources into the strategy formulation process', *Human Resource Management*, Vol. 22, No. 3, pp. 257-271.

Easterby-Smith, M., Thorpe, R. and Jackson, P. R. (2009) *Management Research.* UK: Sage Publications.

Easterby-Smith, M., Thorpe, R. and Jackson, P. R. (2015) *Management and Business Research.* UK: Sage Publications.

Eisenhardt, K. A. and Martin, J. A. (2000) 'Dynamic Capabilities: What are they?', *Strategic Management Journal*, Vol. 21, No. 10/11, pp. 1105-1121.

Ekaterini, G. (2011) 'A Qualitative Approach to Middle Manager Competencies', *Management Research Review*, Vol. 34, No. 5, pp. 553-575.

Ellinger, A., Shin, H., Magnus Northington, W., Adams, F.G., Hofman, D. and O'Marah, K. (2012) 'The influence of supply chain management competency on customer satisfaction and shareholder value', *Supply Chain Management: An International Journal*, Vol. 17, No. 3, pp. 249–262.

Ellinger, A.D. and Bostrom, R.P. (2002) 'An examination of managers' beliefs about their roles as facilitators of learning', *Management Learning*, Vol. 33, No. 2, pp.147-179.

Elton, J. and O'Riordan, A. (2016) *'Healthcare Disrupted: Next Generation Business Models and Strategies',* John Wiley & Sons.

Emiliani, M.L. (1998) 'Lean behaviours', *Management Decision*, Vol. 36, No. 9, pp. 615-631.

Emiliani, M.L. (2003) 'Linking leaders' beliefs to their behaviors and competencies', *Management Decision,* Vol. 41, No. 9, pp. 893-910.

Emiliani, M.L. (2004) 'Improving business school courses by applying lean principles and practices', *Quality Assurance in Education,* Vol. 12 No. 4, pp. 175-187.

Emiliani, M.L. and Stec, D.J. (2004) 'Using value-stream maps to improve leadership', *Leadership & Organization Development Journal,* Vol. 25 Issue: 8, pp. 622-645,

Emiliani, M.L. and Stec, D.J. (2005) 'Leaders lost in transformation', *Leadership & Organization Development Journal,* Vol. 26, No. 5, pp. 370-387.

Engles, T.C.E and Kennedy, H.P. (2007) 'Enhancing a Delphi study on family-focused prevention', *Technology Forecast and Social Change,* Vol. 74, No. 4, pp. 433–451.

Enterkin, J., Robb, E. and McLaren, S. (2013) 'Clinical leadership for high-quality care: developing future ward leaders', *Journal of Nursing Management,* Vol. 21, No. 2, pp. 206-216.

Etikan, I., Musa, S.A. and Alkassim, R.S. (2016) 'Comparison of convenience sampling and purposive sampling', *American journal of theoretical and applied statistics,* Vol. 5, No. 1, pp.1-4.

Fanelli, S., Lanza, G., Enna, C., & Zangrandi, A. (2020) 'Managerial competences in public organisations: the healthcare professionals' perspective', *BMC health services research,* Vol. 20, No. 1, pp. 1-9.

Feigenbaum, A. V. (1991) *Total Quality Control,* New York: McGraw Hill.

Feilzer, M. Y. (2010) 'Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm', *Journal of mixed methods research,* Vol. 4, No. 1, pp.6-16.

Fereday, J. and Muir-Cochrane, E. (2006) 'Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development', *International journal of qualitative methods,* Vol. 5, No. 1, pp.80-92.

Ferlie, E., Crilly, T., Jashapara, A., Trenholm, S., Peckham, A., & Currie, G. (2015) 'Knowledge mobilization in healthcare organizations: a view from the resource-based view of the firm', *International journal of health policy and management,* Vol. 4, No. 3, pp. 127-130.

Fillingham, D. (2007) 'Can Lean Save Lives', *Leadership in Health Services*, Vol. 20, No. 4, pp. 231-241.

Fiol, C. M. (2001) 'Revisiting an identity-based view of sustainable competitive advantage', *Journal of Management*, Vol. 27, No. 6, pp. 691-699.

Flanagan, J. C. (1954) 'The critical incident technique', *Psychological bulletin*, Vol. 51, No. 4, pp. 327-358.

Folaron, J., & Morgan Chase & Co., J. P. (2003). The evolution of Six Sigma, *ASQ Six Sigma Forum Magazine*, Vol. 2, No. 4, pp. 38-44.

Ford, K. (2014) *'Competency-Based Education: History, Opportunities, and Challenges'.* University of Maryland, Available at: https://www.researchgate.net/publication/281444311_Competency_Based_Education_History_Opportunities_and_Challenges (last accessed on 21 June, 2018).

Ford, R. (2005). The Springfield Armory's role in developing interchangeable parts, *Management Decision*, Vol. 43, No. 2, 265-277.

Foss, N. J. (1996a) 'Knowledge-based approaches to the theory of the firm: Some critical comments', *Organization Science*, Vol. 7, No. 5, pp. 470-476.

Foss, N. J. (1996b) 'More critical comments on knowledge-based theories of the firm', *Organization Science*, Vol. 7, No. 5, pp. 519-523.

Found, P.A., Van Dun, D.H. and Fei, F., (2009) 'Multi-level management and leadership skills in lean organizations', In *Proceedings of the 20th Annual Production and Operations Management Society Conference* (pp. 1-12).

Fournier, P. and Jobin, M. (2018) 'Understanding before implementing: the context of Lean in public healthcare organizations', *Public Money & Management*, Vol. 38, No. 1, pp. 37-44.

Fournier, P., Jobin, M., Lapointe, L. and Bahl, L. (2021) 'Lean implementation in healthcare: offsetting Physicians' resistance to change', *Production Planning & Control*, https://doi.org/10.1080/09537287.2021.1938730.

Franklin, N. and Melville, P. (2015) 'Competency assessment tools: An exploration of the pedagogical issues facing competency assessment for nurses in the clinical environment', *Collegian*, Vol. 22, No. 1, pp. 25-31.

Fryer, K.J., Antony, J. and Douglas, A. (2007) 'Critical success factors of continuous improvement in the public sector: A literature review and some key findings', *The TQM magazine*, Vol. 19 No. 5, 2007 pp. 497-517.

Fujimoto, T. (1999) *Evolution of a Manufacturing System at Toyota*. UK: Oxford University Press.

Furukawa, P. and Cunha, I.C.K.O. (2011) 'Profile and competencies of nurse managers at accredited hospitals', *The Revista Latino-Americana de Enfermagem*, Vol. 19, No. 1, pp. 106-114.

Gainty, C. (2012). "Going After the High Brows": Frank Gilbreth and the Surgical Subject, 1912-1917', *Representations*, Vol. 118, No. 1, 1-27.

Galagan, P. (1986) 'HRD is . . . ', *Training and Development Journal*, Vol. 40, No. 4, p. 4.

Gangani, N., McClean, G. N. and Braden, R. A. (2006) 'A Competency-Based Human Resource Development Strategy', *Performance Improvement Quarterly*, Vol. 19, No. 1, pp. 127-139.

Garavan, T. N. and McGuire, D. (2001) 'Competencies and workplace learning: Some reflections on the rhetoric and reality', *Journal of Workplace Learning*, Vol. 13, No. 4, pp. 144–163.

Garman, A. and Scribner, L. (2011) 'Leading for Quality in Healthcare: Development and Validation of a Competency Model', *Journal of Healthcare Management*, Vol.56, No. 6, pp. 373-84.

Garrahan, P., & Stewart, P. (1992). *The Nissan Enigma: Flexibility at Work in a Local Economy*. London: Mansell.

Gatignon, H., Robertson, T. S., and Fein, A. J. (1997) 'Incumbent defense strategies against new product entry', *International Journal of Research in Marketing*, Vol. 14, No. 2, 163–176.

Geist, M. R. (2010) 'Using the Delphi method to engage stakeholders: A comparison of two studies', *Evaluation and Program Planning*, Vol. 33, No. 2, pp. 147-154.

George, M., & Lawrence Jnr., R. (2002). *Lean Six Sigma: Combining Lean Six Sigma with Lean Production Speed, 1st Edition*, USA: McGraw-Hill Education.

Gfroerer, M. (2000) 'Career guidance on the cutting edge of competency-based assessment', *Journal of Career Development*, Vol. 27, No. 2, pp. 119-131.

Ghosh, R., Kim, M., Kim, S. and Callahan, J. L. (2014) 'Examining the dominant, emerging, and waning themes featured in select HRD publications: Is it time to redefine HRD?, *European Journal of Industrial Training and Development*, Vol. 38, No. 4, pp. 302-322.

Giannarou, L. and Servas, E. (2014) 'Using Delphi technique to build consensus in practice', *Int. Journal of Business Science and Applied Management*, Vol. 9, No. 2, pp. 65-82.

Gibbert, M. (2006) 'Generalizing about uniqueness: An essay on an apparent paradox in the resource-based view', *Journal of Management Inquiry*, Vol. 15, No. 2, pp. 124-134.

Gilbert, C. (2005) 'Unbundling the structure of inertia: resource versus routine rigidity', *Academy of Management Journal*, Vol. 48, No. 5, pp. 741–763.

Gillham, B. (2010) *Case Study Research Methods.* Bloomsbury Publishing.

Glaze, T. (1989) 'Cadbury's Dictionary of Competence', *Personnel Journal*, Vol. 68, No. 11, pp. 72.

Gnatzy, T., Warth, J., von der Gracht, H. and Darkow, I.L. (2011) 'Validating an innovative real-time Delphi approach-A methodological comparison between real-time and conventional Delphi studies', *Technological Forecasting and Social Change*, Vol. 78, No. 9, pp.1681-1694.

Godfrey, A. B., and Kenett, R S. (2007). Joseph M. Juran, a perspective on past contributions and future impact, *Quality and Reliability Engineering International*, Vol. 23, No. 6, 653-663.

Godfrey, G., Dale, B., Marchington, M. and Wilkinson, A. (1997) 'Control: a contested concept in TQM research', International Journal of Operations & Production Management, Vol. 17, No. 6, pp. 558-73.

Golden, K, and Ramanujam, V. (1985) 'Between a Dream and a Nightmare: On the Integration of the Human Resource Management and Strategic Business Planning Processes', *Human Resource Management*, Vol. 24, No. 4, pp. 429-452.

Goldratt, E. M. and Cox, J. (1993) *The Goal: A Process of Ongoing Improvement*, Aldershot: Gower Publishing.

González García, A., Pinto-Carral, A., Sanz Villorejo, J. and Marqués-Sánchez, P. (2020) 'Nurse manager core competencies: A proposal in the Spanish health system', *International journal of environmental research and public health*, Vol. 17, No. 9, p.3173.

Graban, M. (2019) 'Lean: breaking down barriers for the sake of improvement', *International Journal for Quality in Health Care*, Vol. 31, Issue Supplement_1, December 2019, Pages 1–2, https://doi.org/10.1093/intqhc/mzz112

Graduous, D. B. (ed.) (1989) S*ystems Theory Applied to Human Resource Development.* Alexandria VA: ASTD Press.

Grant, R. M. (1991) 'The resource based theory of competitive advantage: implications for strategy formulation', *California Management Review,* Vol. 33, No. 3, pp. 114-135.

Grant, R. M. (1996) 'Toward a Knowledge-based Theory of the Firm', *Strategic Management Journal*, Vol. 17, Winter Special Issue, pp. 109-122.

Green, P. C. (1999) *Building robust competencies: Linking human resource systems to organizational strategies*. San Francisco, CA: Jossey-Bass.

Gremler, D.D. (2004) 'The critical incident technique in service research', *Journal of service research*, Vol. 7, No. 1, pp.65-89.

Grewel and Slotegraaf (2007) 'Embeddedness of organizational capabilities', *Decision Sciences*, Vol. 38, No. 3, pp. 451-488.

Grieves, J. and Redman, T. (1999) 'Living in the Shadow of OD: HRD and the search for identity', *Human Resource Development International,* Vol. 2, pp. 81-102.

Grix, J., (2002) 'Introducing students to the generic terminology of social research', *Politics*, Vol. 22, No 3, pp.175-186.

Groenewald, T. (2004) 'A Phenomenological Research Design Illustrated', *International Journal of Qualitative Methods*, Vol. 3, No. 1, pp.42-55.

Grove, A., Meredith, J., MacIntyre, M., Angelis, J., and Neailey, K. (2010) 'UK health visiting: challenges faced during lean implementation', *Leadership in Health Services*, Vol. 23, No. 3, pp.204-218

Groves, K. S. (2007) 'Integrating leadership development and succession planning best practices', *Journal of Management Development,* Vol. 26, No. 3, pp. 239–260.

Guba, E. G. (1987) 'Naturalistic evaluation', *Evaluation Policy*, Special Issue: Evaluation Practice in Review, No. 34, pp. 23-43.

Guererro, M. and Urbano, D (2012) 'The development of an entrepreneurial university', *Journal of Technology Transfer,* Vol. 37, No. 1, pp. 43-74.

Guthrie, J. (2006) 'The joys of a health service driven by Toyota', *Financial Times*.

Hackett, S., Masson, H. and Phillips, S. (2006) 'Exploring consensus in practice with youth who are sexually abusive: Findings from a Delphi study of practitioner views in the United Kingdom and the Republic of Ireland', *Child Maltreatment,* Vol. 11, No. 2, pp.146-156.

Hager, P., (1994) 'Is there a cogent philosophical argument against competency standards?', *Australian Journal of Education,* Vol. 38, No. 1, pp.3-18.

Håland, E., & Tjora, A. (2006) 'Between asset and process: Developing competence by implementing a learning management system', *Human Relations*, Vol. 59, No. 7, pp. 993–1016.

Hallam, C. R. A. (2003) *Lean enterprise self-assessment as a leading indicator for accelerating transformation in the aerospace industry*. Doctoral Thesis. Massachusetts Institute of Technology. Retrieved from https://dspace.mit.edu/handle/1721.1/29216

Hallgren, M. and Olhager, J. (2009) 'Lean and agile manufacturing: external and internal driversand performance outcomes', *International Journal of Operations & Production Management*, Vol. 29, No. 10, pp. 976-99.

Hambach, J., Diezemann, C., Tisch, M. and Metternich, J. (2016) 'Assessment of Students' Lean Competencies with the Help of Behavior Video Analysis–Are Good Students Better Problem Solvers?', *Procedia CIRP*, Vol. 55, pp.230-235.

Hammer, M. and Champy, J. (1993) 'The promise of reengineering', *Fortune*, May 3 1993, Vol. 127, p.94.

Harney, M. and Richetta, P. (2014) *Acting Together A Roadmap for sustainable Healthcare* [Online], Available at https://www.abbvie.com/content/dam/abbviecorp/us/desktop/sustainablehealthcare/images/EU-Sustainable-Healthcare-White-paper.pdf (Last accessed May 30, 2018).

Harris, L. (2002) 'The future for the HRM function in local government: everything has changed—but has anything changed? *Strategic Change*, Vol. 11, No. 7, pp. 369–378.

Harris, L. (2005) 'UK public sector reform and the ''performance agenda'' in UK local government: HRM challenges and dilemmas', *Personnel Review*, Vol. 34, No. 6, pp. 681–696.

Harrison, J. S., Hitt, M. A., Hoskissen, R. E. and Ireland, R. D. (1991) 'Synergies and post acquisition performance: differences versus similarities in resource allocations', *Journal of Management*, Vol. 17, No. 1, pp. 173-190.

Hasle, P., Bojesen, A., Jensen, P.L. and Bramming, P. (2012) 'Lean and the working environment: a review of the literature', *International Journal of Operations & Production Management*, Vol. 32 No. 7, pp. 829-849.

Hasson, F. and Keeney, S. and McKenna, H. (2000) Research guidelines for the Delphi survey technique, *Journal of AdVanced Nursing*, Vol. 32, No. 4, pp. 1008-1015.

Hasson, F. and Keeney, S. (2011) 'Enhancing rigour in the Delphi technique research', *Technological Forecasting & Social Change*, Vol. 78, pp. 1695–1704

Hayes, R.H., (1981) 'Why Japanese factories work', *Harvard Business Review*, Vol. 59, No. 4, pp. 56–67.

Hayes, R. H., and S. C. Wheelwright (1984) *Restoring Our Competitive Edge: Competing through Manufacturing*. New York: Wiley

Hays, S. and Kearney, R. (2001) 'Anticipated changes in human resource management: views from the field', *Public Administration Review*, Vol. 61, No. 5, pp. 585–597.

Hayton, J. C. and McEvoy, G. M. (2006) 'Competencies in practice: An interview with Hanneke C. Frese', *Human Resource Management*, Vol. 45, No. 3, pp. 495–500.

Hazelbaker, C.B. (2013) 'Perceived skills and abilities required by athletic trainers in hospital and clinical management positions: a Delphi study', *Journal of Athletic Training*, Vol. 48, No. 1, pp. 87-91.

Health Services Executive (2015) 'Briefing Document re 'Scientific Management Practices in Healthcare To Tackle Patient Flow: Proof of Concept'.

https://www.hse.ie/eng/about/who/acute-hospitals-division/special-delivery-unit/national-patient-flow-improvement-programme.pdf (last accessed 16/02/2021).

Health Service Executive (HSE) (2016) Framework for Improving Quality in Our Health Services.

https://www.hse.ie/eng/about/who/qid/framework-for-quality-improvement/framework-for-improving-quality-2016.pdf (last accessed 11/02/2021).

Health Services Executive (HSE) (2016) Health Service Performance Report, October-December 2016. https://www.hse.ie/eng/services/publications/performancereports/2016performancereports.html (last accessed 11/02/2021).

Health Services Executive (HSE) (2020) 'By all, with all, for all: a strategic approach to improving quality 2020-2024'. https://www.hse.ie/eng/about/who/qid/strategic-plan-2019-2024/strategic-approach-2020-2024.pdf (last accessed 11/02/2021).

Helfat, C. E. (1997) 'Know-how and asset complementarity and dynamic capability accumulation: The case of R&D', *Strategic Management Journal*, Vol. 18, No. 5, pp. 339–360.

Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M., Singh, H., Teece, D., and Winter, S. G. (2007) *Dynamic capabilities: Understanding strategic change in organizations*, Malden, MA: Blackwell.

Hellriegel, D., Jackson, S. E., & Slocum, J. W. (2008) '*Managing: A competency based approach (11th ed).*, Mason, OH: Thomson South-Western.

Hennessy, D. and Hicks, C. (2003) 'The ideal attributes of chief nurses in Europe: a Delphi study', *Journal of AdVanced Nursing*, Vol. 43, No. 5, pp. 441-448.

Henrique, D. B., Godinho Filho, M., Marodin, G., Lopes de Sousa Jabbour, A. B. and Chiappetta Jabbour, C. J. (2021): 'A framework to assess sustaining continuous improvement in lean healthcare', *International Journal of Production Research*, Vol. 59, Iss. 10, pp. 1-20.

Herd, A. M., Adams-Pope, B. L., Bowers, A. and Sims, B. (2016) 'Finding What Works: Leadership Competencies for the Changing Healthcare Environment', *Journal of Leadership Education*, Vol. 15, No. 4, pp. 217-233.

Hertle, C., Tisch, M., Klas, H., Metternich, J. and Abele, E. (2016) 'Recording Shop-floor Management Competencies – A Guideline for a Systematic Competency Gap Analysis', *Procedia CIRP*, Vol. 57, pp. 625-630.

Hertle, C., Jokovic, B., Weber, C., Tisch, M., Konig, C., Meissner, A., Ardelt, T., Bruder, R., Metternich, J. and Tenberg, R. (2017) 'Innovative approaches for technical, methodological and socio-communicative competency development in production areas', *Procedia Manufacturing*, Vol. 9, pp. 299-306.

Hesketh, A. and Fleetwood, S. (2006) 'Beyond Measuring the Human Resources Management-Organizational Performance Link: Applying Critical Realist Meta-Theory. *Organization*, Vol. 13, No. 5, pp. 677-699.

Hicks, J., Nair, P., and Wilderom, C. P. (2009) 'What if we shifted the basis of consulting from knowledge to knowing?. Management learning', Vol. 40, No. 3, pp. 289-310.

Hilton, R. J. and Sohal, A. (2012) 'A conceptual model for the successful deployment of Lean Six Sigma', *Leadership & Development Journal*, Vol. 29, No. 1, pp. 54-70.

Hines, P. and Rich, N. (1997) 'The Seven Value Stream Mapping Tools', *International Journal of Operations and Production Management*, Vol. 17, No. 1, pp. 46-64.

Hines, P., Holweg, M. and Rich, N. (2004) 'Learning to evolve: a review of contemporary lean thinking', *International Journal of Operations & Production Management*, Vol. 24, No. 10, pp. 994-1011.

Hines, P., Taylor, D. and Walsh, A. (2020) 'The Lean journey: have we got it wrong?', *Total Quality Management & Business Excellence*, Vol. 31, No. 3-4, pp.389-406.

Hines, P. (2021) '*Human centred lean: introducing the people value stream*', International Journal of Lean Six Sigma.

Hines, P., Teo, I., Pied, C., Joshi, K. and Chawla, A. (2022). Chapter 5 Why bother defining behaviors and KBIs? Available at: https://www.researchgate.net/publication/355446298_Chapter_5_Why_bother_defining_behaviors_and_KBIs/citation/download (last accessed 19th June, 2022).

Hirsh, W. and Strebler, M. (1994) '*Defining managerial skills and competencies'*, in Mumford, A. (Ed.), Handbook of Management Development, Gower, Aldershot, pp. 79-97.

Hoffmann, T. (1999) 'The meanings of competency', *Journal of European Industrial Training*, Vol. 23, No. 6, pp.275-286.

Holden, M.T. and Lynch, P. (2004) 'Choosing the appropriate methodology: Understanding research philosophy' *The Marketing Review*, Vol. 4, No. 4, pp.397-409.

Holmberg, M., Nørgaard, J., Eriksson, M. and Svensson, A. (2020) 'Dyadic teams and nursing care: A critical incident study of nurses in the emergency medical service', *Journal of clinical nursing*, Vol. 29, No. 19-20, pp.3743-3753.

Holweg, M. (2007) 'The genealogy of lean production', *Journal of Operations Management*, Vol. 25, No. 2, pp. 420-37.

Hood, C. (1991) 'A Public Management for all Seasons', *Public Administration,* Vol. 69, Spring, pp. 3-19.

Hood, C. and Dixon, R. (2013) 'A Model of Cost-cutting in Government? The Great Management Revolution in UK Central Government Reconsidered', *Public Administration*, Vol. 91, No. 1, pp. 114–134.

Hoover, R.S. and Koerber, A.L. (2009) 'Using NVivo to answer the challenges of qualitative research in professional communication: Benefits and best practices tutorial', *IEEE transactions on Professional Communication*, Vol. 54, No.1, pp.68-82.

Hopkins, M. and Bilimoria, D. (2008) 'Social and emotional competencies predicting success for male and female executives', *Journal of Management Development*, Vol. 27, No. 1, pp. 13 – 35.

Hopp, W. J. and Spearman, M. L. (2004) To pull or not to pull: what is the question? *Manufacturing and Service Operations Management*, Vol. 6, No. 2, pp. 133–148.

Houses of the Oireachtas Committee on the Future of Health care (2017) ‘Slaintecare report’, Dublin (Ireland): Houses of the Oireachtas; 2017.

Hua, Zhu (2015) *Research Methods in Intercultural Communication (A Practical Guide)* || *The Critical Incident Technique*, pp. 223–238, doi:10.1002/9781119166283.ch15

Huselid, M. A. (1985) ‘The Impact of Human Resource Management Practices on Turnover, Productivity, and Corporate Financial Performance’, *The Academy of Management Journal*, Vol. 38, No. 3 (Jun., 1995), pp. 635-672.

Huselid, M., Jackson, S. and Schuler, R. (1997) 'Technical and strategic human resource management effectiveness determinants of firm performance, *Academy of Management Journal*, Vol. 40, No. 1, pp. 171-188.

Huselid, M. A., and Becker, B. E. (2000) 'Comment on measurement error in research in human resources and firm performance: how much error is there and how does it influence effect size estimates’, *Personnel Psychology*, Vol. 53, No. 4, pp. 835-854.

Hutchins, D. (2008) *Hoshin Kanri: The Strategic Approach to Continuous Improvement: The Strategic Approach to Continuous Improvement***.** UK, Hampshire: Gower Publishing Ltd.

Huq, Z. (2007) ‘Six-Sigma implementation through Competency Based Perspective (CBP)’, *Journal of Change Management*, Vol. 6, No. 3, pp. 277-289.

Hwang, P., Hwang, D. and Hong, P. (2014) ‘Lean Practices for Quality Results: A Case Illustration’, *International Journal of Health Care Quality Assurance*, Vol. 27, No. 8, pp. 729-741.

Ichniowski, C., Shaw, K., and Prennushi, G. (1997) 'The Effects of Human Resource Management Practices on Productivity: A Study of Steel Finishing Lines', *The American Economic Review*, Vol. 87, No. 3, p. 291-313.

Inkpen, A. (2008) ‘Knowledge Transfer and International Joint Ventures: The Case of Nummi and General Motors’, *Strategic Management Journal*, Vol. 29, No. 4, pp. 447-453.

Isaac-Renton, J., Chang, Y., Prystajecky, N., Petric, M., Mak, A., and Abbott, B. (2012) ‘Use of Lean response to improve pandemic influenza surge in Public Health Laboratories’, *Emerging Infectious Diseases*, Vol. 18, No. 1, pp.57–62.

Ishikawa, K. (1985) *What is Total Quality Control?: The Japanese Way,* New York: Prentice Hall.

Ismail, G. and Taliep, N. (2020) 'Community engagement in instrument design: The Delphi Consensus Technique', In S. Kramer, S. Laher, A. Fynn, & H. H. Janse Van Vuuren (Eds.), *Online Readings in Research Methods.* Psychological Society of South Africa: Johannesburg.

Ismail, N., Kinchin, G. and Edwards, J.A. (2018) 'Pilot study, Does it really matter? Learning lessons from conducting a pilot study for a qualitative PhD thesis', *International Journal of Social Science Research*, Vol. 6, No. 1, pp.1-17.

Jacobs, R. L. (1987) 'A proposed domain of human performance technology: implications for theory and practice', *Performance Improvement Quarterly,* Vol. 1, No. 2, pp. 2-12.

Jacobs, R. L. (1989) 'Systems theory applied to human resource development', in D. Graduous ed. *Systems Theory Applied to Human Resource Development,* Alexandria, VA: ASTD Press, pp. 22-60.

Jacobs, R. L. (1990) 'Human resource development as an interdisciplinary body of knowledge', *Human Resource Development Quarterly*, Vol. 1, No. 1, pp. 65–71.

Jacobsen, L. (2013) 'On Robinson, Penrose and the resource-based view', *European Journal of the History of Economic Thought,* Vol. 20, No. 1, pp.125-147.

Jaeger, R.G. and Halliday, T.R. (1998) 'On confirmatory versus exploratory research', *Herpetologica,* pp.S64-S66.

Javidian, M. (1998) 'Core competence: What does it mean in practice?', *Long Range Planning*', Vol. 31, No.1, pp. 60-71.

Jimmerson, C., Weber, D., Sobek, D.K., (2005) 'Reducing waste and errors: piloting lean principles at Intermountain Healthcare', *Joint Commission Journal on Quality and Patient Safety,* Vol. 31, No. 5, pp. 249–257.

John, N., Snider, H., Edgerton, L. and Whalin, L. (2017) 'Incorporation of lean methodology into pharmacy residency programs', *American Journal of Health-System Pharmacists,* Vol. 74, No. 6, pp. 438-444.

Johnson, R.B. and Onwuegbuzie, A.J. (2004) 'Mixed methods research: A research paradigm whose time has come. *Educational researcher,* Vol. 33, No. 7, pp.14-26.

Johnson, R.B., Onwuegbuzie, A.J. and Turner, L.A. (2007) 'Toward a definition of mixed methods research', *Journal of mixed methods research*, Vol. 1, No. 2, pp.112-133.

Juran, J. M. (1974) *The Quality Control Handbook,* New York: McGraw Hill.

Jurisch, M. C., Ikas, C., Wolf, P. and Krcmar, H. (2013) 'Key Differences of Private and Public Sector Business Process Change', *e-Service Journal*, Vol. 9, No. 1, pp. 3-27.

Kang, C.M., Chiu, H.T., Hu, Y.C., Chen, H.L., Lee, P.H. and Chang, W.Y. (2012) 'Comparisons of self-ratings on managerial competencies, research capability, time management, executive power, workload and work stress among nurse administrators', *Journal of Nursing Management*, Vol. 20, No. 7, pp. 938-947.

Kano, N., Seraku, N., Takahashi, F., & Tsuji, S. (1984) 'Attractive quality vs. must be quality', *Journal of the Japanese Society for Quality Control*, Vol.14, No. 2, pp. 39–48.

Kaufman, B. E. (2002) 'The role of economics and industrial relations in the development of the field of personnel/human resource management', *Management Decision*, Vol. 40, No. 10, pp. 962-979.

Kaufman, B. E. (2008) '*Managing the human factor [electronic resource] : the early years of human resource management in American industry*', Ithaca: ILR Press/Cornell University Press.

Kaufman, B. E. (2012) 'Strategic Human Resource Management Research in the United States: A Failing Grade After 30 Years?', *Academy Of Management Perspectives*, Vol. 26, No. 2, pp. 12-36.

Kaufman, B. E. (2015) 'The RBV theory foundation of strategic HRM: critical flaws, problems for research and practice, and an alternative economics paradigm', *Human Resource Management Journal*, Vol. 25, No. 4, pp. 516-540.

Keeney, S., Mckenna, H. and Hasson, F. (2011) *The Delphi Technique in Nursing and Health Research,* UK: Wiley-Blackwell.

Kelly, S. (2016) 'Creating a Culture of Continuous Improvement and Sustainable Management Systems at Abbot Diagnostics Longford', *Global Business and Organizational Excellence,* November/December, pp. 6-24.

Kezar, A. and Maxey, D. (2016) 'The Delphi technique: An untapped approach of participatory research', *International journal of social research methodology*, Vol. 19, No. 2, pp.143-160.

Kleinman, C.S. (2003) 'Leadership roles, competencies, and education', *Journal of Nursing Administration*, Vol. 33, No. 9, pp. 451-455.

Klimek Yingling, J., (2020) 'Rationing Evidence-Based Nursing Practice: Considering a Resource-Based Approach', *OJIN: The Online Journal of Issues in Nursing*, Vol. 26, No. 1, October 29. Available at: http://ojin.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Vol-26-2021/No1-Jan-2021/Articles-Previous-Topics/Rationing-Evidence-Based-Nursing-Practice-Considering-a-Resource-Based-Approach.html (Last accessed: May 5th, 2022).

Koch, M. J. and McGrath, R. G. (1996) 'Improving labor productivity; human resource management policies do matter', *Strategic Management Journal*, Vol. 17, No. 5, pp. 335-354.

Koman, E. S. and Wolff, S.B. (2008) 'Emotional intelligence competencies in the team and team leader', *Journal of Management Development*, Vol. 27, No. 1 pp. 55 – 75.

Kor, Y. Y. and Mahoney, J. T. (2000) 'Penrose's research based approach: the process and product of research creativity', *Journal of Management Studies*, Vol. 37, No. 1, pp. 109-139.

Korstjens, I. and Moser, A. (2017) 'Series: Practical guidance to qualitative research. Part 2: Context, research questions and designs', *European Journal of General Practice*, Vol. 23, No. 1, pp. 274-279, DOI: 10.1080/13814788.2017.1375090

Kraaijenbrink, J., Spender, J. C. and Groen, A. (2010) 'The RBV: a Review and Assessment of its Critiques', *Journal of Management*, Vol. 36, No. 1, pp. 349-372.

Krafcik, J. F. (1988) 'Triumph of the lean production system', *Sloan Management Review*, Vol. 30 No. 1, pp. 41–52.

Krishna, N.V. and Kodali, J.R. (2014) 'A literature review of empirical research methodology in lean manufacturing', *International Journal of Operations & Production Management*, Vol. 34 No. 8, pp. 1080-1122.

Krishnaswami, O. & Satyaprasad, B. (2010). *Business Research Methods.* Mumbai, IN: Himalaya Publishing House.

Kronenburg, M.A. (2014) 'Evaluating Important Healthcare Management Competency Areas and Preparation for Healthcare Reforms', *International Journal of Business & Public Administration,* Vol. 11, No. 1, pp. 31-40.

Kuhlmann, E. and von Knorring, M. (2014) 'Management and medicine: why we need a new approach to the relationship', *Journal of Health Services Research and Policy,* Vol. 19 No. 3, pp. 189-191.

Kumar, M., and Rodrigues, V. S. (2020) 'Synergetic effect of lean and green on innovation: A resource-based perspective', *International Journal of Production Economics*, Vol. 219, pp. 469-479.

Kumar, R. (2011) *Research Methodology: a step-by-step guide for beginners.* 3rd edition. Sage Publications.

Lado, A. A., Boyd, N. G. and Wright, P. (1992) 'Competency-Based Model of Sustainable Competitive Advantage: Toward a Conceptual Integration Journal of Management', Vol. 18, No. 1, pp.77-91.

Lado, A. A., Boyd, N. G., Wright, P., & Kroll, M. (2006) 'Paradox and theorizing within the resource-based view', *Academy of Management Review*, Vol. 31, No. 1, pp. 115-131.

Lahti, R. K. (1999) 'Identifying and integrating individual level and organizational level core Competencies', *Journal of Business and Psychology*, Vol. 14, No. 1, pp. 59–75.

Langley, A. (2007) 'Process thinking in strategic organization', *Strategic Organization,* Vol. 5, No. 3, pp. 271-282.

Langley, A., & Tsoukas, H. (2010). Introducing "Perspectives on process organization studies." In T. Hernes & S. Maitlis (Eds.), *Process, sensemaking, & organizing* (pp. 1–26). Oxford, UK: Oxford University Press.

Lasswell, H. (1928) 'The Function of the Propagandist', *International Journal of Ethics,* vol. 38, No. 3, pp. 258-268.

Laureani, A., Brady, M. and Antony, J. (2013) 'Applications of Lean Six Sigma in an Irish hospital', *Leadership in Health Services,* Vol. 26, No. 4, pp. 322 – 337.

Lawal, A., Adegboyega, K., Rotter, T., Kinsman, L., Sari, N., Harrison, L., Jeffery, C., Kutz, M., Kahn, M. and Flynn, R. (2014) 'Lean management in health care: definition, concepts, methodology and effects reported (systematic review protocol)', *Systematic Reviews*, Vol.3, No. 1, pp. 103.

Lawler, E. (1994) 'From job-based to competency-based organizations', *Journal of Organizational Behavior*, Vol. 15, pp., 3–15.

Lawson, B. and Samson, D. (2001) 'Developing Innovation Capability in Organizations: A Dynamic Capabilities Approach', *International Journal of Innovation Management*, Vol. 5, No. 3, pp. 377-400.

Lee, M. (2001) 'A refusal to define HRD', *Human Resource Development International*, Vol. 4 No. 3, pp. 327-341.

Lee, M. (2004) 'National Human Resource Development in the United Kingdom', *AdVances in Developing Human Resources*, Vol. 6, No. 3, pp. 334-345

Lee, M. (2011) *Human Resource Development as We Know It: Speeches that Have Shaped the Field*. New York: Routledge.

Lee, R. G. and Dale, B. G. (1998) 'Policy deployment: an examination of the theory', *The International Journal of Quality & Reliability Management*, Vol. 15, No. 5, pp. 520-540.

Lehane, E., Agreli, H., O' Connor, S., Hegarty, J., Leahy-Warren, P., Bennet, D., Blake, C., Burke, F., Corrigan, M., Drennan, J., Hayes, M., Heffernan, E., Horgan, F., Lynch, H., McVeigh, J., Müller, N., O' Keeffe, E., O' Tuathaigh, C., Sahm, L. and Savage, E. (2018) 'Development of a Competency Framework for Clinical Effectiveness Education in Ireland'. Report prepared for Department of Health, Clinical Effectiveness Unit, National Patient Safety Office, Ireland.

Leite, H., Radnor, Z. and Bateman, N. (2022) 'Meaningful inhibitors of the lean journey: a systematic review and categorisation of over 20 years of literature', *Production Planning & Control*, Vol. 33, No. 5, pp.403-426.

Leite, H., Williams, S., Radnor, Z. and Bateman, N. (2022) 'Emergent barriers to the lean healthcare journey: baronies, tribalism and scepticism', *Production Planning & Control*, https://doi.org/10.1080/09537287.2022.2054386

Leitner, P. (1999) 'Japan's post-war economic success: Deming, quality, and contextual realities', *Journal of Management History*, Vol. 5, No. 8, pp. 489-505.

Lepak, D. P., & Snell, S. A. (1999) 'The human resource architecture: Toward a theory of human capital allocation and development', *Academy of Management Review*, Vol. 21, No. 4, pp. 31–48.

Lepak, D. P., & Snell, S. A. (2002) 'Examining the human resource architecture: The relationships among human capital, employment, and human resource configurations', *Journal of Management*, Vol. 28, No. 4, pp. 517–543.

Lewis, M.A. (2000) 'Lean production and sustainable competitive advantage', *International Journal of Operations & Production Management*, Vol. 20 No. 8, pp. 959-78.

Lewis, R., Yarker, J., Donaldson-Feilder, E., Flaxman, P. and Munir, F. (2010) 'Using a competency-based approach to identify the management behaviours required to manage workplace stress in nursing: a critical incident study', *International Journal of Nursing Studies*, Vol. 47, No. 3, pp.307-313.

Liang, Z., Leggat, S., Howard, P. and KOH, L. (2013) 'What makes a hospital manager competent at the middle and senior levels?', *Australian Health Review*, Vol. 37, No. 5, pp. 566-73.

Liang, Z., Howard, P. and Wollersheim, D. (2017) 'Assessing the competence of evidence-informed decision-making amongst health service managers', *Asia Pacific Journal of Health Management*, Vol. 12, No. 3, pp. 16-23.

Lievens, F., Sanchez J. I. and De Corte, W. (2004) 'Easing the inferential leap in competency modeling: The effects of task related information and subject matter expertise', *Personnel Psychology*, Vol. 57, No. 4, pp. 881–904.

Liker, J. (1996) *Becoming Lean*, Free Press, New York, NY.

Liker, J. (2004) *The Toyota Way – 14 Management Principles from the World's Greatest Manufacturer*. New York, NY: McGraw-Hill.

Liker, J. and Hoseus, M. (2008). *Toyota Culture*, New York, NY: McGraw-Hill.

Likert, R. (1961). *New Patterns of Management*, New York, NY: McGraw-Hill.

Lincoln, Y. S. and Guba, E. G. (1985) *Naturalistic Inquiry*, Newbury Park, CA., Sage Publications.

Linstone, H.A. and Turoff, M. eds., (1975) *The delphi method* (pp. 3-12). Reading, MA: Addison-Wesley.

Lippman, S. A., and Rumelt, R. P. (2003) 'A bargaining perspective on resource advantage', *Strategic Management Journal,* Vol. 24, No. 11, pp.1069-1086.

Ljungquist, U. (2007) 'Core competency beyond identification: presentation of a model', *Management Decision,* Vol. 45 Issue: 3, pp.393-402.

Llorens, J., and Battaglio, R. (2010) 'Human resources management in a changing world: reassessing public human resources management education', *Review of Public Personnel Administration,* Vol. 30, No. 1, pp. 112–132.

Lockett, A., Thompson, S., & Morgenstern, U. (2009) 'The development of the resource-based view of the firm: A critical appraisal', *International Journal of Management Reviews*, Vol.11, No. 1, pp. 9-28.

Lockett, A. and Wild, A. (2014) 'Bringing history (back) into the resource-based view', *Business History,* Vol. 56, No.3, pp.372-390.

Lodge, M. and Hood, C. (2005) 'Symposium Introduction: Competency and Higher Civil SerVants', *Public Administration,* Vol. 83, No. 4, 779–787.

Lokkerbol, J., Molenaar, M. F. A. and Does, R. J. M. M. (2012) 'Quality Quandaries: An Efficient Public Sector', *Quality Engineering,* Vol. 24, No. 3, pp. 431-435.

Lopez-Fernandez, O., & Molina-Azorin, J. F. (2011). The use of mixed methods research in the field of behavioural sciences. *Quality & Quantity: International Journal of Methodology,* Vol. 45, No. 6, pp. 1459–1472.

Lorber, M. and Savicˇ, B.S. (2011) 'Perceptions of managerial competencies, style and characteristics among professionals in nursing', *Croatian Medical Journal*, Vol. 52, No. 2, pp. 198-204.

Lorden, A., Zhang, L., Yichen, L., Szu-Hsuan, C. and Murray, J. (2014) 'Measure is of Success: The Role of Human Factors in Lean Implementation in Healthcare', *The Quality Management Journal,* Vol. 21, No. 3, pp. 26-37.

Lucas, B. and Nacer, H., (2015) *The habits of an improver: thinking about learning for improvement in healthcare*. The Health Foundation, London.

Lucey, J. J. (2009) 'The concept of a lean sustainability zone', *Management Services*, Vol. 53 No. 3, pp. 8-13.

Lucia, A.D. and Lepsinger, R., (1999) *Art & Science of Competency Models*. San Francisco, CA: Jossey-Bass.

Luthans, F. and Davis, T.R.V. (1982) 'An Idiographic Approach to Organizational Behavior Research: The Use of Single Case Experimental Designs and Direct Measures', *Academy of Management Review*, Vol. 7, No. 3, pp. 380-391.

Macdonald, S., Cowan, I., Floyd, R., Mackintosh, S., Graham, R., and Jenkins, E. (2013), 'Measuring and managing radiologist workload: application of lean and constraint theories and production planning principles to planning radiology services in a major tertiary hospital', *Journal of Medical Imaging and Radiation Oncology,* Vol. 57, pp. 544-550.

Mahoney, J. T. (2001) 'A resource-based theory of sustainable rents', *Journal of Management,* Vol. 27, No. 6, pp. 651-660.

Makadok, R. (2001) 'Towards a Synthesis of the Resource-Based and Dynamic-Capability Views of Rent Creation', *Strategic Management Journal*, Vol. 22, No. 5, pp. 387-401.

Mann, D. (2009) 'The Missing Link: Lean Leadership', *Frontiers of health services management,* Vol. 26, No. 1, pp. 15-26.

Mann, D. (2015) *Creating a Lean Culture: Tools to Sustain Lean Conversations, 3rd Edition,* Boca Raton: CRC Press.

Mannon, M. (2014) 'Lean Healthcare and Quality Management: The experience of Thedacare', *The Quality Management Journal,* Vol. 21, No. 1, pp.7-10.

Mansfield, R. S. (1996) ‘Building competency models: Approaches for HR professionals’, *Human Resource Management*, Vol. 35, No. 1, pp. 7–18.

Marciano, V. M. (1995) ‘The Origins and Development of Human Resource Management’, *Academy of Management Best Paper Proceedings,* p.223-227.

Martone, D. (2003) ‘A guide to developing a competency-based performance-management system’, *Employment Relations Today*, Vol. 30, No. 3, pp. 23–32.

Matei, L., and Lazăr, C.G. (2011) ‘Quality management and the reform of public administration in several states in South-Eastern Europe: Comparative Analysis’, *Theoretical and Applied Economics,* Vol. 18, No. 4, pp. 65-98.

Materly, T. and Cudney, E. A. (2017) ‘The need for quality in healthcare’, *The Quality Management Forum*, Spring 2017, pp. 11-13.

Mayo, E. (1933) *The Human Problems of an Industrial Civilization,* New York, Macmillan.

Mazur, L., McCreery, J. and Rothenberg, L. (2012) ‘Facilitating lean learning and behaviors in hospitals during the early stages of lean implementation’, *Engineering Management Journal*, Vol. 24, No. 1, pp.11-22.

Mazur, L., Stokes, S.B. and McCreery, J. (2019) Lean-thinking: Implementation and measurement in healthcare settings. *Engineering Management Journal*, Vol. 31, No. 3, pp.193-206.

McCallin, A. M. and Frankson, C. (2010) ‘The role of the charge nurse manager: a descriptive exploratory study’, *Journal of Nursing Management*, Vol. 18, No. 3, pp. 319-325.

McCarthy, G. and Fitzpatrick, J. (2009) ‘Development of a Competency Framework for Nurse Managers in Ireland’, *Journal of Continuing Education in Nursing*, Vol. 40, No. 8, pp. 346-350. doi: 10.3928/00220124-20090723-01.

McClagan, P. A. (1989) 'Models for HRD Practice', *Training and Development Journal,* Vol. 43, No. 9, pp. 49-59.

McClelland, D. C. (1973) ‘Testing for Competence rather than for “Intelligence”’, *American Psychologist*’, Vol. 28, No. 1, 1-14.

McClelland, D.C. (1985) *Human Motivation,* Glenview, IL: Scott Foreman.

McClelland, D.C., (1998) 'Identifying Competencies with Behavioural Event Interviews', *Psychological Science*, Vol. 9, No. 5, pp. 331-339.

McGregor, D. (1960) *The Human Side of Enterprise.* US: McGraw-Hill.

McIntosh, B., Sheppy, B. and Cohen, I. (2014) 'Illusion or delusion – Lean management in the health sector', *International Journal of Health Care Quality Assurance*, Vol. 27, No. 6, pp. 482 – 492.

McIvor, R. (2013) 'Understanding the Manufacturing Location Decision: The Case for the Transaction Cost and Capability Perspectives', Journal of Supply Chain Management, Vol. 49, No. 2, pp. 23-26.

McKenzie, C. A., Garavan, T. N. and Carberry (2012) 'Through the looking glass: challenges for human resource development (HRD) post the global financial crisis – business as usual?', *Human Resource Development International*, Vol. 15, No. 3, pp.353-364.

McNamara, M. and Teeling, S. P. (2019) 'Developing a university-accredited Lean Six Sigma curriculum to overcome system blindness', *International Journal for Quality in Health Care*, Vol. 31, Issue Supplement 1, December 2019, pp. 3–5.

McPherson, S., Reese, C., Wendler, M. C. (2018) 'Methodology Update', *Nursing Research*, Vol. 67, No. 5, pp. 404–410.

Mehaut, P. and Winch, C. (2012) 'The European Qualification Framework: skills, competences or knowledge?', *European Educational Research Journal*, Vol. 11, No. 3, pp. 369-381.

Mehri, D. (2006) 'The darker side of lean: an insider's perspective on the realities of the Toyota production system', *Academy of Management Perspectives*, Vol. 20 No. 2, pp. 21-42.

Mériot, S. (2005) 'One or Several Models for Competence Descriptions: Does It Matter?', *Human Resource Development Quarterly*, Vol. 16, No. 2, pp. 285-292.

Merriam, S. B. (1988) *Case Study Research in Education: A Qualitative Approach*. San Francisco, CA: Jossey-Bass.

Miles, R. E. (1965) 'Human Relation or Human Resources?', *Harvard Business Review*, Vol. 43, July/August, pp.148-163.

Miles, M. B., Huberman, A. M. and Saldana, J. (2014) *Qualitative Data Analysis: A Methods Sourcebook. 3rd ed.*, Thousand Oaks: SAGE.

Milgrom, P. and Roberts, J. (1990) 'The economics of modern manufacturing: technology, strategy, and organization', *American Economic Review,* Vol. 80, No. 3, pp. 511-528.

Milgrom, P., Qian, Y., and Roberts, J. (1991) 'Complementarities, momentum and the evolution of modern manufacturing', *American Economic Review,* Vol. 81, No. 2, pp. 84-88.

Miller, D. (2003) 'An asymmetry-based view of advantage: Towards an attainable sustainability', *Strategic Management Journal,* Vol. 24, No. 10, pp. 961-976.

Miller, D. and Shamsie, J. (1996) 'The Resource-Based View of the Firm in Two Environments: The Hollywood Film Studios from 1936 to 1965', *The Academy of Management Journal*, Vol. 39, No. 3, pp. 519-543.

Miller, L.M. (2011) *Lean Culture – the Leader's Guide*. LM Miller Publishing, Annapolis, MD.

Mintzberg, H., Simons, R. and Basu, K. (2002) 'Beyond selfishness', *MIT Sloan Management Review,* Vol. 44, No. 1, pp. 67-74.

Mirabile, R. J. (1997) 'Everything you wanted to know about competency modeling', *Training and Development,* Vol. 51, No. 8, pp. 73–77.

Mitchelmore, S. and Rowley, J. (2010) 'Entrepreneurial Competencies: A Literature Review and Development Agenda', *International Journal of Entrepreneurial Behaviour and Research,* Vol. 16, No. 2, pp. 92-111.

Monden, Y. (1983) *The Toyota Production System*. Productivity Press, Portland, OR.

Morgan, G. (1997) *Images of Organization,* Thousand Oaks, California: Sage.

Morgan, G. and Smircich, L. (1980) 'The case for qualitative research', *Academy of management review*, Vol. 5, No. 4, pp.491-500.

Mulholland, P. (2019) 'A waiting game for patients.' *Medical Independent*.https://www.medicalindependent.ie/a-waiting-game-for-patients/ (last accessed 16/02/2021).

Murphree, R., Vath, R. and Daigle, L. (2011) 'Sustaining Lean Six Sigma Projects in Healthcare', *Physician Executive*, Vol. 37, No. 1, pp. 44-48.

Murphy, C., Mullen, E., Hogan, K., O'toole, R., & Teeling, S. P. (2019) 'Streamlining an existing hip fracture patient pathway in an acute tertiary adult Irish hospital to improve patient experience and outcomes', *International journal for quality in health care : Journal of the International Society for Quality in Health Care*, Vol. 31 (Supplement_1), pp. 45–51. https://doi.org/10.1093/intqhc/mzz093.

Murray, P. (2003) 'Organisational learning, competencies, and firm performance: empirical observations. The learning organization', Vol. 10, No. 5, pp.305-316.

Murray, R. (2017) *How to Write a Thesis (UK Higher Education Humanities & Social Sciences Study Skills)*. 4th ed., Kindle Edition. London: Open University Press.

Naik, T., Duroseau, Y., Zehtabchi, S., Rinnert, S., Payne, R., McKenzie, M. and Legome, E. (2012) 'A Structured Approach to Transforming a Large Public Hospital Emergency Department via Lean Methodologies', *Journal of Healthcare Quality*, Vol. *34*, No. 2, pp. 86-97.

Narayanamurthy, G., Gurumurthy, A., Subramanian, N. and Moser, R. (2018) 'Assessing the Readiness to Implement Lean in Healthcare Institutions – A Case Study', *International Journal of Production Economics*, Vol. 197, pp.123–142.

Naquin, S. S. and Holton III, E. F. (2006) 'Leadership and Managerial Competency Models: A Simplified Process and Resulting Model', *AdVances in Developing Human Resources*, Vol. 8, No. 2, pp. 144-165.

Nash, P. et al. (2017) 'National Patient Flow Improvement Programme', *International Journal of Integrated Care*, Vol. 17, No. 5, pp. 1-8, DOI: dx.doi.org/10.5334/ijic.3498

Neiderman, F. A., Brancheau, J. C. and Wetherbe, J. C. (1991) 'Information Systems Management Issues for the 1990s', *MIS Quarterly*, Vol. 15, No. 4, pp. 475-500.

Netland, T.H., Powell, D.J. and Hines, P. (2020) 'Demystifying lean leadership', *International Journal of Lean Six Sigma*, Vol. 11 No. 3, pp. 543-554.

Newbert, S. L. (2007) 'Empirical research on the resource-based view of the firm: An assessment and suggestions for future research', *Strategic Management Journal*, Vol. 28, No. 121-146.

Niemeijer, G., Trip, A., De Jong, L., Wendt, K., and Does R. (2012) 'Impact of 5 years of Lean Six Sigma in a University Medical Center', *Quality Management in Health Care*, Vol.21, No. 4, pp. 262–268.

Nodine, T. R. (2016) 'How did we get here? A brief history of competency-based education in the US', *Competency Based Education*, Vol. 1, No. 1, pp. 5-11.

Noori, B (2015) Identifying Critical Issues in Lean Implementation in Hospitals, *Hospital Topics*, Vol. 93, No. 2, pp. 44-52

Norman, P. M., Butler, F. C. and Ranft, A. L. (2013) 'Resources matter: Examining the effects of resources on the state of firms following downsizing', *Journal of Management*, Vol. 39, No. 7, pp. 2009-2038.

Novakowski, N. and Wellar, B. (2008) 'Using the Delphi technique in normative planning research: methodological design considerations', *Environment and Planning*, Vol. 40, No. 6, pp.1485-1500.

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017) 'Thematic Analysis: Striving to Meet the Trustworthiness Criteria', *International Journal of Qualitative Methods*., Vol. 1, pp. 1-13.

Nyberg, A., and Ployhart, R. (2013) 'Context-emergent turnover (CET) theory: a theory of collective turnover', *Academy of Management Review*, Vol. 38, No. 1, pp. 109–131.

Nyberg, A.J., Moliterno, T.P., Hale, D. and Lepak, D.P. (2014) 'Resource-based perspectives on unit-level human capital a review and integration', *Journal of Management*, Vol. 40, No. 1, pp.316-346.

Nye, D. E. (2013). *America's Assembly Line*, Cambridge, MA: MIT Press.

O'Connor, E.S., (1999) 'The politics of management thought: A case study of the Harvard Business School and the Human Relations School', *Academy of Management Review*, Vol. 24, No. 1, pp.117-131.

Odiorne, G. S. (1984) *Strategic management of human resources*. US: Jossey-Bass.

OECD (2021) '*Health at a Glance 2021: OECD Indicators'*, OECD Publishing, Paris, https://doi.org/10.1787/ae3016b9-en.

Ogbeifun, E., Mbohwa, C. and Pretorius, J.H.C. (2017) 'Achieving consensus devoid of complicity: Adopting the Delphi technique', *International Journal of Productivity and Performance Management*, Vol. 66 No. 6, pp. 766-779.

Ohno, T. (1988) *The Toyota Production System: Beyond Large-Scale Production*. Portland, OR: Productivity Press.

Olesen, C., White, D. and Lemmer, I. (2007) ' Career models and culture change at Microsoft', *Organization Development Journal*, Vol. 25, No. 2, pp. 31–36.

O'Neal, S. (1995) 'Competencies and pay in the evolving world of work', *American Compensation Association Journal*, Vol. 4, pp. 72–79.

O'Neil, E., Morjikian, R., Cherner, D., Hirschkorn, C. and West, T. (2008) 'Developing nursing leaders*', The Journal of Nursing Administration,* Vol. 38, No. 4, pp. 178-183.

Opdyke, W. K. (1942) 'Training Within Industry', *Harvard Business Review*, Vol. 20, No. 3. pp. 348-357.

Paauwe, J. and Richardson, R. (1997) 'Introduction to special issue on HRM and performance', *International Journal of Human Resource Management*, Vol. 8, No. 3, pp. 257–62.

Pablo, A. L., Reay, T., Dewald, J. R., & Casebeer, A. L. (2007) 'Identifying, enabling and managing dynamic capabilities in the public sector', *Journal of Management Studies*, Vol. 44, No. 5, pp. 687-708.

Palarca, C., Johnson, S., Mangelsdorff, A.D. and Finstuen, K. (2008) 'Building from within: identifying leadership competencies for future navy nurse executives', *Nursing Administration Quarterly*, Vol. 32, No. 3, pp. 216-225.

Palliative Care Competence Framework Steering Group. (2014). Palliative Care Competence Framework. Dublin: Health Service Executive.

Palm, K., Lilja, J. and Wiklund, H. (2016) 'The challenge of integrating innovation and quality management practice', *Total Quality Management & Business Excellence*, Vol. 27, No.1-2, pp. 34-47.

Pandey, R., and Misra, R. K. (2015) 'Identifying Managerial competencies in the Indian Banking Sector', *Journal of Strategic Human Resource Management,* Vol. 4, No. 1, pp. 33-39.

Papadopoulou, T.C. and Ozbayrak, M. (2004) 'Leanness: experiences from the journey to date', *Journal of Manufacturing Technology Management,* Vol. 16, No. 7, pp. 784-807.

Papadopoulos, T. (2011) 'Continuous improvement and dynamic actor associations: A study of lean thinking implementation in the UK National Health Service', *Leadership in Health Services*, Vol. 24, No. 3, pp.207-227.

Parker, S.K. (2003) 'Longitudinal effects of lean production on employee outcomes and the mediating role of work characteristics', *The Journal of Applied Psychology*, Vol. 88, No. 4, pp. 620-34.

Parker Follet, M. (1918) *The New State: Group Organization the Solution of popular Government.* US: Penn State University Press.

Parry, S. B. (1996) 'The quest for competencies', *Training*, Vol. 33, No. 7, pp. 48–54.

Parson, L., Childs, B. and Elzie, P. (2018) 'Using Competency-Based Curriculum Design to Create a Health Professions Education Certificate Program the Meets the Needs of Students, Administrators, Faculty, and Patients', *Health Professions Education,* Vol. TBC, No. TBC, pp. 1-11.

Penrose, E. T. (1959) *The Growth of the Firm,* New York: Wiley.

Peppard, G., Galliers, R. D. and Thorgood, A. (2014) 'Information systems strategy as practice: Micro strategy and strategizing for IS', *The Journal of Strategic Information Systems,* Vol. 23, No. 1, pp. 1-10.

Peteraf, M. A. (1993) 'The cornerstones of competitive advantage: a resource-based view', *Strategic Management Journal,* Vol. 14, No. 3, pp. 179-191.

Peteraf, M. A. and Barney, J. B. (2003) 'Unravelling the resource-based tangle', *Managerial and Decision Economics,* Vol. 24, No. 4, pp. 309-323.

Peteraf, M. A. and Bergen, M. E. (2003) 'Scanning dynamic competitive landscapes: a market based and resource based framework', *Strategic Management Journal,* Vol. 24, No. 10, pp. 1027-1041.

Peterson, R. B. and Tracy, L. (1979) *Systematic Management of Human Resources,* US:Addison-Wesley Publishing Company.

Pettersen, J. (2009) 'Defining lean production: some conceptual and practical issues', *The TQM Journal*, Vol. 21, No. 2, pp.127-142,

Pettigrew, A. M. (1997) 'What Is Processual Analysis?', *Scandinavian Journal of Management,* Vol. 13, No. 4, pp. 337-348.

Pettigrew, A., Woodman, R., and Cameron K. (2001) 'Studying organizational change and development: Challenges for future research', *Academy of Management Journal,* Vol. 44, No. 4, pp. 697-713.

Phillips, E. M. and Pugh, D. S. (2010) *How to Get a PhD: A Handbook for Students and Their Supervisors*, 5th ed. Berkshire: Open University Press.

Pichault, F. (2007) 'HRM-based reforms in public organisations: problems and perspectives', *Human Resource Management Journal*, Vol. 17, No. 3, pp. 265-282.

Piercy, N. and Rich, N. (2009) 'Lean transformation in the pure service environment: the case of the call service centre', *International Journal of Operations & Production Management*, Vol. 29 No. 1, pp. 54-76.

Pihlainen, V., Kivinen, T. and Lammintakanen, J. (2016) 'Management and leadership competence in hospitals: a systematic literature review', *Leadership in Health Services*, Vol. 29 No. 1, 2016 pp. 95-110.

Pillay, R. (2008) 'The skills gap in hospital management in the South African public health sector', *Journal of Public Health Management Practice,* Vol. 14, No. 5, pp. E8-E14.

Plano Clark, V. L. and Ivankova, N. V. (2016) *Mixed Methods Research: A Guide to the Field.* London, Sage Publication Ltd.

Ployhart, R., Weekley, J. and Ramsey, J. (2009) 'The consequences of human resource stocks and flows: a longitudinal examination of unit service orientation and unit effectiveness', *Academy of Management Journal*, Vol. 52, No. 5, pp. 996–1015.

Plumb, G. E. and Roylance, W. G. (1923) *Industrial Democracy: A Plan for its Achievement*, New York, B. W. Huebsch.

Poksinska, B. (2010) ‘The current state of Lean implementation in health care: literature review’, *Quality Management in Healthcare*, Vol.19, No. 4, pp. 319-329.

Poksinska, B., Swartling, D. and Drotz, E. (2013) ‘The daily work of Lean leaders – lessons from manufacturing and healthcare’, *Total Quality Management & Business Excellence*, Vol. 24, No. 7-8, pp. 886–898.

Pollitt, C., and Bouckaert, G. (2004). *Public management reform: A comparative analysis.* Oxford University Press, USA.

Porter, M. E. (1985) ‘Technology and Competitive Advantage’, *Journal of Business Strategy*, Vol. 5, No. 3, pp. 60-78.

Porter, M. E. (1991) ‘Towards a Dynamic Theory of Strategy’, *Strategic Management Journal,* Vol. 12, No. 2, pp. 95-117.

Porter, M. & Lee, T. (2013) ‘The Strategy that will Fix Healthcare’, *Harvard Business Review*, Vol. 99, No. 10, pp.50-70.

Posthuma, R.A. and Campion, M.A. (2009) ‘Age stereotypes in the workplace: Common stereotypes, moderators, and future research directions’, *Journal of management*, Vol. 35, No. 1, pp.158-188.

Prahalad, C. K. and Hamel, G. (1990) ‘The Core Competence of the Corporation’, *Harvard Business Review*, May-June 1990, pp.79-90.

Prajago, D. and Sohal, A. (2013) ‘Supply chain professionals’, *International Journal of Operations & Production Management*, Vol. 33, No. 11/12, pp. 1532–1554.

Priem, R. L. and Butler, J. E. (2001a) ‘Is the resource based ‘view’ a useful perspective for strategic management research?’, *Academy of Management Review*, Vol. 26, No. 1, pp.22-40.

Priem, R. L., & Butler, J. E. (2001b) ‘Tautology in the resource-based view and the implications of externally determined resource value: Further comments’, *Academy of Management Review*, Vol. 26, No. 1, pp. 57-66.

Pruijt, H. (2000) ‘Repainting, modifying, smashing Taylorism’, *Journal of Organizational Change Management,* Vol. 13 Issue: 5, pp.439-451.

Putnam, H. (1987) *The Many Faces of Realism*. La Salle, Illinois: Open Court.

Rabinovich, E. and Cheon, S. (2011) 'Expanding horizons and deepening understanding via the use of secondary data sources', *Journal of Business Logistics*, Vol. 32, No. 4, pp.303-316.

Radnor, Z.J. and Boaden, R. (2004) 'Developing an understanding of Corporate Anorexia', *International Journal of Operations & Production Management*, Vol. 24 No. 4, pp. 424-440.

Radnor, Z. and Bucci, G. (2011) 'Analysis of lean implementation in UK business schools and universities', *Association of Business Schools, London, 74.*

Radnor, Z., Walley, P., Stephens, A. and Bucci, G. (2006) *Evaluation of the Lean Approach to Business Management and its Use in the Public Sector*, Scottish Executive Social Research, Edinburgh.

Radnor, Z. (2010) *Review of Business Improvement Methodologies in Public Services,* Advanced Institute of Management Research, London.

Radnor, Z., Holweg, M. and Waring, J. (2012) 'Lean in Healthcare: the Unfulfilled Promise', *Social Science and Medicine,* Vol. 74, pp. 364-371.

Radnor, Z. and O'Mahoney, J. (2013) 'The role of management consultancy in implementing operations management in the public sector', *International Journal of Operations & Production Management*', Vol. 33, No. 11/12, pp. 1555-1578.

Rahman, N. M. N., Abdullah, N. A., Adham, K. A., and Mat, N. (2014) 'Managerial Competencies: Comparing Conventional and Islamic Perspectives', *Jurnal Pengurusan*, Vol. 41, p. 91-99.

Rainey, H. G. (2014) *Understanding and Managing Public Organizations, 5th ed.,* New York: Jossey Bass.

Rangone, A. (1999) 'A resource-based approach to strategy analysis in small-medium sized enterprises', *Small Business Economics*, Vol. 12, No. 3, pp. 233–248.

Régis, T.K.O., Santos, L.C. and Gohr, C.F. (2019) 'A case-based methodology for lean implementation in hospital operations', *Journal of Health Organization and Management*, Vol. 33 No. 6, pp. 656-676.

Ridder, H., Piening, E. and McCandless Baluch, A. (2012) 'The third way reconfigured: how and why nonprofit organizations are shifting their human resource management', *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, Vol. 23, No. 3, pp. 605–635.

Rigg, C., Stewart, J. and Trehan, K. (2007) *Critical human resource development: beyond orthodoxy*. Glasgow: Prentice Hall.

Riley, D., Smier, T. and York, N. (2012) 'Cultural competence of practising nurses entering an RN-BSN program', *Nursing Education Perspectives*, Vol. 33, No. 6, pp. 381-386.

Robbins, S. P. (1978) *Personnel: The Management of Human Resources,* Englewood Cliffs, New Jersey: Prentice Hall.

Robinson, A.G. and Stern, S. (1995) 'Strategic National HRD Initiatives: Lessons from the Management Training Program of Japan', *Human Resource Development Quarterly*, Vol. 6, No. 2, pp. 123-147.

Robinson, M.A., Sparrow, P.R., Clegg, C. and Birdi, K. (2007) 'Forecasting future competency requirements: a three-phase methodology', *Personnel Review*, Vol. 36, No. 1, pp. 65-90.

Rodriguez, D., Patel, R., Bright, A., Gregory, D. and Gowing, M. K. (2002) 'Developing competency models to promote integrated human resource Practices', *Human Resource Management,* Vol. 41, No. 3, pp. 309–324.

Roemeling, O., Land, M., & Ahaus, C. (2017) 'Does lean cure variability in health care?', *International Journal of Operations & Production Management*, Vol. 37, No. 9, pp. 1229-1245.

Rorty, R. (1999) 'Pragmatism as Anti-authoritarianism'. *Revue internationale de philosophie*, pp.7-20.

Rosenhoover, D. E. and Kuhn Jnr., H. W. (1996) 'Total Quality Management and the Public Sector', *Public Administration Quarterly,* Vol. 19, No. 4, pp. 435-455.

Rother, M. and Shook, J. (1998) *Learning to See: Value Stream Mapping to Add Value and Eliminate Muda,* The Lean Enterprise Institute, Brookline: MA.

Rothwell, W. J., and Lindholm, J. E. (1999) 'Competency identification, modelling and assessment in the USA', *International Journal Of Training & Development*, Vol. 3, No. 2, pp. 90-106.

Rotter, T., Plishka, C., Lawal, A., Harrison, L., Sari, N., Goodridge, D., Flynn, R., Chan, J., Fiander, M., Poksinska, B., Willoughby, K., and Kinsman, L. (2019) 'What Is Lean

Management in Health Care? Development of an Operational Definition for a Cochrane Systematic Review', *Evaluation & the health professions*, Vol. 30, No. 2, pp. 366–390.

Royal College of Physician's of Ireland (2017) 'Towards 2026: A Future Direction for Irish Healthcare'. https://rcpi-live-cdn.s3.amazonaws.com/wp-content/uploads/2017/03/Towards-2026-Report-web.pdf (last accessed 18/03/2021).

Ruiz, C.E., Hamlin, R.G. and Esparza Martinez, L. (2014) 'Managerial and leadership effectiveness as perceived by managers and non-managerial employees in Mexico', *Human Resource Development International*, Vol. 17, No. 3, pp.258-276.

Rumelt, R. P. (1984) 'Theory, strategy, and entrepreneurship' in R. Lamb., (ed) *Competitive Strategic Management*, Englewood Cliffs, NJ: Prentice-Hall, pp.556-570.

Russ-Eft, D., Short, D., & Jacobs, R. (2014) 'Perspectives in HRD--The Academy of Human Resource Development: Its history and current activities', *New Horizons In Adult Education & Human Resource Development*, Vol. 26, No. 1, pp. 64-68.

Russ-Eft, D., Watkins, K. E., Marsick, V. J., Jacobs, R. L. and McClean, G. N. (2014) 'What Do the Next 25 Years Hold for HRD Research in Areas of Our Interest?', *Human Resource Development Quarterly*, Vol. 25, No. 1, pp. 5-27.

Rutherford, P. D. (1995) *Competency based assessment: a guide to implementation.* Melbourne, Victoria: Pitman Publishing.

Ryan, A., Hunter, K., Cunningham, K., Williams, J., O'Shea, H., Rooney, P. and Hickey, F. (2013), 'STEPS: Lean Thinking, Theory of Constraints and Identifying Bottlenecks in an Emergency Department', *Irish Medical Journal*, Vol. 6, No. 4, pp.105-107.

Salentijn, W., Beijer, S. and Antony, J. (2021) 'Exploring the dark side of Lean: a systematic review of the lean factors that influence social outcomes', *The TQM Journal*, Vol. 33, No. 6, pp. 1469-1483.

Salman, M., Ganie, S.A. and Saleem, I. (2020) 'The concept of competence: a thematic review and discussion', *European Journal of Training and Development*, Vol. 44 No. 6/7, pp. 717-742.

Sambrook, S. (2009) 'Critical HRD: a concept analysis', *Personnel Review*, Vol. 38, No. 1, pp. 61–73.

Samuel, D., Found, P. A., and Williams, S. J. (2015) 'How did the publication of the book the Machine that changed the world change management thinking? Exploring 25 years of lean literature', *International Journal of Operations & Production Management*, Vol. 35, No. 10, pp.1386-1407.

Saunders, M., Lewis, P. and Thornhill, A. (2019) *Research Methods for Business Students.* 8th edition. Harlow: UK, Pearson Educatoin Ltd.

Schattenkirk, D. (2012) 'Building sustainable internal capacity for quality within a healthcare environment', *The TQM Journal*, Vol. 24, No. 4, pp. 374-382.

Schiavone, F. and Ferretti, M. (2021) 'The Futures of Healthcare', *Futures*, Vol. 134, pp. 1-7.

Schippmann, J. S., Ash R. A., Battista, M., Carr, L., Eyde, L. D., Hesketh, B., Kehoe, J., Pearlman, K., Prien, E. P. and Sanchez, J. I. (2000) 'The practice of competency modeling', *Personnel Psychology*, Vol. 53, No. 3, pp. 703–740.

Schluter, J., Seaton, P. and Chaboyer, W. (2008) 'Critical incident technique: a user's guide for nurse researchers', *Journal of advanced nursing*, Vol. 61, No. 1, pp.107-114.

Schonberger, R. J. (1986) *World Class Manufacturing: The Lessons of Simplicity Applied*. New York: Free Press.

Schonberger, R. J. (1996) *World class manufacturing: the next decade*. New York: Free Press.

Schultz, C., Graw, J., Salomo, S., and Kock, A. (2019) 'How Project Management and Top Management Involvement Affect the Innovativeness of Professional Service Organizations—An Empirical Study on Hospitals', *Project Management Journal*, Vol. 50, No. 4, pp. 460–475.

Searcy, D.L. and Mentzer, J.T., (2003) 'A framework for conducting and evaluating research', *Journal of Accounting Literature*, Vol. 22, p.130.

Seddon, J., and Caulkin, S. (2007) 'Systems Thinking: Lean Production and Action Learning', *Action Learning: Research and Practice*, Vol. 4, No. 1, pp. 9-24.

Seidel, A., Marodin, G. A., Saurin, T. A. and Ribeiro, J. L. D. (2017) 'Lean Leadership Competencies: a multi-method study', *Management Decision*, Vol. 55, No. 10, pp. 2163-2180.

Seitz, S. (2016) 'Pixilated partnerships, overcoming obstacles in qualitative interviews via Skype: A research note', *Qualitative Research*, Vol. 16, pp. 229–235.

Selden, S. (2009) *Human capital: tools and strategies for the public sector.* Washington, DC: CQ Press.

Shah, R. and Ward, P.T. (2007) 'Defining and developing measures of lean production', *Journal of Operations Management*, Vol. 25 No. 4, pp. 785-805.

Sharoff, L. (2008) 'Critique of the critical incident technique', *Journal of Research in Nursing*, Vol. 13, No. 4, pp.301-309.

Sheehan, J. R., Lyons, B. and Holt, F. (2020) 'The use of Lean Methodology to reduce personal protective equipment wastage in children undergoing congenital cardiac surgery, during the COVID-19 pandemic', *Pediatric Anesthesia*, Vol. 31, pp. 213–220.

Sherman, R.O., Bishop, M., Eggenberger, T. and Karden, R. (2007) 'Development of a leadership competency model', *Journal of Nursing Administration*, Vol. 37, No. 2, pp. 85-94.

Shewchuk, R.M., O'Connor, S.,J., Fine, D.J. and Tyler, J.L., (2005) 'Building an Understanding of the Competencies Needed for Health Administration Practice', *Journal of Healthcare Management*, Vol. 50, No. 1, pp. 32-48.

Shingo, S. (1989) *Non-stock production:the Shingo system for continuous improvement.* Cambridge, Mass., Productivity Press.

Shingo, S. and Dillon, A. (transl.) (1987) *The Sayings of Shigeo Shingo: Key Strategies for Plant Improvement*, New York: Taylor and Francis.

Simon, W. M. (1960) 'Herbert Spencer and the "Social Organism"', *Journal of the History of Ideas*, Vol. 21, No. 2, pp. 294-299.

Sirmon, D. G. and Hitt, M. A. (2003) 'Managing resources: Linking resources, management and wealth creation in family firms', *Entrepreneurship Theory and Practice*, Vol. 27, No. 4, pp. 339-358.

Sirmon, D. G., Hitt, M. A. and Ireland, R. D. (2007) 'Managing firm resources in dynamic environments to create value: looking inside the black box', *Strategic Management Journal*, Vol. 32, No. 1, pp. 273-292.

Sirmon, D. G., Hitt, M. A., Ireland, R. D. and Gilbert, B. A. (2011) 'Resource Orchestration to Create Competitive Advantage: Breadth, Depth, and Life Cycle Effects', *Journal of Management*, Vol. 37, No. 5, pp. 1390-1412.

Siu, V. (1998) Managing by competencies—a study on the managerial competencies of hotel middle managers in Hong Kong, *International Journal of Hospitality Management,*Vol. 17, No. 3, pp.253-273.

Skulmolski, G. J., Hartman, F. T. and Krahn, J. (2011) 'The Delphi Method for Graduate Research', *Journal of Information Technology Education,* Vol. 6, pp. 1-21.

Smith, E. C. (1982) 'Strategic Business Planning and Human Resources', *Personnel Journal*, Vol. 61, No. 8, pp. 606-611.

Snell, S., Shadur, M., and Wright, P. (2001) Human resources strategy: the era of our ways. In The Blackwell handbook of strategic management, ed. Michael A. Hitt, R.Edward Freeman, and Jeffrey S. Harrison, 627–649. Oxford: Blackwell Publishers Ltd.

Snyder, K. and McDermott, M. (2009), 'A rural hospital takes on Lean', *Journal for Healthcare Quality,* Vol. 31, No. 3, pp. 23–28.

Society for Human Resource Management (2016) *The SHRM Body of Competency and Knowledge,* SHRM Publications.

Soltero, C. (2004) 'Training Within Industry: Overcoming the Barriers to Improved Environmental Performance', *Environmental Quality Management*, Vol.14, No.1, pp. 17-39.

Souza, T. A., de Souza, C.M., Lima, R. M., Pimenta, L. V. and Oliveira, M. S. (2019) 'Lean Healthcare Project Leader: A Framework Based on Functions and Competencies' in Chaki, N., Devarakonda, N., Sarkar, A., and Debnath, N. C. *Proceedings of International Conference n Computational Intelligence and Data Engineering Volume 28,* 10.1007/978-981-13-6459-4(Chapter 25), 261–272. doi:10.1007/978-3-030-14973-4_25.

Spagnol, G.S., Min, L.L., & Newbold, D. (2013) 'Lean principles in Healthcare: an overview of challenges and improvements', *IFAC Proceedings Volumes,* Vol. 46, 229-234.

Spear, S.J., (2005) 'Fixing health care from the inside, today', *Harvard Business Review*, Vol. 83, No. 9, p.78.

Spencer, L., Ryan, J. and Bernhard, U. (2008) 'Cross-Cultural Competencies in a Major Multinational Firm', in R. J. Emmerling, V. K. Shanwal and M. K. Mandal, (eds) *Emotional Intelligence: Theoretical and Cultural Perspectives*, New York: Nova Science Publishers, pp. 171-190.

Spencer, L. and Spencer, S. (1993) *Competence at Work For Superior Performance*. NY: Wiley & Sons Inc.

Srivavasta, R. K., Fahey, L. and Christensen, H. K. (2001) 'The resource-based view and marketing: The role of market-based assets in gaining competitive advantage', *Journal of Management*, Vol. 27, No. 6, pp. 777-802.

Stanton, P., Gough, R., Ballardie, R., Bartram, T., Bamber, G. J., and Sohal, A. (2014) 'Implementing lean management/Six Sigma in hospitals: beyond empowerment or work intensification?', *The International Journal of Human Resource Management*, Vol. 25, No. 20, pp. 2926-2940.

Stauffer, J. (2003). SQC before Deming: the Works of Walter Shewhart, *Journal of Applied Management and Entrepreneurship*, Vol. 8, No. 4, pp. 86-94.

Stefl, M.E. (2008) 'Common competencies for all healthcare managers: The healthcare leadership alliance model', *Journal of Healthcare Management*, Vol. 53, No. 6, pp. 360-374.

Sternberg, R.J. and Kolligian Jr, J.E. (1990) *Competence considered*. Connecticut: Yale University Press.

Stevens, G. W. (2013). A critical review of the science and practice of competency modeling. Human Resource Development Review, Vol. 12, No. 1, pp. 86–107.

Steyn, Z., and Van Staden, L. J. (2018) 'Investigating selected self-management competencies of managers', *Acta Commercii*, Vol. 18, No. 1, pp. 1-10.

Stewart, P., Richardson, M., Danford, A., Murphy, K., Richardson, T. and Wass, V. (2009), *We Sell Our Time No More: Workers' Struggles Against Lean Production in the British Car Industry*, New York, NY: Pluto Press.

Stokes, P. and Oiry, E. (2012) 'An evaluation of the use of competencies in human resource development — a historical and contemporary recontextualisation', *EuroMed Journal of* Business, Vol. 7, No. 1, pp. 4-23.

Stone, K. (2012) 'Four Decades of Lean: A Systematic Literature Review', *International Journal of Lean Six Sigma*, Vol. 3, No. 2, pp. 112-132.

Stone, T. H., Webster, B. D. and Schoonover, S. (2013) 'What Do We Know About Competency Modeling?', International Journal of Selection and Assessment, Vol. 21, No. 3, pp. 334-338.

Streumer, J. N. and Kommers, P.A.M. (2002) 'Developments in the emerging human resource development discipline', *International Journal of Human Resource Development and Management*, Vol. 2, No. 1/2, pp. 1-16.

Studer, Q. (2013) 'Making Lean Progress Last: Why Sustaining Excellence Requires the Right Leadership Framework', *Frontiers of health services management,* Vol. 29, No. 3, pp. 41-46.

Sugimori, Y., Kusunoki, K., Cho, F. and Uchikawa, S. (1977) 'Toyota production system and Kanban system – materialization of just-in-time and respect-for-human system', *International Journal of Production Research*, Vol. 15 No. 6, pp. 553-564.

Swank, C. K. (2003) 'The lean service machine', *Harvard Business Review*, Vol. 81, No. 10, pp. 123-129.

Swanson, R. A. (1995). Human Resource Development: Performance Is the Key. *Human Resource Development Quarterly*, Vol. 6, No. 2, pp. 207-213.

Swanson, R. A. (1996) 'In Praise of the Dependent Variable', *Human Resource Development Quarterly*, Vol. 7, No. 3, pp. 203-207.

Swanson, R. A. (2001) 'Human Resource Development and its underlying theory', *Human Resource Development International*, Vol. 4, No. 3, pp. 299-312.

Swanson, R. A. (2007) 'Defining Intergalactic Human Resource Development (IHRD)', *Human Resource development International*, Vol. 10, No. 4, pp. 455-457.

Swanson, R., Huang, S. and Wang, B. (2014) 'Hospitality-based critical incidents: a cross-cultural comparison', *International Journal of Contemporary Hospitality Management*, Vol. 26 No. 1, pp. 50-68.

Tallaght University Hospital (2014) 'Tallaght Hospital Annual Report 2014: People Caring for People'. https://www.tuh.ie/About-us/Tallaght-Hospital-Annual-Report-2014.pdf (last accessed 16/02/2021).

Tashakkori, A. and Teddlie, C. (2010) ‘Putting the human back in ‘‘human research methodology’: The researcher in mixed methods research’, *Journal of mixed methods research*, Vol. 4, No. 4, pp.271-277.

Teddlie, C. and Yu, F. (2007) ‘Mixed methods sampling: A typology with examples’, *Journal of mixed methods research*, Vol. 1, No. 1, pp.77-100.

Teece, D., Pisano, G. and Shuen, A. (1997) ‘Dynamic capabilities and Strategic Management’, *Strategic Management Journal*, Vol. 18, No. 7, pp. 509-533.

Tahir, I.M. and Abu Bakar, N.M. (2010) ‘Managerial Competencies in the Malaysian Financial Services Sector’, *Interdisciplinary Journal of Contemporary Research in Business*, Vol. 1, No. 12, pp.114-124.

Teece, D. J. (2007) ‘Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance’, *Strategic Management Journal*, Vol. 28, pp. 1319-1350.

Teo, S., and Rodwell, J. (2007) ‘To be strategic in the new public sector, HR must remember its operational activities’, *Human Resource Management*, Vol. 46, No. 2, pp. 265–284.

Terziovski, M. (2010) ‘Innovation practice and its performance implications in small and medium enterprises (SMEs) in the manufacturing sector: a resource-based view’, *Strategic Management Journal*, Vol. 31, No. 8, pp. 892-902.

Thomas, S. and Burke, S. (2012) ‘Coping with austerity in the Irish healthcare system’, *EuroHealth incorporating Euro Observer*, Vol. 18, No. 1, pp. 7-9.

Tichy, N. M., Fombrun, C. J. and DeVanna, M. A. (1982) Strategic Human Resource Management, Sloan Management Review, 23, Winter 1982, p.47-61.

Tobin, G. A. and Begley, C. M. (2004) ‘Methodological rigour within a qualitative framework’, *Journal of AdVanced Nursing*, 48, 388–396.

Tontini, G., Bento, G.D., Milbratz, T.C., Volles, B.K. and Ferrari, D. (2017) ‘The critical incident technique (CIT) and penalty-reward Contrast Analysis (PRCA) applied to online reviews on tripadvisor: Evaluation of satisfaction of hotel customers’, *International Journal of Hospitality Management*, Vol. 66, No. 1, pp.106-116.

Toussaint, J. (2009), ‘Writing the new playbook for U.S. health care: lessons from Wisconsin’, *Health Affairs*, Vol. 28, No. 5, pp. 1343–1350.

Townsend, K., Wilkinson, A., Bamber, G. and Allan, C. (2012) 'Accidental, unprepared, and unsupported: clinical nurses becoming managers', *International Journal of Human Resource Management,* Vol. 23, No. 1, pp. 204-220.

Tracey, M. and Flinchbaugh, J. (2006) 'How human resources departments can help lean transformation', *Association for Manufacturing Excellence*, Vol. 22, pp. 5-10.

Tranfield, D. and Starkey, K. (1998) 'The Nature, Social Organization and Promotion of Management Research: Towards Policy', *British Journal of Management*, Vol. 9, No. 4, pp. 341-353.

Truss, C. (2008) 'Continuity and change: the role of the HR function in the modern public sector', *Public Administration,* Vol. 86, No. 4, pp. 1071–1088.

Tsoukas, H. and Chia, R. (2002) 'On Organizational Becoming: Rethinking Organizational Change', *Organization Science,* Vol. 13, No. 5, pp. 567-582.

Tuck, R. (2009) *NHS Doncaster's Innovative Approach to Redesign its TIA Pathway, to Introduce a Rapid Access One Stop TIA Clinic that Includes Immediate Preventative Treatment and Vascular Review, Case Study*, NHS Doncaster, NHS Improvement, Stoke and London.

Tucker, S. A. and Cofsky, K. M. (1994) 'Competency-based pay on a banding platform: A compensation combination for driving performance and managing change', *American Compensation Association Journal,* Vol. 3, No. 1,pp. 30–45.

Turoff, M. and Linstone, H.A. (2002) The Delphi method-techniques and applications.

Tuttle, D. B. (1997) 'A Classification System for Undestanding Individual Differences in Temporal Orientation among Processual researchers and Organizational Informants', *Scandinavian Journal of Management*, Vol. 13, No. pp. 349-366.

Vakola, M., Soderquist, K. E. and Prastacos, G. P. (2007) 'Competency management in support of organizational change', *International Journal of Manpower*, Vol. 28, No. 3/4, pp. 260-275.

Van Beers, J.C.A.M., Van Dun, D.H. and Wilderom, C.P.M. (2021) 'Effective hospital-wide lean implementation: top-down, bottom-up or through co-creative role modeling?', *International Journal of Lean Six Sigma*, Vol. 13 No. 1, pp. 46-66.

Van de Walle, S. and Hammerschmid, G. (2011) 'The impact of the new public management: Challenges for coordination and cohesion in European public sectors', *Halduskultuur – Administrative Culture*, Vol. 12, No. 2, pp. 190- 209.

Van den Ven, A. H. (1992) 'Suggestions for Studying Strategy Process: A Research Note', *Strategic Management Journal*, Vol. 13, Special Issue: Strategy Process: Managing Corporate Self-Renewal (Summer, 1992), pp. 169-191.

Van der Merwe, K. R.; Pieterse, J. J. and Lourens, A. S. (2014) 'The development of a Theoretical Lean Culture Causal Framework to support the effective implementation of lean in automotive component manufacturers', *South African Journal of Industrial Engineering*, Vol. 25, No. 1, pp.131-144.

Van der Voet, J., Kuipers, B. and Groenveld, S. (2015) 'Held back and pushed forward: leading change in a complex public sector environment', *Journal of Organizational Change Management*, Vol. 28, No. 2, pp. 290-300.

Van Dun, D. H., Hicks, J. N. and Wilderom, C. P. M. (2017) 'Values and behaviors of effective lean managers: Mixed-methods exploratory research', *European Management Journal*, Vol. 35, No. 2, pp. 174-186.

Van Dun, D.H. and Wilderom, C.P.M. (2021) 'Improving high lean team performance through aligned behaviour-value patterns and coactive vicarious learning-by-doing', *International Journal of Operations & Production Management*, Vol. 41 No. 13, pp. 65-99.

Van Elp, B., Roemeling, O. and Aij, K. H. (2021) 'Lean Leadership: Towards Continuous Improvement Capability in Healthcare', *Health Services Management Research*, Vol. 35, No. 1, pp. 1-9.

Van Hoek, R. I., Harrison, A., and Christopher, M. (2001) 'Measuring Agile Capabilities in the Supply Chain', *International Journal of Operations & Production Management*, Vol. 21, No. (1/2), pp. 126-148.

Van Houwelingen, C. T. M., Moerman, A. H., Ettema, R. G. A., Kort, H. S. M. and ten Cate, O. (2016) 'Competencies required for nursing telehealth activities: A Delphi-study', *Nurse Education Today*, Vol. 39, pp. 50-62.

Van Teijlingen, E. and Hundley, V. (2002) 'The importance of pilot studies', *Nursing Standard (through 2013)*, Vol. 16, No. 40, p.33.

Venkatesh, V., Brown, S.A. and Bala, H. (2013) 'Bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems', *MIS quarterly*, pp.21-54.

Vernon, W. (2009) 'The Delphi technique: a review', *International Journal of Therapy and rehabilitation*, Vol. 16, No.2, pp.69-76.

Vianden, J. (2012) 'The critical incident technique in student affairs research and practice', *Journal of Student Affairs Research and Practice*, Vol. 49, No. 3, pp. 333–346.

Vidal, M. (2007) 'Lean production, worker empowerment, and job satisfaction', *Critical Sociology*, Vol. 33, pp. 247-78.

Viergever, R. F. (2019) 'The Critical Incident Technique: Method or Methodology?', *Qualitative Health Research*, Vol. 29, No. 7, pp.1065-1079.

Wada, K. (2006) 'The Fable of the birth of the Japanese Automobile Industry: A Reconsideration of the Toyota-Platt Agreement of 1929', *Business History*, Vol. 48, No. 1, pp. 90-118.

Wade, M. and Hulland, J. (2004) 'Review: the resource-based view and information systems research: review, extension, and suggestions for future research', *MIS Quarterly*, Vol. 28, No. 1, pp. 107-142.

Wadongo, B., Kambona, O. and Odhuno, E. (2011) 'Emerging critical generic managerial competencies', *African Journal of Economic and Management Studies*, Vol. 2, No. 1, pp. 56-71.

Wall, T. D. and Wood, S. J. (2005) 'The romance of human resource management and business performance, and the case for big science', *Human Relations*, Vol. 58, No. 4, pp. 429-462.

Walsh, A., Harrington, D. and Hines, P. (2020) 'Are hospital managers ready for Value-Based Healthcare: A review of the management competence literature', *International Journal of Organizational Analysis*, Vol. 28, No. 1, pp. 49-65.

Waring, J. and Bishop, S. (2010) 'Lean Healthcare: Ritual, rhetoric and resistance', *Social Science & Medicine*, Vol. 71, No. 7, pp.1332-1340.

Watkins, K. E. (2000) 'Aims, Roles, and Structures for Human Resource Development', *Advances in Developing Human Resources*, Vol. 2, No. 3, pp. 54-59.

Wayhuni, D. (2012) ‘The research design maze: Understanding paradigms, cases, methods and methodologies’, *Journal of applied management accounting research*, Vol. 10, No. 1, pp.69-80.

Weeks, K., Meriel Hutton, B., Young, S., Coben, D., Clochesy, J. M. and Pontin, D. (2013) ‘Safety in numbers 2: Competency modelling and diagnostic error assessment in medication dosage calculation problem-solving’, *Nurse Education in Practice*, Vol. 13, No. 2, pp. e23-e32.

Weller, S. (2017) ‘Using internet video calls in qualitative(longitudinal) interviews: Some implications for rapport’, *International Journal of Social Research Methodology*, Vol. 20, pp. 613–625.

Werner, M. J. (2014) 'Human Resource Management = Human Resource Development: What is it?', *Human Resource Development Quarterly*, Vol. 25, No. 2, pp. 127-139.

Wernerfelt, B. (1984) ‘A Resource Based View of the Firm’, *Strategic Management Journal*, Vol. 5, No. 2, pp. 171-180.

Wernerfelt, B. (2014) ‘On the role of the RBV in marketing’, *Journal of the Academy of Marketing Science*, Vol. 42, No. 1, pp. 22-23.

White, L., Lockett, A., Currie, G. and Hayton, J. (2020) ‘Hybrid Context, Management Practices and Organizational Performance: A Configurational Approach’, *Journal of Management Studies*, Vol. 58, No 3, pp. 718-748.

White, M., Wells, J., and Butterworth, T. (2013) ‘Leadership, a key element of quality improvement in healthcare. Results from a literature review of “Lean Healthcare” and the Productive Ward Releasing time to care initiative’, *International Journal of Leadership in Public Services*, Vol. 9, No.3/4, pp. 90-108.

Whiteside, M., Mills, J. and McCalman, J. (2012) ‘Using secondary data for grounded theory analysis’, *Australian Social Work*, Vol. 65, No 4, pp.504-516.

Whiting, R. J. (1964) ‘Historical search in human relations’, *Academy of Management Journal*, Vol. 7, No. 1, pp. 45-53.

Whyte, W. F. (1956) ‘Human Relations Theory – A Progress Report’, *Harvard Business Review*, Vol. 34, No. 5, pp.125-132.

Wickramasinghe, V. and De Zoyza, N. (2009) ‘A comparative analysis of managerial competency needs across areas of functional specialization’, *Journal of management development*, Vol. 28, No. 4, pp.344-360.

Wijma, J., Trip, A., Does, R., and Bisgaard, S. (2009) ‘Quality Quandaries: Efficiency improvement in a Nursing Department’, *Quality Engineering*, Vol. 21, pp. 222-228.

Williams, K., Harlam, C., Williams, J., Cutler, T., Adcroft, A., & Johal, S. (1992) ‘Against Lean Production’, *Economy and Society*, Vol. 21, No. 3, pp. 321-354.

Williams, S. and Radnor, Z. (2018) ‘An integrative approach to improving patient care pathways’, *International Journal of Health Care Quality Assurance*, Vol. 31 No. 7, pp. 810-821.

Winter, S. G. (2003) ‘Understanding Dynamic Capabilities’, *Strategic Management Journal*, Vol. 24, pp. 991-995.

Wolff, S.B., Pescosolido, A.T. and Druskat, V.U. (2002) ‘Emotional intelligence as the basis of leadership emergence in self-managing teams’, *The Leadership Quarterly*, Vol. 13, No. 5, pp.505-522.

Womack, J. P., Jones, D. T., and Roos, D. (1990) *The Machine that Changed the World*, London: Simon and Schuster.

Womack, J. P., & Jones, D. T. (1996) *Lean Thinking: Banish Waste and Create Wealth in your Corporation*. USA: Simon and Schuster.

Womack, J. and Jones, D. (2003) *Lean Thinking*, London: Simon & Schuster.

Woodall, J. and Winstanley, D. (1998) *Management Development: Strategy Practice*. Blackwell, Oxford.

Woodruffe, C. (1993) ‘What Is Meant by a Competency?’, *Leadership & Organization Development Journal*, Vol. 14, No. 1, pp.29-36.

Woolf, S. H. and Schoomaker, H. (2019) ‘Life Expectancy and Mortality Rates in the United States, 1959-2017’, *JAMA*, Vol. 322, No. 20 pp. 1196-2016.

Woolsey, L. K. (1986) ‘The critical incident technique: An innovative qualitative method of research’, *Canadian Journal of Counseling*, Vol. 20, No. 4, pp. 242–2.

World Health Organization (2021) *'Global expenditure on health: public spending on the rise?'* Geneva: World Health Organization.

Wren M. A., and Connolly S. (2017) 'A European late starter: lessons from the history of reform in Irish health care', Health Econ Policy Law, Vol. 1, No. 19, doi:10.1017/S1744133117000275.

Wright, P. M., and McMahan, G. C. (1992) 'Theoretical perspectives for strategic human resource management', *Journal of Management*, Vol. 18, No. 2, pp. 295–320.

Wright P. M., McMahan, G. C., and McWilliams, A. (1994) 'Human resources as a source of sustained competitive advantage', *International Journal of Human Resource Management*, Vol. 5, No. 2, pp. 299–324.

Wright, P. M., Gardner, T. M. and Moynihan, L. M., (2003) 'The impact of HR practices on the performance of business units', *Human Resource Management Journal,* Vol. 13, No. 3, pp. 21-36.

Yeh, H-L., Lin, C-S., Su, C-T., and Wang, P-C (2011), 'Applying Lean Six Sigma to improve healthcare: an empirical study', *African Journal of Business Management,* Vol. 5, No. 31, pp. 12356–12370.

Yin, R. (1989) *Case Study Research, Design and Methods*. Beverly Hills, CA, Sage.

Yoder-Wise, P.S. (2014) 'The future of leadership', *Journal of Nursing Administration*, Vol. 44, No. 6, pp. 318-320.

Yorks, L. (2005) *Strategic human resource development*. Mason, OH: Thomson/South-Western.

Youndt, M. A., Snell, S. A., Dean, J. W. and Lepak, D. P. (1996) 'Human Resource Management, Manufacturing Strategy, and Firm Performance', *The Academy Of Management Journal*, Vol. 39, No. 4, p. 836-866.

Young, M. and Dulewicz, V. (2008) 'Similarities and Differences between Leadership and Management: High-Performance Competencies in the British Royal Navy', *British Journal of Management*, Vol. 19, pp. 17–32.

Young, T., Brailsford, S, Connell, C., Davies, R., Harpur, P., and Klein, J. (2004) 'Using Industrial Processes to Improve Patient Care', *British Medical Journal*, Vol. 328, No. 7432, pp. 162-164.

Young, T. and McClean, S. (2009) 'Some challenges facing lean thinking in healthcare', *International Journal for Quality in Health Care*, Vol. 21 No. 5, pp. 309-310.

Yousuf, M.I. (2007) 'Using expertsopinions through Delphi technique', *Practical assessment, research, and evaluation*, Vol. 12, No. 1, p.1-8.

Zingheim, P. K., Ledford, G. E. and Schuster, J. R. (1996) 'Competencies and competency models: Does one size fit all?, *American Compensation Association Journal,*Vol. 5, pp. 56–65.

Appendix 1

Letter sent to candidates inviting them to participate in the research study.

Dear Mr./Ms. XXX,

My name is Aidan Walsh and I am a researcher in Waterford Institute of Technology in the Department of Management and Organisation under the supervision of Professor Peter Hines and Professor Denis Harrington. I am currently conducting research for a doctoral thesis entitled, "*An investigation of competencies for managing lean projects in Irish hospitals: A mixed methods study*". Because of your expertise, I am inviting you to be a participant in this study.

The main aim of this research is to examine the competencies necessary to manage lean projects in Irish hospitals. Based on this examination, it will seek to contribute to theoretical knowledge of the competencies necessary to succeed in delivering lean projects at Irish hospitals and by extension provide organisations with a competency framework that can guide their training, selection and personnel development activities with respect to lean improvement initiatives.

This study will consist of two primary research components. Firstly, A modified Delphi technique will be conducted to identify a list of competencies as viewed by participants as necessary to deliver lean projects in a hospital environment. To this end, I would request your participation in a Delphi panel, using a modified Delphi method, that will agree to participate four surveys that seek to identify potential managerial competencies. The first survey seeks to identify a range of managerial competencies that will be further examined and ranked in an additional three surveys. Each survey will be communicated by email and will take approximately one hour to complete.

The second stage of the research will involve conducting critical-incident interviews with managers of lean projects at Irish hospitals.

If you would like to participate in this study, you must verify the following criteria for either professional or academic participants by replying to this email and attaching a short summary of your qualifications or resume/CV.

Professional Participants
Earned a BA. or equivalent qualification. 5 years of experience with Lean and healthcare initiatives, some of which focuses on hospitals. Membership of at least 1 professional organisation. Attended at least 3 presentations concerning Lean and healthcare at conferences. Participated in a Lean improvement project in a hospital within the past year.
Academic Participants
Earned PhD. or equivalent. 3 years of experience with work in the areas of Lean and healthcare and has conducted research in the area. Membership of at least 1 professional organisation. Presented on a topic related to lean and healthcare at least 3 or more conferences. Published at least 3 articles or one book in the areas of Lean and healthcare.

The data provided by you will always be exclusively accessible to you, and you may amend your data or withdraw any information at any time during the research. All survey responses will be anonymous and confidential.

Should you agree to participate in this research, you will be contacted within a week of your response with further instructions and the first research survey.

I would be pleased to discuss this research at a time that would be convenient to you. Thank you in adVance for your participation.

Yours sincerely,

Aidan Walsh.

E: awalsh@wit.ie

T:xxx-xxxxxxx.

On behalf of the research team:

Aidan Walsh PhD Researcher	Professor Peter Hines Academic Supervisor	Professor Denis Harrington Academic Supervisor
awalsh@wit.ie 0XX-XXXXXXX	Peter.Hines@sapartners.com 00XXXXXXXXXXX	dharrington@wit.ie 051XXXXXX

Appendix 2

Data protection protocol for the research study / Voluntary consent form – Modified Delphi Study

Confidentiality and Identification:

Participation in this research is entirely voluntary and you are under no obligation to participate should you not feel comfortable doing so. Should you decide to consent to participating in this research it is important to realise that your anonymity will be maintained at all times. When informed consent is received, you will be given the opportunity to participate in a research study, communicate your opinions to the researcher and have your data included in the study. In this way, your privacy may be compromised because your particular opinions may be identified by future readers of the thesis or publications arising from the research. Therefore to maintain your privacy and avoid recognition through the data the researcher will protect your anonymity by:

- Using anonyms and removing reference to specific locations and identifiable events within any future writing so that the identity of the source of that data will be protected.
- Using unique alphanumerical identifiers for participants.
- Keeping electronic information in a secure password protected location.
- Keeping physical information in a locked location.
- Limiting access to the data to the researcher and his 2 academic supervisors.

I agree to participate in the Modified Delphi Technique Expert Panel Component of this study. Please type your name indicating your consent in the text box below:

Please return this voluntary consent form to awalsh@wit.ie

Appendix 3

Modified Delphi Study – First Round Survey

RESEARCH AIM

This research survey forms part of a doctoral research study entitled, "An investigation of competencies for managing Lean projects in Irish hospitals: A mixed methods study".

The main aim of this research is to examine the competencies necessary to manage Lean improvement projects in Irish hospitals. Based on this examination, the research will seek to contribute to the theoretical knowledge of the competencies necessary to succeed in delivering Lean improvement initiatives at Irish hospitals and by extension provide organisations with a competency model that can guide their training, selection and personnel development activities with respect to Lean improvement initiatives.

This will be completed through the development of a competency model which will be refined by conducting critical-incident interviews with managers of Lean projects at Irish hospitals. Firstly, it is necessary to develop a list of competencies as viewed by experts as necessary to successfully deliver and sustain Lean improvement activities in a hospital environment. This is the first of three surveys in a Delphi study that seeks to identify potential managerial competencies. The first survey seeks to identify a range of managerial competencies that will be further examined in a second survey that seeks to rank the competency items identified in the first survey in terms of importance. Consensus will be reached on competency items if 75% of the participants in the Delphi study agree on the ranking of a competency item. Those items that do not reach consensus will be further examined in a third survey to seek a consensus rating.

The results of these surveys will help refine the competency model that will be utilised in the latter stages of the research.

SURVEY INSTRUCTIONS

Please complete the survey in the following manner:

1. Please read each of the survey instructions and survey questions carefully.
2. It will be beneficial to read through the entire survey before you begin answering the survey questions. Consider printing a blank copy of the entire survey for reference purposes.
3. Review the operational definitions for all terms used in this survey.
4. For each competency domain, generate two or more competencies for the successful manager/lead of a Lean project that you have envisioned. Provide a description of the behaviours that are linked to each competency that you have generated.
5. Please ensure that you answer each question on the survey.
6. Email the completed survey to awalsh@wit.ie

OPERATIONAL DEFINITIONS

The underlying key concepts that are examined in this research study are defined below.

Competency.

Competency is any characteristic or trait that an individual uses for successful or exemplary performance of any type. These 'performance tools' include an individual's knowledge, skills, thought patterns, mind-sets, social roles, and aspects of self-esteem or self-efficacy. A characteristic or trait is a competency only when its use can be proven to be necessary for successful performance of some type.

Managerial Competency.

Managerial competencies can be defined as a set of knowledge, skill, behaviour, ability and attitude that contributes toward an individual's effectiveness in a managerial position.

Competency Model.

Competency models refer to collections of knowledge, skills, abilities, and other characteristics (KSAOs) that are required for effective performance in the jobs in question.

Lean.

In Healthcare, Lean can be defined as a set of operating methods and philosophies that help create maximum value for patients while reducing wastes and waits.

Lean improvement projects.

This research is focusing on Lean improvement projects that are more substantial than short-term (Just-do-it) Lean improvement interventions, and less substantial than longer-term organisational Lean improvement initiatives. This research is focusing on the management of Lean projects of a duration that is longer than 3 months and less than 18 months.

Question 1

In your opinion, what *values* do managers of Lean projects in hospitals need to hold to be effective? Please be as detailed as possible and type your answer into the text box below. Click here to enter text.

Question 2

In your opinion, what *knowledge* do managers of Lean projects in hospitals need to have acquired to be effective? Please be as detailed as possible and type your answer into the text box below.

Click here to enter text.

Question 3

In your opinion, what *skills* do managers of Lean projects in hospitals need to practise to be effective? Please be as detailed as possible and type your answer into the text box below.

Click here to enter text.

Question 4

In your opinion, what *behaviours* do managers of Lean projects in hospitals need to exhibit to be effective? Please be as detailed as possible and type your answer into the text box below.

Click here to enter text.

Question 5

Under the competency domain of "Leadership" please generate at least <u>two or more competencies</u> for managing Lean projects in hospitals. Provide a brief description of the behaviours that are linked to each competency that you have generated.

For example, you might identify the competency "*Leads by Example*" and then briefly describe the behaviours linked to that competency.

If you consider "Leadership" not to be an appropriate competency domain for managing Lean projects in hospitals, please enter "NOT APPLICABLE" in block text below.

COMPETENCY DOMAIN: LEADERSHIP

Name of Competency	Description
Leads by Example (SAMPLE)	**Demonstrates leadership qualities and exhibits behaviours conducive to a lean environment such as trust, integrity, honesty and respect for people.**

Question 6

Under the competency domain of "Hospital Management and Healthcare Environment" please generate at least <u>two or more competencies</u> for managing Lean projects in hospitals. Provide a brief description of the behaviours that are linked to each competency that you have generated.

For example, you might identify the competency "*Understands the regulatory environment.*" and then briefly describe the behaviours linked to that competency.
If you consider "Hospital Management and Healthcare Environment" not to be an appropriate competency domain for managing Lean projects in hospitals, please enter "NOT APPLICABLE" in block text below.

COMPETENCY DOMAIN: HOSPITAL MANAGEMENT AND HEALTHCARE ENVIRONMENT.

Name of Competency	Description
Understands the regulatory environment. (SAMPLE)	**Understands the role of government, regulatory, professional and accreditation bodies.**

Question 7

Under the competency domain of "Business Skills" please generate at least two or more competencies for managing Lean projects in hospitals. Provide a brief description of the behaviours that are linked to each competency that you have generated.

For example, you might identify the competency "Uses appropriate data for decision-making" and then briefly describe the behaviours linked to that competency.

If you consider "Business Skills" not to be an appropriate competency domain for managing Lean projects in hospitals, please enter "NOT APPLICABLE" in block text below.

COMPETENCY DOMAIN: BUSINESS SKILLS.

Name of Competency	Description
Uses appropriate data for decision-making. (SAMPLE)	**Sources, understands and analyses both qualitative and quantitative data from internal and external sources to support effective decisions.**

Question 8

Under the competency domain of "Relationship Management" please generate at least <u>two or more competencies</u> for managing Lean projects in hospitals. Provide a brief description of the behaviours that are linked to each competency that you have generated.

For example, you might identify the competency "*Maintains stakeholder relationships*" and then briefly describe the behaviours linked to that competency.

If you consider "Relationship Management" not to be an appropriate competency domain for managing Lean projects in hospitals, please enter "NOT APPLICABLE" in block text below.

COMPETENCY DOMAIN: RELATIONSHIP MANAGEMENT.

Name of Competency	Description
Maintains stakeholder relationships. (SAMPLE)	**Collaborates with others to develop and maintain effective relationships with internal and external stakeholders.**

Question 9.

Under the competency domain of "Professional Ethics and Social Responsibility" please generate at least <u>two or more competencies</u> for managing Lean projects in hospitals. Provide a brief description of the behaviours that are linked to each competency that you have generated.

For example, you might identify the competency "*Demonstrates professional conduct*" and then briefly describe the behaviours linked to that competency.

If you consider "Professional Ethics and Social Responsibility" not to be an appropriate competency domain for managing Lean projects in hospitals, please enter "NOT APPLICABLE" in block text below.

COMPETENCY DOMAIN: PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY.

Name of Competency	Description
Demonstrates professional conduct. (SAMPLE)	**Demonstrates an ability to conduct themselves in a competent, professional manner and acts with integrity.**

Question 10.

Under the competency domain of "Lean Management" please generate at least <u>two or more competencies</u> for managing Lean projects in hospitals. Provide a brief description of the behaviours that are linked to each competency that you have generated.

For example, you might identify the competency "*Gathers customer feedback*" and then briefly describe the behaviours linked to that competency.

If you consider "Lean Management" not to be an appropriate competency domain for managing Lean projects in hospitals, please enter "NOT APPLICABLE" in block text below.

COMPETENCY DOMAIN: LEAN MANAGEMENT.

Name of Competency	Description
Gathers customer feedback. (SAMPLE)	**Develops "voice of the customer" techniques to capture feedback from patients and internal customers**

Question 11.

If you would like to add any competency domains that were not listed above, please do so below and generate the corresponding competencies for that competency domain.

ADD NEW COMPETENCY DOMAIN: Click here to enter text.

Name of Competency	Description

ADD NEW COMPETENCY DOMAIN: Click here to enter text.

Name of Competency	Description

ADD NEW COMPETENCY DOMAIN: Click here to enter text.

Name of Competency	Description

YOU HAVE NOW COMPLETED THIS SURVEY - THANK YOU.

Appendix 4 - Research information sheet

The title of the research project is 'An investigation of competencies for managing lean projects in Irish hospitals: A mixed methods study'.

The main aim of this research is to examine those competencies of managers of lean projects in Irish hospitals that lead to success in those projects. Based on this examination, it will seek to contribute to theoretical knowledge of the competencies required to successfully manage and deliver lean projects in Irish hospitals.

I intend to conduct surveys/interviews in order to capture these competencies. Interviews should take no more than one and one half hours per participant.

It is the researcher's preference that interviews be recorded. The recordings will help the researcher to collect and analyse the data and will be retained securely for at least 5 years after the date of the final interview of the study, as prescribed by the Data Protection Acts 1998 & 2003.

The researcher (Aidan Walsh) confirms that all data extracted from interviews, survey and documentation reviews will only be available to the researcher and his supervisors. To maintain your privacy, the researcher will guarantee your anonymity by using anonyms and removing reference to specific locations or identifiable events.

We would like to advise that some quotes may be used in future academic publications, however, these will not be attributable to individual participants. Data used in peer reviewed publications will be anonymised so that the identity of the source of that data will be protected.

The data provided by you will be exclusively accessible to you at all times, and you may amend your data or withdraw it at any time prior to publication of the PhD thesis or academic publications.

The project has been reviewed by the Waterford Institute of Technology (WIT) Business School Ethics Committee. They have advised that in the unlikely event that a reportable issue is disclosed during the interview; the interviewer will terminate the interview and advise you to report the issue to the appropriate authority. This is common practice with all WIT research projects.

Appendix 5 – Round 2 Survey

RESEARCH AIM

This research survey forms part of a doctoral research study entitled, "An investigation of competencies for managing Lean improvement projects in Irish hospitals: A mixed methods study".

The main aim of this research is to examine the competencies necessary to manage Lean improvement projects/transformations in Irish hospitals. Based on this examination, the research will seek to contribute to the theoretical knowledge of the competencies necessary to succeed in delivering Lean improvement projects/transformations at Irish hospitals and by extension provide organisations with a competency model that can guide their training, selection and personnel development activities with respect to Lean improvement initiatives.

This will be completed through the development of a competency model which will be refined by conducting critical-incident interviews with managers of Lean projects at Irish hospitals. Firstly, it is necessary to develop a list of competencies as viewed by experts as useful in delivering and sustaining Lean improvement activities in a hospital environment. This is the second survey in a modified Delphi study that seeks to identify potential managerial competencies. The first survey identified a range of managerial competencies that will be further examined in this second survey. The results of these surveys will help refine the competency model that will be utilised in the latter stages of the research.

SUMMARY OF DATA ANALYSIS FROM ROUND 1 RESPONSES

In total 20 individuals agreed to participate in the expert panel for this Delphi study. Individuals from eight countries are participating – Ireland, the UK, the USA, Canada, Australia, Denmark, Brazil and South Africa. A mix of roles/profiles is also represented in the expert panel including healthcare managers, healthcare practitioners, academics and management consultants; with some individuals fulfilling multiples roles.

Following a comprehensive review of the academic literature, six competency domains were identified and included in the first-round survey. The expert panel indicated broad support for these competency domains with over 70% of participants indicating that these domains were applicable. Participants also identified individual competencies in each domain.

The title of one competency domain, Lean Management, has been retitled Managing Continuous Improvement. This retitling reflects responses from several participants that knowledge, skills and abilities associated with continuous improvement methodologies and practices other than those associated purely with Lean methodology and practices should be considered.

The second round of this Delphi study lists the individual competencies identified under each domain in the first-round responses. These responses have been content analysed and similar responses grouped together to ensure the survey is not repetitive and is more easily completed.

Please print and carefully read the survey instructions and guide that are attached to the email that included this survey. When you have completed the survey, please save the completed document and email the survey as an attachment to awalsh@wit.ie.

If you have any questions about this survey you can contact Aidan Walsh (Researcher) by:

Phone: 00353 (0)876203703

Email: awalsh@wit.ie

Thank you very much for participating in the study!

OPERATIONAL DEFINITIONS

The underlying key concepts that are examined in this research study are defined below.

Competency.

Competency is any characteristic or trait that is used for successful or exemplary performance of any type. These 'performance tools' include an individual's knowledge, skills, thought patterns, mind-sets, social roles, and aspects of self-esteem or self-efficacy. A characteristic or trait is a competency only when its use can be proven to be necessary for successful performance of some type.

Managerial Competency.

Managerial competencies can be defined as a set of knowledge, skill, behaviour, ability and attitude that contributes toward an individual's effectiveness in a managerial position.

Competency Model.

Competency models refer to collections of knowledge, skills, abilities, and other characteristics (KSAOs) that are required for effective performance in the jobs in question.

Lean.

In Healthcare, Lean can be defined as a set of operating methods and philosophies that help create maximum value for patients while reducing wastes and waits.

Lean improvement projects.

This research is focusing on Lean improvement projects that are more substantial than short-term (Just-do-it) Lean improvement interventions, and less substantial than longer-term organisational-wide Lean improvement transformations. This research is focusing on the management of Lean improvement projects of between 3 months - 18 months duration or Lean improvement projects that are currently ongoing as part of a broader Lean transformation.

Competency Category 1: Leadership.

Name of Competency	Competency Description	Rating
Leads by example.	Demonstrates leadership qualities and exhibits behaviours conducive to a lean environment such as trust, integrity, honesty and respect for people.	
Leads with humility.	Demonstrates a willingness to seek input, actively listen to others, understand other viewpoints and learn from others.	
Articulates mission and shared vision.	Articulates the vision, mission and objectives of the organisation and demonstrates an ability to actively engage in the policy deployment process aligned to a shared vision for the organisation.	
Visible leadership.	Maintains a regular presence at the "gemba", seeking to understand process issues first-hand and regularly attending morning meetings.	
Leads with consistency.	Demonstrates a consistent approach to leadership that reflects the underpinning values of the organisation and embraces standard leader work.	
Engages in participatory decision-making.	Encourages decision-making through consultation with others based around team-based problem solving.	
Creates a psychologically safe environment.	Develops an environment that is psychologically safe, allowing people to contribute ideas and insightful observations without fear of criticism or reproach.	
Encourages staff commitment.	Demonstrates an ability to achieve results through people by motivating and empowering subordinates.	

Rating Scale				
Expert	Core	Supplementary		Remove
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	2	3	4	5
Highest Importance				**Lowest Importance**

Competency Category 1: Leadership (contd.)

Name of Competency	Competency Description	Rating
Leads with transparency.	Leads transparently, effectively communicating to others about progress, possible problems and planned changes.	
Change Leadership.	Demonstrates ability to identify potential areas of change, challenge the status quo, and lead teams to develop effective, workable solutions in a lean environment.	
Engages in pragmatic decision-making	Encourages decision-making based on available evidence and choosing to move forward rather than wait for optimal conditions.	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	**Competency is necessary for Lean improvement project success.**	**Competency is necessary for Lean improvement project success but is useful frequently.**	**Competency is necessary for Lean improvement project success but is useful infrequently.**	**Competency is not useful for Lean improvement project success.**
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 2: Hospital and Healthcare environment.

Name of Competency	Competency Description	Rating
Understands the regulatory environment.	Understands the role of government, regulatory, professional and accreditation bodies.	
Understands the political environment and health system drivers.	Understands the role of national policy, demographics, societal changes and public sector funding on the healthcare environment.	
Understands the inter-relationships between different hospital functions and units.	Demonstrates knowledge of the internal structures of the organisation and an awareness of the needs of internal customers. Understands that interdependencies occur within the hospital system and that a change in one area may have an impact in another part of the system.	
Understands the resource implications of improvement decisions.	Understands the need to balance priorities in a resource constrained environment and demonstrates an ability to make effective resource deployment decisions.	
Demonstrates knowledge of hospital practices.	Demonstrates knowledge of professional and clinical practices and behaviours in different departments of the hospital.	

Rating Scale				
Expert	Core	Supplementary		Remove
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	2	3	4	5
Highest Importance				Lowest Importance

Competency Category 2: Hospital and Healthcare environment (contd.).

Name of Competency	Competency Description	Rating
Appreciates patient value.	Demonstrates an ability to identify activities that add value for patients and understands the concept of patient-centred care.	
Understands patient safety systems within the clinical environment.	Understands the reporting mechanisms within risk management and clinical governance structures when managing activities within clinical environments.	
Communicates effectively with stakeholders.	Develops an awareness of the "different languages" in a hospital and can communicate effectively with the different stakeholders regarding improvement activities and how they add value.	
Understands the impact of change on people.	Understands the impact any planned change will have on the internal stakeholders (staff) and on the external stakeholders (patients and families).	
Develops others.	Develops and implements practices that coach and develop other colleagues and team members.	

Rating Scale				
Expert	Core	Supplementary		Remove
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	2	3	4	5
Highest Importance				Lowest Importance

Competency Category 3: Business Skills.

Name of Competency	Competency Description	Rating
Understands data.	Understands data on a scientific and technical level and appreciates the difference the difference between financial data and healthcare data.	
Uses appropriate data for decision-making.	Sources, understands and analyses both qualitative and quantitative data from internal and external sources to support effective decisions.	
Utilises data as a basis for measuring improvement.	Uses data and statistical techniques to understand variation and the impact of proposed improvement.	
Collects first-hand data.	Engages in Gemba walks, morning meetings and performance review meetings to obtain first-hand accounts of operational performance problems as they arise.	
Understands operational management.	Understands the demand profiles on services and demonstrates an ability to effectively manage operations and the roles of people and technology in relation to processes.	
Uses visual management to improve performance.	Creates a visual management system for front line teams to track and improve performance.	
Identifies and solves process problems.	Demonstrates an ability to use lean tools and techniques such as Value Stream Mapping to identify improvement opportunities and generate process improvement solutions.	
Understands contracting and procurement processes.	Understands the importance of managing supplies across the organisational network and the contracting process in developing and maintaining relationships with suppliers.	
Financial management.	Understands, effectively uses and effectively communicates financial data.	

Rating Scale				
Expert	Core	Supplementary		Remove
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	2	3	4	5
Highest Importance				Lowest Importance

Competency Category 3: Business Skills (Contd.).

Name of Competency	Competency Description	Rating
Measures key performance indicators as defined by organisation strategy.	Demonstrates an awareness of organisational and national key performance indicators and measures contribution towards achieving organisational goals and objectives.	
Understands budgeting processes.	Ensures projects are managed efficiently and within allocated budgets.	
Resource management.	Plans, organises effectively and manages the resources of the organisation.	
Business case development.	Demonstrates an ability to interpret and use financial information to support development of a business case and demonstrate financial impact of planned improvements.	
Aligns project and corporate goals.	Demonstrates an ability to identify projects and actions that will meet and achieve corporate goals and the strategic direction of the organisation.	
Project management.	Demonstrates an ability to resource, manage and deliver projects.	
Meetings management.	Demonstrates an ability to effectively chair and manage project meetings in a consistent fashion.	
Demonstrates commitment by delivering tangible wins.	Utilises the achievement of milestone targets to build momentum and maintain buy-in from the project team.	

Rating Scale				
Expert	Core	Supplementary		Remove
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 4: Relationship Management

Name of Competency	Competency Description	Rating
Identifies stakeholders.	Identifies stakeholders to ensure the right people are involved in improvement activity, including those outside of their own organisation/usual networks.	
Maintains stakeholder relationships.	Collaborates with others to maintain effective relationships with internal and external stakeholders.	
Displays gratitude.	Shows appreciation to stakeholders for their contribution.	
Understands and acknowledges power dynamics.	Demonstrates awareness of power dynamics and appropriately engages with the right people in the right order to bring about discussion, especially in relation to change.	
Partners in the value stream.	Ensures partners in other parts of the value stream are actively engaged with to check that they are aware of work in progress to allow them to understand potential changes and impacts.	
Maintains or develops relationships with similar areas of focus both inside and outside of the organization.	Develops relationships with other individuals and organisations that the team can engage with to see how others perform similar work thus enabling an appreciation of other approaches and methods.	
Works effectively with teams.	Develops and can work effectively with teams.	
Acknowledges that everyone is important.	Demonstrates that everyone's opinion and ideas are valued.	

Rating Scale				
Expert	Core	Supplementary		Remove
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	2	3	4	5
Highest Importance				**Lowest Importance**

Competency Category 4: Relationship Management (contd.)

Name of Competency	Competency Description	Rating
Creates behavioural expectations.	Communicates and reinforces to team members the behaviours that are expected of them.	
Creates cross disciplinary links.	Establishes connections that span professional silos, creating links that are meaningful for all.	
Ensures collaborative working.	Involves a broad range of people regularly and whenever feasible to ensure buy-in so that progress and results represent a group effort.	
Communication skills.	Demonstrates an ability to communicate in written and verbal communication formats.	
Communicates progress.	Shares progress with internal and external stakeholders as well as with other colleagues across the health care system.	
Respects others.	Understands how to engage with people, how to speak about people when they are not present, and how to address inadequacies in performance.	
Displays empathy and understanding.	Demonstrates an ability to have empathy for others and seeks to understand the impact their decisions and the project/transformation will have on all people involved, both directly and indirectly.	
Active listening.	Listens to others and actively hears their ideas and suggestions.	
Manages conflict.	Seeks to understand reasons for conflict between parties and manages this through discussion, mediation, negotiation and communication.	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	**Competency is necessary for Lean improvement project success.**	**Competency is necessary for Lean improvement project success but is useful frequently.**	**Competency is necessary for Lean improvement project success but is useful infrequently.**	**Competency is not useful for Lean improvement project success.**
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 5: Professional Ethics and Social Responsibility

Name of Competency	Competency Description	Rating
Demonstrates professional conduct and expects professional conduct from others.	Demonstrates an ability to conduct themselves in a competent, professional manner and acts with integrity. Expects a high level of integrity from the people they work with.	
Demonstrates commitment to agreed values and behaviours.	Acts consistently reflecting agreed values. Commits to embracing agreed behaviours and challenges compliance when behaviours are not aligned with the values of the organisation.	
Strives for ethical project delivery.	Implements meaningful change, seeking the most efficient processes to bring the greatest value to the customer.	
Encourages ethical behaviour.	Demonstrates transparency in decision making and uses ethical and moral standards to make sound and fair decisions that include participants perspectives and considerations.	
Is inclusive and respectful.	Is inclusive and collaborative, respecting the team, past experiences, the patients and the environment.	
Acknowledges social context.	Demonstrates an awareness of the socioeconomic context of the organisation and does not seek to income generate from those who cannot afford to pay.	
Demonstrates social awareness.	Demonstrates an ability to look outwards, learning about and appreciating others in their diversity, views and needs in an open and collaborative way.	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	**Competency is necessary for Lean improvement project success.**	**Competency is necessary for Lean improvement project success but is useful frequently.**	**Competency is necessary for Lean improvement project success but is useful infrequently.**	**Competency is not useful for Lean improvement project success.**
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 5: Professional Ethics and Social Responsibility (contd.).

Name of Competency	Competency Description	Rating
Supports others and is mindful of the needs of staff.	Constantly celebrates the good work of the team and is aware of the interests and needs of staff members. Coaches, and mentors, others in their development.	
Confronts skills gaps.	Where coaching and mentoring is not working, has the courage to identify staff where performance management is required, with the potential that should a performance approach not work, utilises the HR process to remove or redeploy staff.	
Demonstrates commitment to principles.	Demonstrates consistency in their values and principles and shows courage in adhering to these.	
Demonstrates technical and professional expertise.	Competent in using the project tools and has professional expertise in the project subject. Engages with training and development opportunities as applicable.	
Awareness of scope of practice.	Does not suggest that staff members exceed their scope beyond established professional and personal competence.	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	**Competency is necessary for Lean improvement project success.**	**Competency is necessary for Lean improvement project success but is useful frequently.**	**Competency is necessary for Lean improvement project success but is useful infrequently.**	**Competency is not useful for Lean improvement project success.**
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 6: Managing Continuous Improvement.

Name of Competency	Competency Description	Rating
Customer focused.	The manager should understand the tremendous responsibility entrusted to them by patients and understand it is their responsibility to make things better for them by providing value to them as customers.	
Involves patients, carers, and service users.	Adopts an empathetic approach that views healthcare services from the service-users perspective. Seeks the involvement of service users in service redesign.	
Gathers customer feedback	Develops “voice of the customer” techniques to capture feedback from patients and internal customers.	
Deploys the lean management system.	Manages according to the principles of lean – providing clarity of direction, understanding current state, root cause analysis, creation of target conditions, delivery.	
Able to select and apply appropriate lean methods and tools	Demonstrates an understanding of how to plan a project and select and use the best tools and methods for the purpose.	
Balances the application of standard work with experimentation.	Recognises the importance of consistent adherence to agreed best practice, whilst simultaneously encouraging experiments to find better ways.	
Meetings management.	Ensure meetings are productive, efficient and not just talking shops that run over time without any agreed actions.	
Identifies and eliminates waste.	Demonstrates a strong desire to identify, eliminate and prevent the recurrence of waste.	

Rating Scale				
Expert	Core	Supplementary		Remove
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	2	3	4	5
Highest Importance				**Lowest Importance**

Competency Category 6: Managing Continuous Improvement (contd.).

Name of Competency	Competency Description	Rating
Understands Continuous Improvement Culture	Creates an attitude of improvement and demonstrates determination to achieve agreed target conditions.	
Manages Continuous Improvement.	Understand the components of a continuous improvement system including harvesting opportunities and commissioning and monitoring projects to improve performance.	
Advocates a GEMBA culture.	Creates a strong link between staff and management by bringing management to Gemba and giving voice to day-to-day staff problems.	
Demonstrates a commitment to stability.	Understands that reducing variation is fundamental to quality, safety, and improvement. Strives to improve the stability of processes.	
Able to select and apply appropriate quality methods and tools.	Demonstrates an ability to select and apply appropriate quality methods and tools, such as root-cause analysis and Six Sigma, to better understand process variation, engage in problem solving and recognise improvement opportunities.	
Demonstrates patience and a tolerance for failure.	Builds psychological safety in the context of experimentation, understanding that failure can be part of problem solving and recognises that problem solving is a process that requires creativity and idea generation.	
Adopts a systematic problem-solving approach.	Demonstrates knowledge of established continuous improvement cycles such as PDSA/PDCA and/or DMAIC and can apply these.	
Understands Value Added Analysis.	Develops a lean culture which uses value added and non-value-added time study analysis.	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	**Competency is necessary for Lean improvement project success.**	**Competency is necessary for Lean improvement project success but is useful frequently.**	**Competency is necessary for Lean improvement project success but is useful infrequently.**	**Competency is not useful for Lean improvement project success.**
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 6: Managing Continuous Improvement (contd.).

Name of Competency	Competency Description	Rating
Mapping processes.	Demonstrates an ability to conduct process mapping and Value Stream Mapping with the active involvement of staff, capturing and analysing current state data to identify improvement opportunities. Evaluates future state data to understand the impact that actions taken have had on value stream performance.	
Change management.	Develops guidelines to identify change needed and understands the reasons why change is necessary. Seeks to understand barriers to change from the perspective of others and takes action to address these.	
Visualises performance.	Understand how to make process performance and abnormalities visible and actionable.	
Setting up and constructively using visual management boards	Understands that data-driven feedback is essential to learning, accountability and improvement. Uses the concepts of daily operations, status at a glance, performance improvement and continuous improvement huddles.	
Directly observes process activity.	Adopts the practice of Gemba walks to see what is happening in processes.	
Shares feedback.	Communicates feedback with relevant stakeholders in a non-judgmental way.	
Plans for sustainability.	Develops action plans that seek to sustain improvements and seeks to leverage project benefits by sharing learnings and knowledge with others.	
Acts as a coach and mentor to others.	Demonstrates an ability to coach others to identify and solve problems rather than just solve problems themselves.	
Promotes training and education.	Encourages participation in training and education programmes that support a sustained organisational approach to Lean Management.	

Rating Scale				
Expert	Core	Supplementary		Remove
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	2	3	4	5
Highest Importance			Lowest Importance	

Appendix 6 – Third Round Survey of the Modified Delphi Study

RESEARCH AIM

This research survey forms part of a doctoral research study entitled, "An investigation of competencies for managing Lean improvement projects in Irish hospitals: A mixed methods study".

The main aim of this research is to examine the competencies necessary to manage Lean improvement projects/transformations in Irish hospitals. Based on this examination, the research will seek to contribute to the theoretical knowledge of the competencies necessary to succeed in delivering Lean improvement projects/transformations at Irish hospitals and by extension provide organisations with a competency model that can guide their training, selection and personnel development activities with respect to Lean improvement initiatives.

This will be completed through the development of a competency model which will be refined by conducting critical-incident interviews with managers of Lean projects at Irish hospitals. Firstly, it is necessary to develop a list of competencies as viewed by experts as useful in delivering and sustaining Lean improvement activities in a hospital environment. This is the third survey in a modified Delphi study that seeks to identify potential managerial competencies. The first survey identified a range of managerial competencies that were further examined and rated in terms of importance in a second survey. This third-round survey seeks to obtain majority consensus from the participants in the expert panel. The results of these surveys will help refine the competency model that will be utilised in the latter stages of the research.

SUMMARY OF DATA ANALYSIS FROM ROUND 2 RESPONSES

The second round of this Delphi study listed the individual competencies identified under each domain in the first-round responses. In total 16 individuals returned the second-round survey representing a response rate of 80% of the original panel. In the second-round survey participants were asked to rate each competency statement in terms of its relative importance. A five-point Likert scale was used with a rating of 1 indicating highest importance and that the competency is considered critical to Lean improvement project success, and a rating of 5 indicating lowest importance and that the competency is not considered useful for Lean improvement project success.

Few competencies were individually rated, and none achieved a consensus group rating, as 5 on the rating scale. This indicates support for the inclusion of the competency statements in the competency model. A small number of competency statements achieved a group consensus rating in the round 2 survey, with many more almost achieving consensus. In this third-round survey participants are asked to consider their Round 2 rating for each competency statement in the context of the group median rating and consider changing their rating to more closely align to the group response.

Please print and carefully read the survey instructions and guide that are attached to the email that included this survey. When you have completed the survey, please save the completed document and email the survey as an attachment to awalsh@wit.ie.
If you have any questions about this survey you can contact Aidan Walsh (Researcher) by:
Phone: 00353 (0)876203703
Email: awalsh@wit.ie

Thank you very much for participating in the study!

OPERATIONAL DEFINITIONS

The underlying key concepts that are examined in this research study are defined below.

Competency.
Competency is any characteristic or trait that is used for successful or exemplary performance of any type. These 'performance tools' include an individual's knowledge, skills, thought patterns, mind-sets, social roles, and aspects of self-esteem or self-efficacy. A characteristic or trait is a competency only when its use can be proven to be necessary for successful performance of some type.

Managerial Competency.
Managerial competencies can be defined as a set of knowledge, skill, behaviour, ability and attitude that contributes toward an individual's effectiveness in a managerial position.

Competency Model.
Competency models refer to collections of knowledge, skills, abilities, and other characteristics (KSAOs) that are required for effective performance in the jobs in question.

Lean.
In Healthcare, Lean can be defined as a set of operating methods and philosophies that help create maximum value for patients while reducing wastes and waits.

Lean improvement projects.
This research is focusing on Lean improvement projects that are more substantial than short-term (Just-do-it) Lean improvement interventions, and less substantial than longer-term organisational-wide Lean improvement transformations. This research is focusing on the management of Lean improvement projects of between 3 months - 18 months duration or Lean improvement projects that are currently ongoing as part of a broader Lean transformation.

Competency Category 1: Leadership.

Name of Competency	Competency Description	Group Median Rating	Your Round 2 Rating	New Rating
Leads by example.	Demonstrates leadership qualities and exhibits behaviours conducive to a lean environment such as trust, integrity, honesty and respect for people.	1	Consensus achieved No action required.	
Leads with humility.	Demonstrates a willingness to seek input, actively listen to others, understand other viewpoints and learn from others.	1.5	1	
Articulates mission and shared vision.	Articulates the vision, mission and objectives of the organisation and demonstrates an ability to actively engage in the policy deployment process aligned to a shared vision for the organisation.	2	1	
Visible leadership.	Maintains a regular presence at the "gemba", seeking to understand process issues first-hand and regularly attending morning meetings.	2	1	
Leads with consistency.	Demonstrates a consistent approach to leadership that reflects the underpinning values of the organisation and embraces standard leader work.	2	1	
Engages in participatory decision-making.	Encourages decision-making through consultation with others based around team-based problem solving.	2	1	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance			**Lowest Importance**	

Competency Category 1: Leadership (contd.)

Name of Competency	Competency Description	Group Median Rating	Your Round 2 Rating	New Rating
Creates a psychologically safe environment.	Develops an environment that is psychologically safe, allowing people to contribute ideas and insightful observations without fear of criticism or reproach.	1	1	
Encourages staff commitment.	Demonstrates an ability to achieve results through people by motivating and empowering subordinates.	2	1	
Leads with transparency.	Leads transparently, effectively communicating to others about progress, possible problems and planned changes.	2	1	
Change Leadership.	Demonstrates ability to identify potential areas of change, challenge the status quo, and lead teams to develop effective, workable solutions in a lean environment.	2	2	
Engages in pragmatic decision-making	Encourages decision-making based on available evidence and choosing to move forward rather than wait for optimal conditions.	2	1	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance			**Lowest Importance**	

Competency Category 2: Hospital and Healthcare environment.

Name of Competency	Competency Description	Group Median Rating	Your Round 2 Rating	New Rating
Understands the regulatory environment.	Understands the role of government, regulatory, professional and accreditation bodies.	4	4	
Understands the political environment and health system drivers.	Understands the role of national policy, demographics, societal changes and public sector funding on the healthcare environment.	4	4	
Understands the inter-relationships between different hospital functions and units.	Demonstrates knowledge of the internal structures of the organisation and an awareness of the needs of internal customers. Understands that interdependencies occur within the hospital system and that a change in one area may have an impact in another part of the system.	2	1	
Understands the resource implications of improvement decisions.	Understands the need to balance priorities in a resource constrained environment and demonstrates an ability to make effective resource deployment decisions.	2	1	
Demonstrates knowledge of hospital practices.	Demonstrates knowledge of professional and clinical practices and behaviours in different departments of the hospital.	3	Consensus achieved No action required	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance			**Lowest Importance**	

Competency Category 2: Hospital and Healthcare environment (contd.).

Name of Competency	Competency Description	Group Median Rating	Your Round 2 Rating	New Rating
Appreciates patient value.	Demonstrates an ability to identify activities that add value for patients and understands the concept of patient-centred care.	1	1	
Understands patient safety systems within the clinical environment.	Understands the reporting mechanisms within risk management and clinical governance structures when managing activities within clinical environments.	2.5	3	
Communicates effectively with stakeholders.	Develops an awareness of the "different languages" in a hospital and can communicate effectively with the different stakeholders regarding improvement activities and how they add value.	2	2	
Understands the impact of change on people.	Understands the impact any planned change will have on the internal stakeholders (staff) and on the external stakeholders (patients and families).	2	2	
Develops others.	Develops and implements practices that coach and develop other colleagues and team members.	2	1	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance			**Lowest Importance**	

Competency Category 3: Business Skills.

Name of Competency	Competency Description	Group Median Rating	Your Round 2 Rating	New Rating
Understands data.	Understands data on a scientific and technical level and appreciates the difference the difference between financial data and healthcare data.	2	3	
Uses appropriate data for decision-making.	Sources, understands and analyses both qualitative and quantitative data from internal and external sources to support effective decisions.	2	1	
Utilises data as a basis for measuring improvement.	Uses data and statistical techniques to understand variation and the impact of proposed improvement.	2	3	
Collects first-hand data.	Engages in Gemba walks, morning meetings and performance review meetings to obtain first-hand accounts of operational performance problems as they arise.	1.5	1	
Understands operational management.	Understands the demand profiles on services and demonstrates an ability to effectively manage operations and the roles of people and technology in relation to processes.	2.5	1	
Uses visual management to improve performance.	Creates a visual management system for front line teams to track and improve performance.	1.5	1	
Identifies and solves process problems.	Demonstrates an ability to use lean tools and techniques such as Value Stream Mapping to identify improvement opportunities and generate process improvement solutions.	1.5	3	
Understands contracting and procurement processes.	Understands the importance of managing supplies across the organisational network and the contracting process in developing and maintaining relationships with suppliers.	3	3	
Financial management.	Understands, effectively uses and effectively communicates financial data.	3	1	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 3: Business Skills (Contd.).

Name of Competency	Competency Description	Group Median Rating	Your Round 2 Rating	New Rating
Measures key performance indicators as defined by organisation strategy.	Demonstrates an awareness of organisational and national key performance indicators and measures contribution towards achieving organisational goals and objectives.	2.5	1	
Understands budgeting processes.	Ensures projects are managed efficiently and within allocated budgets.	3	3	
Resource management.	Plans, organises effectively and manages the resources of the organisation.	2	1	
Business case development.	Demonstrates an ability to interpret and use financial information to support development of a business case and demonstrate financial impact of planned improvements.	3	1	
Aligns project and corporate goals.	Demonstrates an ability to identify projects and actions that will meet and achieve corporate goals and the strategic direction of the organisation.	2	1	
Project management.	Demonstrates an ability to resource, manage and deliver projects.	3	3	
Meetings management.	Demonstrates an ability to effectively chair and manage project meetings in a consistent fashion.	2	1	
Demonstrates commitment by delivering tangible wins.	Utilises the achievement of milestone targets to build momentum and maintain buy-in from the project team.	2	1	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 4: Relationship Management

Name of Competency	Competency Description	Group Median Rating	Your Round 2 Rating	New Rating
Identifies stakeholders.	Identifies stakeholders to ensure the right people are involved in improvement activity, including those outside of their own organisation/usual networks.	1	1	
Maintains stakeholder relationships.	Collaborates with others to maintain effective relationships with internal and external stakeholders.	2	3	
Displays gratitude.	Shows appreciation to stakeholders for their contribution.	2	1	
Understands and acknowledges power dynamics.	Demonstrates awareness of power dynamics and appropriately engages with the right people in the right order to bring about discussion, especially in relation to change.	2	1	
Partners in the value stream.	Ensures partners in other parts of the value stream are actively engaged with to check that they are aware of work in progress to allow them to understand potential changes and impacts.	2	1	
Maintains or develops relationships with similar areas of focus both inside and outside of the organization.	Develops relationships with other individuals and organisations that the team can engage with to see how others perform similar work thus enabling an appreciation of other approaches and methods.	3	3	
Works effectively with teams.	Develops and can work effectively with teams.	1.5	1	
Acknowledges that everyone is important.	Demonstrates that everyone's opinion and ideas are valued.	1	1	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 4: Relationship Management (contd.)

Name of Competency	Competency Description	Group Median Rating	Your Round 2 Rating	New Rating
Creates behavioural expectations.	Communicates and reinforces to team members the behaviours that are expected of them.	2	1	
Creates cross disciplinary links.	Establishes connections that span professional silos, creating links that are meaningful for all.	2.5	1	
Ensures collaborative working.	Involves a broad range of people regularly and whenever feasible to ensure buy-in so that progress and results represent a group effort.	2	2	
Communication skills.	Demonstrates an ability to communicate in written and verbal communication formats.	2	4	
Communicates progress.	Shares progress with internal and external stakeholders as well as with other colleagues across the health care system.	3	3	
Respects others.	Understands how to engage with people, how to speak about people when they are not present, and how to address inadequacies in performance.	2	1	
Displays empathy and understanding.	Demonstrates an ability to have empathy for others and seeks to understand the impact their decisions and the project/transformation will have on all people involved, both directly and indirectly.	2	1	
Active listening.	Listens to others and actively hears their ideas and suggestions.	2	1	
Manages conflict.	Seeks to understand reasons for conflict between parties and manages this through discussion, mediation, negotiation and communication.	2	4	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 5: Professional Ethics and Social Responsibility

Name of Competency	Competency Description	Group Median Rating	Your Round 2 Rating	New Rating
Demonstrates professional conduct and expects professional conduct from others.	Demonstrates an ability to conduct themselves in a competent, professional manner and acts with integrity. Expects a high level of integrity from the people they work with.	1	1	
Demonstrates commitment to agreed values and behaviours.	Acts consistently reflecting agreed values. Commits to embracing agreed behaviours and challenges compliance when behaviours are not aligned with the values of the organisation.	2	1	
Strives for ethical project delivery.	Implements meaningful change, seeking the most efficient processes to bring the greatest value to the customer.	2	3	
Encourages ethical behaviour.	Demonstrates transparency in decision making and uses ethical and moral standards to make sound and fair decisions that include participants perspectives and considerations.	2	1	
Is inclusive and respectful.	Is inclusive and collaborative, respecting the team, past experiences, the patients and the environment.	1.5	1	
Acknowledges social context.	Demonstrates an awareness of the socioeconomic context of the organisation and does not seek to income generate from those who cannot afford to pay.	3	4	
Demonstrates social awareness.	Demonstrates an ability to look outwards, learning about and appreciating others in their diversity, views and needs in an open and collaborative way.	2.5	2	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 5: Professional Ethics and Social Responsibility (contd.).

Name of Competency	Competency Description	Group Median Rating	Your Round 2 Rating	New Rating
Supports others and is mindful of the needs of staff.	Constantly celebrates the good work of the team and is aware of the interests and needs of staff members. Coaches, and mentors, others in their development.	2	1	
Confronts skills gaps.	Where coaching and mentoring is not working, has the courage to identify staff where performance management is required, with the potential that should a performance approach not work, utilises the HR process to remove or redeploy staff.	2.5	1	
Demonstrates commitment to principles.	Demonstrates consistency in their values and principles and shows courage in adhering to these.	2	1	
Demonstrates technical and professional expertise.	Competent in using the project tools and has professional expertise in the project subject. Engages with training and development opportunities as applicable.	2	3	
Awareness of scope of practice.	Does not suggest that staff members exceed their scope beyond established professional and personal competence.	2.5	4	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance			**Lowest Importance**	

Competency Category 6: Managing Continuous Improvement.

Name of Competency	Competency Description	Group Median Rating	Your Round 2 Rating	New Rating
Customer focused.	The manager should understand the tremendous responsibility entrusted to them by patients and understand it is their responsibility to make things better for them by providing value to them as customers.	1	3	
Involves patients, carers, and service users.	Adopts an empathetic approach that views healthcare services from the service-users perspective. Seeks the involvement of service users in service redesign.	1	1	
Gathers customer feedback	Develops "voice of the customer" techniques to capture feedback from patients and internal customers.	1.5	1	
Deploys the lean management system.	Manages according to the principles of lean – providing clarity of direction, understanding current state, root cause analysis, creation of target conditions, delivery.	1.5	1	
Able to select and apply appropriate lean methods and tools	Demonstrates an understanding of how to plan a project and select and use the best tools and methods for the purpose.	3	3	
Balances the application of standard work with experimentation.	Recognises the importance of consistent adherence to agreed best practice, whilst simultaneously encouraging experiments to find better ways.	2	3	
Meetings management.	Ensure meetings are productive, efficient and not just talking shops that run over time without any agreed actions.	2	1	
Identifies and eliminates waste.	Demonstrates a strong desire to identify, eliminate and prevent the recurrence of waste.	1.5	1	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 6: Managing Continuous Improvement (contd.).

Name of Competency	Competency Description	Group Median Rating	Your Round 2 Rating	New Rating
Understands Continuous Improvement Culture	Creates an attitude of improvement and demonstrates determination to achieve agreed target conditions.	1.5	1	
Manages Continuous Improvement.	Understand the components of a continuous improvement system including harvesting opportunities and commissioning and monitoring projects to improve performance.	2	1	
Advocates a GEMBA culture.	Creates a strong link between staff and management by bringing management to Gemba and giving voice to day-to-day staff problems.	1	1	
Demonstrates a commitment to stability.	Understands that reducing variation is fundamental to quality, safety, and improvement. Strives to improve the stability of processes.	1	1	
Able to select and apply appropriate quality methods and tools.	Demonstrates an ability to select and apply appropriate quality methods and tools, such as root-cause analysis and Six Sigma, to better understand process variation, engage in problem solving and recognise improvement opportunities.	2	4	
Demonstrates patience and a tolerance for failure.	Builds psychological safety in the context of experimentation, understanding that failure can be part of problem solving and recognises that problem solving is a process that requires creativity and idea generation.	1	Consensus achieved No action required.	
Adopts a systematic problem-solving approach.	Demonstrates knowledge of established continuous improvement cycles such as PDSA/PDCA and/or DMAIC and can apply these.	1.5	2	
Understands Value Added Analysis.	Develops a lean culture which uses value added and non-value-added time study analysis.	2	3	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 6: Managing Continuous Improvement (contd.).

Name of Competency	Competency Description	Group Median Rating	Your Round 2 Rating	New Rating
Mapping processes.	Demonstrates an ability to conduct process mapping and Value Stream Mapping with the active involvement of staff, capturing and analysing current state data to identify improvement opportunities. Evaluates future state data to understand the impact that actions taken have had on value stream performance.	1	1	
Change management.	Develops guidelines to identify change needed and understands the reasons why change is necessary. Seeks to understand barriers to change from the perspective of others and takes action to address these.	2	1	
Visualises performance.	Understand how to make process performance and abnormalities visible and actionable.	1	1	
Setting up and constructively using visual management boards	Understands that data-driven feedback is essential to learning, accountability and improvement. Uses the concepts of daily operations, status at a glance, performance improvement and continuous improvement huddles.	1	Consensus achieved No action required.	
Directly observes process activity.	Adopts the practice of Gemba walks to see what is happening in processes.	1	1	
Shares feedback.	Communicates feedback with relevant stakeholders in a non-judgmental way.	1	1	
Plans for sustainability.	Develops action plans that seek to sustain improvements and seeks to leverage project benefits by sharing learnings and knowledge with others.	1	1	
Acts as a coach and mentor to others.	Demonstrates an ability to coach others to identify and solve problems rather than just solve problems themselves.	2	1	
Promotes training and education.	Encourages participation in training and education programmes that support a sustained organisational approach to Lean Management.	2	4	

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance			**Lowest Importance**	

You have fully completed the survey – thank for taking the time to contribute your responses.

Please save your final responses and return your completed survey to awalsh@wit.ie

Appendix 7: Fourth Round of the Delphi Study

RESEARCH AIM

This research survey forms part of a doctoral research study entitled, "An investigation of competencies for managing Lean improvement projects in Irish hospitals: A mixed methods study".

The main aim of this research is to examine the competencies necessary to manage Lean improvement projects/transformations in Irish hospitals. Based on this examination, the research will seek to contribute to the theoretical knowledge of the competencies necessary to succeed in delivering Lean improvement projects/transformations at Irish hospitals and by extension provide organisations with a competency model that can guide their training, selection and personnel development activities with respect to Lean improvement initiatives.

This will be completed through the development of a competency model that will be refined by conducting critical-incident interviews with managers of Lean projects at Irish hospitals. Firstly, it is necessary to develop a list of competencies as viewed by experts as useful in delivering and sustaining Lean improvement activities in a hospital environment. This is the fourth and final survey in a modified Delphi study that seeks to identify potential managerial competencies. The first survey identified a range of managerial competencies that were further examined and rated in terms of importance in subsequent second and third round surveys. This fourth-round survey seeks to obtain majority consensus from the participants in the expert panel. The results of these surveys will help refine the competency model that will be utilised in the latter stages of the research.

SUMMARY OF DATA ANALYSIS FROM ROUND 3 RESPONSES

The third round of this Delphi study listed the individual competencies identified under each catgory derived from the first-round responses. In total 14 individuals returned the third-round survey representing a response rate of 70% of the original panel. In the third-round survey participants were asked to rate each competency statement in terms of its relative importance. A five-point Likert scale was used with a rating of 1 indicating highest importance and that the competency is considered critical to Lean improvement project success, and a rating of 5 indicating lowest importance and that the competency is not considered useful for Lean improvement project success.

In this fourth-round survey participants are asked to consider their Round 3 rating for each competency statement in the context of the group median rating and consider changing their rating to more closely align to the group response. It is important to understand that you do not have to change your rating from Round 3 should you not wish to do so. Additional information concerning the interquartile range score and standard deviation for each of the competency statement is also presented for your consideration.

The interquartile range (IQR) is a measure of where the middle fifty % lies in a data set. It is a measure of where the bulk of the values are in a data set and can be calculated by subtracting the first quartile from the third quartile. In Delphi studies using a 5-point scale (as is used in this study) an IQR of less than or equal to 1 indicates consensus.

The standard deviation (SD) is a measure of the variation or dispersion around a set of values. A low standard deviation indicates that the values tend to be close to the mean of the set, while a high

standard deviation indicates that the values are spread out over a wider range. In Delphi studies using a 5-point scale (as is used in this study) a SD of less than 1.5 commonly indicates consensus.

A great number of competency statements achieved a group consensus rating in the round 3 survey. All competency statements from Round 3 have achieved consensus when considered against the interquartile range and standard deviation measures. However, thirty-six competencies have yet to achieve consensus when considered against the median score.

Please print and carefully read the survey instructions and guide that are attached to the email that included this survey. When you have completed the survey, please save the completed document and email the survey as an attachment to awalsh@wit.ie.

If you have any questions about this survey you can contact Aidan Walsh (Researcher) by:
Phone: 00353 (0)876203703 Email: awalsh@wit.ie

Thank you very much for participating in the study!

OPERATIONAL DEFINITIONS

The underlying key concepts that are examined in this research study are defined below.

Competency.
Competency is any characteristic or trait that is used for successful or exemplary performance of any type. These 'performance tools' include an individual's knowledge, skills, thought patterns, mind-sets, social roles, and aspects of self-esteem or self-efficacy. A characteristic or trait is a competency only when its use can be proven to be necessary for successful performance of some type.

Managerial Competency.
Managerial competencies can be defined as a set of knowledge, skill, behaviour, ability and attitude that contributes toward an individual's effectiveness in a managerial position.

Competency Model.
Competency models refer to collections of knowledge, skills, abilities, and other characteristics (KSAOs) that are required for effective performance in the jobs in question.

Lean.
In Healthcare, Lean can be defined as a set of operating methods and philosophies that help create maximum value for patients while reducing wastes and waits.

Lean improvement projects.
This research is focusing on Lean improvement projects that are more substantial than short-term (Just-do-it) Lean improvement interventions, and less substantial than longer-term organisational-wide Lean improvement transformations. This research is focusing on the management of Lean improvement projects of between 3 months - 18 months duration or Lean improvement projects that are currently ongoing as part of a broader Lean transformation.

Competency Category 1: Leadership.

Name of Competency	Competency Description	IQR	SD	Group Median Rating	Your Round 3 Rating	New Rating
Leads with humility.	Demonstrates a willingness to seek input, actively listen to others, understand other viewpoints and learn from others.	1	0.50	1		
Articulates mission and shared vision.	Articulates the vision, mission and objectives of the organisation and demonstrates an ability to actively engage in the policy deployment process aligned to a shared vision for the organisation.	1	0.66	2		
Visible leadership.	Maintains a regular presence at the "gemba", seeking to understand process issues first-hand and regularly attending morning meetings.	1	0.73	2		
Leads with consistency.	Demonstrates a consistent approach to leadership that reflects the underpinning values of the organisation and embraces standard leader work.	1	0.51	2		
Change Leadership.	Demonstrates ability to identify potential areas of change, challenge the status quo, and lead teams to develop effective, workable solutions in a lean environment.	1	0.63	2		

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 2: Hospital and Healthcare environment.

Name of Competency	Competency Description	IQR	SD	Group Median Rating	Your Round 3 Rating	New Rating
Understands the inter-relationships between different hospital functions and units.	Demonstrates knowledge of the internal structures of the organisation and an awareness of the needs of internal customers. Understands that interdependencies occur within the hospital system and that a change in one area may have an impact in another part of the system.	0.25	0.78	2		
Understands patient safety systems within the clinical environment.	Understands the reporting mechanisms within risk management and clinical governance structures when managing activities within clinical environments.	1	0.5	2		
Develops others.	Develops and implements practices that coach and develop other colleagues and team members.	1	0.8	2		

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 3: Business Skills.

Name of Competency	Competency Description	IQR	SD	Group Median Rating	Your Round 3 Rating	New Rating
Collects first-hand data.	Engages in Gemba walks, morning meetings and performance review meetings to obtain first-hand accounts of operational performance problems as they arise.	1	0.51	1		
Understands operational management.	Understands the demand profiles on services and demonstrates an ability to effectively manage operations and the roles of people and technology in relation to processes.	1	0.58	2		
Uses visual management to improve performance.	Creates a visual management system for front line teams to track and improve performance.	1	0.5	1		
Identifies and solves process problems.	Demonstrates an ability to use lean tools and techniques such as Value Stream Mapping to identify improvement opportunities and generate process improvement solutions.	1	0.76	1		
Understands budgeting processes.	Ensures projects are managed efficiently and within allocated budgets.	1	0.5	3		
Business case development.	Demonstrates an ability to interpret and use financial information to support development of a business case and demonstrate financial impact of planned improvements.	1	0.76	3		
Project management.	Demonstrates an ability to resource, manage and deliver projects.	1	0.65	2.5		
Meetings management.	Demonstrates an ability to effectively chair and manage project meetings in a consistent fashion.	1	0.58	2		

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance			**Lowest Importance**	

Competency Category 4: Relationship Management

Name of Competency	Competency Description	IQR	SD	Group Median Rating	Your Round 3 Rating	New Rating
Displays gratitude.	Shows appreciation to stakeholders for their contribution.	1	0.58	2		
Creates cross disciplinary links.	Establishes connections that span professional silos, creating links that are meaningful for all.	1	0.73	2		
Ensures collaborative working.	Involves a broad range of people regularly and whenever feasible to ensure buy-in so that progress and results represent a group effort.	1	0.73	2		
Communicates progress.	Shares progress with internal and external stakeholders as well as with other colleagues across the health care system.	1	0.63	3		
Active listening.	Listens to others and actively hears their ideas and suggestions.	1	0.5	2		
Manages conflict.	Seeks to understand reasons for conflict between parties and manages this through discussion, mediation, negotiation and communication.	0.25	0.62	2		

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 5: Professional Ethics and Social Responsibility

Name of Competency	Competency Description	IQR	SD	Group Median Rating	Your Round 3 Rating	New Rating
Demonstrates commitment to agreed values and behaviours.	Acts consistently reflecting agreed values. Commits to embracing agreed behaviours and challenges compliance when behaviours are not aligned with the values of the organisation.	1	0.58	2		
Strives for ethical project delivery.	Implements meaningful change, seeking the most efficient processes to bring the greatest value to the customer.	1	0.63	2		
Demonstrates social awareness.	Demonstrates an ability to look outwards, learning about and appreciating others in their diversity, views and needs in an open and collaborative way.	1	0.95	2		
Confronts skills gaps.	Where coaching and mentoring is not working, has the courage to identify staff where performance management is required, with the potential that should a performance approach not work, utilises the HR process to remove or redeploy staff.	1	0.76	2		
Demonstrates commitment to principles.	Demonstrates consistency in their values and principles and shows courage in adhering to these.	1	0.5	2		
Awareness of scope of practice.	Does not suggest that staff members exceed their scope beyond established professional and personal competence.	1	0.97	3		

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

Competency Category 6: Managing Continuous Improvement.

Name of Competency	Competency Description	IQR	SD	Group Median Rating	Your Round 3 Rating	New Rating
Gathers customer feedback	Develops "voice of the customer" techniques to capture feedback from patients and internal customers.	1	0.65	1		
Deploys the lean management system.	Manages according to the principles of lean – providing clarity of direction, understanding current state, root cause analysis, creation of target conditions, delivery.	1	0.76	1		
Able to select and apply appropriate lean methods and tools	Demonstrates an understanding of how to plan a project and select and use the best tools and methods for the purpose.	1	0.85	3		
Balances the application of standard work with experimentation.	Recognises the importance of consistent adherence to agreed best practice, whilst simultaneously encouraging experiments to find better ways.	1	0.86	2		
Meetings management.	Ensure meetings are productive, efficient and not just talking shops that run over time without any agreed actions.	1	0.66	2		
Identifies and eliminates waste.	Demonstrates a strong desire to identify, eliminate and prevent the recurrence of waste.	1	0.65	1		
Understands Continuous Improvement Culture	Creates an attitude of improvement and demonstrates determination to achieve agreed target conditions.	1	0.5	1		
Adopts a systematic problem-solving approach.	Demonstrates knowledge of established continuous improvement cycles such as PDSA/PDCA and/or DMAIC and can apply these.	1	0.52	1.5		
Change management.	Develops guidelines to identify change needed and understands the reasons why change is necessary. Seeks to understand barriers to change from the perspective of others and takes action to address these.	0.25	0.62	2		

Rating Scale				
Expert	**Core**	**Supplementary**		**Remove**
Competency is critical for Lean improvement project success	Competency is necessary for Lean improvement project success.	Competency is necessary for Lean improvement project success but is useful frequently.	Competency is necessary for Lean improvement project success but is useful infrequently.	Competency is not useful for Lean improvement project success.
1	**2**	**3**	**4**	**5**
Highest Importance				**Lowest Importance**

You have fully completed the survey – thank for taking the time to contribute your responses.

Please save your final responses and return your completed survey to awalsh@wit.ie

The competency statements from the previous rounds that have already reached consensus are listed in the following pages.

Competency Category 1: Leadership: Competency Statements Achieving Consensus.

Competency Statements Achieving Consensus in Previous Rounds.

Name of Competency	Competency Description	Group Consensus Rating	Consensus Status
Leads by example.	Demonstrates leadership qualities and exhibits behaviours conducive to a lean environment such as trust, integrity, honesty and respect for people.	1	Consensus achieved.
Engages in participatory decision-making.	Encourages decision-making through consultation with others based around team-based problem solving.	2	Consensus achieved.
Creates a psychologically safe environment.	Develops an environment that is psychologically safe, allowing people to contribute ideas and insightful observations without fear of criticism or reproach.	1	Consensus achieved.
Encourages staff commitment.	Demonstrates an ability to achieve results through people by motivating and empowering subordinates.	2	Consensus achieved.
Leads with transparency.	Leads transparently, effectively communicating to others about progress, possible problems and planned changes.	2	Consensus achieved.
Engages in pragmatic decision-making	Encourages decision-making based on available evidence and choosing to move forward rather than wait for optimal conditions.	2	Consensus achieved.

Competency Category 2: Hospital and Healthcare environment:

Competency Statements Achieving Consensus in Previous Rounds.

Name of Competency	Competency Description	Group Median Rating	Consensus Status
Understands the regulatory environment.	Understands the role of government, regulatory, professional and accreditation bodies.	4	Consensus achieved.
Understands the political environment and health system drivers.	Understands the role of national policy, demographics, societal changes and public sector funding on the healthcare environment.	4	Consensus achieved.
Understands the resource implications of improvement decisions.	Understands the need to balance priorities in a resource constrained environment and demonstrates an ability to make effective resource deployment decisions.	2	Consensus achieved.
Demonstrates knowledge of hospital practices.	Demonstrates knowledge of professional and clinical practices and behaviours in different departments of the hospital.	3	Consensus achieved.
Appreciates patient value.	Demonstrates an ability to identify activities that add value for patients and understands the concept of patient-centred care.	1	Consensus achieved.
Communicates effectively with stakeholders.	Develops an awareness of the "different languages" in a hospital and can communicate effectively with the different stakeholders regarding improvement activities and how they add value.	2	Consensus achieved.
Understands the impact of change on people.	Understands the impact any planned change will have on the internal stakeholders (staff) and on the external stakeholders (patients and families).	2	Consensus achieved.

Competency Category 3: Business Skills.

Competency Statements Achieving Consensus in Previous Rounds.

Name of Competency	Competency Description	Group Median Rating	Consensus Status
Understands data.	Understands data on a scientific and technical level and appreciates the difference the difference between financial data and healthcare data.	2	Consensus achieved.
Uses appropriate data for decision-making.	Sources, understands and analyses both qualitative and quantitative data from internal and external sources to support effective decisions.	2	Consensus achieved.
Understands contracting and procurement processes.	Understands the importance of managing supplies across the organisational network and the contracting process in developing and maintaining relationships with suppliers.	3	Consensus achieved.
Financial management.	Understands, effectively uses and effectively communicates financial data.	3	Consensus achieved.
Measures key performance indicators as defined by organisation strategy.	Demonstrates an awareness of organisational and national key performance indicators and measures contribution towards achieving organisational goals and objectives.	2.5	Consensus achieved.
Resource management.	Plans, organises effectively and manages the resources of the organisation.	2	Consensus achieved.
Aligns project and corporate goals.	Demonstrates an ability to identify projects and actions that will meet and achieve corporate goals and the strategic direction of the organisation.	2	Consensus achieved.
Demonstrates commitment by delivering tangible wins.	Utilises the achievement of milestone targets to build momentum and maintain buy-in from the project team.	2	Consensus achieved.

Competency Category 4: Relationship Management

Competency Statements Achieving Consensus in Previous Rounds.

Name of Competency	Competency Description	Group Median Rating	Consensus Status
Identifies stakeholders.	Identifies stakeholders to ensure the right people are involved in improvement activity, including those outside of their own organisation/usual networks.	1	Consensus achieved.
Maintains stakeholder relationships.	Collaborates with others to maintain effective relationships with internal and external stakeholders.	2	Consensus achieved.
Understands and acknowledges power dynamics.	Demonstrates awareness of power dynamics and appropriately engages with the right people in the right order to bring about discussion, especially in relation to change.	2	Consensus achieved.
Partners in the value stream.	Ensures partners in other parts of the value stream are actively engaged with to check that they are aware of work in progress to allow them to understand potential changes and impacts.	2	Consensus achieved.
Maintains or develops relationships with similar areas of focus both inside and outside of the organization.	Develops relationships with other individuals and organisations that the team can engage with to see how others perform similar work thus enabling an appreciation of other approaches and methods.	3	Consensus achieved.
Works effectively with teams.	Develops and can work effectively with teams.	1.5	Consensus achieved.
Acknowledges that everyone is important.	Demonstrates that everyone's opinion and ideas are valued.	1	Consensus achieved.
Creates behavioural expectations.	Communicates and reinforces to team members the behaviours that are expected of them.	2	Consensus achieved.
Communication skills.	Demonstrates an ability to communicate in written and verbal communication formats.	2	Consensus achieved.
Respects others.	Understands how to engage with people, how to speak about people when they are not present, and how to address inadequacies in performance.	2	Consensus achieved.
Displays empathy and understanding	Demonstrates an ability to have empathy for others and seeks to understand the impact their decisions and the project/transformation will have on all people involved, both directly and indirectly.	2	Consensus achieved.

Competency Category 5: Professional Ethics and Social Responsibility

Competency Statements Achieving Consensus in Previous Rounds.

Name of Competency	Competency Description	Group Median Rating	Consensus Status
Demonstrates professional conduct and expects professional conduct from others.	Demonstrates an ability to conduct themselves in a competent, professional manner and acts with integrity. Expects a high level of integrity from the people they work with.	1	Consensus achieved.
Encourages ethical behaviour.	Demonstrates transparency in decision making and uses ethical and moral standards to make sound and fair decisions that include participants perspectives and considerations.	2	Consensus achieved.
Is inclusive and respectful.	Is inclusive and collaborative, respecting the team, past experiences, the patients and the environment.	1.5	Consensus achieved.
Acknowledges social context.	Demonstrates an awareness of the socioeconomic context of the organisation and does not seek to income generate from those who cannot afford to pay.	3	Consensus achieved.
Supports others and is mindful of the needs of staff.	Constantly celebrates the good work of the team and is aware of the interests and needs of staff members. Coaches, and mentors, others in their development.	2	Consensus achieved.
Demonstrates technical and professional expertise.	Competent in using the project tools and has professional expertise in the project subject. Engages with training and development opportunities as applicable.	2	Consensus achieved.

Competency Category 6: Managing Continuous Improvement.

Competency Statements Achieving Consensus in Previous Rounds.

Name of Competency	Competency Description	Group Median Rating	Consensus Status
Customer focused.	The manager should understand the tremendous responsibility entrusted to them by patients and understand it is their responsibility to make things better for them by providing value to them as customers.	1	Consensus achieved.
Involves patients, carers, and service users.	Adopts an empathetic approach that views healthcare services from the service-users perspective. Seeks the involvement of service users in service redesign.	1	Consensus achieved.
Manages Continuous Improvement.	Understand the components of a continuous improvement system including harvesting opportunities and commissioning and monitoring projects to improve performance.	2	Consensus achieved.
Advocates a GEMBA culture.	Creates a strong link between staff and management by bringing management to Gemba and giving voice to day-to-day staff problems.	1	Consensus achieved.
Demonstrates a commitment to stability.	Understands that reducing variation is fundamental to quality, safety, and improvement. Strives to improve the stability of processes.	1	Consensus achieved.
Able to select and apply appropriate quality methods and tools.	Demonstrates an ability to select and apply appropriate quality methods and tools, such as root-cause analysis and Six Sigma, to better understand process variation, engage in problem solving and recognise improvement opportunities.	2	Consensus achieved.
Demonstrates patience and a tolerance for failure.	Builds psychological safety in the context of experimentation, understanding that failure can be part of problem solving and recognises that problem solving is a process that requires creativity and idea generation.	1	Consensus achieved.
Understands Value Added Analysis.	Develops a lean culture which uses value added and non-value-added time study analysis.	2	Consensus achieved.

Competency Category 6: Managing Continuous Improvement.

Competency Statements Achieving Consensus in Previous Rounds.

Name of Competency	Competency Description	Group Median Rating	Consensus Status
Mapping processes.	Demonstrates an ability to conduct process mapping and Value Stream Mapping with the active involvement of staff, capturing and analysing current state data to identify improvement opportunities. Evaluates future state data to understand the impact that actions taken have had on value stream performance.	1	Consensus achieved.
Visualises performance.	Understand how to make process performance and abnormalities visible and actionable.	1	Consensus achieved.
Setting up and constructively using visual management boards	Understands that data-driven feedback is essential to learning, accountability and improvement. Uses the concepts of daily operations, status at a glance, performance improvement and continuous improvement huddles.	1	Consensus achieved.
Directly observes process activity.	Adopts the practice of Gemba walks to see what is happening in processes.	1	Consensus achieved.
Shares feedback.	Communicates feedback with relevant stakeholders in a non-judgmental way.	1	Consensus achieved.
Plans for sustainability.	Develops action plans that seek to sustain improvements and seeks to leverage project benefits by sharing learnings and knowledge with others.	1	Consensus achieved.
Acts as a coach and mentor to others.	Demonstrates an ability to coach others to identify and solve problems rather than just solve problems themselves.	2	Consensus achieved.
Promotes training and education.	Encourages participation in training and education programmes that support a sustained organisational approach to Lean Management.	2	Consensus achieved.

Appendix 8: Sample of email correspondence following up on the Fourth Round survey of the Modified Delphi study.

Dear Mr. / Ms.,

I hope that you are keeping well.

I am contacting you in relation to my research investigating management competencies for managing lean improvement projects in Irish hospitals. This research is now in its final stages and I am currently completing the final write up of the study findings.

I was hoping to follow up with you regarding your fourth-round survey response. In relation to the competency statement below, you gave a rating of 5, indicating that in your opinion that this competency should be removed.

Competency: Awareness of scope of practice.

Competency Description: Does not suggest that staff members exceed their scope beyond established professional and personal competence.

The consensus rating for the panel for this competency statement was 3 indicating that competency is necessary for lean improvement project success and used frequently.

Would it be possible for you to briefly explain your reasoning for indicating a rating of 5 for this competency?

Thanks in advance,
Aidan Walsh.

Appendix 9: Schedule of Interview questions.

Definition of a critical event:

By an event is meant any observable human activity that is sufficiently complete in itself to permit inferences and predictions to be made about the person performing the act. To be critical, an event must occur in a situation where the purpose or intent of the act seems fairly clear to the observer and where its consequences are sufficiently definite to leave little doubt concerning its effects.

Participants will be asked to consider both negative and positive events on the basis that a positive occurrence might indicate the utilisation of a competency that had a positive impact; whereas a negative occurrence might indicate a situation where the utilisation of a competency did not have the desired impact, or may indicate a competency deficiency.

General questions:
1) How much experience have you of working with lean work practices?
2) How many lean improvement projects have you been involved with?

Critical-Event Interview (Opening question):
Please describe a significant event that occurred during your term as the [position title] of a lean project in this hospital and consider the outcome. A significant event is an event outside of routine events, which triggered/hindered progress towards completion of project outcomes. Please think of an event that you can easily remember.

Critical-Event Interview (Follow-up probing questions):

- What happened next?
- Who was involved?
- What was the outcome?
- How would you describe your behaviour in managing this situation?
- How did you feel during this situation?
- Upon reflection, what behaviours contributed most to the outcome?
- What knowledge did you use in this situation?
- Did you use any specific lean tools in this situation?
- Did you utilise any specific abilities in this situation?
- What would have made the outcome different?
- What would you do differently if this situation arose again?

- The lean manager will be asked to rate the success of the lean project that they managed (as identified in the critical-incident interview) on a scale of 1-7. (7 indicating that the project was very successful, and 1 indicating the project was very unsuccessful).

Appendix 10: First-round Pilot Survey

RESEARCH AIM

This research survey forms part of a doctoral research study entitled, "An investigation of competencies for managing Lean projects in Irish hospitals: A mixed methods study".

The main aim of this research is to examine the competencies necessary to manage Lean improvement projects in Irish hospitals. Based on this examination, the research will seek to contribute to the theoretical knowledge of the competencies necessary to succeed in delivering Lean improvement initiatives at Irish hospitals and by extension provide organisations with a competency model that can guide their training, selection and personnel development activities with respect to Lean improvement initiatives.

This will be completed through the development of a competency model which will be refined by conducting critical-incident interviews with managers of Lean projects at Irish hospitals. Firstly it is necessary to develop a list of competencies as viewed by experts as necessary to successfully deliver and sustain Lean improvement activities in a hospital environment. This is the first of two surveys that seek to identify potential managerial competencies. The first survey seeks to identify a range of managerial competencies that will be further examined in a second more detailed survey. The results of these surveys will help refine the competency model that will be utilised in the latter stages of the research.

This survey is part of a pilot study that seeks to test and evaluate the design of the survey instruments that will be used during the research study. You will be asked to evaluate and critique this survey as part of the pilot study. Your feedback is really important and will be used to improve the design of the final survey instrument.

SURVEY INSTRUCTIONS

Please complete the survey in the following manner:

1. Please read each of the survey instructions and survey questions carefully.

2. It will be beneficial to read through the entire survey before you begin answering the survey questions. Consider printing a blank copy of the entire survey for reference purposes.

3. Review the operational definitions for all terms used in this survey.

4. For each competency category, generate two or more competencies for the successful manager/lead of a Lean project that you have envisioned. Provide a description of the behaviours that are linked to each competency that you have generated.

5. Please ensure that you answer each question on the survey.

6. Email the completed survey to **awalsh@wit.ie**

OPERATIONAL DEFINITIONS

The underlying key concepts that are examined in this research study are defined below.

Competency.

Competency is any characteristic or trait that an individual uses for successful or exemplary performance of any type. These 'performance tools' include an individual's knowledge, skills, thought patterns, mind-sets, social roles, and aspects of self-esteem or self-efficacy. A characteristic or trait is a competency only when its use can be proven to be necessary for successful performance of some type.

Managerial Competency.

Managerial competencies can be defined as a set of knowledge, skill, behaviour, ability and attitude that contributes toward an individual's effectiveness in a managerial position.

Competency Model.

Competency models refer to collections of knowledge, skills, abilities, and other characteristics (KSAOs) that are required for effective performance in the jobs in question.

Lean.

In Healthcare, Lean can be defined as a set of operating methods and philosophies that help create maximum value for patients while reducing wastes and waits.

Lean improvement projects.

This research is focusing on Lean improvement projects that are more substantial than short-term (Just-do-it) Lean improvement interventions, and less substantial than longer-term organisational Lean improvement initiatives. This research is focusing on the management of Lean projects of a duration that is longer than 3 months and less than 18 months.

Question 1

In your opinion, what *values* do managers of Lean projects in hospitals need to hold to be effective? Please be as detailed as possible and type your answer into the text box below.

Click here to enter text.

Question 2

In your opinion, what *knowledge* do managers of Lean projects in hospitals need to have acquired to be effective? Please be as detailed as possible and type your answer into the text box below.

Click here to enter text.

Question 3

In your opinion, what *skills* do managers of Lean projects in hospitals need to practise to be effective? Please be as detailed as possible and type your answer into the text box below.

Click here to enter text.

Question 4

In your opinion, what *behaviours* do managers of Lean projects in hospitals need to exhibit to be effective? Please be as detailed as possible and type your answer into the text box below.

Click here to enter text.

Question 5

Please list the five competencies that you consider to be most important for managers of Lean projects in Hospitals.

Click here to enter text.

Click here to enter text.

Click here to enter text.

Click here to enter text.

Click here to enter text.

Question 6

Under the competency domain of "**Leadership**" please generate at least two or more competencies for managing Lean projects in hospitals. Provide a brief description of the behaviours that are linked to each competency that you have generated.

For example, you might identify the competency "*Leads by Example*" and then briefly describe the behaviours linked to that competency.

COMPETENCY DOMAIN: LEADERSHIP

Name of Competency	Description
Leads by Example (SAMPLE)	Demonstrates leadership qualities and exhibits behaviours conducive to a lean environment such as trust, integrity, honesty and respect for people.

Question 7

Under the competency domain of "**Hospital Management and Healthcare Environment**" please generate at least two or more competencies for managing Lean projects in hospitals. Provide a brief description of the behaviours that are linked to each competency that you have generated.

For example, you might identify the competency "*Understands the regulatory environment*." and then briefly describe the behaviours linked to that competency.

COMPETENCY DOMAIN: HOSPITAL MANAGEMENT AND HEALTHCARE ENVIRONMENT.

Name of Competency	Description
Understands the regulatory environment. (SAMPLE)	Understands the role of government, regulatory, professional and accreditation bodies.

Question 8

Under the competency domain of **"Business Skills"** please generate at least two or more competencies for managing Lean projects in hospitals. Provide a brief description of the behaviours that are linked to each competency that you have generated.

For example, you might identify the competency "Uses appropriate data for decision-making" and then briefly describe the behaviours linked to that competency.

COMPETENCY DOMAIN: BUSINESS SKILLS.

Name of Competency	Description
Uses appropriate data for decision-making. (SAMPLE)	Sources, understands and analyses both qualitative and quantitative data from internal and external sources to support effective decisions.

Question 9

Under the competency domain of "**Relationship Management**" please generate at least two or more competencies for managing Lean projects in hospitals. Provide a brief description of the behaviours that are linked to each competency that you have generated.

For example, you might identify the competency "*Maintains stakeholder relationships*" and then briefly describe the behaviours linked to that competency.

COMPETENCY DOMAIN: RELATIONSHIP MANAGEMENT.

Name of Competency	Description
Maintains stakeholder relationships. (SAMPLE)	Collaborates with others to develop and maintain effective relationships with internal and external stakeholders.

Question 10

Under the competency domain of "**Professional Ethics and Social Responsibility**" please generate at least two or more competencies for managing Lean projects in hospitals. Provide a brief description of the behaviours that are linked to each competency that you have generated.

For example, you might identify the competency "*Demonstrates professional conduct*" and then briefly describe the behaviours linked to that competency.

COMPETENCY DOMAIN: PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY.

Name of Competency	Description
Demonstrates professional conduct. (SAMPLE)	Demonstrates an ability to conduct themselves in a competent, professional manner and acts with integrity.

Question 11.

Under the competency domain of "**Lean Management**" please generate at least two or more competencies for managing Lean projects in hospitals. Provide a brief description of the behaviours that are linked to each competency that you have generated.

For example, you might identify the competency "*Gathers customer feedback*" and then briefly describe the behaviours linked to that competency.

COMPETENCY DOMAIN: LEAN MANAGEMENT.

Name of Competency	Description
Gathers customer feedback. (SAMPLE)	Develops "voice of the customer" techniques to capture feedback from patients and internal customers

Question 12.

If you would like to add any competency domains that were not listed above, please do so below and generate the corresponding competencies for that competency domain.

ADD NEW COMPETENCY DOMAIN: Click here to enter text.

Name of Competency	Description

ADD NEW COMPETENCY DOMAIN: Click here to enter text.

Name of Competency	Description

ADD NEW COMPETENCY DOMAIN: Click here to enter text.

Name of Competency	Description

YOU HAVE NOW COMPLETED THIS SURVEY - THANK YOU.

CRITIQUE OF INITIAL COMPETENCY SURVEY

Now that you have completed the initial competency survey, please answer the following critique questions.

Try to write a response for each question. Keep in mind that your input will help to improve this survey for other participants. Your feedback is very valuable!

1) Which statements in the introduction of the initial competency survey could be reworded or restated more clearly for study participants?

a) Which specific statements?
b) How would you reword them?

Click here to enter text.

2) Could additional information be added to the introductory statement of the initial competency survey about the nature of the study?

How does this information help the participant?

Click here to enter text.

3) Which sentences in the instructions of the initial competency survey could be more clearly written?

a) What are the specific statements that might confuse participants, why?

b) How would you reword them?

Click here to enter text.

4) After reading the instructions, what did you not understand about how to complete the initial competency survey?

a) Did you have to reread the directions?

b) If so, at what point did you reread the directions?

c) How many times?

Click here to enter text.

5) How was your understanding of the initial competency survey shaped by the operational definitions?

a) Which operational definitions could be added?

b) Which operational definitions need further clarification?

Click here to enter text.

6) Did you experience any difficulties in completing the initial competency survey? Please describe any difficulties that you encountered?

Click here to enter text.

7) How long did it take you to complete the initial competency survey?

Click here to enter text.

THANK YOU FOR COMPLETING THE CRITIQUE OF THE INITIAL COMPETENCY SURVEY.

Appendix 11: Index of training, seminars, fora, and conferences attended by the researcher since commencing the programme of research.

Training and other events attended (including external visits).

The researcher has undertaken the following training to support his research activities.

DATE	TRAINING ACTIVITY
October 5th 2016	Research Postgraduate Induction.
October 5th 2016	Introduction/Networking Event –Balancing Multiple Demands in Research delivered by Ms. Breda Heavey and Dr. Annette Murphy.
November 10th 2016	Time Management – Planning and Prioritising, Maintaining Motivation delivered by Dr. Felicity Kelliher.
November 17th 2016	Managing yourself and your time delivered by Dr. Felicity Kelliher.
November 23rd 2016	How to do the Literature Review delivered by Dr. Tom Egan.
December 15th 2016.	Introduction to End Note delivered by Ms. Claire Kennedy.
January 18th 2017	Collecting and Managing Data/Information delivered by Dr. Chris O'Riordan.
March 8th 2017	Academic Writing: Writing for Publications delivered by Dr. Brendan Jennings.

Seminars, fora, and networking events attend by researcher.

DATE	EVENT ATTENDED
October 26th 2016	WIT Lean Practitioner Seminar Series – SMED delivered by Mr. Bill Stacey, Caratmundi.
November 16th 2016	WIT Lean Practitioner Seminar Series – Lean Coaching delivered by Ms. Cathy Mullins, Genzyme-Sanofi.
December 14th 2016	WIT Lean Practitioner Seminar Series – Value Stream Mapping delivered by Mr. Pat Mulvee, Boston Scientific.
February 14th 2017	National Healthcare Expo at Citywest, Dublin.
February 15th 2017	WIT Lean Practitioner Seminar Series – 5S delivered by Mr. Pat Power, Keltech.

March 15th 2017	WIT Lean Practitioner Seminar Series - Lean in Hospitality delivered by Mr. Paul Broderick, Pembroke Hotel.
May 4th 2017	WIT Annual Lean Forum.
July 7th 2017	Lean Showcase Event, Aut Even Hospital, Kilkenny
October 18th 2017	WIT Lean Practitioner Seminar Series – Encouraging Employee Creativity delivered by Mr. Joe Fitzgerald, Owner – Microfix, Niggle.ie
February 14th 2018	WIT Lean Practitioner Seminar Series – The Lean Maintenance Journey delivered by Joe O'SulliVan, Teva Pharmaceuticals.
March 14th 2018	WIT Lean Practitioner Seminar Series – The Power of Coaching delivered by Mr. Trevor Doherty, Merck/MSD Carlow.
May 3rd 2018	WIT Annual Lean Fourm.

Seminar and conference presentations made and publication record.

The researcher delivered/co-delivered presentations at the following conferences.

DATE	**EVENT**	**TITLE**
2/12/2016	Shingo European Conference, Copenhagen.	The Lean Journey: Have we got it Wrong? – (co-presented with Prof. Peter Hines and Mr. Darrin Taylor).
9/05/2017	WIT Research Review Seminar	An exploration of managerial competencies required to successfully deliver Lean improvement initiatives in an Irish Healthcare context.
15/05/2017	WIT Research Day 2017.	Poster Presentation.
15/05/2017	WIT Research Day 2017.	One-minute research pitch.
30/8/2017	Irish Academy of Management Conference: Doctoral Colloquium.	The case for understanding the managerial competencies that influence Lean implementations in Irish healthcare.

Appendix 12 – Raw Codes Generated Under Question 1 of the First-Round Delphi Survey			
Appreciates the input of all project participants; Approachable; Authenticity; Be comfortable with failure - not all things they try will be successful; Belief in person centred care – working together for patients, Calmness; Care for the patient; Coaching; Collaboration; Commitment - committed to whatever project they are working on; Commitment to improving working lives –for staff and team members; Commitment to the process and program; Commitment to the quality of care – provision of the best possible care; Compassion for patients and staff; Competency; Competitive - want to be better than others; Consistency in support, advice and actions; Constancy of purpose, Continuous improvement; Co-production and co-design; Courage - to admit past mistakes; Courage - to challenge others. curious - needs to understand how things work; Customer focused - patient focused; dedication and choices; Demonstrate humility - an acceptance of and even a search for failure; Desire to improve/get better; Determination; Developing people first; Differentiate value from 'value'	Dignity; Embrace and respect diversity; Embrace scientific thinking; Empathy is to be in place of others; End customer-focused value; End to End; Equality; Every voice counts; Excellence - sustain a high level of trust in products or processes; Fairness and social justice; Flexible; Flow and pull value, Focus on process; Hear others; Highlighting your own mistakes will help foster an environment where others can do the same; Honest - honest and open with the stakeholders; Humble inquiry; Humility; I'm not sure that Lean is best enacted and sustained in hospitals if it is delivered in a 'project' way; Impartiality; Improve the work of a healthcare institution that provides care to patient; Insisting on quality and striving to get the basics of quality of care right every time; Integrity and ethical behaviour; Integrity in relationships; Involving those who do the work to improve the work; Justice; Knowledge; Lead with humility; Leadership by example; Learning by doing; Learning from these can be built into new processes and ways of working.	Learning; No blame; Failure in PDSA is ok; Listening; Managers must have values that are compatible with the project participants / wards; Mapped their own values and beliefs; Meaningful work; Motivation; Non-judgemental; Open-minded – a willingness to try ideas; Openness; Participatory mindset; Patience; Patient and staff focused; Patients come first in everything we do, persistent - may need to try several attempts before achieving success; Person centredness; Personal Commitment and Service; Problem solving; Process thinking; Professionalism, Pursue perfection, Quality at the source, Reliable systems; Improving people; Facts; Direct observation of processes; Resilience; Respect for others - patients, staff, organisation, teams, resources; Respect for people and society; Simplicity on the mindset approach - solve complex problems with elementary tools.	Social consciousness; Someone who asks questions and listens effectively; Teamwork The people who do the work, improve the work; Think systemically; Transparency; Trustworthiness; Understanding and valuing patient safety over all else; Understanding the immediate versus longer term improvement; Using data; Value to the customer, Values data and evidence; Valuing 'right first time'; Valuing the individuals wishes and requirements for their own care; What is actually happening; What is value to patients; Willing to experiment/try new things -break new ground; Seek breakthrough performance;

Appendix 13: Main reported theme of critical events and corresponding valence (signifying if action taken was effective, partially effective or ineffective) in progressing the lean project.

	Critical event and corresponding valence		
	Effective	*Partially effective*	*Ineffective*
Stakeholder management and engagement.	CE1, CE5, CE8, CE9, CE10, CE20, CE28	CE11, CE12	CE 2, CE3, CE15, CE16, CE21, CE23, CE30, CE37
Utilising data for informed decision making.	CE6, CE10, CE22, CE29, CE32	CE11	CE19
Project management skills.	CE7, CE31		CE25, CE33, CE35
Reporting success and obtaining recognition	CE9, CE18, CE26		
Utilising standard work practices.	CE13, CE14, CE38		CE39
Understanding the voice of the customer.	CE4, CE24, CE27		

Individual incidences reported:

CE17 – Technology and equipment constraints elevated following a machine breakdown.

CE36 – Business case for minor project funding was initially rejected impeding project progress.