The Role of Governance Mechanisms on the Diffusion of Innovation in Healthcare Networks

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Abstract

This research investigated innovation diffusion in healthcare networks, focusing on the roles of contractual and relational governance mechanisms. The National Health Service (NHS) England is faced with many challenges, including an ageing population, austerity measures, changes in public expectations in terms of quality of healthcare delivery, advances in technology and medicines, and pressure to do more with less resources (Lacobucci, 2017; Wollaston, 2017). Several studies and practitioner reports identify innovation within healthcare networks as a means of dealing with the current challenges in NHS England (see Nicholson, 2011; Ham and Murray, 2015; Parris et al., 2016). Consequently, innovation is now at the heart of the healthcare agenda, with much of the rhetoric focused on the ability of NHS England to diffuse and adopt innovations (Barnett et al., 2011).

Increasingly, studies are highlighting the linkages between innovation diffusion and governance, with many commentators suggesting that governance has an influence on innovation diffusion (Hartley, 2005; Savedoff, 2009; Mikkelsen-Lopez et al. 2011 Barbazza and Tello, 2014). Focusing on healthcare networks, researchers have stressed that governance is a function of mechanisms or processes which are formally and informally used to distribute responsibilities among actors (Kaufmann et al., 1999; WHO, 2007; Siddiqi et al., 2009). Governance affects the organisational environment in which innovation diffusion decisions are made and is typically believed to be represented by contractual and relational rules of exchange between the actors (Vandaele et al., 2007). Existing investigations have recognised that contractual and relational mechanisms play a significant role in networks (Cannon et al., 2000; Poppo and Zenger, 2002; Yang et al., 2012; Cao and Lumineau, 2015), but the nature of such roles and their interplay has not been established in relation to the diffusion of innovation in healthcare networks, particularly where a bottom-up, rather than top-down, approach to innovation has been employed. The bottom-up process of innovation diffusion highlights the key steps taken during diffusion process, whereby opportunities are created for individuals at the low and mid-level of an organisation to own the innovation, share ideas, and take decisions that enhance the diffusion process (Parnaby and Towil, 2008). This is in contrast to top-down diffusion processes, which are characterised by senior management staff developing innovation diffusion pathways that are expected to be embraced by frontline staff.

Building on a review of relevant literature that included innovation diffusion, networks, governance, and contractual and relational governance mechanisms, an initial conceptual framework was developed. The study employed this framework to examine the role of governance mechanisms on the diffusion of innovation in healthcare networks, focusing on a

regional Academic Health Science Network (AHSN) network. The research adopted a case study methodology (Yin, 2014) and employed a single case design with multiple embedded sub-units of analysis. The study is part of a large collaborative research programme carried out by a multidisciplinary group of academics drawn from three different universities to evidence the value of the AHSN. The AHSN represented the single case and this study presents two of the seven embedded sub-units that were selected as projects supported by the AHSN that employed a bottom-up approach to innovation diffusion. The first sub-embedded unit focused on five maternity units and the second on eleven general practices in one English healthcare region. The research data were collected over an eighteen-month period, and incorporated multiple sources of evidence, including semi-structured interviews, observations and secondary data analysis.

The findings indicated that the diffusion of innovation in regional healthcare networks can be promoted via a bottom-up approach enabled through the parallel use of formal governance mechanisms, in this case contracts, and relational governance mechanisms such as trust, information exchange and reputation. The research study also uncovered the key role played by boundary spanners and gatekeepers in orchestrating the innovation diffusion process through, for instance, the connection of experts and industry partners. Based on these findings, the research suggests that, when employing a bottom-up approach to innovation diffusion in healthcare networks it is important that the interplay between contractual and relational governance mechanisms is carefully managed, and that key actors are identified that can operate as boundary spanners and gatekeepers, supporting and championing the diffusion of innovations throughout the healthcare network.

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Table of contents

ABSTRACT **2**

ACKNOWLEDGEMENTS **4**

LIST OF TABLES **10**

LIST OF FIGURES **11**

CHAPTER 1: INTRODUCTION TO THE THESIS **12**

1.1 INTRODUCTION 12

1.2 THE INNOVATION CHALLENGE – THE CONTEXT OF THE NHS 12

1.3 DIFFUSION OF INNOVATION IN NHS ENGLAND 13

1.3.1 The role of governance on the diffusion of innovation in NHS England *14*

1.3.2 Healthcare networks *15*

1.3.3 The Academic Health Science Network (AHSN) *16*

1.4 AIMS, OBJECTIVES AND RESEARCH QUESTIONS 17

1.5 CONTEXT OF THE RESEARCH AND METHODOLOGY 18

1.6 STRUCTURE OF THE THESIS 19

1.6.1 Chapter 2: Innovation diffusion *19*

1.6.2 Chapter 4: Governance mechanisms *20*

1.6.3 Chapter 5: Research methodology *20*

1.6.4 Chapter 6: Findings and analysis *20*

1.6.5 Chapter 7: Conclusions and limitations of the study *20*

CHAPTER 2: INNOVATION DIFFUSION **22**

2.1 INTRODUCTION 22

2.2 TOWARDS A DEFINITION AND MEANING OF INNOVATION 22

2.3 INNOVATION DIFFUSION 25

2.3.1 Theory of Reasoned Action (TRA) *26*

2.3.2 Theory of Planned Behaviour (TPB) *27*

2.3.3 Diffusion of Innovation Theory (DOI) *28*

2.4 DIFFUSION VERSUS ADOPTION 29

2.5 ADOPTER CATEGORIES 30

2.5.1 Innovators and early adopters *30*

2.5.2 Early majority, late majority and laggards *31*

2.6 INNOVATION ATTRIBUTES 32

2.6.1 Relative advantage *32*

2.6.2 Compatibility *32*
2.6.3 Complexity *33*
2.6.4 Trialability *33*
2.6.5 Observability *34*
2.7 THE DECISION TO ADOPT OR REJECT AN INNOVATION 34
2.7.1 Adoption at the organisational level *35*
2.7.2 Adoption at the level of the individual *35*
2.8 THE BOTTOM-UP VERSUS TOP-DOWN PROCESS OF INNOVATION DIFFUSION 37
2.9 UNDERSTANDING THE BARRIERS TO INNOVATION DIFFUSION 38
2.9.1 Organisational context *38*
2.9.2 Innovation fit *39*
2.9.3 Knowledge and attitudes towards the innovation *39*
2.9.4 Organisational processes *40*
2.9.5 Professional networks *42*
2.9.6 Staff motivation: rewards and incentives *43*
2.10 SUMMARY 44
CHAPTER 3: NETWORKS 47
3.1 INTRODUCTION 47
3.2 WHAT IS A NETWORK? 47
3.3 FORMALITY IN NETWORK: FORMAL AND INFORMAL NETWORKS 48
3.4 INTERORGANISATIONAL NETWORKS 50
3.4.1 Interorganisational networks and public sector organisations *51*
3.5 NETWORK MOTIVATION, STRONG AND WEAK TIES 52
3.6 BENEFITS OF NETWORK FORMATION 54
3.6.1 Creation and diffusion of innovation *54*
3.6.2 Access to new knowledge *54*
3.6.3 Legitimisation *55*
3.6.4 Access to external resources *56*
3.7 HEALTHCARE NETWORKS 56
3.8 GATEKEEPERS AND BOUNDARY SPANNERS 57
3.8.1 Gatekeepers *58*
3.8.2 Boundary spanners *59*
3.8.3 The role of gatekeepers and boundary spanners during the process of innovation diffusion 60

3.9 SUMMARY 61

CHAPTER 4: GOVERNANCE OF INTERORGANISATIONAL NETWORKS 64

4.1 INTRODUCTION 64

4.2 GOVERNANCE PARADIGMS 64

4.3 GOVERNANCE: TOWARDS A DEFINITION 66

4.4 NETWORK GOVERNANCE 67

4.5 CONTRACTUAL GOVERNANCE MECHANISMS 70

4.5.1 Formal contracts 70

4.6 RELATIONAL GOVERNANCE MECHANISMS 72

4.7 CONTRACT FUNCTIONS 73

4.7.1 Protection against opportunistic behaviour 73

4.7.2 Organisational learning 74

4.7.3 Coordination of exchange relationships 75

4.8 RELATIONAL GOVERNANCE: TRUST AND RELATIONAL NORMS 75

4.8.1 Interpersonal and interorganisational trust 76

4.9 RELATIONAL NORMS 77

4.9.1 Flexibility 78

4.9.2 Information exchange 78

4.9.3 Mutuality 79

4.10 CHAPTER SUMMARY 79

4.11 CONCEPTUAL FRAMEWORK AND RESEARCH QUESTIONS 80

CHAPTER 5: RESEARCH METHODOLOGY 82

5.1 INTRODUCTION 82

5.2 RESEARCH PHILOSOPHY 82

5.3 ONTOLOGICAL UNDERPINNING 82

5.4 EPISTEMOLOGICAL UNDERPINNING 83

5.4.1 Interpretivism and positivism 83

5.4.2 Critical realism 85

5.5 RESEARCH STRATEGY 86

5.5.1 Case study research design 88

5.5.2 Critiques of case study design 89

5.5.3 Selection of the embedded sub-units of analysis: the rationale 91

5.5.4 Unit of analysis 91

5.5.5 The embedded sub-units of analysis 92

5.5.6 Ensuring validity and reliability *94*
5.6 ETHICAL CONSIDERATIONS 97
5.6.1 Gaining informed consent and protecting the participants *97*
5.6.2 Anonymity *97*
5.7 SOURCES OF EVIDENCE 98
5.7.1 Semi-structured interviews *99*
5.7.2 Documentation and sampling of the documentation *100*
5.7.3 Participant observation and sampling of the participant observations *103*
5.8 CONVENIENCE SAMPLING: THE SELECTION OF THE EMBEDDED SUB-UNITS 104
5.8.1 Participant selection *105*
5.9 ANALYSIS 107
5.9.1 Developing a case description for the study: interview data *108*
5.9.2 Observation and documentary data *111*
5.10 CHAPTER SUMMARY 112
CHAPTER 6: FINDINGS AND ANALYSIS 113
6.1 INTRODUCTION 113
6.2 FORMAL CONTRACTS 113
6.2.1 The role of contracts in supporting and motivating participant involvements *114*
6.2.2 Improved coordination and performance *116*
6.2.3 Mutual communication framework – the key role of infographics *117*
6.3 THE ROLE OF RELATIONAL MECHANISMS: COMPETENCY-BASED TRUST AND RELATIONAL NORMS 120
6.3.1 Competency-based trust *120*
6.3.2 Flexibility *122*
6.3.3 Informal communication *123*
6.4 DUAL USE OF CONTRACTUAL AND RELATIONAL MECHANISMS 125
6.5 BOUNDARY SPANNERS 140
6.6 GATEKEEPERS 143
6.7 DISCUSSION OF THE FINDINGS 147
6.7.1 The role of contracts in supporting and motivating participant involvements *147*
6.7.2 The Influence of relational governance mechanisms *148*
6.7.3 The dual roles of contractual and relational mechanisms (interplay) *150*
6.7.4 Boundary spanners *151*
6.7.5 The role of gatekeepers *153*
6.8 TOWARDS A REFINED CONCEPTUAL FRAMEWORK 154

6.8.1 Chapter summary 158

CHAPTER 7: CONCLUSIONS 159

7.1 INTRODUCTION 159

7.2 RESEARCH QUESTION 1: HOW DO CONTRACTUAL AND RELATIONAL GOVERNANCE MECHANISMS INFLUENCE THE DIFFUSION OF INNOVATION IN HEALTHCARE NETWORKS? 159

7.2.1 Contractual governance role 159

7.2.2 Relational mechanism roles 160

7.3 RESEARCH QUESTION 2: WHO ARE THE KEY ACTORS INVOLVED IN THE DIFFUSION OF INNOVATION IN HEALTHCARE NETWORKS? 162

7.4 RESEARCH QUESTION 3: HOW DO THE KEY ACTORS INFLUENCE THE PROCESS OF INNOVATION DIFFUSION IN HEALTHCARE NETWORKS? 163

7.5 THEORETICAL IMPLICATIONS 164

7.6 IMPLICATIONS FOR PRACTICE 166

7.7 LIMITATIONS OF THE STUDY 167

7.8 RECOMMENDATIONS FOR FUTURE RESEARCH 168

REFERENCES 170

APPENDIX 1 193

APPENDIX 2: EXAMPLE FROM NVIVO ANALYSIS 196

APPENDIX 3: COPYRIGHT CLEARANCE CERTIFICATE 1 198

APPENDIX 4: COPYRIGHT CLEARANCE CERTIFICATE 2 199

List of Tables

Table 4.1: Changing conceptions of governance (adapted from Bennington and Hartley, 2001) 65

Table 5.1: Interpretivism and positivism 84

Table 5.2: Relevant contexts for different research methods 87

Table 5.3: Establishing validity and reliability in case study design 96

Table 5.4: Advantage and disadvantages of the sources of evidence 98

Table 5.5: Description of documents used in this study 101

Table 5.6: Overview of the interviewees 106

Table 5.8: Examples of the stage 1 coding process 109

Table 5.9: Stage 2 coding process: the child codes 111

Table 6.1: Key actors in the persuasion stage of Unit A 128

Table 6.2: Key actors in the decision stage of Unit A 131

Table 6.3: Key actors in the implementation stage of Unit A 133

Table 6.4: Key actors in the persuasion stage in Unit B 135

Table 6.5 Key actors at the decision stage in Unit B 137

Table 6.6: Key actors in the implementation stage 139

Table 7.1: Key actors involved in the diffusion of innovation for the Unit A intervention ..... **Error! Bookmark not defined.**

Table 7.2: Key actors involved in the diffusion of innovation for the Unit B intervention ..... **Error! Bookmark not defined.**

List of Figures

Figure 2.1: Conceptual framework and diffusion of innovation 45

Figure 3.1: conceptual synthesis of network roles on the diffusion of innovation 63

Figure 4.1: The initial conceptual framework 80

Figure 5.1: Single case with embedded units of analysis 92

Figure 6.1: Comprehensive conceptual framework showing the research findings 156

Chapter 1: Introduction to the thesis

1.1 Introduction

Confronted by numerous and immediate challenges such as an ageing population, austerity measures and advances in technologies, NHS England is under increasing pressure to do more with less resources (Lacobucci, 2017; Wollaston, 2017). Evidently, these challenges hinder NHS England's ability to provide "universal, equitable, comprehensive and high-quality healthcare services to patients and the general public" (Lacobucci, 2017, p. 1), and in recent years there has been mounting political and academic rhetoric centred on the role of innovation in addressing many of these challenges (Albury, 2005, DH, 2011; OECD, 2013). For example, a report by Sir David Nicholson for the Department of Health (DH), "Innovation, Health and Wealth: Accelerating Adoption and Diffusion of Innovation in the NHS" (DH, 2011), identified innovation as one of the key factors in meeting the increasing demand by patients and the general public for quality healthcare services within NHS England. Further reports suggest that, to meet current healthcare challenges, NHS England needs to adapt and take advantage of the opportunities that innovation offers to the sector (Ham and Murray, 2015). A similar view is echoed by Parris et al. (2016), who argue that the NHS can improve healthcare services through the use and adoption of innovative activities. This perspective implies that innovation is now placed at the heart of the healthcare agenda as one of the means of tackling the current challenges in NHS England (Barnett et al., 2011).

Consequently, there is a need for further studies to be undertaken to understand the steps that are required to promote the use of new products, processes and therapies in the NHS (Adams et al., 2011). If the enablers are not recognised, understood, documented and widely spread, it is very difficult to comprehend how the spread of innovation will be achieved within NHS England (Parnaby and Towil, 2008).

This chapter outlines the innovation challenge currently facing NHS England. It goes on to provide an overview of the Academic Health Science Network (AHSN), the research context and methodology, and the study aims and objectives. The chapter ends by presenting the structure of the thesis, providing a summary of each chapter.

1.2 The Innovation challenge – the context of the NHS

A recent study established that the ageing population is currently the most prevalent problem in the UK healthcare sector, and a major cause for concern for healthcare providers (Lacobucci, 2017). Wollaston (2017) considered the current pressure on the UK healthcare sector,

particularly the NHS, and noted that in the UK the number of people living to age 85 and beyond increased by 31% between the years 2005 to 2015. By 2024, there will be more people aged over 65 than ages 0 to 15 (ONS, 2015). The study also found a consistent increase in the number of people living with chronic conditions, particularly in England, with an increase from 1.9 million to 2.9 million since 2008. The impact of this challenge has been reflected in UK NHS current expenditure. According to the UK Department of Health (DH, 2016), long-term health conditions account for 70% of total health and social care expenditure in England (DH, 2013; Lacobucci, 2017).

Current studies have also shown a decrease in the UK government's response to funding healthcare services (Tunrberg, 2015; Wollaston, 2017). Within the last Parliament, funding for the NHS increased annually by only 1.1%, far below the actual increase in costs or the long term average of around 3.8% since 1978 (Office for Budget Responsibility, 2016). This implies that by 2021, the NHS will be faced with a possible underfunding of £30 billion (Tunrberg, 2015), with GDP expenditure falling to 6-7%, compared with 8.4% in 2010 (Appleby et al., 2014). However, despite the introduction of austerity measures by the current UK government, a growing population and a continuing demand from patients for higher quality healthcare services within the UK healthcare sector has intensified the pressure on the NHS to do more with less resource (DH, 2011; OECD 2013). According to Lacobucci (2017, p. 2), "72% of patients and the general public expect the NHS to provide drugs and treatments irrespective of cost, an impossible demand in today's financial climate". In response to this pressure, the NHS is increasingly looking towards innovative ways of delivering exceptional yet cost-effective healthcare (Tunrberg, 2015).

1.3 Diffusion of innovation in NHS England

The UK healthcare sector has increasingly become a focus of attention amongst scholars of innovation management (Barnett et al., 2011), particularly with respect to the adoption and diffusion of innovation into NHS England. In 2002 an influential report, entitled "Securing Our Future Health, Taking a Long-Term View", by Derek Wanless (2002), found the NHS to be a slow adopter of new technologies and innovation. Other reports acknowledged that although the UK healthcare sector remains a world leader in healthcare innovation, it is slow in the uptake of innovation, with even the best innovations failing to achieve widespread use (DH, 2011; OECD, 2013; OECD, 2015).

For the purpose of this study, innovation is defined as an "idea, service or product, new to the healthcare sector, which significantly improves the quality of health and care wherever it is applied" (DH, 2011, p. 9). Diffusion is defined as "the process by which an innovation is communicated through certain channels over time among the members of a social system"

(Rogers, 2003, p. 5). Examples of innovation within NHS England include new drugs, improvements in surgical equipment, development of devices and machinery, patient education and service delivery models (Mulgan and Albury, 2003; Dixon-Woods et al., 2011). However, as Phillips et al. (2011) have found, the uptake of innovations into the NHS and healthcare networks has been hindered by competing vested interests and silo mentalities within the NHS, which have been further exacerbated by muddied, top-down government directives (Phillips et al., 2011). Prescriptive government advice has been found to hinder the diffusion of innovations in the NHS (Nutley and Davies, 2000; Greenhalgh et al., 2004), which has been further compounded by a fragmented NHS, regularly restructured through central governance (Nutley and Davies, 2000). The result of such structural instability forces the NHS to operate within its comfort zone and provide similar types of services, rather than adapting and embracing innovations (Nutley and Davies, 2000).

According to Sydow at al. (2012), major barriers to the diffusion of innovations in the majority of healthcare organisations, such as NHS England, are the use of top-down communication and implementation approaches, and neglect of the value created by frontline staff and middle managers. Other barriers to innovation diffusion in NHS England are the failure of healthcare policy makers either to involve and empower healthcare professionals in an appropriate manner, or to coordinate their activities and processes towards performance improvement. In the NHS, a lack of effective integration of the right professionals and resources has aggravated the slow diffusion and adoption of innovations (Parnaby and Towil, 2008). Consequently, crucial questions that need to be addressed include: could the integration of healthcare professionals and industry partners into the diffusion process make any useful, positive impact on the innovation diffusion process? Who are the key professional actors? What are their roles in facilitating the diffusion of innovation in healthcare networks?

1.3.1 The role of governance on the diffusion of innovation in NHS England

In recent years, increasing attention has focused on the effect of governance on the diffusion of innovation in the healthcare sector (Lewis, 2006; Provan and Kenis 2007; Savedoff, 2009; Klijn et al., 2010). Barbazza and Tello (2014) undertook a study of governance, providing an overview of how it could be employed to resolve the barriers to diffusion in healthcare networks such as NHS England. In defining governance, this study draws on the work of Rhodes (2007, p. 4) to define governance as “a new process of governing; or a changed condition of ordered rule or the method by which the society is governed”. This implies that governance is a function of mechanisms or

processes which are formally and informally used to distribute responsibilities among actors within a given society or setting (Kaufmann et al., 1999).

Governance mechanisms can be viewed as the formal and informal rules of exchange between healthcare partners (North, 1990; Vandaele et al., 2007). These mechanisms include contracts and relational mechanisms that are derived from trust and relational norms (Griffith and Myers, 2005; Vandaele et al., 2007). Contractual and relational mechanisms are important in coordinating actors, resources, and activities between healthcare professionals over an extended period of time (Zheng et al., 2008; Caldwell et al., 2009). Relational norms are considered as behavioural guidelines that enforce social obligations during exchange relationships (Heide, 1994; Cannon et al., 2000). Focusing on interorganisational networks, various studies have reported on the positive effects of contractual and relational mechanisms on innovation diffusion (Pittaway et al., 2004; Isett et al., 2011; Cao and Lumineau, 2015). In view of this, there is an urgent need to examine the influence of the combined use of contractual and relational mechanisms on healthcare innovation diffusion.

1.3.2 Healthcare networks

Evidence from official reports and publications demonstrates that the diffusion of innovation in the NHS has remained a high priority agenda for healthcare policy-makers (Phillips et al., 2011). In 2011, the Chief Executive of NHS England (DH, 2011) announced that innovation has a vital role to play in improving the quality of care for patients, increasing productivity, and enabling NHS England to contribute as a major investor and wealth creator in the UK. The report called for strong relationships between industry and the UK's scientific and academic communities in order to develop solutions to healthcare problems, and to enhance the pace and scale at which existing solutions are diffused into NHS England. As identified by Johnsen et al. (2006), empirical analysis of existing literature indicates the importance of considering how healthcare networks can facilitate innovation diffusion in the NHS (Margolis and Halfon, 2009; Barnett et al., 2011). Margolis and Halfon (2009) emphasised the importance of healthcare networks in the study of innovation diffusion. In particular, they claim that insights from healthcare networks provide a useful model for understanding the role of networks in supporting the process of innovation diffusion.

Healthcare networks often include scientific and academic communities, and industry partners committed to enhancing continuous improvement in health services (DH, 2011). Drawing on studies by Tsai (2009) and Zeng et al. (2009), networks may be viewed as a group of research institutions, universities, government agents, suppliers and industry partners that play an important role during innovation development and diffusion (Johnsen et al., 2006).

A study by Najib et al. (2014) identified the benefits of networks, which include knowledge transfer, partnerships and increased capacity towards innovation diffusion. Networks can also supportive of "sharing learning and ideas, building a sense of community and purpose, shaping new solutions to entrenched problems, tapping into hidden talent and knowledge, and providing space to innovate and embed change" (Randall, 2013, p. 3). Within NHS England, literature shows that factors such as policy-makers' initiatives and increasing pressure from government to improve healthcare delivery have contributed to the growing interest in healthcare networks. In his influential report "Innovation, Health and Wealth: Accelerating Adoption and Diffusion of Innovation in the NHS", Nicholson (DH, 2011, p. 19) emphasised that "to solve the real NHS problems, NHS England will need a stronger relationship with the scientific and academic communities and industry to develop solutions to healthcare problems and get existing solutions spread at pace and scale in the NHS". The Nicholson report introduced an initiative to accelerate the adoption and spread of innovation in the NHS - the Academic Health Science Networks, which are explored in the next section.

1.3.3 The Academic Health Science Network (AHSN)

The need to promote the diffusion of innovations in NHS England has been high on the agenda for healthcare policy makers (Phillips et al., 2011). Nicholson's report (DH, 2011) announced that innovation has a vital role to play in improving the quality of care for patients, increasing productivity, and enabling the NHS to operate as a major investor and wealth creator in the UK. The report called for the strong relationships between industry and the UK's scientific and academic communities to develop solutions to healthcare problems and to enhance the pace and scale so that existing solutions are diffused into the NHS. Building on Nicholson's recommendations, in 2013, 15 regional Academic Health Science Networks (AHSNs) were set up with a five-year licence from the NHS England. The AHSNs were given a mandate to align education, clinical research, innovation and healthcare delivery to support knowledge exchange, evaluation and the early adoption of new innovations (DH, 2013). The initiative presented a distinct opportunity to provide necessary links and connections across healthcare settings, supporting and facilitating the introduction of innovations, products, services and solutions. The AHSN investigated by this study has the directive to work with the NHS, universities, industries and NHS commissioners to spread innovation and evidence-based practice to enable the best quality healthcare delivery within one of the healthcare regions in England. Specifically, the overarching objectives of the AHSN include:

1. To deliver measurable gains in health and wellbeing across the region, focusing on the needs of patients and the local population.

2. To make a meaningful contribution to the regional and UK economy.
3. To build a learning and delivery network to accelerate the adoption and spread of innovation, and improvement of clinical outcomes and patient experience.
4. To build a culture of partnership and collaboration.

The main role of the AHSN is to operate as a focal organisation for members drawn from seven different local authority areas (AHSN, 2016), and to oversee the network, ensuring it achieves its objectives. In order to meet the objectives set down by the government, the AHSN funded and oversaw projects focused around four key themes: enterprise and translation, patient safety, quality improvement, and connecting data for patient benefit. The quality improvement projects focus on putting innovation at the heart of healthcare and evidencing the uptake of innovations. This study explored two of the quality improvement projects (referred to as Unit A and Unit B) and the backgrounds to each of the units are presented in section 5.5.5 of the study. The overarching aim of each project was to implement evidence-based practice and scale up the adoption and diffusion of the innovations implemented by each project.

1.4 Aims, objectives and research questions

Existing studies acknowledge that governance has an influence on the diffusion of innovation (Savedoff, 2009; Mikkelsen-Lopez et al., 2011; Barbazza and Tello, 2014). Although previous investigations have recognised that contractual and relational mechanisms play a significant role in networks (Cannon et al., 2000; Poppo and Zenger, 2002; Yang et al., 2012; Cao and Lumineau, 2015), the nature of such roles and their interplay has not been established in relation to the diffusion of innovation in healthcare networks such as NHS England. Thus, the aim of this research is to examine the role of governance mechanisms on the diffusion of innovation in healthcare networks, employing a bottom-up approach. The bottom-up process of innovation diffusion highlights the key steps taken during diffusion process, whereby opportunities are created for individuals at the low and mid-level of an organisation to own the innovation, share ideas and take decisions that enhance the diffusion process (Parnaby and Towil, 2008). In order to develop a sound investigation into the effect of governance on the diffusion of innovation in healthcare networks, focusing on the context of NHS England, the specific objectives of this research are:

1. To examine the influence of contractual and relational mechanisms on the diffusion of innovations in healthcare networks.
2. To identify the key network actors involved and examine their roles during the diffusion of innovations in healthcare networks where a bottom-up approach has been employed.

In order to pursue these objectives, the following research questions have been developed:

1. How do contractual and relational governance mechanisms influence the diffusion of innovation in healthcare networks?
2. Who are the key actors involved in the diffusion of innovation in healthcare networks?
3. How do the different key actors influence the process of innovation diffusion in healthcare networks?

1.5 Context of the research and methodology

This study was part of a wider project called *Evidencing the value of the AHSN*, undertaken by a multidisciplinary group of academics drawn from three different universities and funded by the AHSN. In order to ensure that researchers did not infringe on the day-to-day activities of the actors involved in the projects, the AHSN selected the projects. For this study, two projects were selected that demonstrated a bottom-up approach to innovation as the AHSN aimed to promote the wider uptake and diffusion of innovations from within NHS England, leveraging the skill and expertise of clinical practitioners and their deep understanding of the English healthcare system. These innovative projects were carried out in a healthcare region within NHS England with the intention, that if the projects were successful, they would be replicated at a national level. Two further studies were undertaken by the wider project that looked at PPI and enterprise networks.

The research adopted a case study methodology (Yin, 2014), using a single case design with multiple embedded sub-units of analysis, where the AHSN represented the single case. For each area of value to be investigated (innovation diffusion, PPI and enterprise networks), working in partnership with the AHSN, the researchers used convenience sampling (Patton, 2002, p. 228) to select embedded sub-units of analysis and as mentioned earlier, for this study these were projects that had employed a bottom-up approach to innovation diffusion.

For this study, both embedded sub-units investigated innovations that had yet to be diffused into NHS England. The first embedded sub-unit examined by this study, Unit A, investigated an evidence-into-practice project that involved the use of magnesium sulphate to reduce the occurrence of cerebral palsy in preterm labour. Despite clear clinical evidence, the use of magnesium sulphate to address this condition is not widespread throughout NHS England (Cochrane review, 2010; AHSN, 2014). The second embedded sub-unit (Unit B) is another evidence-into-practice project that aimed to increase the uptake of novel anticoagulation medication (NOACs) in patients with atrial fibrillation. There is large- scale underuse of NOACS, even though there is clear clinical evidence supporting their use (NICE, 2014).

Drawing on the literature review presented in chapters 2, 3 and 4, a conceptual framework was developed that provided the codes for variable coding (Miles et al., 2014, p. 100). The case evidence was analysed using a case description process (Yin, 2014). Consideration of rival

explanations (Yin, 2014) required collecting all the data relating to the variables in the conceptual framework, whether that data supported or contested the hypothesised relationships in the conceptual framework. The research used document review, semi-structured interviews and observation as sources of evidence. Document review entailed a review of secondary data that related to the two projects, including project initiation documents, evaluation documents, and minutes of steering group meetings, education materials, quality improvement reports and policy documents. Purposive sampling was used to select 23 interviewees across the maternity units and GP practices. This approach helped to obtain an understanding of both projects from multiple perspectives.

1.6 Structure of the thesis

To achieve the research objectives, the thesis is set out as follows:

1.6.1 Chapter 2: Innovation diffusion

Chapter 2 provides an overview of innovation and the process of innovation followed by a detailed description of the most prominent innovation diffusion theories such as the Theory of Reasoned Action, Theory of Planned Behaviour and Rogers' Diffusion of Innovation Theory (Fishbein and Ajzen, 1975; Ajzen, 1991; Rogers, 1995, 2003). Based on the review of innovation diffusion theories, the barriers and enablers to innovation diffusion are considered. Furthermore, the bottom-up approach to innovation is explored and considered against a top-down approach. Drawing on the review of the literature, the initial stages of the conceptual framework are developed, focusing the key factors arising from the review of the innovation diffusion literature.

Chapter 3: Networks

Chapter 3 commences by developing an understanding of networks, focusing on interorganisational networks, and considers the various motivations for network formation, particularly the role of strong and weak ties. The chapter goes on to present the benefits that networks can provide to participating organisations, including the creation and spread of innovation, access to new technologies, access to complementary skills, access to external resources, and legitimisation. Healthcare networks are then explored, followed by network roles, particularly the roles of gatekeepers and boundary spanners. The last section concludes by drawing on the review of the literature to further develop the conceptual framework by incorporating the key network concepts identified during the review of the literature.

1.6.2 Chapter 4: Governance mechanisms

Chapter 4 provides an overview of governance, before discussing contractual and relational mechanisms, and identifying the various functions of these mechanisms during the innovation diffusion process. An overview of trust is presented, including interpersonal and interorganisational trust, and relational norms such as information exchange and flexibility are examined. Based on these discussions, the conceptual framework is expanded to include the role of governance during the process of innovation diffusion in healthcare networks, thus presenting the conceptual model employed during the research.

1.6.3 Chapter 5: Research methodology

Chapter 5 presents the research methodologies used in this study. First, the philosophical and methodological assumptions that underpin this study are presented. Second, the research strategy used in this study is discussed, presenting the use of a single case with embedded sub-units. Subsequently, the rationales for case selection are explored as well as the issues around case study design and how the study attempted to resolve each of these concerns. Towards the end of the chapter, the ethical consideration, the sources of evidence, the sampling method and the data analysis process adopted by the study are presented.

1.6.4 Chapter 6: Findings and analysis

In Chapter 6, the findings from the data analysis are presented in relation to the research questions, reviewed literature and the conceptual framework, focusing on the roles of contractual and relational mechanisms, boundary spanners and gatekeepers during the process of innovation diffusion where a bottom-up approach is employed. Finally, drawing on the findings, the conceptual model is revised and refined.

1.6.5 Chapter 7: Conclusions and limitations of the study

Chapter 7 presents the conclusions of the research. First, the initial research questions are revisited, followed by a discussion of implications for theory and practice. Then, the limitations of the study are addressed, along with recommendations for future research. In conclusion, the findings from this study can be considered as initial steps towards investigating the roles of contractual and relational mechanisms, boundary spanners and gatekeepers during the process of innovation diffusion in healthcare networks where a bottom-up approach to innovation is used. This study concludes that:

1) Although contractual and relational mechanisms on their own influenced the diffusion of innovation, there is evidence that dual use of contractual and relational mechanisms can positively influence the process of innovation diffusion.

2) For innovation diffusion from the bottom-up to occur, it is important to identify and work with boundary spanners that can connect experts and relevant stakeholders together to drive the process of innovation diffusion.

3) If a bottom-up approach to the diffusion of innovation is to be promoted, it is essential that suitable gatekeepers are identified and engaged. In this study, the gatekeepers are individuals that have the ability to draw on external and local knowledge, and champion innovations from the grassroots upwards.

Having provided an overview of the study and the structure of the thesis, the next chapter shall present a review of the literature relating to innovation diffusion theory, which is a one of the key theories underpinning this research.

Chapter 2: Innovation diffusion

2.1 Introduction

In line with the key theoretical areas covered by this study, the literature review is divided into three chapters, namely: diffusion of innovation, networks, and contractual and relational governance. The literature that informs this study was obtained from electronic and hard copy journals, books, policy documents and web-based materials. Although the literature was not reviewed systematically, the initial search of the literature was carried out in a systematic manner, through the identification and synthesis of articles published in business and management journals ranked as 3* and above by the Association of Business Schools. The search focused on studies of healthcare sectors that addressed the diffusion of innovation. Consistent with this, the literature review was supported by a snowball search method: a process of "using the reference list of a paper or the citations to the paper to identify additional papers" (Wohil 2014, p. 2). In other words, snowballing supports the process of pursuing references and electronic citation tracking, which have been found to be particularly valuable in uncovering high quality texts in unfamiliar sources (Greenhalgh and Peacock, 2005). The snowballing strategy was designed to focus on the diffusion of innovation in healthcare networks, particularly NHS England.

This chapter starts by presenting a definition of innovation and the differing degrees of innovation, including radical and incremental innovation. It continues with an overview of literature relating to the diffusion of innovation process, discussing key theories that have shaped understanding of the process of innovation diffusion, namely: the Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB) and the Diffusion of Innovation (DOI) theory. Having presented the barriers and enablers to the diffusion of innovation, the chapter concludes by presenting the initial stages of the conceptual model, based on the key innovation diffusion concepts arising from the chapter's review of the literature.

2.2 Towards a definition and meaning of innovation

The concept and meaning of innovation remains an area of interest in innovation management studies (Doz et al., 2001). According to Baregheh et al. (2009), its meaning remains inconclusive, underdeveloped and inconsistent. There are a range of different bodies of literature defining innovation, but according to Francis and Bessant (2005), although different definitions of innovation exist, they share a similar meaning that incorporates the creation of new ideas and improvements in existing ideas. The initial work of Schumpeter (1934) suggested that innovation refers to new ways of doing things and Thompson (1965, p. 2), described innovation as "the

generation, acceptance and implementation of new ideas, processes and products or services". It is also described as an outcome of an innovative process or as the innovative process itself (Drucker, 1985). Saren (1984, p. 11-12) proposed that "innovation is the process by which an invention is first transformed into a new commercial product, process, or service". This is consistent with Freeman's (1982) argument that innovation represents the introduction of a new product, process or system that is different from invention and signifies a new idea, improved device, product, process or system. In line with Freeman's (1982) view, Slaughter (1993) argued that innovation is different from invention. His study maintained that innovation could be considered as any new thing that is used by an individual, while an invention is purely the technical development of anything that meets the legal specification of such an item.

Von Hippel (1986, 1998) viewed innovation from the demand-side perspective, highlighting the role of user–producer interactions in the innovation process. According to von Hippel (1986, 1998), user–producer interactions are critical during innovation development, irrespective of the industry and the products. Innovation can be viewed in terms of the key knowledge and information the producers and users may possess (von Hippel, 1998). In most cases, the producers will have the knowledge as it relates to the innovation, while the users will have the knowledge about their needs and the context of use.

Rogers (2003, p. 12) defined innovation as "an idea, practice, or object perceived as new by an individual or other units of adoption". This implies that innovation can be tangible and intangible, and, with respect to healthcare, could include patient education and service delivery models, new drugs, new devices, improvements in surgical procedures, and development of tools and machinery (Mulgan and Albury, 2003). Rogers (1995, 2003) argued that an innovation can be cutting-edge science and technology, or a well-established practice that is new to an organisation or group of individuals. However, Rogers' (1995) view has been criticised. For instance, van de Van (1999) contended that in Rogers' study, the journey of innovation seems to end when the products and services are launched. Van de Van (1999, p. 887) stressed that this is problematic because "when innovative new technologies threaten existing organizational behaviours and routines, implementation is often deeply problematic and challenging".

Despite this limitation, it is evident that Rogers (1995) perceived innovation in relation to an individual's or organisation's perception of how novel an innovation is. Rogers (2003, p. 12) concluded that the degree of newness relates to knowledge, persuasion to use, and the decision to adopt. The newness dimension of innovation has been found in other studies (see: Zaltman et al., 1973; Nohria and Gulati, 1996; Johannessen et al., 2001; Johnsen, 2009). For example, Zaltman et al. (1973, p. 10) saw an innovation as "any idea, practice, or material artefact perceived to be new by the relevant unit of adoption''. This explanation is significant in describing innovation, as

it considers what is adopted and what constitutes successful diffusion. Identifying what is new is crucial in differentiating between innovation and mere change, since all innovation involves change, but not all change involves innovation (Johannessen et al., 2001). According to Johannessen et al, (2001) innovation infers newness and in their study of innovation they investigated three dimensions of newness: what is new, how new, and new to whom? Johannessen at al. (2001) explored six areas of innovative activity: new products, new services, new methods of production, opening new markets, new sources of supply, and new ways of organizing, and found that innovation as newness is a unidimensional construct, distinguished only by the degree of radicalness.

Building on the degree of newness perspective of innovation, Baregheh et al. (2011) present innovation as radical and incremental innovations. Consistent with their study, radical innovation represents a critical change in the innovation, while incremental innovation is an improvement to the previous innovation, with the aim to change some features in the innovation. The concept of radical and incremental innovation has been discussed by many innovation management scholars. Tushman and Anderson (1986) described both concepts as incremental and breakthrough innovation with the potential to enhance or destroy the competency of an organisation within an industry. For Henderson and Clark (1990), incremental innovation introduces a minor changes to the existing innovation and at the same time exploits the potential of the established design. Radical innovation is centred on set of engineering and scientific principles and often opens up whole new markets and potential application. In order words, radical innovation brings about changes that usually disrupt existing innovation and in most cases can be basis for successful entry of a new product or services in a giving industry (Henderson and Clark, 1990).

Since radical innovation brings revolutionary changes in organisations, markets and industry, literature highlights that they require large of amount of knowledge in terms of research and developments that is different from existing knowledge (Flor et al., 2017). More importantly, Van de Ven and Garud (1993) maintained that radical innovation in most cases are generated by scientists that combine new ideas knowledge and technologies today. Thus, they argued that radical innovation are often described as technology push innovation. This context therefore, suggests that radical innovation is based on high level of knowledge and technical knowhow (Audretsch and Aldridge, 2008). Nevertheless Audretsch and Aldridge (2008) argued that the economic value of radical innovation can be highly uncertain, particularly with the fear that the product or services may not be successful when they are produced and lunched into the market.

In the words of Geiger and Finch (2016, p. 2463) incremental innovation occurs when a "service organisation draw upon established resources to work with users and network partners in identifying new products or services or adaptations of existing products or services in order to solve their problems". This implies that, in most cases, incremental innovation involves some degree of improvement in the existing innovation with less cost and risks (Tushman and Anderson, 1986). Most importantly, incremental innovation can be some degree of novelty that may not necessarily change the organisational way of creating and delivering services, suggesting that incremental innovation is purely a market pull type of innovation (Doss, 1988), and can represent a slow product or process improvement with new features and added customer value (Benner and Tushman, 2003).

Evidently innovation creates value to an individual or an organisation, which can only be regarded as innovation when it accepted and used by the individual or the organisation. Hence, in its broadest sense, it can be surmised that for an organisation to accept an innovation into its activities will require a considerable amount of effort from all sections of the organisation, particularly with respect to the interactions between the actors or individuals that will be using the innovation within and outside of the organisation.

However, and despite documented evidence that many innovations fail to succeed (Chesbrough, 2006; Stevens and Burley, 1997), there has been little focus on why some innovations fail to be broadly used by an organisation or group of organisations. In other words, why do some innovations fail to diffuse, despite the potential benefits they offer? (Geroski, 2000; Hekkert et al., 2011; Rogers, 2010). As previously mentioned, the diffusion of innovation is a major challenge for NHS England. More specifically, this thesis studied incremental innovation to understand the influence of governance mechanisms and networks on the diffusion of innovation. Consequently, the next section will provide an overview of the literature relating to the diffusion of innovation in order to understand the factors that hinder or support the process of innovation diffusion.

2.3 Innovation diffusion

Innovation management researchers argue that the diversity and complexity of definitions of innovation make it almost impossible for a unifying theory of innovation diffusion to be developed (Baregheh et al., 2009). As interest in the diffusion of innovation has grown, different perspectives have emerged (Fichman and Carroll, 1999) that build on a range of different theories such as the Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB) and the Diffusion of Innovation Theory (DOI), (Fishbein and Ajzen, 1975; Ajzen, 1991; Rogers, 1995, 2003). According to some researchers, TRA, TPB and DOI can be useful in studying the process of innovation diffusion in healthcare settings (Helfrich et al., 2007; May et al., 2007; Fishbein, 2008;

Murray, 2009; Holden and Karsh, 2010; Doyle et al., 2014, Leggott et al., 2015). In particular, evidence from the abovementioned studies highlight that these theories are useful in helping researchers understand the process through which healthcare innovations can be diffused into widespread use (Murray, 2009). Therefore, the TRA, TPB and DOI provide insight into how an innovation in NHS England is diffused. Each of these theories is discussed below.

2.3.1 Theory of Reasoned Action (TRA)

Fishbein and Ajzen (1975) first introduced the Theory of Reasoned Action (TRA), stating that an individual's behaviour determines their attitude towards the acceptance or rejection of an innovation into a social system. The central idea behind the theory is that an individual's intention to perform a particular behaviour is based on the individual's attitude and the subjective norm. The latter is a function of an individual's belief system, which persuades their behaviour towards an action. According to the theory, an individual's intention towards an innovation is based on two important functions: first, the individual's attitude towards an action, which is personal in nature, and, second, social influence (Fishbein and Ajzen, 1975). Fishbein and Ajzen's (1975) study highlighted that an attitude is an individual salient belief system, which may be positive or negative with respect to the outcome of the intended behaviour (Ajzen and Fishbein, 2005). In other words, an individual strongly believes that positively valued outcomes will result from performing the behaviour and will have a positive attitude towards the behaviour. Conversely, an individual who strongly believes that negatively valued outcomes will result from the behaviour will have a negative attitude (Montano and Kasprzyk, 2015).

Consistent with TRA, subjective norms represent the individual's perception of the social pressure that is put on the individual to perform or neglect the behaviour in question (Fishbein and Ajzen, 1975). In general, TRA provides the foundation for the study of attitude and normative influence on behaviour. In terms of innovation diffusion, the theory concludes that an individual is rational and makes logical use of information available to them during the diffusion process. Hence, for diffusion to occur, it is vital to have a high degree of correspondence between attitudes, norms, perceived control, intention and behaviour in terms of actions to adopt or diffuse a particular innovation (Montano and Kasprzyk, 2015).

In health research, TRA has remained a crucial theory in predicting individuals' attitudes and behaviours during the process of innovation diffusion (Webb and Sheeran, 2006; Durantini et al., 2006; Glanz et al., 2008). For instance, Glanz et al. (2008, p. 71) highlighted that the theory assumes that the most important direct determinant of behaviour is behavioural intention. On this note, Glanz et al. (2008) stated that the theory helps to understand behaviour, and that this behaviour is dependent upon the degree to which it is under volitional control (that is, individuals

can exercise a large degree of control over the behaviour). Hence, they concluded that it is not clear that the TRA components are sufficient to predict behaviours in which volitional control is reduced. Thus, one of the limitations of TRA is its emphasis on individual intention in predicting attitudes and behaviours during the process of innovation diffusion (Ogden, 2003; Glanz et al., 2008). In particular, Glanz et al. (2008) outlined that TRA focuses on user characteristics to predict actions during the diffusion process. Consequently, TRA will not be adopted in this research since this study focuses on innovation diffusion in the context of a network and not an individual context. Hence TRA does not support the development of an understanding of the enablers of the diffusion of innovation in healthcare networks.

2.3.2 Theory of Planned Behaviour (TPB)

To address the limitations of TRA, Ajzen (1991), and Ajzen and Driver (1991) extended TRA to minimise the factors outside an individual's control that may affect intentions and behaviours. As a result, they created the Theory of Planned Behaviour (TPB) (Glanz et al., 2008). Ajzen (1991) claimed that the addition of perceived control was due to the idea that behavioural performance is determined jointly by intention and behavioural control. That is to say, the perceived behavioural control shows the internal and external factors that influence an individual's behaviour. TPB assumes that perceived control is an important determinant of an individual's behavioural intention, together with an individual's attitude towards the behaviour and subjective norm.

According to TPB, the perceived behavioural control and the behavioural intention can be used directly to predict an individual's behavioural achievement (Ajzen, 1991). Ajzen (1991) explained TPB using a scenario of two individuals who want to learn to ski. When two individual learn to ski, even though both of them have equal intentions to learn skiing, only the individual with a stronger perceived behavioural control (that is, having confidence in their ability to learn) will effectively learn to ski (Ajzen, 1991).

Although TPB has been applied in healthcare research (for example: Durantini et al., 2006; Glanz et al., 2008), Sniehotta et al. (2014) stated that TPB dwells on volitional behaviour that is based on only four explanatory concepts, namely: attitude towards behaviour, perceived social norms, perceived behavioural control and intentions. Sheeran et al. (2014) criticised TPB for concentrating on rational reasoning and neglecting unconscious effects on individuals' behaviour. Similarly, McEachan et al. (2011) contended that TPB makes it difficult to understand the influence of behaviour on individuals' cognitions and future behaviour. This view is supported by Chatzisarantis et al. (2007), who identified further shortcomings of TPB and noted that the theory provided an effective foundation for the explanation of differences in intentions and behaviour

without identifying the origins of the antecedents of the behaviour. The empirical evidence argued that the TPB operational view did not capture social influence on the perceived future behaviour of an individual. For example, the study noted that "children may ignore parental disapproval of dieting because they model the dieting regime of their friends, whose opinions they highly value" (Chatzisarantis et al., 2007, p. 935). On this note, the study identified that the TPB failed to recognise and differentiate the influence of interpersonal figures and social groups on an individual intention and behaviour. As this study explores the influence of network actors on innovation diffusion, the above limitations suggest that TPB is not applicable for this study.

2.3.3 Diffusion of Innovation Theory (DOI)

Rogers' (1995, 2003) Diffusion of Innovation (DOI) Theory argues that an innovation is termed a success when it is adopted within the intended social system. The theory classifies individuals based on their likelihood of adopting an innovation within a social system, and classifies organisations based on their stage of adoption of an innovation (Doyle et al., 2014). The decision to adopt an innovation is generally determined by how it is perceived by adopters, and by their commitment to the innovation. An innovation may be adopted, adapted or rejected following initial adoption. According to Rogers (2003, p. 177) adoption is "making full use of an innovation as the best course of action available". Rejection is the decision to "not adopt an innovation" (Rogers, 2003, p. 177). As a result, the adoption of an innovation relates to an organisation's or individual's willingness to perceive the potential of an innovation, irrespective of their involvement in its development.

DOI theory recognises adopter categories, innovation attributes, network roles, innovation decision-making processes and the organisational context within which the innovation is adopted and diffused. In general, the theory addresses potential adopters' awareness of innovation characteristics and argues that other important contextual elements also influence the adopter's ability to adopt or reject the innovation.

Innovation management literature has suggested that Rogers' DOI theory offers a strong theoretical foundation for investigating healthcare innovation diffusion (Truman et al., 2003; Helfrich et al., 2007; Doyle et al., 2014; Leggott et al., 2015). For instance, Helfrich et al. (2007) used Rogers' DOI model and identified that key factors such as organisational leadership, shared problem-solving and peer learning can facilitate the diffusion of innovation in community healthcare centres. Doyle et al. (2014) examined the diffusion of mobile devices in nursing schools and the corresponding impact on learning outcomes. Their study highlighted that Rogers' DOI is a useful theory for studying the adoption strategies of mobile devices in nursing education.

Leggott et al. (2015) employed Rogers' DOI model as a theoretical framework to study the how healthcare innovation is implemented and diffused, and argued Rogers' DOI theory aligns well with of the adoption and diffusion of innovations in healthcare settings. According to Leggott et al (2015) Rogers' DOI theory is the most commonly adopted and accepted model of innovation diffusion, particularly in healthcare settings. Hence the theory provides a strong rationale for investigating how innovation is implemented and diffused within the context of NHS England. Accordingly, the theory of DOI appears to be pertinent to this study because:

1) It perceives an innovation as a tangible or physical object, such as a medicine or new technology.
2) It provides a rationale for how ideas can diffuse among individuals in a social system.
3) It identifies the characteristics of an innovation and the different factors that can hinder or enable the process of innovation diffusion.

In view of the above rationale, this study will employ the theory of DOI to explore the diffusion of innovation in healthcare networks.

2.4 Diffusion versus adoption

Conceptually it is often difficult to differentiate between diffusion and adoption, as both concepts attempt to convey how an innovation is received. Adoption may be considered at an organisational level (Hage, 1980; Daft, 1982; Damanpour; 1988, 1991), whereby organisations decide to adopt an innovation due to changes in their environment. There are some fundamental differences between, for instance, individual adoption of an innovative end-consumer product and an innovation adopted by an organisation. According to Rogers (2003), individuals within an organisation may sometimes not be able to adopt an innovation before the organisation does so, i.e. somebody with authority over the organisation has the ultimate decision whether or not to adopt an innovation. Furthermore, the decision made by an organisation to adopt a certain innovation does not necessarily mean that an individual within the organisation will do so directly. Thus, within an organisational context, the decision to reject or adopt an innovation is not a straightforward process (Rogers, 2003).

Diffusion looks at how an innovation "is communicated through certain channels over time among members of a social system" (Rogers, 2003, p. 5). By focusing on diffusion, it is therefore possible to understand how an innovation spreads through a system. However, in order to diffuse, an innovation must have been already adopted by users. Roger defined a social system as "a set of interrelated units that are engaged in joint problem solving to accomplish a common goal"

(Rogers, 1995, p. 23). Units of such a system may be individuals, informal groups, organisations, and/or subsystems (Rogers, 2003, p. 23).

It is important to acknowledge that users may adapt innovations over time to meet their needs and requirements, or they may be used in ways that were not initially envisioned. In considering how innovations are adopted, Nelson et al. (2004) studied the diffusion of innovation along two dimensions: the degree of increasing returns to the adopter and the degree of interpretive flexibility. The degree of increasing returns infers that as adoption of an innovation increases amongst an organisation, its value increases as it becomes institutionalised amongst groups of individuals. The next section examines adopter categories, as identified by Rogers' (2003) DOI theory.

2.5 Adopter categories

Adopter categories consider the rate at which innovation is adopted within a system based on the willingness of people to adopt the innovation (Doyle et al., 2014). For Rogers (2003), the adopter categories are "the classifications of members of a social system on the basis of innovativeness" (Rogers, 1995, p. 22), and are characterised as: innovators, early adopters, early majority, late majority and laggards. Each of the categories classifies individuals within a social system based on their level of innovativeness (Hoffmann et al., 2007). Innovativeness is the degree to which an individual is relatively earlier in adopting a new idea than other members of a social system (Rogers, 2003, p. 22). This implies that innovativeness helps organisations to understand the fundamental behaviour in the innovation decision-making process (Rogers, 2003). The next section will examine each of the adopter's categories as proposed by Rogers' (2003) study.

2.5.1 Innovators and early adopters

Innovators and early adopters represent those who are the first to adopt a new idea in a social system. The innovators are groups of individuals or organisations that have greater interest in experiencing new ideas than other members of a social system (Rogers, 2003). Research suggests that innovators are members of a social system that are willing to take risks and be the vanguard of innovations. Innovators are the gatekeepers that bring new ideas or innovation from outside the social system, with the aim of resolving client or customer needs (Rogers, 2003). Accordingly, some commentators argue that the uniqueness of early adopters and innovators is because of their personality variables, socio-economic status and communication behaviour (Rogers, 2003; Hoffmann, 2007; Laukkanen and Pasanen, 2008). For instance, in terms of socio-economic uniqueness, Hoffmann (2007) argued that early adopters and innovators are more likely to have formal education, high social status and a greater degree of upward social mobility.

In terms of personality variables, early adopters and innovators have a more favourable attitude towards risk and uncertainty, high aspirations for scientific knowledge, and a positive attitude towards change and new ideas (Hoffmann, 2007; Rogers, 2003). In their communication behaviour, Hoffmann (2007) suggested that early adopters and innovators are more inclined to social participation, are more cosmopolitan, have good relationships with change agents and greater exposure to interpersonal networks. Moreover, research by Conway (1997) and Ferlie et al. (2005), looking at the influence of social networks, scientific information and health practitioners on the diffusion of innovation, found that innovators and early adopters play key roles during the diffusion process. Importantly, Rogers (2003) stated that each of these variables (personality variables, socio-economic status and communication behaviour) provide an avenue for innovators and early adopters to communicate innovation to different groups in the system and, in effect, persuade others to adopt the innovation in order to generate a critical mass.

2.5.2 Early majority, late majority and laggards

Early majority: Individuals and organisations in this group adopt an innovation after a varying degree of time (Rogers, 2003). The adoption of innovation by this group is considerably slower than the innovators and early adopters. According to Rogers (2003), the early majority may have good interactions with early adopters but are slower in the adoption process and have above average interorganisational networks, adopting an innovation earlier than the late majority and laggards. Hence, the early majority has less tolerance to risk, which may be due to factors such as lack of resources that support adoption (Sahin, 2006).

Late majority: Individuals and organisations classed as late majority are those that will adopt an innovation after the majority of other organisations or individuals have adopted the innovation (Rogers, 2003). Literature shows that this group of adopters are pessimistic about the innovation and its outcome (Rogers, 2003; Sahin, 2006). However, economic factors, societal pressures and competition may force them into adopting the innovation. Rogers (2003) noted that to adopt an innovation, the late majority provides unnecessary reasons for not adopting the technology and may feel safe to adopt it when they are encouraged by their social networks.

Laggards: Laggards are the last to adopt an innovation. According to Rogers (2003), they focus on tradition and are very unsure about the value of innovation. Laggards may have limited finances and lack of knowledge about the innovation. Hence, they need to be sure that the innovation has been successfully adopted by others before they will adopt it. Rogers concludes that the innovation decision process for laggards tends to be long. Greenhalgh et al. (2004) have found reasons for slow adoption, including a need to ascertain the perceived relative advantage of the innovation. Relative advantage is one of the innovation attributes identified by Rogers

(2003) that can influence the process of innovation diffusion. The next section explores these innovation attributes and presents them in more detail.

2.6 Innovation attributes

Different innovation management studies have examined innovations in terms of their various attributes and characteristics, suggesting that they play a critical role in influencing the diffusion process (Rogers, 1995; Johannessen et al., 2001). Rogers' studies (1995, 2003) present the attributes as: relative advantage, compatibility, complexity, trialability, and observability. He argued that an organisation's perception of each of the attributes determines the rates of adoption and diffusion of an innovation.

2.6.1 Relative advantage

Relative advantage is defined as the degree to which an innovation is an improvement on the artefact that it supersedes. This implies that the rate at which an individual within a social system perceives an innovation will determine the attitude and behaviour of the individual towards the adoption and diffusion of the innovation (Rogers, 2003). Makowsky et al. (2013) argued that relative advantage indicates the extent to which an individual or organisation thinks an innovation is better. For example, a study by Ferlie et al. (2005) on the non-spread of innovation in the UK healthcare sector found that the diffusion of most healthcare innovations depends on the practitioners' perceptions of relative advantage compared to its alternatives. Ferlie et al.'s study goes on to suggest that when healthcare practitioners perceive that an innovation has limited relative advantage over the alternatives, they tend to block the diffusion of the innovation through their social network, supporting the suggestion that the perception of relative advantage will have a positive advantage on the diffusion of healthcare innovations (Rogers 1995, 2003).

2.6.2 Compatibility

Compatibility refers to the level of conformity between the innovation and the existing values of the organisation or individual in terms of their past experiences and perceived need for improvement (Rogers, 1995). Building on Rogers' line of thinking, the compatibility of an innovation determines how an innovation is going to be accepted within the social system (Rogers, 2003). According to Greenhalgh et al. (2004), every innovation in one way or the other affects individual adopters and, at the same time, must reflect their beliefs and values. Consistent with this assertion, Sahin (2006) argued that when an individual in a social system perceives that an innovation is compatible with their needs, values and beliefs, there will be a decrease in uncertainty, which in effect will lead to an increase in the diffusion of the innovation. Knudsen and Roman (2015) supported the above argument and noted that every innovation that will

deliver good healthcare values must be in line with the values and beliefs that exist within the healthcare setting. Nutley and Davies (2000) also affirmed that healthcare innovations that are compatible with existing practice will potentially diffuse more readily within the healthcare system. Hence, this suggests that compatibility will positively influence the diffusion of innovation in the NHS.

2.6.3 Complexity

Complexity looks at the degree to which the innovation is perceived as relatively difficult to understand and implement compared to alternatives, and whether the innovation will require new resources or skills for its implementation and adoption (Rogers, 2003). Based on Rogers' model, complexity attributes can become a negative attribute of innovation (Weberg, 2009). Johnsen and Ford (2001) supported this argument and claimed that complexity is indicative of the disadvantages that members of organisations associate with innovation, arguing that innovations must not be perceived as too complex, or diffusion and adoption will fail (Weberg, 2009). For healthcare innovations, Omachonu and Einspruch (2010) identified that, although innovations that are aimed at improving patient outcomes and care quality can be complicated, such innovations must not be perceived by practitioners to be very complex. This is important because an innovation that is perceived by its adopters as user-friendly will be more readily adopted and diffused into the social system (Omachonu and Einspruch, 2010).

2.6.4 Trialability

Trialability describes the degree to which an innovation may be tested on a small scale before deciding whether or not to adopt it (Rogers, 1995). Trialability is positively linked to the diffusion of an innovation. In the case of innovation in healthcare, evidence from extant literature argues that scientific evidence strongly influences the healthcare sector; the diffusion of innovation must follow rigorous testing, checks and verifications, and must satisfy technical efficiency before being adopted into the system (Rolfstam et al., 2011). Thus, literature identifies that trialability allows adopters to use an innovation that they are not aware of or have seen before. Hence trialability will have a positive influence on the diffusion and adoption of healthcare innovation (Rogers, 2003).

A study by Cain and Mittman (2002) advocated the intrinsic benefit of trialability in diffusing healthcare innovation. Their study maintained that trialability allows healthcare innovations to be tested without total commitment, and with minimal investment. Thus, trialling of healthcare innovations provides an opportunity for potential adopters to reduce the uncertainty and risks of the innovation. For example, Cain and Mittman (2002, p. 9) claimed that "prescription drug

manufacturers benefit from the trialability of their products in two ways. First, a new drug is introduced; free samples make physicians aware of the product. Second, once the drug is well accepted, free samples help physicians introduce patients to the new drugs". Drawing on these studies, it is suggested that trialability supports diffusion, providing the opportunity for clinical practitioners to experiment with the innovation (Cain and Mittman, 2002).

2.6.5 Observability

According to Rogers (1995), observability relates to the degree to which the effects of an innovation are visible to the organisation's members or the intended adopters. When a defined benefit of an innovation is noticeable, it becomes much easier for the innovation to be adopted (Greenhalgh et al., 2004). As discussed in section 2.5.2 above, not every organisation adopts innovations at the same time. Some organisations prefer to adopt innovations when they see that other organisations are using and benefiting from them. Therefore, potential adopters, including innovators, early adopters, early majority, late majority and laggards, will prefer to see the benefits of a particular innovation prior to its adoption and subsequent diffusion.

Rogers' work on innovation attributes affirms that any healthcare innovation that offers a better relative advantage, compatibility, simplicity, trialability and observability will have a higher tendency to be adopted and diffused by the intended adopters (Barnett et al., 2011). Irrespective of the sector or organisation within which innovation is considered, adherence to each of the attributes can potentially speed up the innovation diffusion process. Nevertheless, Rogers' theory of DOI proposes five steps in the diffusion process: knowledge, persuasion, decision, implementation and confirmation. The next section examines the decision-making process that individual or organisations go through when contemplating whether to adopt or reject an innovation.

2.7 The decision to adopt or reject an innovation

Conceptually, Rogers' (2003) Diffusion of Innovation theory proposed that the decision to adopt or reject an innovation requires an individual or organisation to move from the initial knowledge of an innovation to making a decision, and developing an approach or attitude towards the adoption or rejection of the innovation. This implies that when an individual or organisation obtains knowledge of an innovation, they form an attitude towards adopting or rejecting the innovation. Following on from Rogers' work (2003), the innovation decision process focuses on the steps that an individual or an organisation can go through before deciding to adopt or reject an innovation. As this study is centred on the diffusion of innovation in NHS England, it is pertinent to explore the process of adoption at an organisational and individual level.

2.7.1 Adoption at the organisational level

Adoption at the organisational level is the decision-making process whereby organisations decide to adopt an innovation. Rogers (2003) argued that adoption at the organisational level comprises successive stages of initiation, decision, and implementation. The initiation stage identifies the need for the innovation through agenda setting (Melnyk and Davidson, 2009), whereby different actors within the organisation start mobilising towards a new way of doing things. At this point, the various actors come up with different ideas, which may translate to the desired change (White et al., 2005). Rogers (2003) affirmed that the output of this stage is a decision to adopt or to reject the innovation. Accordingly, he argued that as the actors decide on which innovation to adopt, they will get to the point of redefining, clarifying and routinising the innovation (Rogers, 2003). His studies established that during the redefining stage, the innovation goes through the first adjustment to fit the organisation's needs. Clarifying occurs when the innovation is embedded in the organisation, and routinising is when the innovation is fully incorporated in the organisation (Rogers, 1995).

2.7.2 Adoption at the level of the individual

At the individual level, Rogers (2003) highlighted that the diffusion of innovation occurs in five stages, namely: knowledge, persuasion, decision, implementation and confirmation. Diffusion at the individual level begins with the knowledge stage, suggesting that it is almost impossible to consider diffusion without knowing about the innovation (Rogers, 2003). In particular, Rogers' study noted that at this stage, the individual aiming to diffuse the innovation first becomes aware of the new idea or innovation. This could be through formal and informal communication or other forms of education (see: Conway, 1995; Pahl-Wostl, 2009).

The persuasion stage: At this stage, the innovation has moved beyond simple awareness (Rogers, 2003). The individual involved in the innovation at this point shows maximum interest in the innovation, and seeks to understand more about the innovation. Rogers concludes that at this point, the individual begins to consider himself or herself as a potential user of the innovation, and begins to actively consider adopting the innovation into their regular activities.

The decision stage: Rogers (2003) notes that the individual adopting the innovation makes a choice about whether to adopt or reject the innovation. This process will require the individual to compare the advantages, disadvantages, costs, benefits and the trade-off for adopting or rejecting the innovation. As Rogers' points out, the decision to adopt or reject the innovation is an active choice that the individual must make. Once a decision is made, the individual begins to use and integrate the innovation into their daily work routine (Rogers, 2003).

The **implementation stage** is a slow process whereby the individual takes the responsibility of integrating the innovation into regular use. At this stage, Rogers (2003) stated that the individual involved changes their daily routine and practices in order to accommodate the innovation.

The evaluation stage focuses on the assessment of the innovation in order to ascertain that the innovation meets the desired expectations (Rogers, 2003).

The confirmation stage is the point at which the individual confirms the adoption of the innovation. Rogers' study stressed that at the confirmation stage, the individuals involved in the adoption process are committed to using the innovation to its maximum potential.

Consistent with Rogers' (2003) view on the decision to adopt or reject an innovation discussed above, Barlow (2016) suggested that the way the decision-making process is organised will be crucial to any adoption process. The study affirms that in an organisation, the decision to adopt or reject an innovation can come from two different directions, either top-down or bottom-up. When the decision comes from the top down or from the bottom-up, the impact on diffusion and adoption will reflect the characteristics of the group of people that work in any of the levels. On this note, Rogers (1995) explained that innovation that is managed from a top-down perspective is the fastest to be implemented, but there is a risk that the implementation will engender resistance or will be avoided altogether by the staff at lower levels of the organisation. Hence Rogers (1995) affirmed that innovation that is driven from the top down may not always be successful.

Parnaby and Towill (2008) argued that driving new ideas through the bottom-up approach is essential, since it allows all the players in the organisation to actively work together in delivering the innovation objectives. Their study presented the benefits of driving innovation through the bottom-up approach and stressed that every member in an organisation shares similar objectives and aims, irrespective of their position in the organisation. The study advocated that any innovation that can improve services "must be driven locally, fully involving and ensures that everyone engaged in the diffusion process and not by relying on central dictate or top-down approach" (Parnaby and Towill, 2008, p. 145). The above proposition suggests that an understanding of a bottom-up approach to diffusion is critical to this research study, since this is the approach that has been adopted by the participating AHSN, and the projects selected for this study, embedded sub-units A and B.

2.8 The bottom-up versus top-down process of innovation diffusion

The diffusion of innovation literature provides a model along which the process of innovation diffusion can occur (Borins, 2002; Rogers, 2003; Dopson, 2005; Fuller et al., 2007). Drawing on Rogers' (1995, 2003) innovation decision process, diffusion can occur through either a bottom-up or top-down approach. Rogers (2003) viewed the top-down approach as the process through which diffusion occurs based on the influence of organisational factors (e.g., the flow of innovation information from the top management staff down to the frontline staff), whereas the bottom-up approach provides the push for the users at the low and mid-level of the organisation, suggesting that their frequent communication and interaction can influence the process of innovation diffusion.

A number of explanations have been put forward as to how frontline staff in an organisation can influence the diffusion process through the bottom-up approach. Fuller et al. (2007) studied individual and organisational influences on virtual innovation diffusion and argued that frontline staff can accelerate the diffusion process through the bottom-up approach. Adopting a bottom-up approach, opportunities are created for the individuals to own the innovation and share ideas that enhance the diffusion process. Fuller et al. (2007) applied a micro-level theoretical view and identified different factors influencing the decisions made by frontline staff that facilitated the diffusion of virtual innovation. Factors included staff creative efficacy and personal innovativeness as the major facilitators of diffusion through the bottom-up approach. Staff creative efficacy represents staff belief in their competency in creative and innovation tasks (Tierney and Farmer, 2002), while personal innovativeness relates to staff willingness to experience new innovations (Agarwal and Prasad, 1998). In line with these explanations, Fuller et al. (2007) suggested that creative efficacy and personal innovativeness provide the opportunity for the frontline staff to see the direct benefits of innovations, and as a result facilitates the diffusion of innovation via a bottom-up approach.

Top-down diffusion processes are characterised by senior management staff developing innovation diffusion pathways that are expected to be embraced by frontline staff. Top-down diffusion processes can hinder the diffusion of innovation (Hartley, 2005). In addition, the desire of frontline staff to diffuse an innovation may differ, particularly if the frontline staff cannot identify the benefits of the innovation (Borins, 2002; Rogers, 2003; Singh and Hardaker, 2014). Thus the top-down process of diffusion requires highly centralised decision-making and formalisation of behaviour (Damanpour and Gopalakrishnan, 1998).

In summary, significant factors that influence the innovation diffusion process include: an individual's or organisation's perception of an innovation; the characteristics of the individuals

or organisations adopting the innovation; and the environment and contextual factors within which innovation is diffused (van de Ven et al., 2000). Having presented the facilitators of innovation diffusion, the barriers to the diffusion of innovation will be discussed in the next section.

2.9 Understanding the barriers to innovation diffusion

2.9.1 Organisational context

As the previous sections demonstrated, innovations are embedded in a social system that is constructed through rules and regulations, both formal and informal. As suggested by Rogers (2003), the study of innovation and the study of social systems are inseparable, because the interaction of both concepts provides meaning to the study of the diffusion of innovation. This perspective is also captured in other studies, such as Johnsen (2001), which maintained that there are connections between innovations and social systems, since the adoption and diffusion of innovation are likely to occur in an environment where actors have easy and frequent access to knowledge and information about the innovation. Greenhalgh et al.'s (2004) research examined the connection between innovation and the social system, finding that organisational context has an influence on how an innovation is perceived or adopted within a social system. Their study pointed out that by allowing flexible boundaries between organisational units, with a system of incentives or rewards for risk-taking, organisations can positively influence innovation diffusion (Greenhalgh et al., 2004).

Similarly, research by Dopson et al. (2002) indicated that the organisational context can be viewed as "a layered set of influences, which commences at the outer layer with influences from government health policy and moves inwards to regional/local influences, and finally to influences that are specific to a single organisation and individual practitioner" (p. 43). Dopson et al. (2002) suggested that the activities at each of the layers will indicate a different combination of influences on the diffusion of innovation. For instance, the study noted that the history of local interorganisational networks represents a key area of influence on innovation diffusion (Dopson et al., 2002). Consistent with this line of thinking, Rogers (2003) concluded that the influence of organisational context on innovation diffusion relates to the way the social structure of an organisation affects the diffusion process. This may be the way in which organisation units are configured, the policies within the organisations, and the relationship between the organisation and its social environment.

2.9.2 Innovation fit

Innovation fit is the degree to which an innovation is compatible with the potential adopters' existing values and current needs (Rogers, 2003). Literature on innovation management has established that an innovation should aim to be positive and at the same time introduce novelty into an organisation (Dixon-Woods et al., 2011). As innovation is generally assumed to be positive in its impact, many believe that good innovation fit within existing practice is necessary for diffusion to occur and for innovation benefits to be maximised (Taylor and McAdam, 2004; Dixon-Woods et al., 2011). Some studies have attempted to examine the distinctive influence of innovation fit on the diffusion process (Taylor and McAdam, 2004; Chapman and Newenhouse, 2013; Etheridge et al., 2014; Vlaeyen et al., 2017). The literature has identified several barriers in relation to innovation fit that hinder diffusion in the healthcare sector. The barriers are: the simplicity of innovation (Brown et al., 2009); the complexity of innovation (Chapman and Newenhouse, 2013); lack of fit into existing practice (Etheridge et al., 2014); lack of clear benefits; and end users' knowledge (Etheridge et al., 2014).

For example, Brown et al. (2009) investigated the perceived barriers to evidence-based intervention and found that lack of understanding of the clinical evidence of an innovation amongst practising nurses can hinder the diffusion process. According to the study, innovation must be simple, available and understandable. Brown et al. (2009) claimed that simplicity of innovation means that staff can understand it and translate it into everyday use. Without such simplicity, diffusion can become a difficult process. Etheridge et al. (2014) demonstrated that lack of innovation fit into existing practice and lack of knowledge of the innovation by the end user also hinders the diffusion process. Etheridge et al.'s (2014) study highlighted that organisations need to seek for end users' or frontline staff's opinion and feedback before introducing an innovation. Failing to do so makes it difficult for the innovation to diffuse and may ultimately end up in rejection of the innovation by end users.

2.9.3 Knowledge and attitudes towards the innovation

Research suggests that actors' knowledge about an innovation can go a long way towards either supporting or hindering innovation diffusion (Brown et al., 2009). Rogers' (2003) seminal work on innovation diffusion recognised the effect of adopters' knowledge on innovation diffusion. His study explicitly identified knowledge as the first innovation decision process, and affirmed that a potential adopter cannot initiate the diffusion process without having knowledge of the innovation.

Within the context of healthcare research, empirical studies have found some level of relationship between practitioners' knowledge of an innovation and the diffusion of healthcare innovations.

For example, in the study of the diffusion of an innovative intervention for microbiological root canal sampling, Molander et al. (2007) reported that lack of diffusion was as a result of dental practitioners' lack of knowledge of any of the clinical benefits of the intervention. Similarly, Whitebird et al. (2014) identified healthcare professionals' attitudes as barriers to innovation. They noted that when healthcare professionals develop a negative attitude towards an innovation, there is a significant possibility that the diffusion of the innovation will suffer a setback (Whitebird et al., 2014). In addition, Brown et al. (2009) studied attitudes and knowledge as perceived barriers to the diffusion of evidence-based care in nursing practice. They found a relationship between staff knowledge of the evidence and the rate of diffusion. The study concluded that staff training and development to increase knowledge and understanding of the intervention facilitated the diffusion process. This is supported by Mohid and Coker (2005), who found that for an evidence-based intervention to take its full effect in nursing practice, it must be easy for nursing staff to understand and incorporate into their existing practice.

The above research findings provide an insight into the important role of clinicians and practitioners, and the need for a positive attitude and knowledge of the innovation if innovation diffusion is to occur successfully. Having considered the influence of practitioner attitudes and knowledge, the next section examines the effect of organisational processes on innovation diffusion.

2.9.4 Organisational processes

Organisational processes have received significant attention in innovation management studies (Greenhalgh et al., 2004; Damanpour et al., 2009). Such studies often investigate the influence of processes on innovation diffusion. According to Fitzgerald et al. (2003), organisational structure and culture are two fundamental elements affecting innovation diffusion in an organisation. Hence the influence of organisational structure and culture on the diffusion of innovation is discussed in the following subsections.

Organisational structure

According to Hao et al. (2012), organisational structure represents an organisation's formal reporting process and distribution of responsibilities, as well as management of the process that ensures that the organisation's performance is maximised. It also signifies the continuing arrangement and integration of organisational tasks and processes that reflect corporate goals and objectives (Hao et al., 2012). In the words of Mahmoudsalehi et al. (2012, p. 521) organisational structure is a "formal allocation of work responsibility and administrative mechanism to control and integrate work activities".

Hao et al. (2012) suggested that organisational structure focuses on horizontal integration, hierarchy levels and authority centralisation. Mahmoudsalehi et al. (2012) argued that centralisation relies on the concentration of management and decision-making power at the top of an organisation's hierarchy. Further literature has highlighted that when the decision is centralised at the top of an organisation, it exerts a direct influence on the employees through the way teams are organised and the degree of formality (Smith et al., 2008). A high degree of formality implies that employees will be uncomfortable to support the innovation diffusion process in their work environment (Smith et al., 2008).

While organisational structure is aimed at representing a formal reporting process and principles, some studies argue that organisational structures within the context of healthcare networks are often complex, reducing opportunities for innovation to be diffused (Nutley and Davies, 2000; Phillips et al., 2011). For example, early research by Nutley and Davies (2000) noted that in a highly centralised system such as NHS England, central government decides which innovations are diffused, suggesting a top-down process of innovation (Phillips et al., 2011). Nutley and Davis (2000) argued that most of the reform initiatives that have occurred in UK public sector organisations, such as the welfare system, are centrally promulgated, involving little or no discretion on the part of frontline staff. Rogers (2003) suggested that centralised systems and high concentration of power at the top level of an organisation can support the diffusion of innovations for which there is yet no need. In such a situation, the innovation may confront user resistance, whereby it will not be readily accepted by the adopters, thus hindering the diffusion process (Rogers, 2003).

Organisational culture

Organisational culture refers to an organisation's values, beliefs, attitudes and assumptions, and how they impact upon the management of innovation and the process of diffusion (Smith et al., 2008). The literature provides a general view of organisational culture as being fundamental to the way an organisation operates and the values it produces within its operations (Smith et al., 2008). The study of organisational influence on innovation affirms that shared attitudes, beliefs, values and assumptions deeply affect "how organisational members interpret social objects and practices, what goals members develop, and what strategies members enact to link the objects and practices to the goals" (Love and Coben, 2008, p. 243). This is evidenced by Rogers (2003), who maintained that diffusion occurs more quickly when the innovation is compatible with the values and belief systems of the potential adopters. This means that diffusion can occur or be delayed depending on the interpretation and meaning placed on the innovation by the adopters during the diffusion process (Love and Coben, 2008).

For example, there is a growing argument that with respect to NHS England, the culture within the NHS hinders the diffusion of innovation (Nutley and Davis, 2000; Mulgan and Albury, 2003; Albury, 2005). Albury's (2005) study on fostering healthcare innovation reported on the negative effect of culture on the rate of innovation diffusion in NHS England. The study expressed that all healthcare innovations come with risks, such as risks to patients. As a result, healthcare providers and managers, in an effort to minimise these risks, tend to develop cultural norms and behaviours that hinder the diffusion of innovations. In their analysis of the English NHS ambulance service, Wankhade and Brinkman (2014) found that the culture of the NHS had a negative influence on practitioners' approach to service improvements. Consequently, the study called for healthcare providers and managers to address cultural issues that hinder innovation diffusion in NHS England.

2.9.5 Professional networks

Prior research has reported on the influence of professional networks on the diffusion of innovation (Pittaway et al., 2004; Ferlie et al., 2005). For example, Ferlie et al. (2005) demonstrated the impact of healthcare professional networks on the diffusion of innovation in NHS England. They conducted a qualitative study investigating eight innovation cases in NHS England and concluded that links between professional groups at the micro level of practice slow innovation spread (Ferlie et al., 2005; Dopson, 2005). To that effect, Ferlie et al. (2005) argued that healthcare professionals play a significantly negative role in the diffusion of innovation and influence diffusion through their interpretation, reconstruction, and negotiation of new scientific knowledge for local use.

Other studies argue that individual factors relating to professional networks have an influence on the diffusion of innovation (Johnsen 2011; Gagnon et al., 2012; Whitebird et al., 2014). In his study of supplier engagement during product innovation, Johnsen (2011, p. 28) recognised the impact of supply networks on product development, stating that "supply network intervention can easily ruin an otherwise constructive relationship atmosphere and at the same time impact negatively on innovation". Gagnon et al. (2012) demonstrated the impact of healthcare professionals on the diffusion of information and communication technologies in the healthcare settings. Their study established that professional networks can increase knowledge distribution within networks, but at the same time may constrain the transfer of knowledge across networks. For instance, while healthcare professionals within the same field of work can relate and communicate with colleagues globally about an innovation, they may not communicate and relate with professionals across disciplines, even at the local level (Cetina, 2009). Thus, according to Gagnon et al. (2012), professional networks can be a potential barrier to the diffusion of innovation.

More generally, literature provides other reasons such as lack of communication between professionals as a barrier to the diffusion of innovation (Eghaneyen et al., 2014). Formal and informal communication (e.g. the use of email, phone calls, formal and informal meetings, and brief in-person meetings) between healthcare professionals in the same organisation facilitates information exchange about innovation but where there is inadequate communication, the diffusion process can be hindered (Eghaneyen et al., 2014).

2.9.6 Staff motivation: rewards and incentives

As established earlier, an individual or organisational adopter first develops an attitude towards either the adoption or the rejection of an innovation (Rogers, 2003). This implies that innovation diffusion is a goal-oriented process in which diffusion is dependent on an individual's or an organisation's motivation towards the innovation. Motivation in this instance relates to internal factors that compel action and to external factors that can act as inducements to action (Lock and Latham, 2004). In the words of Moody and Pesut (2006, p. 17), "motivation is a values-based, psycho-biologically stimulus-driven inner urge that activates and guides human behaviour in response to self, other, and environment, supporting intrinsic satisfaction and leading to the intentional fulfilment of basic human drives, perceived needs, and desired goals''.

Different studies have increasingly cited the benefits of staff motivation on performance outcome (Elbach and Hargedon, 2006; Grant, 2008; Grant and Berry, 2011). For instance, Elbach and Hargedon (2006) studied the effect of motivation on the creativity of overworked staff and came to the conclusion that motivation is a vital facilitator of staff creativity. In the literature, some studies have identified different approaches to motivation and its various impacts on work outcomes, particularly on innovation diffusion (Greenhalgh et al., 2004; Weiner et al., 2011). Beecham et al. (2008) argued that most of the literature focuses on staff reward and recognition. In terms of reward, Klein and Sorra's (2006) study identified staff reward as one of the key criterial for innovation diffusion. In addition, Weiner et al.'s (2011) research on the influence of organisational climate on innovation diffusion concluded that staff reward is positively related to diffusion effectiveness.

In relation to the effect of healthcare workers' motivation on healthcare outcomes, Toode et al. (2011) considered work motivation of nurses and argued that rewards such as reduced workload and adequate training can improve nurse performance. They maintained that the lack of positive reward for nurses can hinder their commitment to work. Hence, their study suggested, "a motivated and satisfied nurse has probably greater readiness to take care of patients and collaborate, and thereby provide a better healthcare service" (Toode et al., 2011, p. 247). Other commentators, such as Yildiz et al. (2009), have also presented the negative impact of lack of staff

motivation on healthcare outcome. With respect to Rogers' (2003) study, staff motivation was found to be a key factor in promoting the diffusion of innovations and, thus, it is crucial to this study, since it implies that motivation of healthcare practitioners will have a significant impact on the diffusion of innovations in healthcare networks.

2.10 Summary

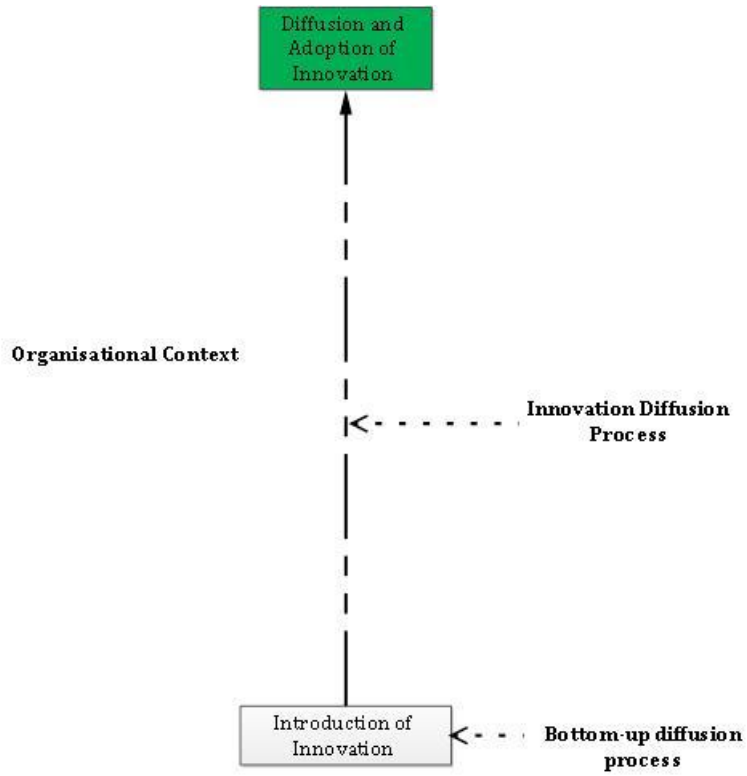
This chapter has provided an overview of innovation and diffusion of innovation theories, including the Theory of Reasoned Action, the Theory of Planned Behaviour and Rogers' Diffusion of Innovation Theory. It has considered enablers to innovation diffusion, focusing on adopter categories, innovation attributes and the decision to adopt or reject an innovation. Barriers to innovation diffusion have also been considered in relation to organisational context, innovation fit, professional networks and staff motivation. Furthermore, the chapter has addressed the advantages and disadvantages of a bottom-up versus a top-down approach to innovation diffusion, and found that a top-down diffusion process can hinder the process of innovation diffusion when an innovation is introduced without an opportunity for frontline staff to identify the benefits of the innovation whereas a bottom-up approach provides the opportunity for the frontline staff to contribute through idea generation and frequent communication about the innovation, acting as an enabler to innovation diffusion.

It was established from Rogers' (1995, 2003) comprehensive research into the diffusion of innovation that an adopter can be an actor who is aware and intentionally interacts in a creative and systematic manner within an organisation, with the expectation of gaining a certain level of benefit from the innovation that has been adopted (Rogers, 1995; Greenhalgh et al., 2004). This underpins Greenhalgh et al.'s (2004) argument that the diffusion of innovation within an organisation can be planned or unplanned, largely horizontal or vertical, formal or informal, and in most cases, is greatly influenced by the social system.

The studies of innovation and diffusion of innovation discussed in this chapter identified three vital components. First, an innovation can be a cutting-edge idea or simply an idea that, whilst not new to the world or market, may be new to an organisation or group of individuals (Rogers, 1995, 2003; Omachonu et al., 2010). Second, innovation can be diffused and adopted depending on the potential adopter's perception of the innovation's attributes, namely: relative advantage, complexity, compatibility, observability and trialability (Rogers, 1995, 2003). Third, the diffusion of innovation does not take place in a vacuum, but within a social system or organisational context (Rogers 1995, 2003; Dopson, 2005; Dopson et al., 2008). Drawing on the review of the literature, it is possible to start building a conceptual framework (see Figure 2.1) that will help in understanding the process of innovation diffusion. In addition, building a conceptual framework

will help in setting out the key concepts that will be used to organise and make sense of the qualitative data collected during this study. Above all, developing a conceptual framework will help in identifying the boundaries and scope of this research. Hence, drawing on the review of the literature, the next section presents the initial stages of the conceptual framework with respect to innovation and diffusion of innovation.

Figure 2.1: Conceptual framework and diffusion of innovation



As illustrated in Figure 2.1, the organisational context represents "a set of interrelated units that are engaged in joint problem solving to accomplish a common goal" (Rogers, 1995, p. 23). In light of this definition, for the purpose of this study, organisational context includes the environment in which the organisation sits the organisation's structure and governance, and the network of individuals or groups that function within the organisation (Dopson et al., 2008). Often in a complex organisation such as NHS England, the interaction between the different contextual elements will have an influence upon the process of innovation diffusion (Fitzgerald et al., 2002). As shown in Figure 2.1, in line with this study, a bottom-up approach to innovation diffusion is presented.

Building on the reviewed literature, the organisational context presented in Figure 2.1 represents the set of influences, such as organisational policy, culture, structure, and system of incentives

and rewards for risk-taking, which can positively or negatively influence the process of innovation diffusion.

As established in this chapter, individuals and organisations generate and diffuse innovation through the integration of knowledge and resources, as well as interactions between actors (Conway and Steward, 2009; Graf and Kruger, 2011); in other words, by means of a network of interactions and relationships. This suggests that the interactions and relationships between different actors and organisations have a significant impact on the process of innovation diffusion. Hence it is essential that the network of interactions that support the diffusion of innovation must be considered. The next chapter will present a review of the literature on networks, and discuss the roles and influences of key network actors, such as boundary spanners and gatekeepers, on the innovation diffusion process.

Chapter 3: Networks

3.1 Introduction

As established in the previous chapter, the process of innovation diffusion does not occur in isolation but amongst a network of actors. The chapter begins with an overview of networks, including interorganisational networks. It goes on to consider network formation, discussing the influence of strong and weak ties. Subsequently, healthcare networks are presented and the roles of boundary spanners and gatekeepers during the process of innovation diffusion are considered. The last section draws on the key elements identified through the review of the networks literature in order to further develop the conceptual framework.

3.2 What is a network?

Network studies have been conducted from a broad range of perspectives and disciplines, including operations and supply chain management (e.g. Harland et al., 2004; Johnsen, 2009), public management (e.g. Isett et al., 2011), governance and leadership (e.g. Provan and Lemaire, 2012; Provan et al., 2007), and marketing (e.g., Araujo and Easton, 1996). Importantly, although each of these perspectives and disciplines has its own focus, the majority emphasise the benefits of networks in improving organisational outcomes (Isett et al., 2011). In the late 1970s, Cook and Emerson (1978) presented a network as "a set of two or more connected exchange relationships" (Cook and Emerson, 1978, p. 725), and proposed that networks are comprised of two or more organisations working together to achieve mutually beneficial trading possibilities. In a similar vein, van de Ven and Ferry (1980) presented a network as a group of organisations working towards the same goal, each different network actor developing relationships with the others in order to gain returns or benefits. In the words of Johnsen et al. (2000, p. 162), networks "include those actors, resources and activities involved in the production and delivery of a product". Work by Håkansson and Ford (2002) found that a network is an aggregate of relationships between individuals or organisations that develop an increasing dependence on each other in order to survive. They go on to propose that a network represents a "structure where some numbers of nodes are related to each other by specific threads" (Håkansson and Ford, 2002, p. 133). Here the term node describes actors that connect the different organisations with each other, while the threads are the links or the relationships between these individuals or organisations (Hakansson and Ford, 2002).

Easton (1992) presented a summary of three broad definitional groups of networks: the pattern of relationships that exist within a group of organisations acting together with the intention to achieve a network outcome (Provan et al., 2007); the social relationships that link loosely

connected organisations (Jones et al., 1997; Conway and Steward, 2009); and an exchange dimension in two or more connected relationships, where the exchange in one relationship is contingent upon the exchange in another (Anderson et al., 1994). The first definition recognises the importance of networks in achieving organisational objectives, which Lee et al. (2009) acknowledged is critical in the study of the diffusion of innovation.

Studies show that a network can support the innovation and diffusion process (Conway and Steward, 2009), providing a community-pull effect that can resolve current problems, such as an ageing population and long-term healthcare conditions, e.g. diabetes (Omachonu and Einspruch, 2010; Heinerth and Lettl, 2011). To this end, it is important to provide a definition that provides an all-encompassing view of the network at both the interpersonal and interorganisational levels of analysis (Provan et al., 2007). According to Conway, "a network may be visualized as consisting of a set of actors connected by links, which represents the relationships between the various actors" (Conway, 1997, p. 2). Conway's definition suggests that actors interact with each other to achieve a defined network outcome, highlighting the significant role of interactions and linkages between actors, and the role social mechanisms play in the innovation process (Graf and Kruger, 2011), as well as emphasising the importance of formal and informal relationships in establishing networks. This shall be explored in more depth in the next section, which presents formal and informal networks.

3.3 Formality in network: formal and informal networks

Formality in networks represents an intentional and obligatory agreement that binds actor's participation in an exchange relationship (Isett et al., 2011). A common assumption among network scholars is that formal networks can be a contract and joint agreement that legally control the activities and the role of network actors in ensuring that overall network outcome is achieved (Provan and Milward, 2001; Agranoff, 2007). For service delivery organisations, Isett et al. (2011) maintained that formal contracts are formally used to define each actor's expectations of a network relationship. For example, Andrew (2009) examined how a formal contract supports local government decisions on which actors to engage with when delivering public services. And found that a formal contract enhances the success of actors 'engagement by defining the future expectations of the parties in the network arrangement.

Other studies such as Moynihan (2005) highlight the benefits of formality in networks, supported through the use of a formal contract and argued that formal networks enhance networking outcomes and provides the opportunity for network actors to overcome unforeseen difficulties in networking activities. Other forms of tools that can be used to formalise a network include memoranda of understanding, which can enable networking organisations to share a set of

defined objectives, establish well-defined roles, and at the same time demonstrate sustained commitment to these roles over a period of time, even in the absence of legal obligations to fulfil network responsibilities (Isett et al., 2011).

Although the formality of a network is significant to this research, extant literature identified network boundary specification as one of the major problems of formality in networks (Isett and Provan, 2005; Isett et al., 2011), and maintained that it can be quite difficult to identify and define network boundaries (Isett et al, 2011). For instance, many contractors in service organisations who produce and deliver services through a network, rely on an extensive network of subcontractors to whom they delegate authority and some degree of discretion in service implementation. According to Isett et al. (2011): "In addition to subcontractors, network participants may make referrals or go into partnerships with community or voluntary organizations that are not part of the formal network but are essential to network outcomes nevertheless" (Isett et al., 2011, p. 164). The researchers' summarise that such a situation makes it difficult to determine where the boundaries of networks can be drawn.

To overcome the limitations of formality in networks, organisations increasingly rely on informal networks, which Isett et al. (2011) proposed are more organically derived, suggesting an outgrowth of organizational contingencies that multiple actors come together to address. That is to say, in informal networks, actors are at the forefront of a network arrangement, and the connectivity of the actors translates to positive network outcomes. Cross et al (2002) argued that an informal network arrangement is formed through relational exchanges that emanate from informal communications. The study further established that informal networks can be useful in knowledge intensive sectors, such as healthcare where actors can use personal relationships to locate information that supports their job functions.

Informal network arrangements are formed through relational exchanges that arise through from informal communications. Isett et al. (2011) suggest that information exchanges that is focused around problem solving and service delivery, drive informal network formation. The formation of informal networks bring a variety of associated benefits that include information exchange, capacity building and the ability of organisations to innovate (Cross et al., 2002; Cross et al., 2004; Allen et al., 2007; Isett et al., 2011).

In presenting the concept of informal networks, Krackhardt and Hanson (1993) argued that informal networks are the central nervous system that drives the collective efforts and thought processed, including actions and reactions, of the various business units within an organisation in a network. In this context, Isett et al. (2011) argued that understanding the relational dynamics of informal networks is one way to ascertain the effectiveness of informal networks.

3.4 Interorganisational networks

Over the past twenty years interorganisational networks have received increased attention (Brass et al., 2004). Traditionally, interorganisational networks provide the opportunity for business organisations or institutions to collaborate with each other to meet the continuous challenges brought about by a changing business environment. When organisations, institutions or agencies are confronted with a complex problem (e.g. the ageing population treated by the healthcare sector), multiple organisations or institutions come together with the intention to create a large-scale solution to the problem (Ainsworth, 2011). Jones et al. (1997) identified interorganisational networks as exchanges "among autonomous units engaged in creating products or services based on implicit and open-ended contracts" with the aim to solve complex problems. This is reinforced by Powel et al. (1996) who presented interorganisational networks as different organisations or actors that come together to exploit a set of skills, knowledge, trust and increased capacity to deal with complex problems that one organisation cannot solve alone.

Different meanings and interpretations have been assigned to interorganisational networks, making it difficult to present a clear definition (Johnsen et al., 2000; Provan et al., 2007). For instance, Podolny and Page (1998) viewed interorganisational networks as forms of joint business ventures, strategic alliances, business groups, franchises, research consortia, relational contracts and outsourcing agreements. Kapucu (2006) viewed them as a group of individuals or organisations who exchange information and undertake joint activities on a voluntary basis, and who organise themselves in such a way that their individual autonomy remains intact. Although it has been stated in the literature that there is ambiguity in defining interorganisational networks (Ritter and Gemünden, 2003), some authors state that there is a common recurring theme in the meaning given to the term by network authors (Provan et al., 2007). Overall, it has been observed that interorganisational networks share a common characteristic, which is to encourage relationships and provide opportunities for organisations to exchange resources that promote innovation (Gemünden et al., 1996; Podolny and Page, 1998).

Consistent with the above assertions, Ritter and Gemünden (2003) described the characteristics of interorganisational networks, and how each characteristic influences relationships and the innovation process. First, interorganisational networks are an ongoing relationship that occurs between two or more actors. Second, in interorganisational networks, the relationship is unique and dynamic, and can change at any time. Third, interorganisational networking comes with a considerable investment in cost, resources and time. Studies by Podolny and Page (1998) and Sorenson (1997) identified other characteristics of interorganisational networks that contradict some of Ritter and Gemünden's assertions. For Podolny and Page (1998), the interorganisational network can be based on a distinct ethical value and value-orientation on the part of the exchange

partners. On the other hand, Sorenson (1997) maintained that, unlike the boundaries of markets and hierarchies, the boundaries of interorganisational networks can easily be adjusted. In other words, interorganisational networks can be changed to respond to the needs of the participating organisations (Sorenson, 1997; Podolny and Page, 1998).

Many studies argue that interorganisational networks have the potential to contribute to organisational success or innovation success (see Powell et al., 1996; Gemünden et al., 1996). As discussed earlier, interorganisational networks provide a means for organisations and institutions to work together to address challenging and complex issues. They have also been viewed as an alternative form of organisation when markets and bureaucracies fail within the public sector (O'Toole, 1997). Research by Rittel and Webber (1973) labelled the continuously changing demands of society as "wicked problems" and argued that markets and bureaucracies are less capable of dealing with them. Wicked problems are problems that are complex, open-ended and intractable (Head, 2008), encompassing public sector challenges such as poverty, healthcare problems, and unemployment. Many argue that no single organisation is capable of addressing such wicked problems (O'Toole, 1997; Kettl, 2006; Head, 2008). It is proposed that interorganisational networks exist to resolve wicked problems by providing a flexible structure, information-rich resources and collaborations (Johnsen et al., 2000; Isett et al., 2011). Consistent with this view, the next section will explore the value of interorganisational networks in public sector organisations such as the NHS, particularly in facilitating the diffusion of innovation.

3.4.1 Interorganisational networks and public sector organisations

Generally, the term interorganisational network denotes the relationships that exist between different organisations in a network to achieve shared outcomes (Klijn, 2008). Within the context of public sector organisations, early researchers identified interorganisational networks with various terminologies (Jones et al., 1997). For example, Powell (1990) viewed them as networked forms of organisation characterised by a lateral and horizontal pattern of relationships, through which resources are distributed via reciprocal lines of communications. Alter and Hage (1993) presented interorganisational networks as the arrangement of bounded and unbounded groups of public sector organisations, which are coordinated through non-hierarchical units. In other words, an interorganisational network is a collection of different organisations that are joined through formal and informal contracts (Jones et al., 1997).

Cunningham et al. (2012) noted that the term interorganisational network is used extensively in healthcare research and in health services delivery. In their study of professional healthcare networks, Cunningham et al. (2012) found that healthcare organisations adopt interorganisational networking approaches to deliver collaboratively oriented healthcare.

Interorganisational networks may facilitate the diffusion process within the healthcare sector (Johnsen and Ford, 2005). For example, Ferlie et al. (2005) examined the mediating role of professionals on the diffusion of innovations in the UK healthcare sector, and noted the influence of interorganisational boundaries between health authorities, local hospitals and primary care. This study also established that professional groups in interorganisational relationships use trust to produce robust social and cognitive ties that affect the process of innovation diffusion in healthcare settings.

Research into public sector organisation, such as Ferrin et al. (2006), identified trust as one of the key determinants of the effectiveness of interorganisational networks in the public sector. Trust reduces transaction costs for both network managers and network participants. Newell and Swan (2000) described trust as the ability of interorganisational network members to accept being vulnerable when dealing with risk and uncertainty in an exchange relationship. In order words, trust is an attitudinal drive that allows network members the opportunity to involve themselves in an exchange relationship (Luhmann, 2000). However, it has been reported that in interorganisational networks and in the absence of sanctions, trust encourages unrestricted participation to occur. This study views trust as a key determinant of interorganisational networks, and it will be explored in more detail in the next chapter.

Johnsen and Ford (2005) stressed that interactions and linkages are rooted in networks of relationships, which have the potential of enabling and hindering innovation processes. Their view supports a prior study by Baum et al. (2003), which found that networks of relationships are characterised by connections within the same organisation or the same industry, and that these networks of relationships are central in providing the resources needed for innovation. Thus an understanding of network motivation, and of strong and weak ties, is critical if an understanding of the influence of interorganisational networks on the process of innovation diffusion is to be developed. Understanding the motivation to form networks is essential to this study, because it focuses on why organisations enter into network relationships and why they make certain decision about their interaction with network members (Fowler and Reisenwitz, 2013).

3.5 Network motivation, strong and weak ties

Ritter and Gemünden (2003) suggested that organisations enter into network relationships for different reasons or motivations. In general, these motivations focus on the resource needs of the organisation and the need to form a network (Ahuja, 2000). According to Ahuja (2000), there are two key motivating factors for network formation: firstly, the need for the organisation to obtain access to knowledge and resources which they lack but may be owned by another organisation

(Dyer and Singh, 1998; Ahuja, 2000; Pittaway et al., 2004; Lavie, 2006); and secondly, to develop network relationships with organisations that have a high level of commercial competence.

Other studies of network formation argue that human actions are the key determinants for the formation of networks (Håkansson, 1987; Brass et al., 2004), and that actors are embedded in networks of interconnected relationships that create opportunities and constraints on behaviour. Such interconnections or ties are maintained over time and can lead to stable patterns of network formation. The ties that connect social actors can be direct or indirect, and both will have a different impact on the network relationships (Fowler and Reisenwitz, 2013). Granovetter (1973) classified the ties that enable the development of new ideas and new information within a social network as strong and weak, and identified four indicators that define the strength of a tie: intimacy, emotional intensity, frequency of interactions and reciprocal services.

Granovetter (1973) presented family ties, close friends and intimate contacts as examples of strong ties. In general, this definition suggests that strong ties bring together related and similar people, such that the information obtained and shared through these ties may not be useful for innovation (Granovetter, 1973; Brass et al., 2004). Other relevant studies, such as Gulati and Westpal (1999), examined the impact of interlocking ties on network formation, and found that direct and indirect network ties have a critical influence. As suggested by Elfring and Hulsink (2003), weak ties are loose, long-lasting and profound relationships that exist between various individuals, which tend to increase access to innovation and knowledge. Granovetter (1973) classified weak ties as loose contacts and acquaintances (e.g. fellow colleagues, fellow employers and business partners), who connect those contacts that cannot be reached by strong ties (Marsden and Hurlbert, 1988). This implies that weak ties connect different and not easily defined relationships, where knowledge and information are more likely to be obtained and shared (Elfring and Hulsink, 2003).

Studies have identified that strong and weak ties can be differentiated in terms of their benefits (Brass et al., 2004). In the search for new ideas, weak ties present more opportunities for ideas and new knowledge to be obtained, because they are likely to be within a social system with a diverse group of people, which is more likely to share and distribute knowledge and ideas that will potentially support innovation diffusion. Because strong ties include close friends and family relationships, they may tend to retain outdated ideas and information (Ruef, 2002). Inasmuch as weak ties are seen to be more important for providing new ideas and spreading information, Krackhardt (1992) argued that since the parties in a strong tie know each other well, they will be keener to provide help for each other than those in weak ties. This suggests that strong ties require more investment to be established and sustained, while weak ties require less investment (Elfring and Hulsink, 2003). Ties are important in organisational network formation and can exist

among actors in both private and public sector organisations (Fowler and Reisenwitz, 2013). To clarify the relevance of ties in organisational network formation, it will be useful to consider the benefits of network formation and their impact on the diffusion of innovation.

3.6 Benefits of network formation

Over the years, increasing numbers of researchers have highlighted the importance of network relationships in, for example, promoting the creation and diffusion of innovation; access to new technologies; access to complimentary skills; and access to external resources, legitimacy and improved economic performance (O'Toole, 1997; Ritter and Gemünden, 2003; Ritter et al. 2004). The next section will explore these benefits.

3.6.1 Creation and diffusion of innovation

Commentators argue that network relationships influence the creation and diffusion of innovation within social systems (Greenhalgh et al., 2004; Fleming et al., 2006). The creation and diffusion of innovation is not dependent upon an individual or single organisation, but on the relationships with the network in which the individual or group is embedded (Alter and Hage, 1993). Bougrain and Haudeville (2002) argued that many of today's innovation breakthroughs occurred due to the contribution of numerous actors working within a network. A study by Gemünden et al. (1996) on the networking effect on innovation in six high technology organisations found that organisations with key strategic network relationships are likely to have 20% more product innovations than those that are not in any network relationship, demonstrating that the degree of success of an innovation depends highly on the ability of firms to interact with other firms. Erikson and Jacoby (2003) investigated the role of social networks in organisational learning and innovation diffusion in the workplace, looking at network relationships between actors in the same industry and the internal network of business units. The study found that networks have a direct impact on innovation diffusion and adoption, with network actors' participation in more than one network increasing the possibilities of improved organisational learning and innovation adoption (Erickson and Jacoby, 2003).

3.6.2 Access to new knowledge

Studies of the benefits of networks highlight access to new knowledge as one of the key values for network formation (e.g. Baum et al., 2000; Tsai, 2001; Ritter et al., 2004). In the context of business networks, Ritter et al. (2004) noted that networks provide direct benefits to the participating actors or organisations by enabling access to knowledge resources and competencies. Networks provide the opportunity for mutual learning between organisations, encouraging the creation of knowledge that contributes to an organisation's ability to innovate

(Ritter et al., 2004). This echoes previous research by Tsai (2001), who established that a unit within an organisation can acquire knowledge from another unit within the same organisation when they collectively come together to solve problems within the organisation.

In a similar vein, Phelps et al. (2012) provided a multiple (interpersonal and interorganisational) analysis of network benefits in creating access to new knowledge, recognising that individuals with more ties prior to the adoption of an innovation are more likely to have access to knowledge about the innovation. This means that if the individual occupies a central position in the network, the individual will tend to have good access to valuable knowledge and information about the innovation. Hence they will have the capacity to influence other members within their units towards adopting the innovation, suggesting that centrality provides an individual or an organisation in a network relationship access to beneficial knowledge that will potentially influence innovation diffusion (Tsai, 2001; Phelps et al., 2012).

3.6.3 Legitimisation

Network relationships have been identified as providing the opportunity for participating actors or organisations to gain legitimacy and promote innovation (Baum and Oliver, 1992; Dyer and Singh, 1998; Podolny and Page, 1998). According to Podolny and Page (1998) legitimacy is a perception held by an organisation, an actor or network member that focuses on reputation. It can be based on direct or indirect relationships, and it is centred on the judgement of a network member as being trustworthy and reliable. They argued that gaining legitimacy through networking provides a number of active benefits to the participating organisations or actors, such as organisational growth and increased productivity. Baum and Oliver (1992) noted that within public sector organisations, a network relationship between legitimate institutional actors, such as between a healthcare commissioning group and a healthcare centre, will have a positive effect on the survival chances of the healthcare centre. Organisations such as healthcare centres are more likely to survive and achieve high performance if they have the institutional support and legitimacy that can be acquired through a network (Baum et al., 2000).

Similarly, Pittaway et al. (2004) found that interactions between hospitals and other healthcare providers, commissioning groups, research institutions and academia within the same sector provided a pool of complementary skills, as well as the opportunity to gain legitimacy and to spread new ideas. Elfring and Hulsink (2007) observed that the individuals or organisations that gain legitimacy are those with both strong and weak ties, and that focused on gaining institutional support. Elfring and Hulsink (2007, p. 1862) stressed that weak ties are important in the search for new information to enhance the opportunity for organisational legitimacy, whereas strong

ties provide legitimacy and trusted feedback, as well as offering a certain degree of focus in the search for weak ties that may provide new information.

3.6.4 Access to external resources

Network studies not only stress the importance of networks in accessing complimentary skills and resources, but also highlight their role in providing access to external resources (Borgatti, and Foster, 2003). Cohen and Levinthal (1990) noted that the knowledge and innovative activities of most organisations no longer come from the internal resources of the organisation. Rather, most of the valuable resources that are useful for sustaining innovative activities now come from external sources (Powell et al., 1996; Gulati et al., 2000; Lee et al., 2001). Powell et al. (1996) proposed that "as the knowledge base of an industry is both complex and expanding, and the sources of expertise are widely dispersed, the locus of innovation will be found in networks of learning, rather than in individual firms" (Powell et al., 1996, p. 116). Their study of networks of learning in the biotechnological industry found that innovation easily occurs in networks of interorganisational relationships that maintain friendly and evolving communities of practice. They noted that friendly and evolving communities of practice, such as universities and research hospitals, provide opportunities for organisations within the biotechnology industry to obtain knowledge and resources that enhance organisational innovativeness.

Moreover, network studies have emphasised that networks represent one of the strategic tools that help networking organisations to exchange resources to develop innovation processes (Barringer and Harrison, 2000; Lavie, 2008). Lavie (2008, p. 548) identified network resources as "assets that are owned by the firm's partners but can potentially be accessed by the firm through its ties to these partners". These resources can be used to promote policy agendas, innovative ideas and collective learning, and to advocate for changes in practice (Randall, 2013). The literature on networks supports the claim that access to resources is important for network outcomes, particularly in healthcare networks. This will be explored in the next section.

3.7 Healthcare networks

Healthcare networks increasingly focus on how to improve healthcare delivery by solving healthcare problems through networks of healthcare professionals and other relevant institutions (Nicholson, 2011). Research by Braithwaite et al. (2009) and Meltzer et al. (2010) identified the benefits of healthcare networks in supporting the delivery of efficient healthcare services to the general publics. According to Braithwaite et al. (2009), healthcare networks are relationships that are formed among clinicians and other external institutions. These relationships depend on mutual agreements that allow network members to participate with the

overall intention of adding positive value to the delivery of healthcare services. In line with the above definition, their study contends that in order to achieve better and safer healthcare delivery, healthcare providers must be willing to exploit the benefits of healthcare networks.

Baum et al. (2003, p. 697) described healthcare networks as "locally clustered into dense sub-networks or cliques that are sparsely connected by a small number of ties that cut across the cliques, linking network members through a relatively small number of intermediaries". A study of healthcare supply networks by Johnsen et al. (2011) characterised networks as partners and actors that combine resources, skills and knowledge to support the innovation process in healthcare settings. One of the key aspects of these studies is the suggestion that, with respect to innovation diffusion, healthcare networks can be clusters of clinical practitioners, non-clinical professionals such as managers, research institutions, universities, government agents, suppliers and industry partners, which play an important role during innovation development and diffusion (Johnsen et al., 2006). For instance, West and Barron (2005) looked at networking between nurses and other professionals (e.g., clinical directors and directors of nursing) to demonstrate the significant impact of healthcare networks in supporting continuous improvement in healthcare services. West and Barron's (2005) study identified the intrinsic roles of directors of nursing, clinical directors and managers in promoting efficient healthcare delivery in acute care hospitals in the UK.

To facilitate innovation in networks, organisations such as universities, research institutions and government institutions take on roles that connect healthcare organisations and their partners in order to support the diffusion process through knowledge creation (Patru et al., 2015). Haas (2015) identified the key roles played by "boundary spanners" and "gatekeepers" in facilitating access to external knowledge and resources, emphasising that boundary spanners and gatekeepers are central to understanding both innovation development and the innovation diffusion process in networks. Studying the roles of boundary spanners and gatekeepers provides an opportunity to understand the key role played by actors that support the process of innovation diffusion in healthcare networks. The next sections explore these roles in more depth.

3.8 Gatekeepers and boundary spanners

Allen (1979) originally identified the roles of gatekeepers and boundary spanners, and characterised gatekeepers as both internal and external communicators that transfer information and knowledge into organisational units; and boundary spanners as individuals within an organisation that assume the role of linking the internal network of its organisation with external sources of knowledge. Gatekeepers and boundary spanners are actors that exploit external sources and at the same time push the new knowledge into the local system (Giuliani and Bell,

2005). Since no single organisation is capable of meeting the constantly changing needs of clients (O'Toole, 2003), many have argued that gatekeepers and boundary spanners facilitate the anticipated benefits of networking by being at the forefront of networking activities (Morrison, 2008; Morrison et al., 2013). Gatekeepers and boundary spanners provide a secure interface between networking organisations and their environment (Morrison et al., 2013).

The level to which an organisation obtains knowledge and resources depends upon its ability to interact within the boundaries of the network (Conway, 1997). Research by Haas (2015) has emphasised that the boundaries between networking organisations and their environment may hinder resource and innovation access. Cohen and Levinthal (1990) presented boundary spanners and gatekeepers as the individuals or group of individuals that cross organisational boundaries to access resources that add value to organisational innovativeness. In particular, they noted that they are often internal members of a networking organisation, with the capacity to exploit and transfer valued resources into the organisation (Cohen and Levinthal, 1990). Thus, the presence of gatekeepers and boundary spanners in networking organisations is important in elucidating network benefits by creating access to external resources and supporting innovation diffusion (Provan et al., 2011). Both support the transfer and integration of new knowledge in organisational relationships (Haas, 2015). The next section presents gatekeepers and boundary spanners in more depth, and considers their role with respect to the diffusion of innovation.

3.8.1 Gatekeepers

The gatekeeper's role has been widely acknowledged as one of the means through which organisations obtain knowledge and information through external sources (Morrison, 2008; Graf and Kruger, 2011). Prior research by Allen (1977) argues that gatekeepers are a small number of individuals in a business environment who function as a critical information network within their organisation. Allen (1977) emphasised that gatekeepers are individuals within a profession and organisation who are exposed to external sources of information for improving organisational outcomes. Tushman and Kats (1980) argued that gatekeepers play a significant role in connecting their organisation with their external business environment, and suggested they act as a "linking mechanism to external sources of information and also take an active training, development and socialisation role within their work units" (Tushman and Kats, 1980, p. 1076). Gittelman and Kogut (2003) stressed that gatekeepers have the capacity to connect formal and informal networks, and to search for information within the network, as well as interpreting, absorbing and translating it to organisational units.

In recognition of the vital role played by gatekeepers, Haas (2015) emphasised the role of the gatekeeper during the innovation diffusion process, particularly the gatekeeper's search for

external knowledge and information relating to innovation, and the gatekeeper's communication with the internal units of the organisation. This role has been acknowledged in a study by Conway (1997), who recorded that gatekeepers become involved in different groups such as cliques, clusters and interlocking networks. They also interact with each other, facilitating innovation diffusion. Brass et al. (2004) stressed that being part of these different groups supports the flow of communication and increases trust among network members. Moreover, Graf and Kruger (2011) found that gatekeepers improve network performance and facilitate innovation. In other words, the gatekeepers' presence produces a positive link between innovation systems and external knowledge sources (Graf and Kruger, 2011).

In the context of healthcare innovation, a recent study by Hung (2017) on the gatekeeper's functions in a social network found that gatekeepers are talented individuals who link healthcare professional's together, advocating innovation and at the same time communicating information critical to the diffusion process (Hung, 2017). In a communication and information-intensive sector such as UK healthcare networks, Thakur et al. (2012) highlighted that gatekeepers are frontrunners that connect practices to innovations. Their study found that the gatekeepers make decisions that keep physicians, administrators, nurses, industry partners, regulators and patients satisfied and informed during the innovation diffusion process. This argument is consistent with Conway (1997), who suggested that gatekeepers are successful innovation teams that influence innovation diffusion by actively engaging in effective and efficient communication between their internal and external groupings.

Graf and Kruger's (2011) overview of the performance of gatekeepers in networks concluded that gatekeepers offer many benefits to the innovation diffusion process. However, they argued that while it is important to have gatekeepers to facilitate the diffusion process, it might be better to combine the roles of gatekeepers and boundary spanners during the diffusion process. The next section goes on to consider the different roles of boundary spanners during the process of innovation diffusion.

3.8.2 Boundary spanners

The past thirty years has seen growing interest in the role of boundary spanners (e.g. Tushman, 1977; Conway and Steward, 1998; Greenhalgh et al., 2004; Levina and Vaast, 2005; Patru et al., 2015). The early work of Tushman (1977) conceived the idea of "boundary spanners" as information providers and knowledge exchange facilitators for the organisation that they represent. Boundary spanners function as channels of information distribution, particularly when an organisation requires knowledge, resources or expertise from external organisations (Cross and Prusak, 2002). Leifer and Delbecq (1978) presented boundary spanners as "persons

who operate at the periphery or boundary of an organisation, performing organisationally relevant tasks, relating the organisation with elements outside it" (p. 41). Thus, the term "boundary spanner" is assigned to particular individuals, or groups of individuals, who share information and interact with people both inside and outside their organisation to achieve organisational outcomes (Cross and Prusak, 2002). Boundary spanners typically concentrate on information processing and external representation (Tushman and Scanlan, 1981).

According to Patru (2015), boundary spanners "facilitate the joint work of distinct groups by collecting, synthesizing, and translating information across professions, cultures, or organisations" (Patru et al., 2015, p. 667). Walsh (2015) identified that boundary spanners operate within an organisation and provide support to organisational units by transferring knowledge to the units, and by keeping close connections between colleagues working in the units (Khan et al., 2015). In their external roles, boundary spanners support regular communication and engagement between other organisations and their network members to achieve network outcomes (Lavina and Vaast, 2005; Van Meerkerk and Edelenbos, 2014). Moreover, research by Holmes and Smart (2009) argued that during the innovation process, boundary spanners formally manage innovation opportunities and outcomes, and informally act as a conduit that facilitates search and exploration to locate opportunities for innovation through idea exchange.

The role of boundary spanners has been identified and applied in various areas of research, such as marketing (Kusari et al., 2005), information technology (Levina and Vaast, 2005; Ryan and O'Malley, 2016), investment banking (Cross and Prusak, 2002), public sector organisations (De Vries et al., 2014) and healthcare organisations (Ritcher et al., 2006; Long et al., 2013). Long et al.'s (2013) study of bridges, brokers and boundary spanners in collaborative networks maintained that "the healthcare sector is a context that is rich in isolated clusters, such as silos and professional tribes, in need of connectivity" (Long et al., 2013 p. 1). They found that boundary spanners enable the connection and interaction of practitioners by facilitating the flow of information between different groups of healthcare professionals, which may not otherwise have access to one another.

3.8.3 The role of gatekeepers and boundary spanners during the process of innovation diffusion

A recent study by Ter Wal et al. (2017) focused on gatekeepers and innovation performance, concluding that gatekeepers perform two important roles that influence innovation diffusion: external knowledge acquisition and translation. They argued that gatekeepers search for and acquire external knowledge, which is used to support innovation diffusion process within the

internal units of their organisation. In terms of knowledge translation, the study claimed that knowledge acquisition on its own cannot support innovation diffusion. Rather, gatekeepers give external knowledge a suitable home by aligning it with the organisation's existing processes and competencies to support innovation diffusion (Ter Wal et al., 2017).

Several studies on the contribution of boundary spanners in facilitating innovation diffusion in organisations have been undertaken (see: William, 2002; Bartlett and Dibben, 2002; Holmes and Smart; 2009; Ryan and O'Malley; 2016). Abittan and Assens (2011) emphasised their role in supporting the flow of knowledge and controlling the quality of this knowledge, and their function as knowledge connectors and experts. Morgan and Finnegan's (2007) study of the diffusion of technological innovations investigated the adoption of open source software (OSS) in thirteen companies operating in the secondary software sector in Europe, and found that boundary spanners introduced their organisations into innovation through their connections with external knowledge. The study found that some individuals with good knowledge of OSS supported the introduction and diffusion of OSS within their organisations. Morgan and Finnegan (2007) identified these individuals as boundary spanners and maintained that their engagement with the frontline staff influenced the diffusion and adoption of OSS.

A more recent study by Ryan and O'Malley (2016) also acknowledged the role of boundary spanners in innovation diffusion and found that the boundary spanner plays the role of network builder, entrepreneur and mediator. As a network-builder, the boundary spanner supports the creation of interpersonal networks. As an entrepreneur within their organisations, boundary spanners enable the network to approach network goals in a dynamic and unique way (Bartlett and Dibben, 2002; Ryan and O'Malley, 2016). As a mediator, the boundary spanner supports the free flow of knowledge and information within the organisation through formal and informal communication (Holmes and Smart, 2009; Ryan and O'Malley, 2016).

Van de Van (1976) stressed that neither gatekeepers nor boundary spanners can operate in a vacuum: a relationship must already exist between one organisation and another before the roles of gatekeepers and boundary spanners can be enacted (Berends et al., 2001). Gatekeepers and boundary spanners are only valuable when organisations have an agreement to work together in a manner that improves performance, such as a network, and emphasise the important roles of gatekeepers and boundary spanners in supporting the process of innovation diffusion in networks.

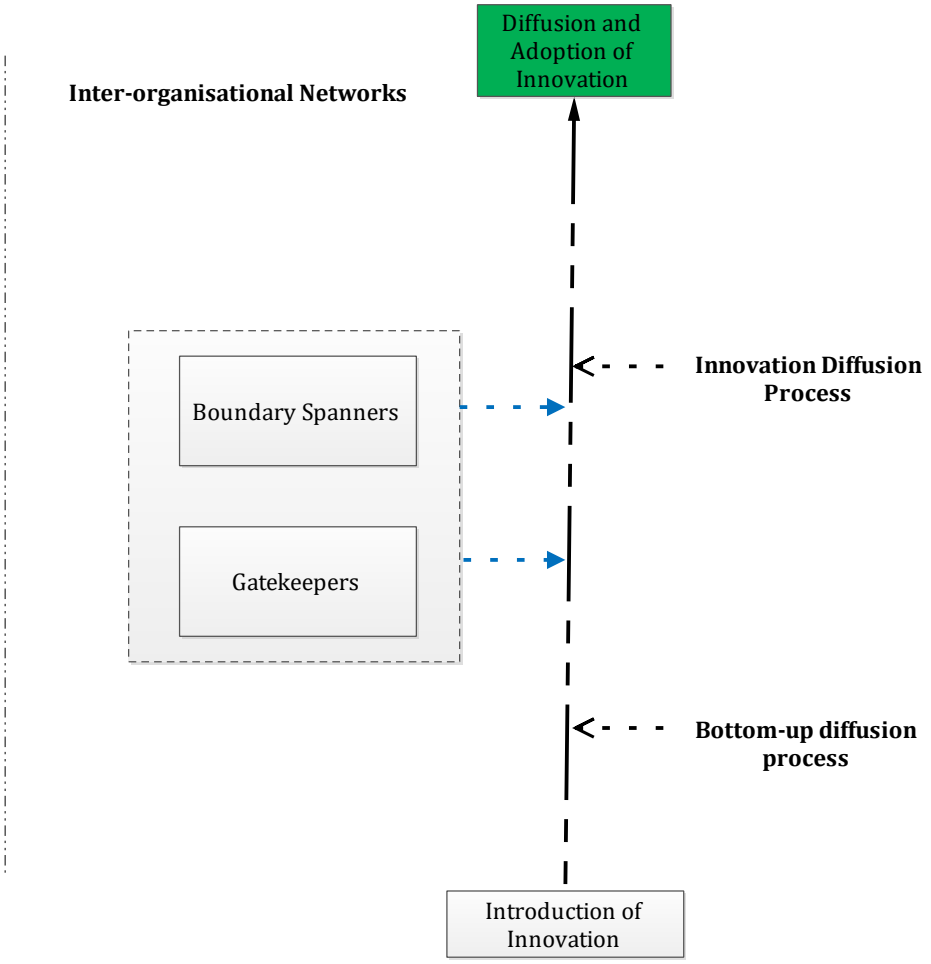
3.9 Summary

Consistent with the review of the literature presented in the previous sections, a picture has emerged that presents a network as a set of relationships between actors at the interpersonal and

interorganisational levels, whose activities and resources must be integrated in order to promote the diffusion of innovation (Johnsen et al., 2008; Conway and Steward, 2009). In terms of the roles and functions of the actors in a network, two distinct roles have been identified, namely boundary spanners and gatekeepers (Allen, 1979; Tushman, 1977; Conway, 1997; Cross and Prusak, 2002; Haas, 2015; Patru et al., 2015).

Based on the review of the literature, it is proposed that boundary spanners and gatekeepers facilitate the diffusion of innovation in healthcare networks. The boundary spanner functions as a conduit, facilitating the innovation diffusion process by providing valuable information and knowledge. Similarly, gatekeepers support the innovation diffusion process through knowledge creation, and have a positive influence on the diffusion process within their organisations through their knowledge absorption. These important insights have been incorporated into a revised version of the conceptual framework, which now presents the influence of boundary spanners and gatekeepers on the process of innovation diffusion (see Figure 3.2). In particular, the blue dotted lines pointing to the black dotted line depict the influence of boundary spanners and gatekeepers on the process of innovation diffusion. Their influence can be positive or negative, depending on how the boundary spanners and gatekeepers perceive and react to the innovation.

Figure 3.1: Conceptual synthesis of network roles on the diffusion of innovation



As this chapter has shown, the significance of networks in supporting the diffusion process within the healthcare sector cannot be overemphasised. According to Provan and Kenis (2007), interorganisational networks can only deliver positive outcomes when there is adequate coordination and governance of the activities of the actors within the network. Building on this assertion, the next chapter will explore the role of governance in interorganisational networks, particularly contractual and relational governance mechanisms, and their influence upon the process of innovation diffusion.

Chapter 4: Governance of interorganisational networks

4.1 Introduction

As established in the previous chapter, interorganisational networks can facilitate innovation success (Phillips et al., 2011). Public sector organisations are exploring options for network coordination and management (Klijn et al., 2010). Many authors have argued that governance establishes the platform on which the activities of networks can be coordinated and managed for the efficient delivery of public goods and services (Osborne, 2006, 2010; Klijn, 2008; WHO, 2007). The governance of interorganisational networks involves "a select, persistent, and structured set of independent organisations engaged in creating services based on formal and informal contracts to adapt to environmental contingencies and to coordinate and safeguard exchanges" (Jones et al., 1997, p. 914). Governance is an alternative way of improving, organising and coordinating actors in a network with the intention of achieving network outcomes (Provan and Kenis, 2007; Klijn, 2008), providing a means of ensuring effectiveness in a goal-oriented network (Vangen et al., 2015). Provan and Kenis (2007) argued that an essential capability in the governance of interorganisational networks is the ability to be governed without hierarchy or bureaucratic authority (Powell, 1990). Following on Jones et al.'s (1997) argument, a key point to note in the governance of interorganisational networks is its dynamic nature, which allows network members to form subsets through which exchanges occur frequently over a period of time. Jones et al. (1997) highlighted that in the process of governance; exchange within the network is neither random nor uniform, but rather patterned, reflecting a division of labour.

The aim of this chapter is to consider different views of governance, presenting three key paradigms: traditional public administration, new public management and network governance (Jones et al., 1997; Ferguson et al., 2005). Following this, the chapter will introduce network governance, with an emphasis on contractual and relational mechanisms, particularly how contractual and relational mechanisms influence exchange relationships. Consistent with the last section, the conceptual framework is further developed to incorporate governance mechanisms and the interplay between contractual and relational mechanisms on innovation diffusion.

4.2 Governance paradigms

The study of governance is gaining considerable attention in both the private and public sectors, with many authors providing differing interpretations (Mulgan and Albury, 2003). In establishing what constitutes governance within public sector organisations, Bennington and Hartley (2001) identified three competing paradigms: traditional public administration, new public management and network governance. These are explored in Table 4.1.

Table 4.1: Changing conceptions of governance (adapted from Bennington and Hartley, 2001)

	Traditional public administration	New public management	Networked governance
Period of introduction	Post-Second World War	1980s	2000s
Context	Stable	Competitive	Continuously changing
Population	Homogeneous	Atomised	Diverse
Needs/problems	Straightforward, defined by professionals	Wants expressed through the market	Complex, volatile and prone to risk
Strategy	State production-centred	Market- and customer-centred	Shaped by civil society
Governance through actors	Hierarchies and public servants	Markets, purchasers and providers, clients and contractors	Networks and partnerships
Key concepts	Public goods	Public choice	Public value

As Table 4.1 shows, Bennington and Hartley (2001) emphasised that the traditional public administration is mainly state- and producer-oriented, focusing on hierarchical administrative relations within the public administration. The first paradigm focuses on the administrative transfer of political will into practice through top-down decision-making processes (Scupola and Zanfei, 2016, p. 239) and the dominance of the rule of law (Osborne, 2006). Importantly, extant literature highlights that traditional public administration thrived in the post-1945 era, when the state had the responsibility for meeting most of the social and economic needs of the public (Osborne, 2006). Although traditional public administration was seen by many as the new way of administering public rules and guidelines (Bennington and Hartley, 2001; Osborne, 2006), commentators such as Rhodes (1997) argued that it has no place in today's public governance. Hence, traditional public administration paved the way for the new public management (Osborne, 2006).

For Bennington and Hartley (2001), new public management presents market mechanisms as a means of governance, following a strategy centred on the market and the customer (Hartley, 2010). In the context of new public management, the market becomes the key mechanism for the distribution of resources (Scupola and Zanfei, 2016), with an emphasis on entrepreneurial leadership within public service organisations (Osborne, 2006). According to Osborne (2006, 2011), new public management dwelt on the dominance of private-sector managerial techniques over those of public administration, with the assumption that the utilisation of these techniques

within public sector organisations would automatically deliver efficiency in public services. As seen in the public administration literature, many research authors have critiqued the ideologies of new public management (Metcalfe and Richards, 1991; Kickert, 1997; Borins, 2002; Ferlie et al., 2006). For instance, Metcalfe and Richards (1991) described new public management as a failed ideology due to its intra-governmental focus and its belief in private sector approaches to the governance of the public sector.

The network governance paradigm emerged in the early 2000s, founded on the insight that that the state functions to steer action within complex social systems rather than to exert control solely through hierarchy or market mechanisms (Hartley, 2010). According to Osborne et al. (2013), the third paradigm is reinforced by network theory, and pays attention to multiple actors' interactions in solving public needs (Scupola and Zanfei, 2016). This overview of various perspectives used by different scholars in conceptualising governance indicates a shift in governance theory from state-centred administration to a new mode of governance whereby a diverse range of actors are employed by the government in order to achieve public sector goals (Klijn, 2008). However, despite attempts to establish an understanding of how governance has evolved within public sector organisations, Rhodes (2007) noted that the term governance is used in different ways and has a variety of meanings. Hence, for the purpose of this research, it is important to establish a common definition of governance.

4.3 Governance: towards a definition

Governance has garnered significant attention over the past few decades (Osborne, 2006). It refers to the establishment of conditions for orders, regulations, collective action, and the analysis of organisational dynamics and institutional influence (Stoker, 1998; Yeung, 2005; Osborne, 2010). By creating the conditions for orders and regulations, governance creates the opportunity for organisations to exchange resources and negotiate a common purpose (Stoker, 1998). Nevertheless, the outcome of this exchange is governed is determined not only by the resources of the participants, but also by the rules of the game and the context of the exchange (Stoker, 1998). Hence, Stoker (1998) stressed that governance not only recognises the increased complexity in our systems of government, but also draws our attention to a shift in responsibility: a stepping back of the state and a concern to push responsibilities onto the private and voluntary sectors as well as, more broadly, the citizen.

Focusing on public management governance, Osborne (2006) presented a conceptual framework that compared different definitions of governance and identified a new governance paradigm, around which theory and research is developing to inform practice. Osborne (2006) viewed governance from a different perspective, focusing his work on the conceptual thinking of Rhodes

(1997) and Kickert (1993), who maintained that governance refers to self-organising and interorganisational networks that are characterised by interdependence and resource exchange, and that function with or without the state. Importantly, Osborne (2006) highlighted the significant roles played by actors in networks that facilitate the delivery of public goods and services. The salient point is that through governance, the actors in exchange relationships will gain the opportunity to work together by combining resources, skills and purposes.

For Rhodes (2007, p. 4), governance denotes "a new process of governing; or a changed condition of ordered rule; or the new method by which society is governed". Rhodes emphasised the coordination of social actors in the provision of public services and used the term "network governance", recognising that governance facilitates continuing interactions between network members, caused by the need to exchange resources and negotiate a shared purpose (Rhodes, 2007, p. 5). Rhodes' (1997, 2007) view supports the aim of this thesis, which is to examine the influence of governance on the diffusion of innovation. Thus, Rhodes' definition will be adopted by this study.

4.4 Network governance

Rhodes' (2007) study on understanding governance, policy networks, reflexivity and accountability extended the concept of governance, terming it "network governance". Rhode argued that due to the fragmentation of government policies, social actors interact with other organisations within and outside public sector organisations to ensure that public needs and demands are met (Sorensen and Torfing, 2007; Klijn, 2008). Provan and Kenis (2007) argued that network governance is a mechanism that enables network actors working together to achieve a collective goal and conceptualised three forms of governance: participant-governed networks; lead organisation-governed networks; and network administrative organisations (NAO). The participant-governed network is a form of governance that is developed informally, through regular interaction between network members with a stake in the network's success. According to Frith and Montgomery (2006) a participant-governed network is focused on empowering network members to control their own effort towards achieving the overall network outcomes. This suggests that it is a form of governance mechanisms that emerge through decentralisation whilst allowing network members to interact on an equal basis (Provan and Kenis 2007).

The lead organisation-governed network is a form of network governance that supports the centralisation of network activities (Provan and Kenis, 2007). Unlike participant-governed networks, where responsibilities should be equally distributed amongst network members (Provan and Kenis, 2007), proponents of lead organisation-governed networks contend that all the network activities and decisions should be controlled and managed by a particular network

organisation (Human and Provan, 2000). Dhanaraj and Parkhe (2006) argued that the lead organisation in the network has a significant leadership role, using its power to coordinate resources and capabilities amongst network members. This suggests that the lead organisation takes on responsibility for the maintenance of both internal and external relationships within the network (Provan et al., 2007). In this instance, the governance of the network becomes highly centralised and brokered with asymmetric power (Provan and Kenis, 2007). Although asymmetric power permits the lead organisation to coordinate and control resource distribution within the network (Provan et al., 2007), Short and Winter (1999) contend that such governance can hinder inter-organisational networking, since asymmetric power can lead to an imbalance of power which can be a source of mistrust, and as a result threaten to effective network participation.

The NAO is an externally established organisation that is set up to govern and coordinate the activities and decisions of the entire network in a relationship. Provan et al. (2007) argued that the key function of the administrative organisation is to provide basic support in the form of network leadership and could be a government entity or a single individual, a network facilitator, a broker, an executive director (Provan et al. 2004; Provan and Kenis, 2007). Although Provan and Kenis (2007) explicitly focused on the governance of networks, Bryson et al. (2006) critiqued Provan and Kenis' approach and claimed that it can be problematic to govern through these approaches. They maintained that contingencies such as network size and the degrees of trust amongst members can influence which form or approaches is appropriate for effective governance. For Jones et al (1997), governing a network through these approaches can be challenging since network governance emerges through consistent and structured exchanges that builds network level values, norms, and trust. On this this note, the participant-governed networks; lead organisation-governed networks and the NAO will not be considered as the appropriate governance mechanisms for this study.

Further critique of network governance from Kiljn et al. (2010) argued that the processes governing networks are complicated, considering the complexity of interactions, which makes mutually agreeable outcomes problematic. They emphasised that achieving network-level results is almost impossible, due to the different perceptions of the actors involved. Further, they claimed that introducing governance mechanisms as a means to ensure cooperation amongst actors can further hinder meaningful outcomes (Kiljn et al., 2010). Past studies have generally highlighted network control as one of the key challenges of governing interorganisational networks (Dekker, 2004). To overcome the issue of control in network governance, organisational scholars have adopted the transaction cost economics (TCE) approach (Dekker, 2004; Williamson, 1985, 1991),

which presents formal contracts as a means of controlling and coordinating interorganisational networks.

Poppo and Zenger (2002, p. 707) focused on the governance of interorganisational networks through formal contracts, extending the existing theory of transaction cost economics, and argued that within public sector organisations, managers and practitioners align the governance features of interorganisational relationships to match known exchange hazards, particularly those associated with specialised asset investments, difficult performance measurement or uncertainty. To overcome exchange hazards arising through interorganisational relationships, managers and practitioners may create formal contracts that "define remedies for foreseeable contingencies or specify processes for resolving unforeseeable outcomes in the network" (Poppo and Zenger, 2002, p. 707).

Previous studies (e.g. Barthon and Jepsen, 1997) showed that network governance can be explained through relational exchange theory (RET) and proposed that RET represents the level at which network relationships are governed by social relations and shared norms (Barthon and Jepsen, 1997; Poppo et al., 2008; Zhou and Xu, 2012). Other empirical work has suggested that another form of governance, not well identified by TCE, is relational governance (Poppo and Zenger, 2002). Relational governance is characterised as the level to which an interorganisational relationship is governed by social relations and shared norms (Poppo et al., 2008). For Poppo et al. (2008), relational governance coordinates interorganisational networks through social processes that promote norms of flexibility, solidarity and information exchange. Social norms are considered as behavioural guidelines that enforce social obligation amongst interorganisational networks (Cannon et al., 2000).

However, RET on its own cannot account for network relationships (Cao and Lumineau, 2015). Studies have emphasised the role of contractual governance in network relationships, highlighting the importance of contracts between network actors in providing formal processes that safeguard against opportunistic behaviour and conflict (Poppo and Zenger, 2002, Liu et al., 2009 and Wang et al., 2011; Cao and Lumineau, 2015). This has been supported by other studies which have suggested that relational and contractual governance complement each other during the exchange process, such that the use of both in a network relationship positively impacts network performance (Poppo and Zenger, 2002; Liu et al., 2009; Cao and Lumineau, 2015).

Importantly, extant literature states that contractual governance focuses on formal structures, whereas relational governance dwells on governing through informal structures and self-enforcement of actors in the interorganisational (Malhotra and Murnighan, 2002). This is consistent with studies such as Cannon et al., 2000; Poppo and Zenger, 2002; Lewis and Roehrich, 2009; Wang et al., 2011; Cao and Lumineau, 2015 which have noted the critical position of

contractual and relational governance mechanisms in coordinating and promoting networking relationships. For example, Cannon et al. (2002) concentrated on legal and relational norms and identified both mechanisms as the common governance mechanisms that can be used to study complex networks of organisations. Moreover Cao and Lumineau (2015) proposed that the concepts of both contractual and relational governance mechanisms provide an in-depth understanding of how exchange relationships can be governed, particularly in coordinating the activities of inter-organisational networks. Hence, both formal and informal contracts are further examined in this study and explored in the following sections.

4.5 Contractual governance mechanisms

4.5.1 Formal contracts

The concept of formal contract governance is expressed in the theory of transaction cost economics (TCE), which proposes that social mechanisms influence the cost of transacting exchanges (Williamson, 1985; Jones et al., 1997). In particular, TCE stresses that every transaction exchange is influenced by human behaviour and bounded rationality (Williamson, 1985; Rindfleisch and Heide, 1997). Human behaviour is described as opportunistic behaviour, which Williamson (1993) labelled as "seeking of self-interest with guile" (p. 102), while bounded rationality highlights actors' limited rationality due to restrictions on their cognitive capabilities (Rindfleisch and Heide, 1997). In other words, bounded rationality implies that actors in exchange relationships have constraints on their cognitive behaviour and are limited by their rationality (Rindfleisch and Heide, 1997). Earlier research by Williamson (1993) argued that actors' opportunistic behaviour and bounded rationality bring threats and uncertainty to exchange relationships. In response to this, network actors develop governance mechanisms intended to limit the known threats and risks inherent to a particular exchange transaction (Poppo and Zenger, 2002).

Formal contracts are governance mechanisms that aim to reduce threats and uncertainty in exchange relationships between different actors in a network (Lusch and Brown, 1996). They are legally binding agreements between network actors in an interorganisational relationship, identifying the obligations and responsibilities of each of the parties in the network (Ferguson et al., 2005). According to Poppo and Zenger (2002), a formal contract is a formal governance mechanism designed to capture specific promises of each of the actors in a network, and detailing the process of conflict resolution that might be required in the future. The logic of contractual governance is that as exchange hazards increase, the formal contract should mitigate such hazards adequately. A prior study by Williamson (1985) categorised these hazards as asset specificity, performance measurement difficulties and uncertainty.

Asset specificity refers to the "durable investments that are undertaken in support of particular transactions, the opportunity cost of which investments is much lower in best alternative uses should the original transaction be prematurely terminated" (Williamson, 1995, p. 55). In an exchange relationship, asset specificity occurs when exchange relationships require a lot of relationship-specific investment in either physical or human assets (Poppo and Zenger, 2002). In this type of situation, Williamson (1991) proposed that the presence of specific assets transforms an exchange relationship by making the identity of actors irrelevant, while the identity of exchange partners is of critical importance.

Poppo and Zenger (2002) explain that when there are problems with measuring performance in exchange transactions, actors are forced to withdraw their efforts towards delivering on the transaction agreement. As a result, actors in the relationship are faced with the option of developing complex contracts that will set specific levels of performance expectations in the exchange transaction. Uncertainty in an exchange relationship leads to adaptation problems, and forces parties to amend transaction agreements due to unforeseen circumstances (Williamson, 1991; Jones et al., 1997: Rindfleisch and Heide, 1997). According to Williamson (1991, p. 278), fundamental uncertainty is the "central problem of economic organisation", due to the unpredictability and instability of the economic environment. These hazards and threats may constrain an exchange relationship and as a result formal contracts have been identified as a means of mitigating hazards and threats (Masten, 1996).

Some scholars acknowledge that formal contracts have limitations when it comes to exchange relationships (Woolthuis et al., 2005; Lewis and Roehrich, 2009). According to Lewis and Roehrich (2009), a formal contract can be incomplete due to the bounded rationality of human beings (Poppo and Zenger, 2002). As a result, it can be impossible to have a contract that will capture all the activities and events that may occur in the exchange relationship. Luo (2002) examined joint venture contracts amongst large corporations and highlighted that the absence of specific clauses in a contract can bring about uncertainty in the contract, possibly creating space for opportunistic behaviour. In such a situation, Cao and Lumineau (2015) stressed that a lack of specific clauses in a contract can render the safeguarding function of a contract less effective. In addition, Cavusgil et al. (2003) observed that a contract with inadequate clauses may be very ineffective in defining actors' roles, and in regulating and coordinating unexpected behaviour by actors in the exchange relationship.

Other studies present the benefits of contracts, suggesting that contractual agreements improve the confidence of networking organisations during the exchange process and as a result, can create a way of developing relational governance (Poppo and Zenger, 2002). A recent study on the interplay between contractual and relational governance found that networking

organisations could achieve a higher level of performance when both contractual and relational governance complemented each other, observing that "contractual and relational governance can address each other's limitations in governance and complement each other to improve performance" (Cao and Lumineau, 2015, p. 11). Similarly, Roerich and Lewis (2014) looked at the systemic complexity of contractual and relational exchange governance in public–private partnerships and found that the integration of contractual and relational governance gave rise to better outcomes. On this point, the next section presents relational governance mechanisms.

4.6 Relational governance mechanisms

Relational exchange theory (RET) considers interorganisational exchange relationships, focusing on the relational behaviour of the network actors (Pilling et al. 1994). The theory suggests that collaboration and continuity can be achieved in an interorganisational network through trust and cooperation of the network members (Poppo and Zenger, 2002). Research suggests that relational exchange theory provides a significant valuable means of understanding interorganisational exchanges in public sector organisations (Heide and John, 1992; Provan and Milward, 2001). RET provides a set of relational contracting norms, which are adaptations of the rules common to all the contracts (Macneil, 1980), and emphasises the importance of long-term, continuous and complex relationships as opposed to individual transactions.

Dyer and Singh (1998) have supported this view, suggesting that actors in an interorganisational network can drive exchange transactions through informal self-enforcing agreements that rely on trust and reputation. Ferguson et al. (2005) referred to such transactions as relational governance mechanisms and suggested that it is the strength of social norms that reinforce exchanges. For example, Fitzgerald et al. (2003) found that in the healthcare sector, "the essential foundation for improvement and innovation is a set of right, or at least satisfactory, relationships between the partners, the employed general practitioners (GPs), and the remaining professionals, arguing that where dysfunctional relationships exist, there is a limited probability of promoting improvements and change" (Fitzgerald et al., 2003, p. 224).

Relational governance deals with the social control of an interorganisational relationship based on inter-firm commitment (Poppo and Zenger, 2002). Proponents of relational governance claim that interorganisational exchange occurs via a social process that reduces transaction costs by replacing contracts with handshakes (Adler, 2001; Ferguson et al., 2005). Early research by Macneil (1980) on relational governance mechanisms highlighted exchange behaviours, such as trust, and relational norms that underpin transaction exchanges in interorganisational networks. Relational norms include the trust that network actors will behave in a particular way that promotes each other's interest and integrity during the transaction process (Poppo and Zenger,

2002; Joshi and Campbell, 2003). For Rindfleisch and Heide (1997), bilateral governance mechanisms give network actors the opportunity to safeguard a particular asset by developing a closer tie with their network partners. Other examples of relational norms include flexibility and information exchange, which in effect enforce obligations, responsibilities, promises and expectations amongst network actors. Both trust and relational norms are important governance mechanisms that can reduce opportunistic behaviour (Liu et al., 2009; Poppo and Zenger, 2002).

4.7 Contract functions

While some have argued that the major function performed by a contract is that of safeguarding exchange relationships against opportunistic behaviour (Ferguson, 2005), a recent study by Schepker et al. (2014) argued that contracts perform multiple functions beyond legal and economic safeguards. Extant literature suggests that contracts have obtained additional functions in response to growing complexity, environmental uncertainties and multiple interactive service elements in today's exchange transactions (Roehrich and Lewis, 2014; Selviaridis, 2016). Consistent with this observation, Mayer and Argyres (2004) proposed that it is impossible for a contract to protect a relationship-specific investment by only safeguarding against opportunistic behaviour. In examining the various roles performed by contracts in exchange relationships, Selviaridis (2016) found that the functions of a contract go beyond protecting against opportunistic behaviour (Williamson, 1985, 1993; Poppo and Zenger, 2002) to include supporting organisational learning (Mayer and Argyres, 2004; Lumineau et al., 2011) and coordinating the exchange relationship (Mayer and Argyres, 2004; Schepker et al., 2011). The next sections will explore each of the contractual functions identified above, in order to develop an understanding of the influence of formal contracts on exchange relationships and the diffusion of innovation.

4.7.1 Protection against opportunistic behaviour

Contractual functions build on TCE (Williamson, 1985, 1991), which argues that a contract exists for the overall purpose of protecting organisations in an exchange relationship against opportunistic behaviour and other operational issues that prevent exchange partners from performing their obligatory duties (Williamson, 1991; Poppo and Zenger, 2002). In the logic of transaction cost economics, trust alone cannot guarantee consistent transaction exchange without providing an opportunity for partners to seek self-interest with guile (Williamson, 1993, p. 102). A contract is designed to contain different requirements that offer legal, economic and social protection in an exchange relationship (Adegbesan and Higgins, 2011). Woolthuis et al. (2005) asserted that contracts protect partners against opportunistic behaviour through an

established binding agreement, and can come in written or verbal, implicit or explicit forms, which must be enforceable (Woolthuis et al., 2005).

Argyres et al. (2007) identified that enforceable agreements must be specific on the terms and responsibilities of the parties involved in the exchange relationship. Early termination rights as defined by agreements provide an opportunity for contract exit and at the same time safeguard partners against moral hazard. Woolthuis et al. (2005) suggested that a definite agreement on assignment of property rights helps partners to control external influences and protects exchange partners with limited negotiating power. In terms of clauses that protect problematic contingencies, Argyres et al. (2007) emphasised that "contingency planning clauses function as parts of a contract that are designed to support within-agreement adjustments by prescribing the ways in which the contractual partners will deal with problematic contingencies that might arise during the execution of the contract" (Argyres et al., 2007, p. 5). In sum, Woolthuis et al. (2005) noted that a contract agreement that safeguards against opportunistic behaviour will have definite clauses that will protect property rights, spillovers, management of relationships, behaviours and allocation of decision rights.

4.7.2 Organisational learning

The view of a contract as an important avenue for organisational learning has been discussed by several scholars (e.g. Mayer and Argyres, 2004; Lumineau et al., 2011). For instance, Mayer and Argyres (2004, p. 396) affirmed that a contract provides "learning opportunities for boundary spanners and their organisation to understand the implications of contingencies for the relationship better, for the organisation's performance, and for its future contractual relationships". In particular, the study claimed that as the exchange relationship is advanced, partners in the exchange relationship increasingly develop learning capability that enables them to understand the operational procedure of the partnering organisation as it relates to the contract terms (Mayer and Argyres, 2004). This type of learning is described in organisational learning literature as experiential learning, or learning by doing, which Heimeriks (2010) labelled as the process through which organisations learn through direct experience. For Argote (1999), experiential learning consists of information and knowledge that is obtained by reflecting on one's experience and participation in a contractual agreement. For instance, research findings have shown that experience acquired through reflection can support exchange partners to use contracts efficiently, in order to learn how to develop agreements that better safeguard vulnerable assets (Heimeriks, 2010).

4.7.3 Coordination of exchange relationships

Existing literature indicates that beyond the safeguarding and organisational learning function, a contract performs a coordination and adoption function in a relationship-specific investment (Schepker et al., 2011). As the contractual agreement is established between exchange partners, coordination is required to ensure that the terms and conditions identified in the contract documents are met (Mayer and Argyres, 2004). Recent work on contract functions has discussed the various means through which contracts perform coordination functions in an exchange relationship (see: Schepker et al., 2011; Selviaridis, 2016). A study by Schepker et al. (2011) affirmed that contracts carry out coordination functions, providing a definitive clause that identifies roles and responsibilities between parties in an exchange relationship. Further, the study maintained that contracts perform coordination functions by developing lines of performance monitoring and control that guide the parties in the exchange relationship (Schepker et al., 2011; Selviaridis, 2016).

To address how contracts coordinate exchange relationships with respect to trust, contract and relationship development, Woolthuis et al. (2005) established that parties in exchange relationships use a contract to define roles and responsibilities and in some cases define role-specific functions. Similarly, other researchers claim that contracts can achieve coordination through the creation of clauses that permit partners to update contract documentation to improve communication and at the same time set expectations for parties involved in the relationship (Mayer and Argyres, 2004; Schepker et al., 2011). This implies that through contracts, each of the actors in an exchange relationship know what their roles and responsibilities are and, as a result, know how to respond to any challenges that arise during exchange transactions (Mayer and Argyres, 2004; Schepker et al., 2011).

4.8 Relational governance: trust and relational norms

Cullen et al. (2000) viewed trust as one of the major components of relationship capital, influencing how network actors behave in an exchange relationship. Many accounts of trust exist, and Grandori and Soda (1995) identified trust as one of the most frequently mentioned concepts in connection with interorganisational relationships. A study by Dirks (1999) found that much of the literature describes trust as a concept that influences organisational processes and performance. For example, trust can shape behavioural dependence (Luhmann, 2000), impact on conflict resolution (Ferrin and Shah, 1997), and is an important element with respect to interpersonal and interorganisational performance (Zaheer et al., 1998). Considering conflict resolution in relational contracts, some authors have argued that trust can help to reduce conflict management through the communication of actors' values, attitudes and emotions (Jones and

George, 1998; Rowley et al., 2000). Bernstein (2015) proposed that in a relational contract, trust creates the environment for a long-term exchange relationship with high level of cooperation and commitment. This implies that trust enables network action and at the same time facilitates collaborations that can lead to organisational outcomes (Dodgson, 1993; Poppo and Zenger, 2002). Research by Sako (1992) concluded that trust is built through contractual agreement, and through the competencies and goodwill of the actors involved in the exchange relationship.

Many definitions of trust exist. Morgan and Hunt (1994, p. 3) suggested that trust is "confidence in an exchange partner's reliability and integrity", taking into account a partner's ability to believe that other exchange partners will not fail in their promises. Zaheer et al. (1998, p. 143) viewed trust as the "leap of faith by placing confidence in a referent without knowing with absolute certainty that the referent's future actions will not produce unpleasant surprises". According to this definition, trust focuses on the reliability, predictability and fairness towards each other of exchange partners (Zaheer et al., 1998). As Newell and Swan (2000) have asserted, trust is perceived differently in various literatures; however, the two prevalent ideas are reduction of risk and uncertainty. Hudson (2004) suggested that trust takes place in situations of risk and vulnerability. When actors trust each other, they become less uncertain and less vulnerable, having confidence that the trustee will not exploit this vulnerability (Hudson, 2004). Thus, Hudson (2004) presented risk as the condition necessary for the existence of trust, arguing that trust in exchange relationships has some degree of risk that actors might or might not commit to the exchange agreement. Consistent with the themes emanating from the literature, Zaheer et al. (1998) recommended that trust can be examined from two different perspectives: interpersonal trust and interorganisational trust. This will be discussed in more detail in the following sections.

4.8.1 Interpersonal and interorganisational trust

Zaheer et al. (1998, p. 142) defined interpersonal trust "as the extent of a boundary spanning agent's trust in her counterpart in the partner organisation". That is to say, interpersonal trust is the trust that individual boundary spanners place on each other because of interpersonal ties established over a certain period of time (Zaheer et al., 1998). Lewicki et al. (2006) noted that in relational exchanges, interpersonal trust focuses on the rational expectations of actors who have established a long-term relationship with each other. Studies by McAllister (1995) and Levin and Cross (2004) supported this argument, affirming that interpersonal trust facilitates knowledge transfer and improves peers' and managers' performance. Abrams et al. (2003) described this perspective as competence-based trust, and contended that due to interpersonal trust, actors in an exchange relationship can rely on each other, once they believe that a trusted counterpart is capable of learning and implementing organisational outcomes.

In contrast, Zaheer et al. (1998) stated that interorganisational trust is the extent of trust placed in the partner organisation by the members of a focal organisation (Zaheer, 1998, p. 142). It requires an organisation to believe that another organisation cannot fail in an exchange relationship. Arguably, interorganisational trust facilitates exchange performance, such that it allows different organisations in an exchange relationship to replace formal means of governance with relational ones (Currall and Inkpen, 2002). The extant literature highlights that one of the fundamental principles of interorganisational trust is to provide an organisation with the ability to predict its behaviour towards another vulnerable organisation (Gulati, 1995). It has been observed that when an organisation in an exchange relationship performs its obligatory expectations, the partnering organisation accrues much greater confidence in the relationship (Gulati, 1995; Nooteboom et al., 1997).

Zaheer and Harris (2006) conceived interorganisational trust as a relational concept focusing on social and dyadic relationships, presenting relational trust as social, in contrast to "calculative" trust or trust as a quasi-rational choice, implying the inclusion of relational elements or the possession of social orientation (Zaheer and Harris, 2006, p. 181). In other words, interorganisational trust embraces social elements such as norms, expectations and long-term horizons (Poppo and Zenger, 2002). Ring and Van de Ven (1992) argued that interorganisational trust, as a relational concept, is centred on the experience of, and interaction between, exchange partners. Zaheer and Harris (2006) also suggested that interorganisational trust can be network-based, noting that interorganisational trust is centred on reputation when viewed from a network perspective. They argued that reputation may be more easily spread when the networking organisation is embedded in a dense network of ties (Zaheer and Zenger, 2006). Supporting this argument, literature suggests that interorganisational trust facilitates the management of economic activities, reduces exchange costs, creates opportunities for strategic action, enhances system stability and supports organisational trust (Sydow, 1998, p. 32). In sum, evidence from Morgan and Hunt's (1994) study leads to the conclusion that interorganisational trust influences organisational outcomes by reducing risk in an exchange relationship, thus allowing organisations to gain confidence in each other and promoting the exchange of information through formal and informal mechanisms (Squire et al., 2009).

4.9 Relational norms

Relational norms are referred to as shared expectations of the behaviour of actors in an exchange or interorganisational relationship (Cannon et al., 2000). In other words, relational norms display actors' expectations regarding the attitudes and behaviours that exist in interorganisational relationships, which enable all the parties in the relationship to work together towards achieving

collective and individual objectives (Cannon et al., 2000). As an important means of controlling exchange relationships, relational norms focus on the shared values of all the actors to protect exchange, and rely on peer pressure and social sanction to alleviate the risk of opportunistic behaviour (Cannon et al., 2000).

Relational norms are one of the core elements of RET, playing a significant role in governing exchange hazards (Valta, 2013; Cao and Lumineau, 2015). According to Cannon et al. (2000, p. 184), relational norms provide a "general frame of reference, order, and standards against which to guide and assess appropriate behaviour in uncertain and ambiguous situations". Thus, relational norms focus on expectations whilst also supporting the continuity of exchange relationships through actors' cooperation. Such an assumption is evidenced in earlier research by Macneil (1980, p. 38), who presented the concept of relational norms as the "principles of right action binding upon the members of a group and serving to guide, control, or regulate proper and acceptable behaviour" (Macneil, 1980, p 38). Macneil's (1980) study identified the different types of relational norms as flexibility, information exchange and restraint in the use of power. Each of these norms in explored further in the following sections.

4.9.1 Flexibility

Flexibility has been the subject of much discourse amongst the academic community (Macneil, 1980; Heide and John, 1992; Zhang et al., 2003; Huo et al., 2015). Heide and John (1992) viewed flexibility as the bilateral expectation of willingness to make adaptations in response to changes or unforeseen circumstances. Flexibility represents an assurance that the relationship will be subject to good-faith modifications if a particular practice proves detrimental in light of changed circumstances (Heide and John, 1992, p. 35). For public sector organisations, this demonstrates that flexibility is beneficial to actors, as it provides the opportunity for them to change practices or processes to suit their immediate environment (Powell, 1990; Zhang et al., 2003).

According to Provan and Kennis (2007), flexibility allows parties in exchange relationships to respond strategically and to utilise available opportunities within their networks. Given the complex nature of public sector organisations, Dedeurwaerdere (2005) noted that flexibility encourages learning and improves exchange relationships by driving the purposeful collection of actions and interactions amongst practitioners.

4.9.2 Information exchange

Information exchange refers to the mutual expectation that actors engaged in exchange relationships will be willing and ready to provide valid information to other parties in the relationship (Heide and John, 1992; Valta, 2013). Lai et al. (2012) supported this definition and

affirmed that in interorganisational networks, information exchange improves communication between the actors and parties involved in the relationship and provides the opportunity to gain a better understanding of the parties in the network. In their study of governance and opportunism in logistics outsourcing relationship, Lai et al. (2012) found that lack of valuable information exchange between parties promulgated opportunistic behaviour. However, when adequate information exchange is supported by relational norms, it promoted a high level of transparency (Huo et al., 2016). Morgan and Hunt (1994) suggested that in an exchange relationship, information enhances trust. This is further supported by Provan and Kennis (2007), who proposed that trust encourages cooperation between parties and the achievement of both network and individual goals.

4.9.3 Mutuality

According to Cannon et al. (2000, p. 183), mutuality is "the attitude that each party's success is a function of everyone's success and that one cannot prosper at the expense of one's partner". That is to say, mutuality represents the joint expectations of the behaviours of actors in a network to be shared by all decision makers in the exchange relationship (Heide and John, 1992). The fundamental aspect of mutuality in relational norms is the creation of a social environment that discourages self-interested behaviour in favour of mutual interest-seeking behaviour (Lai et al., 2012). More generally, mutuality dwells at the core of the concept of relational norms. It focuses on the shared interests of two or more actors in an exchange relationship, while acknowledging that they may have other differing interests (Guest and Peccei, 2001). In the literature, it is argued that a feeling of mutuality in an exchange relationship is essential, because it enhances social cohesion (Berezin and Lamount, 2006), and facilitates exchange relationships and outcomes (Easterly et al., 2006). Thus the relational norm of mutuality is important to this study as it focuses on providing support that enhances exchange relationships in interorganisational networks.

4.10 Chapter summary

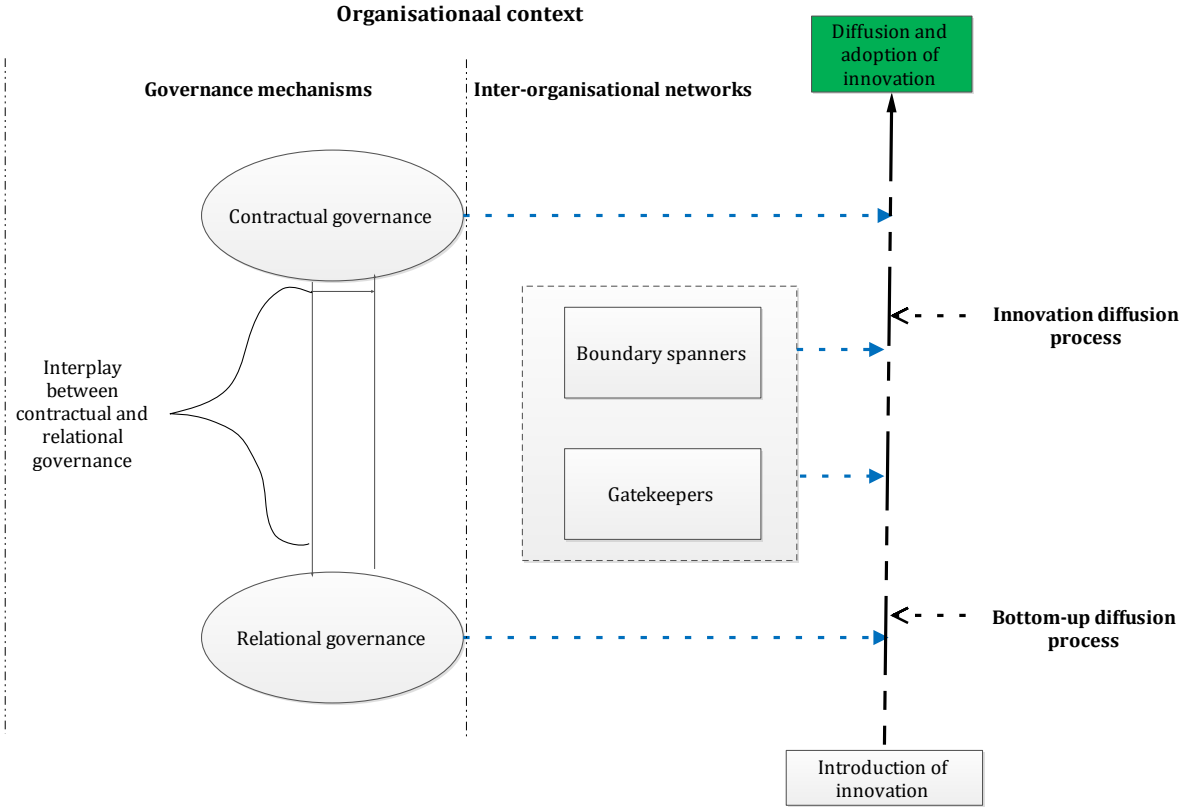
This chapter reviewed the literature on governance mechanisms, including contractual and relational governance mechanisms, followed by an overview of governance, including its origins and meaning. Further, discussions on contractual and relational mechanisms were considered, and various functions that facilitate the innovation diffusion process were identified: protection against opportunistic behaviour; organisational learning; and the coordination of exchange relationships. An overview of trust was presented, including interpersonal and interorganisational trust, and relational norms such as information exchange and flexibility were examined. Building on the key concepts that emerged from the reviewed literature, the

conceptual framework will be developed further to incorporate the role of governance during the innovation diffusion process. Doing so will also present a possible map of the territory to be investigated by this study. Drawing on the review of the literature, the research questions will also be presented.

4.11 Conceptual framework and research questions

The conceptual framework builds on the reviewed literature on governance mechanisms, presenting the influence of governance mechanisms on interorganisational networks. Specifically, in line with the focus of this study, the conceptual framework presents the influence of governance mechanisms on bottom-up diffusion of innovation in healthcare networks. This revised conceptual framework is illustrated in Figure 4.1, and having undertaken the review of the literature and incorporated the key concepts, it is this version that will be employed by the study for the subsequent analysis of data.

Figure 4.1: The conceptual framework



As seen in Figure 4.1, the small dotted black lines delineate two different layers: the network actors and the governance mechanisms (that is, the contractual and relational mechanisms). The thick black dotted lines represent the bottom-up introduction of an innovation into the system. The first and last horizontal dotted blue lines show the influence of governance mechanisms (contractual and relational mechanisms) on the innovation, while the blue dotted lines show the

influence of networks on the innovation introduced into the system, illustrating how networks governed by contractual and relational mechanisms facilitate the innovation diffusion process.

As illustrated in Figure 4.1, the conceptual framework shows the influence of governance mechanisms on the diffusion of innovation in interorganisational networks, and how such influence affects the diffusion of innovation in an organisational context. As established in the reviewed literature, the activities of the boundary spanners and gatekeepers have an influence on the diffusion of innovation, with the boundary spanners providing valuable information and knowledge that supports innovation diffusion. The gatekeepers support the process through knowledge creation and their awareness of the organisational environment in which the innovation is being introduced.

The initial conceptual framework displayed in Figure 4.1 shows the interaction of governance mechanisms and the network actors influencing the diffusion of innovation in healthcare networks. The conceptual framework identifies three contextual variables that may influence the process of innovation diffusion in healthcare networks, as indicated by the extant literature reviewed in this study. They are: contractual and relational governance mechanisms, including the interplay between contractual and relational mechanisms; boundary spanners; and gatekeepers. The extant literature reviewed in this study indicated that these variables have the potential to influence the process of innovation diffusion in healthcare networks. Hence, the research questions derived from the conceptual framework are:

1. How do contractual and relational governance mechanisms influence the diffusion of innovation in healthcare networks?
2. Who are the key actors involved in the diffusion of innovation in healthcare networks?
3. How do the different key actors influence the process of innovation diffusion in healthcare networks?

To address the above research questions, the conceptual framework will be tested through data collection and analysis. The research methodology adopted by the study for the collection and analysis of data is introduced and discussed in the next chapter.

Chapter 5: Research methodology

5.1 Introduction

Within this chapter, the methodology used in conducting this study is presented. Firstly, an overview of the research philosophy, the ontology and the epistemological positions adopted in the study is provided, followed by a discussion of the research strategy. Secondly, the research design discusses the rationale for the single case selection and the use of embedded sub-units. The approaches taken to ensure validity and reliability in this study are considered and related to Yin's (2014) four criteria for judging the quality of case study research. The ethical considerations are stated, followed by the sources of evidence and the sampling strategy adopted by the study. The chapter concludes by presenting the approached employed in analysing the data.

5.2 Research philosophy

Bryman and Bell (2007, p. 25) viewed a research philosophy as "a cluster of beliefs that dictate and influence what should be studied, how research is done, and how results are interpreted". The research philosophy has been seen as the lens through which a researcher looks at the world, and the basic belief system or worldview that guides an investigation (Crotty, 2012; Bryman and Bell, 2015). Saunders et al. (2015) presented research philosophy as a paradigm, and argued that it represents the way through which social phenomena can be examined to gain a scientific or social understanding of the phenomena. Early research by Proctor (1998) noted that research philosophy focuses on three levels of enquiry, namely:

1) Ontology – what is the nature of reality?
2) Epistemology – what can be studied?
3) Methodology – how can researchers discover what they believe can be discovered?

The next section examines how each of these three levels of enquiry supported this study.

5.3 Ontological underpinning

Ontology is the philosophy of reality or the understanding of existence (Crotty, 2012). It presents the basic assumptions people have about the way the world operates (Saunders et al., 2015). Bryman (2012) identified two contrasting ontologies: realist and idealist. The realist argues that the existence of reality is independent of human thought and beliefs, while the idealist believes that reality is based on the individual reasoning of structures and thoughts (Crotty, 2012; Saunders et al., 2015). The idealist ontology underlines the role of individuals' thoughts and

actions in constructing social phenomena. The realist school of thought, on the other hand, argues that causal mechanisms are independent, stable factors that under certain conditions connect, thus causing an effect (Crotty, 2012). According to George and Bennett (2005), realism supports case study research that aims to discover evidence of causal mechanisms to explain outcomes. This is pertinent for this study, as the diffusion of innovation in healthcare networks cannot only be influenced by natural and social phenomena, but also by events (in this study, the process of innovation diffusion) and the way participants experience events and act upon them to create a desired effect.

5.4 Epistemological underpinning

The epistemological approach focuses on what the researcher believes knowledge to be, as well as how knowledge is acquired or how we come to know (Trochim, 2002). It is the theory of knowledge that is embedded in the theoretical perspective and methodology chosen by a researcher (Crotty, 2012). Epistemology deals with the nature of knowledge and aims to ask the following questions:

1) How do we know what we know?
2) What is the relationship between the knower and known?
3) What do we regard as knowledge? (Krauss, 2005)

Bryman (2012) identified three epistemological positions: interpretivism, positivism and critical realism. Each of these positions is discussed below.

5.4.1 Interpretivism and positivism

In the words of Saunders et al. (2015) the interpretivist position holds that the "the social world of business and management is too complex to lend itself to theorizing by definite laws in the same way as the physical sciences" (p. 116). The interpretivist position claims that there is no single reality; rather, reality is based on an individual's interpretation of social phenomena through their life experiences (Crotty, 2012). Interpretivists believe that reality cannot be independent of the individual that observes it (Ron, 2004). This implies that they can only provide their own interpretation, thereby denying what is possible to be known as real and rejecting the possibilities of discerning causality.

In contrast, positivists claim that reality is distinct from the researcher who observes it, meaning that the researcher and the phenomenon which is studied are independent of each other (Saunders et al., 2015). The positivist position is most commonly affiliated with quantitative methods of data collection and analysis, which require a highly structured methodology to

facilitate replication in research (Saunders et al., 2015). Crotty (2012) maintains that the positivist believes that a single reality can be obtained when research is carried out using an objective approach and following a neutral process. Hence, reality is discovered when a researcher follows the cause and effect principle and measures relationships between variables to determine a single reality (Healy and Perry, 2000). Easton (2010) warned of this limitation and emphasised "that the most crucial problem is that constant conjunction of elements or variables is not a causal explanation or indeed an explanation of any kind. It is simply a theoretical statement about the world and doesn't answer the question why?" (Easton, 2010, p. 118).

The positivist approach views individual and their real-life experiences as key components of research, which are independent and non-reflective objects. It ignores the ability of individuals "to reflect on problem situations and act on these in an interdependent way" (Robson, 1993, p. 60). Moreover, Maykut and Morehouse (1994) stated that individuals are surrounded by socially constructed realities that cannot be measured with statistical instruments and structural equations. Further criticism by Silverman (2013) claimed that the natural science method cannot be used for social research due to the interactions that occur between the researcher and the phenomenon under study. In addition, the positivist position separates the researcher from the world they study in social research; yet the researcher will participate in real-world life to some extent, in order to understand and express its emergent properties and features (Healy and Perry, 2000). The key characteristics of both epistemological positions are shown in Table 5.1.

Table 5.1: Interpretivism and positivism

Epistemological position	Basic belief	Researcher should	Preferred methods include
Interpretivist philosophy	The world is socially constructed and subjective	Focus on meaning by understanding the individual's view of the phenomenon under investigation	Adopt simple methods to establish different views of the phenomenon under investigation
	Observer is part of the research process	Conduct a comprehensive examination of the situation of events through interviews, observation, and documentation analysis	Small or large sample investigated in depth, over time
	Science is driven by human interest	Develop ideas through induction from the qualitative data	
Positivist philosophy	That the world is external and objective	Focus on fact and look for fundamental laws	Operationalisation of concepts so that they can be measured

	Observer is independent of the research	Reduce research phenomenon to simplest elements	Collection of large sample and a large quantity of qualitative data
	Science is value-free	Formulate hypothesis and then test for result	

Source: adapted from Easterby-Smith et al. (1991, p. 27)

Consistent, with the above argument, Easton (2010) suggested that both positivist and interpretivist positions are not appropriate epistemologies for conducting case study research. Easton (2010) emphasised that critical realism offers a better epistemological approach that is more closely aligned to the case study design, and this is discussed in more detail in the next section.

5.4.2 Critical realism

Critical realism is seen by many as a useful philosophical paradigm for conducting social science research, and has been presented as an alternative to positivist and interpretivist paradigms (Sayer, 1992; Tsang and Kwan, 2001; Wynn and Williams, 2012). Critical realism originated from the work of Bhaskar (1975), and has been used by many researchers conducting social science research (Tsang and Kwan, 1999). According to Mir and Watson (2001), critical realism represents a vital point of epistemological departure from mainstream realism, as it assumes that there is a real world out there to be discovered (Easton, 2010). For critical realism, language and concepts are seen as constructing social realities. Bhaskar (2001) proposed that "of course social reality is concept dependent, of course it is people dependent; but it is not concept exhaustive; it is not people exhaustive; it is not exhausted by human beings as powerful particulars; it is not exhausted by discourse or the text" (Bhaskar, 2001, p. 28). This assertion implies that language and concepts are the basic factors that construct learning and knowledge within an organisation. It also highlights that language and concepts are the key connections between thought and actions in a networked organisation.

The central tenet of the critical realist explanation can be found in Sayer's (1992) claim that the world exists independently of our knowledge of it, and social phenomena such as actions, texts and institutions are concept dependent. This suggests that social researchers will not only have to explain the production of social phenomena and material effects, but to understand, read or interpret what they mean. While social phenomena have to be interpreted by starting from the researcher's own frames of reference and understanding, they exist regardless of how they are interpreted by the researcher (Sayer, 1992). Hence, "critical realism acknowledges the role of subjective knowledge of social actors in a given situation as well as the existence of independent

structures that constrain and enable these actors to pursue certain actions in a particular setting" (Wynn and Williams, 2012, p. 788).

Bhaskar (1975, 1998) acknowledged that a critical realist researcher attempts to provide explanations of a defined event by uncovering the proposed existence of mechanisms which, if they had existed and were implemented, could have formed these events. Consistent with the empirical evidence regarding these events and the context, the vital question to be asked would be: what would reality be like in order for this event to occur? (Wynn and Williams, 2012). This therefore suggests that the ultimate goal of a critical realist researcher is to uncover the mechanisms that emanate from the components of a physical and social structure to produce this event (Sayer, 1992).

Wynn and Williams (2012) argued that critical realism has the potential to inform research strategy, as it offers researchers new opportunities to investigate complex organisational phenomena using a holistic approach (Kwan and Tsang, 2001). In other words, critical realism is a detailed and comprehensive epistemology, and its explanation offers a clear philosophical justification for research strategies such as case study design (Sayer, 1992). In line with this view, Yin (2014) conceptualised case study research from the social science perspective and defined case study research as "empirical inquiry" (p. 16). In fact, Yin (2014) explained case study design from the critical realist perspective and focused on maintaining clear objectivity in the methodological process of case study design. Yin argued that case study inquiry "copes with the technically distinctive situation in which there will be many more variables of interest than data points, and relies on multiple sources of evidence, with data needing to converge in a triangulation fashion" (Yin, 2014; p. 17).

Others, such as Easton (2010), also considered case study design from a critical realist perspective. For instance, Easton (2010) argued that a case study "involves investigating one or a small number of social entities or situations about which data are collected using multiple sources of evidence" (p. 119). In fact, the study claimed that the case study method provides an opportunity for critical realist researchers to examine the interaction of structure, events, actions and context to uncover and elucidate causal mechanisms (Wynn and Williams, 2012). Thus, since this study aims to examine a contemporary phenomenon to discover the role of governance mechanisms on the diffusion of innovation in healthcare networks, critical realist epistemology is well suited for the research.

5.5 Research strategy

A research strategy shows the direction and process of research, and provides a framework for the collection and analysis of data (Creswell, 2007; Bryman, 2012). The choice of research

strategy reflects decisions about the priority being given to a range of dimensions of the research process. Saunders et al. (2015) identified different research designs, including: experiments, surveys, archival analyses, histories and case studies, grounded theory, ethnography, action research, cross-sectional and longitudinal studies. However, Yin (2014) stated that the use of any of the above design strategies is dependent on the research questions posed, the extent of control a researcher has over the research events, and the degree of focus on contemporary as opposed to historical events. Table 5.2 illustrates the relevant contexts for different research methods.

Table 5.2: Relevant contexts for different research methods

Method	Form of research question	Requires control of behavioural events	Focuses on contemporary events
Experiment	How, why?	Yes	Yes
Survey	Who, what, where, how many, how much?	No	Yes
Archival analysis	Who, what, where, how many, how much?	No	Yes / No
History	How, why?	No	No
Case study	How, why?	No	Yes

Source: adapted from Yin (2014, p. 9)

According to Yin (2014), case study design tends to ask the "how" questions in qualitative research. Yin's (2014) study suggested that the "why" and "how" questions deal with operational links needing to be traced over, rather than mere frequencies or incidences. This research is bound within the focus of "how" questions. This study aims to understand how governance mechanisms influence the diffusion of innovation in healthcare networks, and to identify how the key actors involved in the diffusion of innovation in healthcare networks influence the process. In other words, the focus of the study is to understand how different factors influence the diffusion of innovation in healthcare networks. Unlike history and survey design, case study design explores contemporary events in which the relevant behaviour cannot be manipulated.

In addition, case studies utilise different sources of evidence and it is important to note that such criteria distinguish case study design (Yin, 2014). For the purpose of this, meetings notes, supporting documents and interviews of participants involved in the selected projects have been used. Case study design is considered an appropriate design for this research as it is an approach that allows some flexibility (Godoy, 2006), however, specific epistemological principles and

methodological procedures must be recognised and respected if quality work is to be produced. Thus, Yin's case study approach to will be adopted by this study to ensure the delivery of a quality research output.

5.5.1 Case study research design

Yin (2014) viewed a case study as an "empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 2014; p. 13). Case study design enables the subject of the research to be studied as an example of a real-world phenomenon, within the context in which it occurs. Therefore, to understand the real-world phenomenon, it is important to collect qualitative data using multiple sources of evidence, such as interviews, questionnaires and document analysis (Yin, 2014). Importantly, Yin (2014) argued that case study research is different from other research designs and is often connected with modern studies within health science. Authors such as Creswell (2007), and Baxter and Jack (2008), have also claimed that case study design involves the study of an organisation or an individual in a bounded system. When it is used in an organisation, it allows a researcher to develop an in-depth description and analysis of the phenomenon under investigation, with the intention to answer the "how" questions in the research (Creswell, 2007; Yin, 2014). In terms of network research, case study data can be used to identify the patterns and relationships in interorganisational networks. That is to say, in network research, case study design brings fragmented details together and at the same time offers techniques that put details into context, rather than leaving them hanging, as do conventional statistical approaches (Gummesson, 2007).

Baxter and Jack (2008) argued that when the process of case study design is applied correctly, it becomes a valuable method for healthcare research to develop theory, evaluate programs and develop interventions. Furthermore, Collis and Hussey (2009) stressed that case study research can generate in-depth and comprehensive data that can be used in the study of intangible phenomena within a complex and bounded organisation such as NHS England.

Researchers recognise that case study design applies to the study of single and multiple cases within a complex organisation, with the aim of describing, exploring and explaining the dynamics present within the organisation (Eisenhardt and Graebner, 2007). Consistent with this view, Baxter and Jack (2008) supported the use of single case study design in providing the opportunity for researchers to look at sub-units that are situated within a larger case, particularly when the research data can be analysed within the sub-units separately (within-case analysis), between the different sub-units (between-case analysis), or across all of the sub-units (cross-case analysis). In other words, the use of "a single case study design will allow a researcher to analyse

within each setting and across settings" (Baxter and Jack, 2008, p. 550). Hence, since this study is investigating different units within one large case, this thesis follows a single case study design.

Yin (2014) has presented single case study design with embedded units of analysis. In an embedded unit of analysis design, Yin (2014) argued that the case is divided into multiple units of analysis. This suggests that, although the study is about a single entity (single case), attention can be given to a sub-unit or sub-units within the same entity. In this study, the network as represented by the AHSN is the single case, and the projects investigated were the embedded sub-units. In other words, the use of sub-units in an embedded design provides a vital opportunity for extensive research while at the same time enhancing insight into the single case (Yin, 2014). Although case study design is viewed by many as an important qualitative research approach, the attention given to case study design in social science literature varies significantly (Tight, 2010). Some critiques of case study design are discussed in the next section.

5.5.2 Critiques of case study design

Although Yin's (2003, 2009, 2014) approach to case study design has enjoyed extensive popularity among social researchers, Stake (1995, 2005), Flyvbjerg (2006) and other researchers have critiqued Yin's approach for different reasons. Part of Stake's (1995, 2005) criticism is the view of what should be termed case study design. Stake (1995) argued that case study design focuses on the particularity and complexity of a single case, aiming to understand its activity within relevant circumstances. Stake (2005, p. 445) went on to identify three main types of case study: intrinsic, instrumental and collective. The case can be intrinsic "if the study is undertaken because, first and last, one wants better understanding of this particular case". It can be instrumental "if a particular case is examined mainly to provide insight into an issue or to redraw a generalization". Finally, and a case can be multiple "when a number of cases may be studied jointly in order to investigate a phenomenon, population or general condition" (Stake, 2005, p. 445). Yin (2014) conceptualised four types of case study design along two dichotomous dimensions: single or multiple case, holistic and embedded case study (Yin, 2014, p. 50). Stake (2005) critiqued Yin's approach and argued that it focused on the study of selected units within a case instead of the purpose of doing the case study. Stake (2005) claimed that a case study must concentrate on experiential knowledge of the case and pay close attention to the influence of its social, political and other contexts.

Another criticism of Yin's case study approach is the problem of generalisation. Tellis (1997) criticised the dependence of case study design on a single case approach. This view is shared by Stake (1995), who argued that case study research cannot make generalisations from the case study findings. In fact, Stake (1995) maintained that case study findings can be classified as

naturalistic generalisation, which is viewed as a moderately intuitive process arrived at by recognising the similarities of objects and issues in and out of context. Stake's view of generalisability is also acknowledged in the work of Lincoln and Guba (2000), who used the term "transferability" in preference to generalisation, stating that it is the job of a researcher to produce detailed descriptions of the result, which allow the reader to make inferences about the findings in other settings. On this note, Stake (1995, 2005) concluded that to produce a valid social science investigation, researchers must not only rely on generalisation of findings, but rather they should present the case investigated in a way that captures the unique feature of the case.

For Flyvbjerg (2006), the problems of conventional wisdom can be summarised in five misunderstandings of case studies. According to Flyvbjerg (2006), the first misunderstanding is the belief that general, theoretical (context-independent) knowledge is more valuable than concrete, practical (context-dependent) knowledge. On this, Flyvbjerg (2006) argued that social researchers have only specific cases and context-dependent knowledge, which therefore rule out the possibilities of epistemic theoretical construction. The second misunderstanding is that case studies cannot be generalised on the basis of an individual case, and that as a result case studies cannot add value to scientific development. For the second point, Flyvbjerg (2006) noted that the above argument depends on the case and how the case is chosen. The third misunderstanding is that case studies are most useful for generating hypotheses. Flyvbjerg (2006) rejected this, arguing that the criteria for selection of extreme, critical and paradigmatic cases deal with this misconception. In fact, this argument supports Yin's (2014) view on the five rationales for single case study selection. The fourth misunderstanding relates to a bias towards verification; that is, a tendency to confirm the researcher's preconceived notions. For Flyvbjerg (2006), this limitation is a problem for all methods of social research. The fifth misunderstanding is that it is often difficult to summarise and develop general propositions and theories on the basis of specific case studies. Here, Flyvbjerg (2006) concluded that the problems in summarising case studies are in fact due more often to the properties of the reality studied than to the case study as a research method. Often it is not desirable to summarise and generalise case studies. Good studies should be read as narratives in their entirety.

On this note, Yin (2014) proposed a set of criteria and tests for judging the quality of case study design. The four tests are: construct validity, internal validity, external validity and reliability. Each of these quality criteria is discussed in a later section of this chapter, in an effort to address the traditional concerns relating to the use of case study research.

5.5.3 Selection of the embedded sub-units of analysis: the rationale

Single case studies are one of the most common designs employed in case study research, and Yin (2014) noted that they can be used to examine a phenomenon that is within an established theory. As mentioned earlier, this study investigated the AHSN as a network, and the theory around networks is well established. Therefore, it is appropriate for the wider project to have selected a single case study approach. In line with the above assumption, this study adopted a single case design, following Yin's (2014) suggestion that the single case design is justifiable within five unique rationales, particularly when the case investigated is extreme or unusual. In view of the above conditions, the rationale for selecting a single case design is that the study represents an extreme or unusual case. In terms of the larger collaborative project, the aim is to evidence the value of the AHSN, with the focus of this specifically centred on the influence of governance mechanisms on the diffusion of innovation where a bottom-up approach has been employed.

The extreme case represents one of the conditions for selecting a single case design. Yin (2014) argues that this condition exists when a case represents extreme circumstances that are different from theoretical norms. Such a situation can provide an opportunity for researchers to adopt single case design, particularly when the value of the case study can be connected to a large number of people well beyond those related to the case, and if it also reveals insights about normal processes (Yin, 2014, p. 52). This implies that in evidencing the value of the AHSN, it is possible, through the use of embedded sub-units, to document and analyse the role of contractual and relational mechanisms on the diffusion of innovation in healthcare networks where a bottom-up approach has been used.

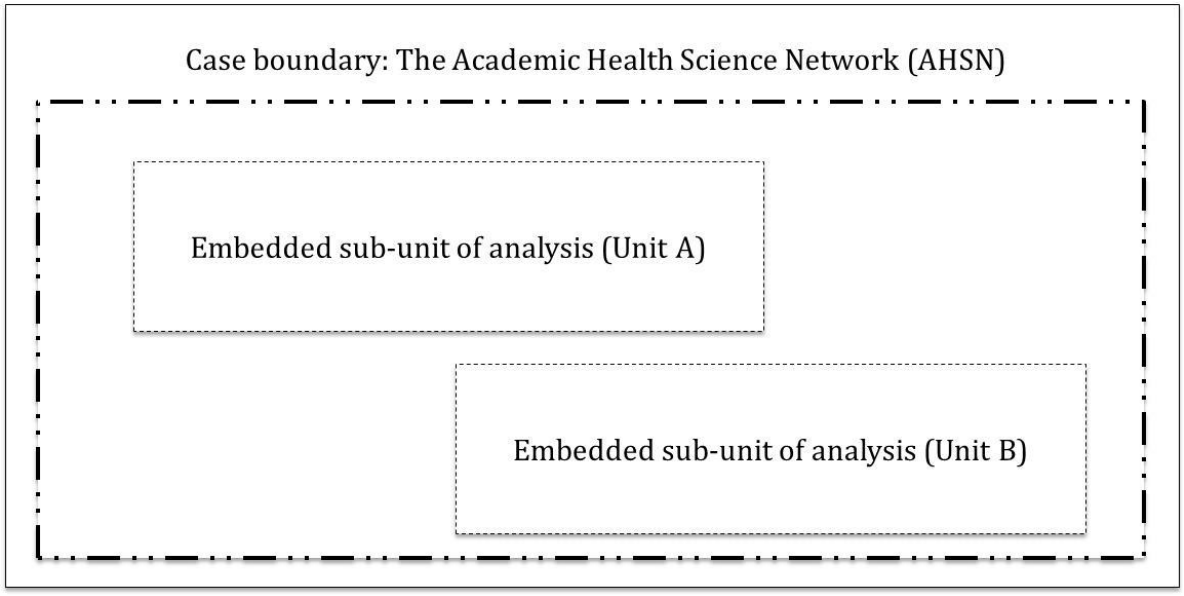
As previously mentioned, the participating AHSN represents one of fifteen AHSNs set up by NHS England to accelerate the adoption and spread of innovation and improve clinical outcomes and patient experience (AHSN, 2014). Adopting the AHSN as a single case study will provide learning not only for AHSNs in other regions, but also for NHS England. It is important to mention that this study is not just a single case; rather it is a case with embedded sub-units of analysis. In this thesis, the two embedded sub-units are classified as Unit A and B, and the background of each of the embedded units of analysis will be explored in the following sections

5.5.4 Unit of analysis

The value of the AHSN has been studied by a multidisciplinary group of academics drawn from three different universities. This particular study focuses on the AHSN as the single case, while two of the quality improvement projects that were initiated and implemented by the AHSN have been classified as the embedded sub-units of analysis. Both quality improvement projects are

represented as Unit A and B. Figure 5.1, below, illustrates the single case with the embedded units of analyses.

Figure 5.1: Single case with embedded sub-units of analysis



Source: Adapted from Yin (2014, p. 50)

5.5.5 The embedded sub-units of analysis

When a single case study has more than one unit of analysis, it is referred to as having embedded or multiple units of analysis (Yin, 2014). As detailed in chapter 1 of this study, the AHSN in collaboration with the wider research team selected the projects (embedded sub-units of analysis) that were investigated because their implementation followed a grassroots approach to adoption. The context of each of the embedded units of analysis is presented below, as Unit A and B, taking into account the need for anonymity.

Unit A

According to a Cochrane Review (2010), which presented a systematic review of primary research in human healthcare and health policy, magnesium sulphate can be used as a preventative measure against cerebral palsy in preterm babies, reducing the risk of its occurrence. However, the practice of using magnesium sulphate in at-risk patients is significantly lower in the UK (Huusom et al., 2011). Between 2012 and 2013, only 8% of all preterm babies in the UK benefited from the use of magnesium sulphate, compared to 46% of infants in the international Vermont Oxford Network, which consists of units in North America, Canada and Australasia (AHSN, 2014).

According to the Cochrane Review (2010) magnesium sulphate should be administered to women at less than thirty weeks' gestation, as the benefits are most significant at earlier stages and there are no adverse long term side effects. Despite the fact that the introduction of magnesium sulphate is not new, it should be noted that its implementation is not widespread clinical practice in NHS England, and thus is new to NHS England. Therefore, although it is not a new-to-the-world innovation, it is new to NHS England. According to Vermont Oxford Network benchmarking data undertaken in 2012, the uptake in the UK has been relatively low (average of 12%) compared with other areas in the world (50% +) (Unit A, Evaluation Report, 2015). One percent of all babies in the UK are born prematurely (before thirty weeks) and 10% of these premature babies have cerebral palsy, affecting around 2.5% of babies born in the UK, or, locally, 75 babies per year. The estimated cost of magnesium sulphate is only £1 per treatment, but it is administered to only 30% of eligible mothers (Cochrane, 2010). The Cochrane Review (2010) therefore concluded that in the UK, if all mothers of at-risk babies were treated, NHS England could prevent five babies each year from developing cerebral palsy in the region under investigation by this study.

In Unit A, having identified the low implementation rates of magnesium sulphate in the region's maternity units, the project looked to promote the use of magnesium sulphate in pre-term babies at risk of developing cerebral palsy. The AHSN identified five maternity units in the region, which for the purposes of this study will be presented as Mat 1, Mat 2, Mat 3, Mat 4 and Mat 5. All five maternity units actively participated in implementing magnesium sulphate in their units at the time that this study was conducted. The AHSN were keen to promote the innovation from the grassroots up, employing a bottom-up approach.

Unit B

Unit B involved an initiative undertaken by the AHSN to reduce the incidence of atrial fibrillation-related strokes in high-risk patients and increase clinical knowledge regarding the timely use of novel oral anticoagulants (NOACs) at primary care level. Atrial fibrillation (AF) is one of the most common causes of cardiac arrhythmia and is a major cause of strokes in the UK (NICE, 2013). Evidence from the UK's National Institute of Health and Clinical Excellence (NICE, 2013) suggested that of the 16,000 annual strokes in the UK, about 12,500 are thought to be attributable to AF. Research evidence has suggested that different causes can be attributed to AF, including hypertension, thyrotoxicosis, complications of heart disease, structural heart problems, pericardial disease and cardiomyopathy, and excessive caffeine and alcohol intake (AHSN, 2014). NICE (2013) reported that the recurrence rates of AF-related stroke are high, with a significant impact on morbidity and mortality, and identified AF as the most common sustained arrhythmia, particularly within patients aged sixty-five and above. The report highlighted that about 57% of

patients with AF are at a high risk of suffering a stroke, and should be anticoagulated. Estimates suggest that only 49.3% of AF cases currently receive anticoagulation therapy such as warfarin (Unit B Project Initiation Document, 2014). Traditionally, warfarin is prescribed for the management of AF. Whilst it is low cost, this requires regular monitoring at a clinic, resulting in additional costs through repeat visits, and having a significant impact on the quality of life of the patient (AF Project Initiation Document, 2014).

It is predicted that the prevalence of AF will double over the next thirty years (NICE, 2014). According to NICE guidance (2014), many AF-related strokes are preventable through the appropriate use of NOACs. It is believed that establishing this population on NOACs will result in a lowered risk of AF-related strokes in this group, and will also bring about quality of life benefits through reduced monitoring and reduced impact on lifestyle (as compared to warfarin use) (Unit B Project Initiation Document, 2014). AF-related strokes could be prevented at a rate of 6,000 strokes nationally, thus saving 4,000 lives should the uptake of NOACs be increased to reach all patients within the high-risk group (NICE, 2014). The introduction of NOACs provides useful medical options in the treatment of patients for whom warfarin is not ideal, such as patients who may struggle with variable dosing regimens (NICE, 2014).

Despite clear clinical evidence provided by NICE, there is large-scale underuse of NOACs, with NICE estimations in the region of 46% of patients not being anticoagulated who would benefit clinically from doing so. As in Unit A, although NOACs are not new -to-the-world or new to the market, they are still relatively new to NHS England. Unit B is a project that aimed to increase the uptake of NOACs in indicated patients with AF using a bottom-up approach. The project looked at how the practitioners could use educational tools to provide support for patients to make decisions about the use of NOACs. To achieve this aim, the GPs and pharmacists received training and had access to a website with tools to use. Furthermore, patient lists were reviewed by pharmacists and GPs to identify which patients to focus on during the implementation of the NOACs. This project was a pilot study and was undertaken with selected sites across a chosen healthcare region in England. The aim of the study was to identify enablers to success, barriers to progress and to report on lessons learned. The project was designed by the AHSN and undertaken in collaboration with eleven general practices. The identities of the general practices and the other participants involved in the project have been anonymised due to confidentiality agreements.

5.5.6 Ensuring validity and reliability

Bryman and Bell (2007, p. 157) asserted that “reliability is fundamentally concerned with the issues of consistency of measures in qualitative research”. The measurement of the data collection

techniques must be valid in terms of accuracy and be unbiased (Jankowicz, 2005). Yin (2014) suggested four criteria for testing the quality of case study research: construct validity, internal validity, external validity, and reliability. Yin (2014) maintained that adhering to these four tenets will guarantee quality in case study design. Each of the quality criteria used at each stage of this study are illustrated in Table 5.3.

Although there are different accounts of what represents validity in qualitative research, researchers claim that an account is valid or true if it represents accurately those features of the phenomenon that it intends to describe, explain or theorise (Guba and Lincoln, 1994). Leung (2015) suggested that validity seeks to ask "if the research question is valid for the desired outcome, the choice of methodology is appropriate for answering the research question, the design is valid for the methodology, the sampling and data analysis is appropriate, and finally the results and conclusions are valid for the sample and context" (Leung, 2015; p. 325). In general, validity is explained through three different features: construct validity, internal validity and external validity (Yin, 2014).

Construct validity

Construct validity is the part of research validity concerned with putting together the correct operational measures for each of the constructs under study (Yin, 2014). Yin (2014) suggested three important features of construct validity: triangulation; retaining a chain of evidence; and the use of a case study database. To ensure construct validity in this study, qualitative data were collected from different sources, such as documentation, observation and semi-structured interviews, to encourage a convergent line of inquiry. Interview data collected were recorded, transcribed verbatim and analysed systematically. The recorded and transcribed data were stored in a secure database to retain a chain of evidence for cross-referencing.

Internal and external validity

Internal validity serves to "establish a causal relationship, whereby certain conditions are shown to lead to other conditions as distinguished from spurious relationships" (Yin, 2014, p. 47). This implies that internal validity represents the ability of a researcher to come up with a clear causal conclusion from the research (Winter, 2000). In this study, internal validity was achieved by comparing the emerging themes from the initial conceptual framework together with the documentary evidence, recorded observations and the codes from the semi-structured interviews. Meanwhile, Yin (2014) maintained that external validity signifies the likelihood of generalising the research findings to the initial research problem that prompted the research (Miles et al., 2014). According to Yin (2014, p. 43), "external validity aims to establish the domain to which a study's findings can be generalized". In other words, external validity implies knowing

whether a study's findings are generalisable (Yin, 2014). In this study, external validity was achieved using within-case analysis along with the review of extant literature.

Reliability

Reliability refers to the regularity within the adopted analytical procedures (Noble and Smith, 2015). Reliability in qualitative research focuses on the need for case study research processes and procedures to be well documented during the research process, in order to achieve replicability of the processes and the results (Leung, 2015). The objective of reliability in case study research is to be sure that if a researcher follows the same procedures as described by an earlier researcher and conducts the same case study over again, the later investigator should arrive at the same findings and conclusions (Yin, 2014). In this thesis, reliability was enhanced by ensuring that the case selection criteria, method and procedures for data collection were well recorded and documented.

Table 5.3: Establishing validity and reliability in case study design

Test	Literature definition	Research phase	Application to this study
Construct validity	Qualitative data were collected from different sources The data collected were recorded, transcribed verbatim and analysed systematically Data were stored in a secure database to retain a chain of evidence for cross-referencing	Data collection phase	Gathered various forms of documents including case documents evaluation report from the participating organisations All the evaluation reports and case documents were confirmed with key participants Sources of evidence were systematically identified. All the interview documents and secondary data were labelled, saved and stored in a secure database
Internal and external validity	Generalising and causal relationship	Research design and data analysis phase	Choice of embedded sub-unit of analysis
Reliability	Documentation of case study process	Data collection phase	Developed a comprehensive case study database that contained all the primary and secondary data that relates to the case

Source: Adapted from Yin (2014, p. 45)

5.6 Ethical considerations

Yin (2014) stated that in carrying out case study research, the researcher must give attention to specific ethical considerations when qualitative research involves human subjects. Ethical considerations ensure that the participants involved in the study are protected from any unforeseen harm and risks (Yin, 2014). The study presented in this thesis was conducted in accordance with approvals given by the University of the West of England (UWE) Research Ethics Committee. The application received approval on June 2015 (approval number UWE REC REF No: FBL/15/05/35) and the following documents were approved by the committee: ethics application form, research proposal, participants' information sheet, risk assessment form and interview guidelines. To ensure that ethical considerations were observed throughout this study, this research followed Yin's (2014) recommendation for handling ethical issues in qualitative research, namely: gaining informed consent; protecting the participants' anonymity; and the use of different sources of evidence.

5.6.1 Gaining informed consent and protecting the participants

Mandal et al. (2016) noted that informed consent is the central doctrine for any research based on the principles of autonomy and self-determination. In collecting qualitative data, the researcher must obtain informed consent from all the participants and inform the participants about their rights in the research, the aim of the study, the research procedure, anticipated risks in the research and the research benefits to the participants (Yin, 2014). In this study, once ethical approval was obtained, the participants were sent the information sheet, which contained the research aims and objectives, the interview guide, the possible risks involved in taking part in the study and the consent form. To that end, the participants confirmed their willingness to participate in the research process voluntarily. Yin (2014) suggested that participants involved in qualitative research must be protected against any harm during the research process. This research ensured that the participants involved in this study were protected by completing a risk assessment form that was approved by the University of the West of England's Research Ethics Committee.

5.6.2 Anonymity

To ensure that the participants' privacy and confidentiality were protected in this research, all the participants' names and workplace names were removed from the data so that participants could not be identified. All the data provided by the participants were anonymised and stored on a designated computer. In addition, all data collection, storage and processing complied with the

principles of the Data Protection Act (1998), which states that personal and confidential sensitive data must be securely stored to ensure restricted and authorised access.

5.7 Sources of evidence

Yin (2014) identified a range of sources of evidence available to case study research, some of which were used in this study, namely: documentation; interviews; and participant observation. Other qualitative research authors, for example Creswell (2007), have supported the use of multiple sources of evidence, arguing that locating qualitative data from different sources can reduce prejudice and support triangulation of research data. In terms of the benefits of adopting different sources of evidence in case study research, Patton (2002, p. 228) stressed that "each unit of analysis implies a different kind of data collection, a different focus for the analysis of the data, and a different level at which statements about findings and conclusions would be made". This suggests that in this study, the collection of data from any of the sources mentioned above can contribute to rich and robust case study findings. Yin (2014, p. 105) acknowledged the benefits of each of the sources of evidence but explained that researchers must "note that no single source has a complete advantage over all the others. In fact, the various sources are highly complementary, and a good case study will therefore want to use as many sources as possible". As established by Yin (2014), the advantage and disadvantages of each of the sources are illustrated in Table 5.4.

Table 5.4: Advantage and disadvantages of the sources of evidence

Sources of evidence	Advantages	Disadvantages
Semi-structured interviews	Targeted – focused directly on case study topics	Bias due to poorly articulated questions
	Insightful – provides explanations as well as personal views (e.g. perceptions, attitude and meanings)	Response bias Reflexivity – interviewee gives what interviewer wants to hear
Documentation	Stable and can be reviewed repeatedly	Retrievability – can be difficult to find
	Unobtrusive – not created as a result of case study	Biased selectivity, if collection is incomplete
	Specific – can contain the exact names, references and details of an event	Reporting bias – reflects (unknown) bias of any given document's author
	Broad – can cover a long span of time, many events and settings	Access may be deliberately withheld

Participant observation	Immediacy – covers actions in real time	Time-consuming Selective – broad coverage difficult without a team of observers
	Contextual – can cover the case's context	Reflexivity – actions may proceed differently because they are being observed
	Insightful into interpersonal behaviour	Cost – hours needed by human observers

Adapted from Yin (2014, p. 106)

Following the identification of the participants, the director and operations manager at the AHSN made the first contact through an email to all the participants, then followed up with an email and telephone calls. The email contained the research aims and objectives, interview guide, participant consent form, the ethics approval letter (UWE REC REF No: FBL/15/05/35), and access approval from the research and development unit of the participating NHS Trusts.

Access into the NHS Trust was obtained through the research and development unit of the NHS Trusts involved in the research. The initial approach was an informal meeting and email communication with the team from the AHSN, to identify the links and procedures required for accessing the NHS Trusts. Afterwards, established contact with the research and development units was made through emails and telephone calls. Together with the ethical approval document obtained from the University of the West of England's Research Ethics Committee, a formal access application was sent to the organisations, whereby the participants' works and ethics approval was obtained (approval reference number 15/055/GHT). The formal application letter stated the research aims and objectives, the access that was required, the level of participants' involvement in the research process and the time period over which the access was needed. A follow-up email and telephone call were made to facilitate the approval of the access, and in August 2015, access approval to conduct research in the NHS Trusts was gained.

5.7.1 Semi-structured interviews

The research data were obtained through semi-structured interviews with the participants identified in Table 5.6 of this chapter. According to Yin (2014), a semi-structured interview is one of the best sources of data for case study evidence, and it can be useful for examining the perceptions and views of respondents about complex and sensitive issues. The semi-structured interviews provided an opportunity for the researcher to record interview conversations, take notes and probe the interviewee to obtain more detailed answers that addressed the research questions (Saunders et al., 2015). This view justifies Yin's (2014) argument that a semi-structured

interview technique is one of the data collection methods in a qualitative research study that allows a researcher to obtain information-rich data that will lead to new emerging themes.

A semi-structured interview provided the opportunity to use more open-ended questions in exploring the different activities that took place during the diffusion process of the two embedded sub-units of analysis identified in this study. Adopting a semi-structured interview pattern allowed opportunities to guide and manage the conversation with the research participants and also provided the platform for the participants to freely express their views on the phenomena under investigation (Saunders et al., 2015). Following Bryman and Bell's (2007) suggestion, an interview guide was developed to direct the interview towards ascertaining the views of the research participants on the phenomena under investigation. The interview guide was designed around the conceptual framework that had been developed through the review of the literature that presented the influence of governance mechanisms on a bottom-up approach to innovation diffusion in healthcare networks. As a result, drawing on the conceptual model, the interview guide questions were designed to focus on the diffusion of innovation, the role of governance mechanisms, and the impact of network actors on the diffusion of innovation.

A meeting took place with a representative of the AHSN to ascertain whether the intended participants were suitable and appropriate representatives of the cases under investigation. Furthermore, to ensure that reliability was achieved through the interview guide, the interview was piloted with the research supervisors before sending it out to the participants. In total, twenty-three participants were interviewed. Table 5.6 shows the practice information of the participants and the number of participants interviewed.

The semi-structured interviews lasted between forty and sixty minutes. To protect this study against bias and provide accurate interview record (Corbin and Strauss, 2007), all the interviews were audio recorded and transcribed verbatim with the participants' approval. Moreover, based on the accounts of the interviewees and the evolving understanding of the research events, further follow-up calls and email conversations were carried out to obtain additional information that clarified any points of uncertainty in the original interview data. It is important to state that to meet ethical requirements of anonymisation, all the participants' names and workplace details were removed so that they could not be identified from the transcribed data. In addition, all the interview data were stored at the University of the West of England, in order to comply with the requirements of the Data Protection Act, as discussed in section 5.4.2.

5.7.2 Documentation and sampling of the documentation

Documentary analysis was used as a supplementary approach, in order to provide triangulation and to augment evidence from other sources (Yin, 2014). The documentary analysis was

important in this study, as it provided insights and opportunities for relevant Unit A and Unit B documents to be identified and analysed. The relevant documents accessed and analysed in this study are described in Table 5.5 below.

Table 5.5: Description of documents used in this study

Title	Description and date	Relationship to the embedded units of analysis A and B
Units A project meeting notes 1	This document contained the notes of a meeting on Unit A, which took place at the beginning of March 2014 at the AHSN office.	The notes comprised of information about the background of Unit A; the key stakeholders involved in the project; and the key requirements for the implementation of the Unit A project.
Unit A project meeting notes 2	This is the second project meeting that occurred towards the end of March 2014 and it had consultants from different maternity units, AHSN staff and midwives in attendance. The meeting occurred at the AHSN office.	The documents highlighted the follow-up actions from the initial meeting stated above, and went on to explain the procedure for conducting audits and reports for Unit A. It also specified the implementation requirements for each of the maternity units, and the need to recruit a midwife to manage the implementation of Unit A.
AHSN network meeting notes	This document covered the AHSN network meeting that took place in May 2014 at the AHSN office.	The notes are related to Unit A and are made up of the training requirements for the practitioners involved in Unit A. It also contains the Unit A publication materials that were to be used in each of the sampled maternity units.
Unit A qualitative evaluation report	This evaluation report was carried out in April 2015 and was sponsored by the AHSN to examine the impact of the Unit A tools and training required to effectively implement the Unit A project.	This evaluation was carried out by an independent research and evaluation consultant. The evaluation documents highlight the performance of Unit A in all the sampled maternity units. They also make recommendations for future roll-out of the Unit A project.
Unit A and B project initiation documents	These are the documents that provide the foundation for the initiation and	The project initiation documents established the key stakeholders involved in each project, the core objectives that the projects aimed to achieve, the projects' context, the

	implementation of both the Unit A and Unit B projects.	resources required for the execution of the projects, the process of execution, the risk issues in the projects and the expected outcomes.
The contract documents between the AHSN, all the maternity units and the GP practices involved in both Unit A and Unit B	The contract agreements between the AHSN, the maternity units and the GP practices involved in the implementation of the Unit A and Unit B projects.	The contract documents contain the information about the roles and the responsibilities of each of the parties involved in the initiation and implementation of the Unit A and Unit B projects.
Unit A and Unit B Steering Group Terms of Reference	This document was initiated in 2014. The purpose of the Project Steering Group was to own the project design and direct the work, in conjunction with stakeholders and partner organisations, and agree common pathways to support the uptake of Unit A across the five maternity units sampled in this study.	The document aimed to ensure that decisions regarding Unit A and Unit B project would be based on the best available policy, research, best practice evidence and population needs to inform the design, specification and rapid implementation of the projects and service models.
Unit A lesson learned report	This report was created in September 2014 to capture the lesson learned in implementing the Unit A project in the sampled maternity units.	This report highlighted what went well during the implementation of Unit A, areas of improvement and some recommendation for future roll-out of Unit A.
Unit A Board Report	The board report was created by in February 2015 and it highlights the performance of Unit A to date.	The board report contained information on the evaluation of the Unit A project, in terms of the communication approach used in the project, the training that was provided and the governance aspect of the project.
Action register for Unit A	The action register was created in March 2014 by the AHSN.	This document presented the actions and roles the AHSN team played in order to ensure successful outcomes in Unit A.
Unit B score sheet	The Unit B score sheet document was created in	The score sheet contains the information that will help patients

	January 2015 by the key practitioners involved in the initiation and implementation of the Unit B project.	make decision about Unit B adoption by highlighting the possible risks and benefits of the Unit B project.
Unit B group meeting notes	These meeting notes were created in July 2014 by the AHSN team.	This note highlighted the national picture of the utilisation of Unit B, the targeted population, the percentage of risk of patient receiving Unit B as a treatment, key milestones in Unit B and the necessary support required by the GP practices in facilitating the implementation of Unit B across the sampled GP practices.
Unit B clinical tool kit	This document was created in February 2015 by the key general practitioners who worked in collaboration with the AHSN during the initiation and implementation of Unit B.	The document was created with clinical information that supported Unit B clinicians in making decisions.

All the above listed documents were selected and accessed in partnership with the team from the AHSN. The time period of the documentation accessed in this study ranged from February 2014 to February 2016. These documents detailed some of the major activities that occurred during the implementation of Unit A and Unit B across the maternity units and GP practices sampled in this study.

The secondary documentation for this study was sampled through the support of the operations manager at the AHSN, who provided access to the documents. Each of the documents was appraised by the operations manager to ensure that they were relevant to this study. Each of these sources of documentary evidence was created for the AHSN, and not for the purposes of this research study. In line with Yin's (2014) recommendation, significant attention must be given to the documentary materials due to the fact that the documents were written based on a specific purpose and to a specific audience.

5.7.3 Participant observation and sampling of the participant observations

Participant observation provided an opportunity to capture phenomena in this study by observing participants' actions (Bryman and Bell, 2007). Yin (2014) recognised that participant observation can be either formal or casual observation. This study employed formal observation, which includes observation of meetings and activities, where the researcher gains access to and

immerses himself or herself in new social worlds and at the same time produces written accounts and descriptions that bring versions of these worlds to others (Emerson et al., 2001, p. 352). As was stated by Yin (2014), through observation the researcher gains an in-depth understanding of the participant's experience, and at the same time provides useful qualitative data about the phenomena under investigation.

Formal observation enabled observation of participants' actions in real time, and of the contextual conditions of the phenomena under investigation (Yin, 2014). Participant observation was considered appropriate for this study because it suited the study's objective of exploring and understanding the participants' involvement during the diffusion of innovation process. Hence, participant observation allowed an in-depth study into first-hand experiences of the diffusion of healthcare innovation process. The observational data were collected in both Unit A and Unit B meetings. The meetings were identified through discussions with the director at the AHSN, and the meetings were part of the wider project. The meetings focused on the uptake of the interventions in both units, and the meetings provided opportunities for the participants' actions during the diffusion of both cases to be observed. The meetings took place at the AHSN office and involved participants from both units. Each of the observation meetings were recorded through field notes during the meeting or afterwards. The data collected were analysed using the coding structure developed around the conceptual framework. In each of the meetings, the roles each participant played during the interventions implemented in both units were captured in the notes.

The observation was sampled through the support of the director and operations manager at the AHSN, who supported the identification of meetings and participants to be observed. To facilitate the observation, a formal email was sent to the participants and the chair of the meetings. As mentioned above, the email contained the detailed information about the research aims and objectives, including the ethics approval from the NHS (NHS approval reference number 15/055/GHT). A follow-up email and telephone call were made to facilitate the approval of the access, and between August and November 2015, approval to observe meetings and participants was obtained.

5.8 Convenience sampling: the selection of the embedded sub-units

Patton (p. 228) stated that convenience sampling is the practice of "doing what's fast and convenient". Patton (2002) went on to explain that convenience sampling is a type of sampling that allows the research phenomena to be selected simply because of easy accessibility, time factors and geographical proximity. The two embedded sub-units of analysis in this study were selected because they were part of the wider collaborative projects and representative of a

bottom-up approach to innovation diffusion. Patton (2002) warned that the convenience sampling strategy may be biased and unrepresentative. In this study, convenience sampling was the most viable sampling technique, because the entire project team agreed that both sub-units of analysis could be used as the embedded units of analysis in this study. Most importantly, both units of analysis represented other important factors that supported the aims of this project, such as governance and innovation, and both employed a bottom-up approach. In addition, convenience sampling was most helpful in this study as both projects had been completed, which enabled the whole process of innovation diffusion to be studied.

5.8.1 Participant selection

As established above, this study adopted a convenience sampling approach. However, within the convenience sampling, a purposive sampling approach was used to identify and select the participants. Purposive sampling represents the careful selection of a sample to obtain information-rich data that are central to answering the research questions (Patton, 2015). Purposive sampling is viewed as a random selection of sampling units within the segment of the population with the most information on the characteristic of interest (Guarte and Barrios, 2006). In other words, purposive sampling allowed a focus on the participants who were involved in and experienced the process of innovation diffusion in healthcare networks. In this study, the first step in sampling was the identification of the key participants through the director and operations manager at the AHSN. Afterwards, the director and the operations manager were able to help in identifying other participants through a snowballing process.

A snowballing process is a situation whereby one participant provides the name of another participant, who in turn identifies the name of a third and more participants (Vogt, 1999). In this study, snowballing was designed to focus on the participants who were involved in implementing the Unit A and Unit B projects. For example, after a series of meetings and consultation with the director and operations manager at the AHSN, the choice of two inclusion criteria was established. Firstly, participants must have been involved in the diffusion process of the innovations in the embedded sub-units under investigation. Secondly, the participants must have attended or have been involved in at least two of the engagement meetings between the AHSN and its partners. Consistent with the above criteria, the sample used in Unit A consisted of midwives, neonatal consultants and medical directors. For Unit B, the sample consisted of general practitioners (GPs), consultants, practice pharmacists, practice managers, anticoagulation nurses, industry partners, operation managers and directors. Table 5.6 illustrates the details of the sampled participants and their relationship to the embedded sub-units.

Table 5.6: Overview of the interviewees

Overview of the interviewees		Number of participants interviewed	Relationship with the embedded units	
Participant	**Role description**		**Unit A**	**Unit B**
ASHN director	Was responsible for the design of the implementation model used in both Units from start to finish.	1	Yes	Yes
AHSN operations managers	Were involved in the development of Unit A and Unit B, developing toolkits employed by both units.	3	Yes	Yes
Industry partner	The industry partner is the pharmaceutical organisation that partnered with the Academic Health Science Network to support Unit B.	1		Yes
Practice managers	Were involved in Unit B, providing expert opinion on the anticoagulants and discussing the benefits of the intervention with the patients.	2		Yes
Practice pharmacy	Involved in Unit B, prescribing and auditing targeted patients.	2		Yes
General practitioners	The clinical leads for Unit B.	3		Yes
Anticoagulation nurses	Anticoagulant service managers (Unit B) responsible for the day-to-day management of patients who needed to be anticoagulated.	2	Yes	
Midwives	Project midwives responsible for the implementation of Unit A intervention.	6		Yes
Consultants	The consultant obstetricians and gynaecologists at maternity units involved in the intervention implemented in Unit A.	2		Yes

Medical director	Involved in Unit B and provided the initial thinking about the scope of the project. Then, once the project was approved, was the chair of the steering group until its end.	1	Yes	Yes
Total number of interviews		**23**		

5.9 Analysis

Miles et al. (2014) stated that qualitative data are participants' experiences and actions that are converted into words, which are not readily accessible for meaningful analysis until they are transcribed, read, corrected and made ready for analysis. In other words, data analysis provides a systematic approach to analysing qualitative data during and after collection of data from different sources of evidence (Creswell, 2007). Further, Yin (2014) stated that the best preparation for conducting case study analysis is to have a general analytic strategy that can give a sense of direction in analysing case study data. For Yin (2014), data analysis is made up of examining, categorising, tabulating, testing and then recombining evidence to produce empirically based findings.

Yin (2014) acknowledged that "analysing case study evidence is especially difficult because the techniques is still not well defined", pointing out that "you can start your own analysis by playing with the data and searching for promising patterns, insights, or concepts with the goal to define your priorities for what to analyse and why" (p. 132). Consistent with this notion, Yin (2014) identified developing a case description as one of the strategies that can be used to analyse case study research. Developing a case description refers to organising a case study in line with a descriptive framework, and ensuring that it is a strategy that is workable in its own right (Yin, 2014).

For this study, a case description was adopted as it provided the opportunity for data to be analysed from the bottom up. The data in this study were analysed using the conceptual framework drawn from the literature review conducted by the study. Employing the framework, three key topics regarding the diffusion of innovation in healthcare networks were investigated:

1) The role of formal and relational mechanisms.
2) Identification of the key actors involved in the innovation diffusion process.
3) The role of these key actors during the innovation diffusion process.

To identify the key actors involved and their roles during the process of diffusion of the innovations sampled in this study, Rogers' (2003) three stages of innovation diffusion process

were utilised. As discussed in section 2.7.2 of chapter 2, the stages are persuasion, decision and implementation. This is consistent with Yin's assertion that "As usual, the ideas for your framework should have come from your initial review of literature, which may have revealed topics of interest to you" (Yin, 2014, p. 140). Each of these topics and stages of the diffusion process provided the variables for the data analysis. The process through which the data was analysed is described below.

5.9.1 Developing a case description for the study: interview data

In this study, the analysis of data from both Unit A and Unit B commenced with transcription of interview data. The data were transcribed verbatim, and to achieve data accuracy, extra attention was given to the interview data during the transcription process, such that the researcher repeatedly played, listened to and read the interview data. Afterwards, familiarisation with the data took place through a review of all the interview transcripts from all the participants. The essence of this activity was to understand the actions of the participants involved in the research and at the same time make a note of initial ideas from the transcribed data (for example, the identification of the activities that occurred during the diffusion of innovation in each of the embedded sub-units). All the transcribed data were stored in a secured folder and imported into NVivo 11 data analysis software. NVivo 11 is a tool that facilitates qualitative data analysis with the potential to increase the accuracy of research through the coordination and organisation of data (Leech and Onwuegbuzie, 2011).

Stage 1 coding process

The first stage of coding commenced with the creation of parent codes. Afterwards, interesting features that represented the topics from the conceptual framework were identified and coded as paragraphs and complete sentences. Examples of this process are shown in Table 5.8.

Table 5.7: Examples of the stage 1 coding process

Quotations from the interview data	Keyword	Parent Code
"The contract came with money and they said we can fund a project lead midwife, and they were quite clear about midwifery being, you know, from the bottom-up, to run the project, to disseminate it. They met with the heads of midwifery, from our hospital, and I am assuming it was the same in all hospitals, to agree on the funding that was there. The money got paid, that money then got paid to those midwives for the additional hours, on top of the…"	Formal agreement, funding, midwives	Formal contract
"I think the main thing was that we all knew each other, and we've all worked together at different times as trainers and trainees. So, we all knew each other, and we knew that all the hospitals had a fairly similar ethos in terms of wanting to improve care. So, we felt that it was a good, close team with similar ideas and similar sort of – keen to strive to improve, so it was a good network from that point of view. There's nobody in the project that we felt wasn't willing to embrace it and take it forward."	Trust, reputation, Integrity, skill, and competency	Relational mechanism
"Because we have, we kept the standards the same, but we were not rigid about how it was implemented and what people needed to implement it and influence it, and it's been the small tiny little things that have made a difference." *"One of the things that we had to modify quite a bit was that our consultant lead on this wanted to do up to 34 weeks, and the project was up to 30. So, we extended it out, and we did do it up to 34 weeks. We had to change a lot of the learning tools, and the leaflets for patients and things like that to suit what model we wanted locally."*	Trust, free control of process, design to suit units' culture, cultural influence	Relational mechanism
"I found them really helpful. I was in touch with Mr S. So I really appreciated his support, and he came up to the site and visited, and kept in touch via email and I think that was really important, actually, because of the existing professional	Communication, support, information exchange,	Boundary spanners

relationships with them, they facilitated a lot of the communication of the project and its purpose, and how it was carried out, and what it involved. I think, for me, I felt like I had very good support from Mr S., so I felt quite clear as to what was required of me; what I had to report on every month."	clarification of role and project objective, relational mechanism	
"So you get one midwife in and then that member of staff learns and so she'll kind of snowball. So you then get more of the women involved and more doctors involved and then…" *"Yes, so we really just went for the key people that we thought would make the – that would be the most influential in making the intervention, really. And that's why we went for that group of people, and it seemed to work because they were often working and could influence other members of staff."*	Influence, educator, communicator, organisers, knowledge, and experience	Gatekeepers
Quotations from the documentary data		
"all the parties involved in the project will create a good level of communication and an engagement plan that will include the identification of all staff to be included in training and the most effective ways to engage staff in training and communication"	Definition of actors' roles and responsibilities	Formal contract
"… educational meetings and materials will be used to assist and encourage GPs to increase the appropriate use of anticoagulants in the treatment of AF. This support package will be a combination of materials produced by the project, the suitability of which will be evaluated at the stage review and appropriate external training events."	Agreement, supports and protection for the practitioners	Formal contract
Quotations from the observational data		
"There were a couple of little things that we'd – just minor sort of confusions that perhaps hadn't been ironed out prior to the project starting. So, clinical information, really, not anything – so, it was sort of some of the clinical information."	Clarification of clinical information and project objectives	Boundary spanners
"the standards are kept the same, I don't think we should be rigid about how it was implemented and what people needed to implement it and influence it, and it's been the small tiny little things that have made a difference".	Influence, communicator, organisers, knowledge, and experience	Relational mechanism

Stage 2 coding process

The second stage coding process further broke down the paragraphs and complete sentences to identify the key concepts that represent the child codes. As shown in Table 5.9, the child codes illustrated the key topics from the conceptual framework. In order to derive valid constructs, all the qualitative data was summarised in an iterative fashion (Miles and Huberman, 1994). Each of the child codes that emerged from the literature review, conceptual framework and interviews were subsequently revised during the entire coding process. Empirical findings were compared with the reviewed literature to explore and develop a case description (Yin, 2014). In the end, a descriptive framework emerged over multiple data collection and analysis iterations. The key concepts or child codes that emerged from the framework are illustrated in Table 5.9, and each were further explored and described in the next chapter in line with the primary and secondary data.

Table 5.8: Stage 2 coding process: the child codes

Parent codes	Child codes / key concepts
Formal contracts	Support and motivation
	Coordination and performance
	Mutual communication frameworks
Relational mechanisms	Competency-based trust
	Flexibility
	Knowledge transfer
	Dual role of contractual and relational mechanisms
Boundary spanners	Connects actors together and transfer valuable information
Gatekeepers	Knowledge transfer
	Knowledge exchange and transfer to internal teams
	Contextual knowledge of the working environment

5.9.2 Observation and documentary data

During the participant observation process, the observational data was recorded using handwritten notes, which were later scanned onto the NVivo 11 software. The actual analysis is made up of reading through all the field notes and beginning initial coding on a line-by-line basis, ensuring that all the observational data are considered and reflected upon. Essentially, the choice of coding was guided by the themes arising from the conceptual framework and the literature review, as shown in Tables 5.8 and 5.9 respectively. As a result, memos were used to record the thoughts and reflections on the observational data. As suggested by Yin (2014), each of the

identified parent and child codes was stored in the NVivo software and the coded database was reviewed to ensure that the codes formed descriptive insights that would lead to the analysis of data.

As established in section 5.7.2, the first process of documentation analysis was the identification and collection of the vital documents used in the initiation and implementation of both the Unit A and Unit B projects. The formal documents examined are shown in Table 5.5 of this chapter. Each of the documents was uploaded into NVivo 11 software. Through the process of iterative reading, all the documents were carefully examined to make sense of their content. The reading was useful in annotating the entire documents, and the emerging themes were documented in the form of memos. The choice of coding was guided by the themes in the conceptual framework and the codes formed descriptive insights that supported the analysis of the data.

5.10 Chapter summary

In this chapter, the philosophical and methodological assumptions that underpin this study were presented. The research strategy used in this study was discussed, followed by the rationale for the use of a single case with embedded sub-units and the selected case. Furthermore, the concerns that are frequently raised regarding case study design were addressed and discussed, with an emphasis on how this study attempted to resolve each of the concerns. In addition, ethical considerations and the sources of evidence were examined. The concluding part of the chapter presented the sampling method adopted in this study and the data analysis process. The next chapter goes on to present the analysis of data arising from this study.

Chapter 6: Findings and analysis

6.1 Introduction

In this chapter, the findings for the study are presented. Observational data and secondary data are also drawn upon, including documents such as evaluation reports, meeting reports, contract documents and lessons learned reports. The analysis of the data used to test the conceptual framework developed in the literature review chapters of this study (chapters 2, 3 and 4) are presented. Employing the framework, the diffusion of innovation in healthcare networks is examined in relation to the following three factors:

1) The role of formal and relational mechanisms with a focus on the interplay between contractual and relational governance mechanisms.
2) Identification of key actors involved during the innovation diffusion process.
3) The roles played by these actors during the different stages of the innovation diffusion process.

In line with the data analysis process described in the previous chapter, the findings are presented in order of these factors.

6.2 Formal contracts

The analysis of the interview data shows that contractual mechanisms played an influential role during the innovation diffusion process in both of the embedded sub-units. For Unit A, the participants across all five maternity units consistently identified formal contractual mechanisms as major facilitators in supporting the use of magnesium sulphate. This implies that formal contracts played a significant role in promoting the diffusion of innovation through a bottom-up approach. As illustrated in Table 5.9 the key concepts (child codes) that summarises formal contract functions in promoting the diffusion of innovation through a bottom-up approach are: support and motivation; coordination and performance; and mutual communication frameworks. Each of these concepts are described below in relation to the qualitative data.

6.2.1 The role of contracts in supporting and motivating participant involvements

Unit A

Formal contracts played a key role in motivating the clinicians and practitioners, encouraging their involvement and support of the use of magnesium sulphate. Through the formal contractual agreement, midwives were provided with funding to cover the costs of their time on the project:

> *"… the contract came with money and they said we can fund a project lead midwife, and they were quite clear about midwifery being, you know, from the bottom up, to run the project, to disseminate it. They met with the heads of midwifery, from our hospital, and I am assuming it was the same in all hospitals, to agree on the funding that was there. The money got paid, that money then got paid to those midwives for the additional hours."*

(Midwife, Mat 4, NHS Trust)

As the formal contractual agreement protected the midwives' involvement in the project, it also acted as an incentive, motivating and empowering the midwives. As one midwife indicates:

> *"It was more about the protected time for us. I think that's another driver that came from our management. It is a good driver that the funding came with the project from the AHSN, and with that funding, they had the choice of how they use that. They made it clear that what they wanted to do was to use that funding to have a protected person that would be given protected time to work on the project. They felt that that would be the main key to success."*

(Midwife, Mat 5, NHS Trust)

In addition, the formal contractual agreement provided a defined approach for the exchange of information between the participants involved in the project, via mechanisms such as education, training and communication. This was identified in the documentary evidence (Unit A Project Initiation Document, 2014), which formally stated that all parties involved in the project must maintain a good level of communication and put in place an engagement plan that identifies all the staff to be included in training, as well as effective means of engaging staff in training and communication (Unit A Lessons Learned Report, 2014). Moreover, such formal information exchanges played a part in informing other practitioners about the benefits of the use of magnesium sulphate.

Through their involvement in the information exchange mechanisms, midwives were also able to promote the benefits of the intervention. As one midwife pointed out:

> *"… so that's when the teaching and the training came in, it was to kind of make people more aware, and that was midwifery and obstetrics, because obviously, you'd want to have the midwives flagging it up to the doctors and having the doctors prescribing it."*

(Midwife, Mat 4, NHS Trust)

Furthermore, to support and encourage maximum participation across all the maternity units, the formal contractual agreement specified that training and education would be provided to all participants involved the project. Documentary evidence states that:

> *"In order for the pilot phase to be successful, potentially, clinical champions can deliver training to staff through existing mandatory staff education opportunities in order to minimise the demands on clinical staff. Where this is not possible, opportunistic 'micro' training will be delivered to reach all necessary staff, for example on delivery suites."*

(Unit A Project Initiation Document, 2014)

Unit B

In Unit B, findings from the interviews demonstrated the important role of formal contractual governance in promoting the use of NOACs in at-risk patient groups sampled in the GP practices. The findings were further supported by documentary evidence such as the Project Initiation Document (Unit B Project Initiation Document, 2014). The analysis showed that the formal contract supported and motivated the GPs, practice managers and pharmacists involved in the project, through funding and the provision of additional materials that increased their interest (e.g. educational materials). Evidence from an archival document indicates that:

> *"… educational meetings and materials will be used to assist and encourage GP's to increase the appropriate use of anticoagulants in the treatment of AF. This support package will be a combination of materials produced by the project, the suitability of which will be evaluated at the stage review and appropriate external training events."*

(Unit B Project Initiation Document, 2014)

Similarly, a practicing pharmacist emphasised the importance of the contract, admitting that having provision in the contract for resources and funding was crucial in motivating and supporting clinicians to carry out the additional responsibilities required by the project:

> *"And whenever you're doing kind of case finding work and you're looking for patients who've got a certain illness who need a certain drug you know there's no slack in the*

system for you to be able to do that so the only way to do it is for resources to be provided. Also, I must admit that the motivation was to do something positive for our patients, get involved in a local project that was going to have a positive outcome for our patients… The enabler was the money; we wouldn't have done it without."

(Pharmacist 1, Unit B)

A practice manager admitted that the work required in the project implementation was very intensive and highlighted the importance of funding to cover the hours taken up by the project:

"Yeah, so I wouldn't have done it without the payment because it was labour intensive, and I provided all that information to the Academic Health Science Network at the end about how many hours I'd done and that kind of thing. So, we, yeah we were paid for doing the work… and that yeah so we were paid for doing the work and therefore there was some kind of contract that said that we would attend meetings and we would provide data and that kind of thing."

(Practice manager 2, UK)

Furthermore, one pharmacist suggested the contract also improved learning between the practitioners by making it mandatory for them to attend meetings and provide data and information, leading to improved performance. This aspect of the analysis is captured in the next section.

6.2.2 Improved coordination and performance

Unit A

Data revealed that the formal contractual agreement had a provision that established the roles and responsibilities of the midwives, ensuring efforts were aligned towards achieving the project's objectives. Some of the midwives acknowledged that the contractual agreement had a structured protocol and framework that defined their involvement and expected outcomes.

Following the formal contractual agreement, coordination, and performance expectations were agreed between the AHSN and Mat 1, as demonstrated by a member of the AHSN:

"So, we did have to all agree, as an entire region, that that's what we were going to do, and we did, so, and it worked, really, really well. So, I think that's the collaboration. In fact, the commitment and enthusiasm of the entire maternity and paediatric team who embraced this positive change to practice in line with the most current evidence also contributed to ensuring that the maternity units exceeded the goal of 80% uptake by achieving 100%."

(Director, AHSN)

Another member of the AHSN explained:

> *"… we engaged with the obstetrics and neonatologists in terms of writing the guidelines. And I think it's served two purposes, and one was to inform them about the project and engage them because I think by designing it with us they bought into the project."*

(Operations Manager 1, AHSN)

Unit B

A GP expressed how details in the contract regarding the correct approach to be employed when undertaking the intervention helped the GP to learn more about at-risk patients. The GP stated that the contract set some criteria that must be met before patients can be anticoagulated. The GP affirmed that in meeting those criteria, the practice learnt from the process, resulting in improved performance in this area:

> *"… that particular model, and from a personal point of view, although I will, you know, I would imagine that we were doing a fairly good job in my practice. I've still been able to identify a small but significant number of people who have had treatment, anticoagulation, as a consequence of reviewing my patients who were at risk. So, you know, there's been benefit across practices and there's also been a benefit for me and my particular practice population."*

(GP 1)

Another member of the AHSN reaffirmed that the contract terms contained fundamental principles that supported learning and performance during the project:

> *"… So, the key things in the document is the risk log – have that; lessons learned document – got that; an outline plan of what our project plan might look like but…"*

(Operations Manager 2, AHSN)

6.2.3 Mutual communication framework – the key role of infographics

Unit A

The formal contractual agreement provided the basis for a mutual communication strategy. The agreed communication strategy was the use of infographics to present project information in a logical way, through visualisation and pictures. The data showed that the adoption of a mutual

communications strategy was central in promoting awareness and engagement, promoting the use of magnesium sulphate in at-risk patients:

> *"… I think what the infographics did – it was just a really useful way for me to be able to communicate the information out. Very easy, very simple. We had kind of an input in designing it, which was lovely. So, the three of us that started in the first tranche, they put up some examples, and we kind of – yes, so we came up with what we wanted, and it also meant for me that, because I didn't train everybody face-to-face, I could send out the infographics and posters and things to keep everyone in the loop."*

(Midwife, Mat 2, NHS Trust)

For some participants, the use of infographics was an excellent means of letting the patients and the community of healthcare practitioners appreciate the benefits of administering magnesium sulphate in pre-term babies at risk of cerebral palsy. A member of the AHSN identified the role of infographics in raising awareness and providing a call to action among the midwives and consultants. The interviewee claimed that adopting infographics as a communication strategy is not widespread practice within the healthcare sector, but had a substantial impact on promoting the benefits of the magnesium sulphate to relevant parties:

> *"… and I've got to mention the infographics because I thought that was really useful for the Unit A project as well because it just looks different. It's not what you'd expect to see in an NHS environment. It just looks nicer and more professional than anything else, and it's just a different take on it. Those materials were really important in starting to engage the staff on the ground."*

(Operations Manager 2, AHSN)

As well as communicating the benefits of administering magnesium sulphate, infographics also outlined key details regarding the intervention to clinicians and practitioners:

> *"So, we… and working around … there was the infographic poster that was… That, I think, has been really successful, because it's a very visual way of going, 'This is what happens. This is the cost…' I think that's quite an important message, so that was… And just getting that right, I think, you have these great ideas and you go, 'Okay, so let's put that poster together'. And so, yeah, I think our expectation was that it would be quicker, and perhaps externally people looking at it might go, 'Oh, God…'"*

(Operations Manager 1, AHSN)

Unit B

In Unit B, the formal contract stated that the project must adopt a comprehensive communication framework to pass on clear information about the benefits of the anticoagulants, in line with NICE guidance, to the GP practices and secondary care stakeholders (Unit B Project Initiation Document, 2014). In order to meet this requirement, infographics were employed and, according to some of the practitioners interviewed, infographics were seen to be very user-friendly, easily accessible and had information that was useful in educating the patients. As, one GP commented:

> *"The Academic Health Science Network provided us with some resources which principally were patient decision aids that they'd designed and in fact they modified the NICE ones… so I think the content was the same as the NICE ones but they made the pictures different and they presented them in a way that was quite nice for patients so I used those resources."*

(GP 2)

Furthermore, infographics were paramount in communicating to practitioners the benefits of the intervention. A director at the AHSN described how infographics helped:

> *"So, we've managed to standardise that part of it across our patch. We've developed a beautiful infographic that explains why people should do it, and we've developed site-specific posters as well about how people are doing."*

(Director, AHSN)

Analysis of documentary evidence found that a mutual communication framework was presented as a means of raising awareness of the intervention to practitioners and the public:

> *"Communication framework will include (but not be limited to) posters, online resources and promotional items reinforcing the key messages of the project. A communication and engagement strategy will be developed in order to best reach the target audience and identify wider stakeholders. The campaign will give the project a strong identity and branding and will serve to promote the legacy of the project beyond the Academic Health Science Network involvement."*

(Unit B Project Initiation Document, 2014)

The head of medicine management at the Clinical Commissioning Group (CCG) also commented on the benefits of the mutual communication framework:

> *"…. not just their materials, which were really high quality, you know a lot of effort and thought and design had gone into their materials… Yes, and accessible, so it has to be*

something that's very user friendly and can easily be accessed by clinicians, and by pharmacists and also have access to information that can be used for patients as well..."

(Head of Medicine Management, CCG)

6.3 The role of relational mechanisms: competency-based trust and relational norms

The interview and secondary data showed that trust and relational norms played a crucial role during the process of innovation diffusion in both units. The analysis of data showed that trust was manifested as a result of previous interactions between the practitioners involved in each of the interventions. Trust assisted participating practitioners in cultivating a common understanding of each other's commitment to the projects. Essentially, the data showed that trust functioned at the interpersonal level, due to past relationships that existed among the participating clinical practitioners. The analysis of data showed that the majority of the clinicians and practitioners knew and trusted each other's competencies. In view of this, and from the analysis of data, it is suggested that the trust manifested by the participants was competency-based trust.

6.3.1 Competency-based trust

Unit A

The majority of participants involved in Unit A affirmed that trust was built on confidence in the competencies of the midwives and consultants involved in the project. Importantly, some reports from the field notes and the participant accounts suggest that trust in the midwives' competencies reinforced the level of assurance the maternity units had in the midwives participating in the project. For example, a consultant with Mat 1 reflected on how competency-based trust helped in building relationships and promoting the project's aims and objectives:

"I think the main thing was that we all knew each other, and we've all worked together at different times as trainers and trainees. So, we all knew each other, and we knew that all the units had a similar operational approach… So, we felt that it was a good, close team with similar ideas and similar sort of – keen to strive to improve, so it was a good network from that point of view. There's nobody in the project that we felt wasn't willing to embrace it and take it forward."

(Consultant, Mat 1, NHS Trust)

While the above evidence revealed that competency-based trust encouraged relationship building, it also motivated other practitioners to come on board and become involved in the

project. In addition, the midwives in Mat 4 explained how increased understanding of the benefits of the intervention, along with growing awareness of its use and benefits by consultants that the midwives worked with and trusted, strengthened their confidence in prescribing magnesium sulphate to their patients. One midwife commented:

> *"That was the important bit because we found that some of the consultants and the registrars were using this evidence, this really clear evidence, in practice. But actually, what was really important was that the people administering, the whole team, understood the kind of principles behind the use of Unit A magnesium sulphate for preterm labour."*

(Midwife, Mat 3, NHS Trust)

Unit B

The analysis of the interview data revealed that competency-based trust was an important factor in determining practitioners' involvement in the Unit B project. The interview data highlighted that GPs are currently under pressure to meet the continuously changing health needs of their patients and are working extremely hard to keep up with patient demand. One practice pharmacist explained that in order to overcome the pressure, some of the GPs' responsibilities were delegated to other healthcare professionals, and that this was due to competency-based trust. For Unit B, a pharmacist was trusted with the responsibility of championing the Unit B intervention in their practice. The pharmacist said:

> *"GPs, certainly work that GPs could do, but you know they are very pressured for time and probably would have needed more funding if a GP was going to do it and also because I've been here a long time and I'm the prescriber and I see a lot of patients so I suppose I'm kind of trusted by the doctors to just kind of get on with it and so yeah so Dr […] felt comfortable with me doing it."*

(Pharmacist 2)

Another practice pharmacist gave a similar account on the role of competency-based trust in promoting the pharmacist's involvement in the Unit B project:

> *"… Yeah, so I've worked with them for a long time and been a prescriber here seeing patients for a long time so they were comfortable with my kind of level of expertise and experience and they probably felt that was ok for me to be doing the work… seeing the patients, starting them on the medicines and us kind of talked about it at the clinical meetings within the practice just to keep them updated as to what was going on, sent a couple of emails to say this is what I'm doing…"*

(Pharmacist 1)

Another account from a practice manager revealed that due to competency-based trust, other practices referred their patients to the clinic where the manager practised in order to be treated for AF. The practice manager explained:

> *"… so, the other clinicians at the practice were aware that the project was going on and they send patients my way when there was a new diagnosis of atrial fibrillation and they'd send them to me and I'd have a chat with them about stroke prevention and starting the anticoagulant and that kind of stuff so that kind of happened a fair bit."*

(Practice manager 2)

6.3.2 Flexibility

Unit A

The interview data reveals that members of the AHSN believed in and relied on the capabilities and ingenuity of the midwives and consultants, and considered flexibility to be a relational norm that was important in the way the maternity units organised the uptake of the Unit A intervention. As observed and recorded in the field notes, each of the maternity units had a different approach to implementing the intervention, and by allowing flexibility, the maternity units had the opportunity to embrace different activities to ensure the intervention was implemented effectively, as supported by evidence from the field notes report:

> *"Because we have, we kept the standards the same, but we were not rigid about how it was implemented and what people needed to implement it and influence it, and it's been the small tiny little things that have made a difference. So, in one unit, they wanted us to develop a sticker to go on the notes because that is how they did it, so we did that, in another they wanted magnets because they use the whiteboards and they could put a magnet by the woman's name. Another one, they just wanted lanyards to show whether you'd done the training. In another they wanted little badges to show that they'd done the training."*.

(Unit A meeting note, 2014)

The analysis of the interview findings provided evidence that flexibility gave the midwives an opportunity to tailor the implementation of the Unit A intervention in line with the needs of the maternity units. Importantly, the interview data revealed that a flexible approach allowed the consultants and midwives to modify the implementation process in a way that suited the cultural and operational procedures of their maternity unit. One midwife mentioned:

"One of the things that we had to modify quite a bit was that our consultant lead on this wanted to do up to 34 weeks, and the project was up to 30. So, we extended it out, and we did do it up to 34 weeks. We had to change a lot of the learning tools, and the leaflets for patients and things like that to suit what model we wanted locally."

(Midwife, Mat 5, NHS Trust)

Most importantly, flexibility allowed the midwives and consultants to adjust the implementation process based on a set of agreed standards. Documentary evidence showed how flexibility was seen to promote successful outcomes:

"... They basically gave us all this stuff, and went, 'You use the bits that you think are appropriate, or if you want a sticker made, or if you want this made, we can do that.' So, there was really endless resource, in terms of – they really wanted us to try anything possible to see what would be the most successful, I guess…"

(Unit A project meeting note, 2014)

Unit B

For Unit B, the data showed that the AHSN adopted a flexible approach in designing the implementation process, and that it served as a strong tool for the development of ideas and resources that enabled the smooth uptake of the intervention. As illustrated in the statement below, one of the operations managers at the AHSN affirmed:

I think, for this project, what we… one of the things that we want as an output from Phase 1 is to be able to say, 'This is the nuts and bolts of this project. If you do it, it's gonna take you this amount of resource. This is the amount of support we can give you; these are the options you have.' So, what we want to do at the end is to put all those options on the table and go, 'This is what we know – what would you like to choose and do that suits your practice? What makes most sense to you as a CCG member?'"

(Operations Manager 2, AHSN).

6.3.3 Informal communication

Unit A

Informal communication was another key relational norm that was critical to Unit A, enabling participants to relate to one another effectively during the project. According to the interview data, the midwives admitted that informal communication provided the opportunity for them to

engage with, inform and educate staff about the importance of administering Unit A magnesium sulphate to pregnant women at risk of preterm birth. As one midwife explained:

> *"So, I would book myself onto people's lunchtime meetings, or audit meetings. Frequently, I'd just go along and do my little 10-minute spiel as a part of my working day, we had some discussion about the nitty-gritty about if you have to transfer someone in an ambulance, and all those kinds of things. I think that really ironed out – and so there was kind of group support from it."*

(Midwife, Mat 3, NHS Trust)

In addition, one of the consultants in Mat 1 spoke about the vital opportunity that informal communication provided for educating other medical staff about the administration of magnesium sulphate to at-risk patients:

> *"There was opportunistic training, where the project midwives would be around and just catching people on delivery suites. We did the same with the medical staff, so went through the project presentation with them, and just kept the awareness more than anything else. It was an ongoing process."*

(Consultant Mat 1, NHS Trust).

The interview data further demonstrated a high degree of knowledge transfer between the midwives and other practitioners throughout the project. Importantly, it was seen that informal communication promoted knowledge transfer amongst practitioners, as well as increasing their personal responsibilities and accountability for patient care, as the following example from a midwife retelling an exchange with a consultant demonstrates:

> *"So, the midwives, I know one case where actually the magnesium sulphate midwife happened to be on shift when a lady who was eligible to have magnesium sulphate in the sort of trial, was there, and the consultant hadn't prescribed it. So she said, she's under 30, I think she was 29 weeks, she's in preterm labour, can you prescribe magnesium sulphate? And he said, well, why would I want to do that? Moreover, she said because… and he went really? And she basically said, read these guidelines, and had to persuade him that it was okay, and he did do it, and said all right then, I'll do it."*

(Midwife Mat 4, NHS Trust)

Unit B

Informal communication was considered essential in promoting the uptake of the intervention in the Unit B project, and enhancing the dissemination of important information amongst GP

practices. Informal communication was found to be significant in harmonising practitioners' activities and actions, and in positively influencing the uptake of the intervention. One of the industry partners affirmed that face-to-face communication was vital:

> *"So those regular face-to-face contacts, so communication is key but it's how things are communicated and when things are communicated, so trying to streamline that process, and also to think about the person you're communicating with, what needs to be done and putting that in place early, rather than trying to run things through at relatively short notice."*

(Industry partner, pharmaceutical company, UK)

There were recurrent references in the data showing that informal communication occurred due to good working relationships and friendships, which in effect supported the way in which the Unit B intervention was adopted. When asked about the Unit B project, a GP said:

> *"... Certainly ways of communicating, there was very regular communication, and then there were significant communication points, in terms of review meetings with practices, whereby one of the quality improvement (QI) leads would go out to the practice and sit with the practice and ask where they were at? What was going well? What wasn't going so well? What they needed support with? And as a consequence of that, good working relationships and I would like to think friendships have come out of that.*"

(GP 1)

As seen from the analysis above, formal contractual and relational mechanisms influenced the uptake of the interventions in the sampled maternity units and GP practices. Most importantly, evidence from both primary and secondary data suggested that both contractual and relational governance worked in parallel with each other, and this is further supported in the analysis of data presented in the next section.

6.4 Dual use of contractual and relational mechanisms

In this section, the findings on the dual use of contractual and relational mechanisms are presented. Although contractual and relational mechanisms on their own influenced the uptake of both interventions, evidence from the analysed data indicated dual use of contractual and relational mechanisms in facilitating the uptake of magnesium sulphate and NOACs. Additionally, there are suggestions from the analysed data that different actors played various roles that supported the diffusion of the innovations studied in both Unit A and Unit B. The next section relates to the findings on the dual role of contractual and relational mechanisms on diffusion of

magnesium sulphate use. The findings are presented in terms of the dual role of contractual and relational mechanisms, and in terms of the different stages of the diffusion process presented by Rogers (1995, 2003), namely: persuasion, decision and implementation of the interventions. Each of the stages was identified by aligning the phases of the projects with the characteristics proposed by Rogers. Furthermore, the final two stages of evaluation and confirmation, as suggested by Rogers, were not included because at the time at which this study was undertaken, each project had reached the evaluation stage.

Unit A

The persuasion stage

In Unit A, trust and reputation provided a platform through which the consultant in Mat 1 established relational dealings with the AHSN. Through these mechanisms, it was possible to initiate the interventions within the maternity units. For example, the interview and documentary data showed that at first, a senior consultant in Mat 1 initiated and adopted the use of the intervention into routine care in the Mat 1 (Unit A Evaluation Report, 2015). An evaluation carried out by Mat 1 after the completion of the pilot phase highlighted the success rate of 60% in compliance rates and the diffusion of the intervention in Unit A. Documentary evidence notes that the successful uptake of the intervention in Mat 1 is the exception rather than universal practice in UK healthcare (Unit A Project Initiation Document, 2014).

Commitment was very important in the interactions of the consultant and the team from the AHSN, which in effect supported the introduction of the intervention to the maternity units. For example, It was recognised in the interview data that the commitment of a particular consultant in Mat 1 reinforced the initial introduction of the intervention to the AHSN, as an operations manager at the AHSN explained:

> *"… someone who's just really enthusiastic about it… So, with magnesium sulphate, it would be consultant at Mat 1, from round the corner – the consultant, she had driven the project locally, and then it was her that sort of put the message out. So, I think that is… those are the main mechanisms, I think."*
>
> (Operations Manager 1, AHSN)

To ensure full introduction of the intervention to the various maternity units within the region, formal information exchanges, contracts and the willingness of external champions such as the Obstetric Network (a network of midwives from different maternity units in one of the UK healthcare regions), persuaded the AHSN to extend the idea of the intervention to other key stakeholders. For example, the interview data showed that:

"… In terms of the wider spread, so we linked with our stakeholders that we're already linked to as part of the project – so, the Obstetric Network for […] we actually went and presented it at the Obstetric Network and we had a whole load of midwives there that just said, why aren't we going to do this? So, it quickly went from one maternity unit to all five in our patch."

(Operations Manager 2, AHSN)

In another instance, it was found that engagement with external champions during the persuasion stage was required to ensure adequate introduction of the innovation into the maternity units:

"… I mean, we made it clear with the […] project that we… we've actually engaged with Obstetric Network several times and also with the […] again, so, it's almost like we've got a model of trying to involve as many people as possible. I think that's what's different about magnesium."

(Operations Manager 1, AHSN)

The external champion roles were stated, and this was crucial in facilitating the initial introduction of the interventions into the maternity units. Their role was recognised in the data as one of the factors that enhanced the introduction of the intervention into the maternity units. The operations manager at the AHSN described the key roles of the external champions as follows:

"… But Obstetric Network, as a network of sharing information and good practice – again, we'd already discussed magnesium at Obstetric Network prior to the Unit A project, and all agreed that it was something that we should be doing as a unit."

(Operations Manager 1, AHSN)

Contractual agreements were central in persuading the external champions to agree to a common goal of developing a clinical care pathway that supported the introduction of the intervention in all five maternity units. According to a director at the AHSN:

"… one of the unique things I think about the Unit A project is we have said we've worked with them again to develop a clinical kind of care pathway and clinical standards that are, you know, the standards are the same, so it's around what week you work up to. So, we've got all five to agree, and we've got five, consensus across all five."

(Director, AHSN)

In summary, the analysis of the data showed that relational mechanisms (e.g. trust and reputation) and contractual mechanisms (e.g. formal information exchange and formal contracts)

were essential in facilitating the initial introduction of the intervention into the maternity units sampled in this study. Importantly, the analysed data showed that different actors supported the introduction of the intervention into the maternity units. These actors are identified in Table 6.1.

Table 6.1: Key actors in the persuasion stage of Unit A

Key actors	Functions
AHSN	Raised awareness, set standards Made connections and promoted awareness of the interventions
Consultants at Mat 1	Became a potential user of the intervention and actively considered how it could be adopted into regular activities
Obstetric Networks	Acted as an external champion

The decision stage

In the Unit A intervention, a formal contractual agreement was used to facilitate the relationships between the various participants, including the AHSN and the executive directors of the NHS Trusts where the maternity units are located. Formal contracts were required at this stage in order to establish, clarify and formalise the project's goals, objectives and expectations from each of the stakeholders, particularly the AHSN, the chief executives of the hospitals where the maternity units were located and the external champions; in this instance, the Obstetric Network. This implies that, through a definite formal contract, all the participants involved agreed to their roles and responsibilities, the communication strategy and the procedures for the diffusion of magnesium sulphate use in the maternity units. By agreeing to the terms and conditions of the formal contract, the AHSN and the executive directors were able to reduce the occurrence of opportunistic behaviour and at the same time increased mutual understanding and trust amongst each other. A director at the AHSN said:

> *"… And we have also then worked, we were meant to, this is really interesting, the original project plan said that we would work with the Mat 1 Trust and spread their good practice up to other Trusts in the region, so that was the original project outline. What happened in reality was as soon as we started doing it, all the other chief execs said well, why is it just Mat 1?"*
>
> (Director, AHSN)

More data from the interviews also described the involvement of the chief executives at the hospitals where the maternity units were located:

> *"…. I mean, what drove sort of […] project very much was the chief executive at […] was really … and also at practice […] really took… and they were all interested, but they were really interested."*

(Consultant, NHS)

To facilitate the uptake of the intervention, interview data showed that contractual elements such as formal meetings were required to support the decision-making process. For example, a formal meeting needed to occur between the AHSN and the chief executives in order to highlight the benefits of the innovation. As one of the operations managers at the AHSN stated:

> *"… So, I think, what engages chief execs is stuff that crops up in […] meetings – the stuff that … the awards that crop up during the meeting – those sort of things. So, it's more about marketing the success and using… And we're not communications experts, but that's how… that's what seems to work for us."*

(Operations Manager 2, AHSN)

When asked if there was any formal contract agreement between the AHSN and the maternity units, a midwife said:

> *"… Yeah, I'm sure there were. I think that was key to the, I mean it will all be financial contractual agreements regarding funding for the staff. Yeah, there was definitely, and that went through […] Yeah… there was definitely a contractual agreement."*

(Midwife, Mat 2, NHS Trust)

In terms of the role of the formal contract, the interview data suggested that contractual provisions were important in supporting the involvement of the clinical practitioners, and in effect stimulated their engagement in the intervention. For example, one of the midwives explained:

> *"… So the Academic Health Science Network, yeah, I can never get it right, they have money and they said we can fund a project lead midwife, and they were quite clear about midwifery being, you know, from the bottom up, to run the project, to disseminate it."*

(Midwife, Mat 2, NHS Trust)

Using the formal contract to establish the roles of the AHSN and the chief executives was crucial in supporting the decision process. In particular, the contractual provision was used to secure dedicated research time for clinical champions such as the midwives during the diffusion process. As one of the midwives explained:

> *They met with the chief executives... through the heads of midwifery, from our hospital, and I am assuming it was the same in all hospitals, to agree the funding that was there. The money got paid, that money then got paid to those midwives for the additional hours…"*

(Midwife, Mat 3, NHS Trust)

Another important actor that facilitated this stage of the adoption of magnesium sulphate was the external champions, in this case the Obstetric Network. The data shows that the relationship between the AHSN and the Obstetric Network at this level was based on a formal contractual relationship. In this relationship, the interview data reveals that both parties had to agree on individual roles and responsibilities in order to design the guidelines that influenced the process of the adoption of magnesium sulphate use. A participant from the AHSN said:

> *"… So, magnesium sulphate approach, we engaged with the […] so, the obstetrics and neonatologists in terms of writing the guidelines – and I think it's served two purposes, and one was to inform them about the project and engage them because I think by designing it with us they became bought in because it was theirs. But also, it meant that we could then use that, and it got some authority behind it."*

(Operations Manager 1, AHSN)

Another account from a midwife in one of the maternity units interviewed also demonstrated how the contractual agreement between the AHSN and the Obstetric Network influenced their role in facilitating the uptake of magnesium sulphate. The midwife explained:

> *"I know the Obstetric Network, the education network also came with their protocol to the network, to say this is the protocol, this is the pro forma and this is the leaflet, and I was there then, and they said we get, we had a workshop to go through it with people from all over the region, obstetricians and midwives… you know, really the whole region was there and we had these workshops to go through, and they had, they had it there so we could all agree, as an entire network, what would happen."*

(Midwife, Mat 2, NHS Trust)

In addition, evidence from the interview data found that by agreeing to the terms and conditions of the formal contract, the external champions were able to encourage all the relevant parties to

come to a contractual agreement, which in turn influenced the decision-making process regarding the introduction of magnesium sulphate into clinical use:

> *"… So, we did have to all agree, as an entire regional unit, that that's what we were going to do, and we did, so, and it worked, really, really well. So, I think that's the collaboration. Once it was agreed, it was disseminated that the Obstetric Network had said this is what we should be doing; this is what we have agreed. That midwife […] at the time, then put through the guidance that this is what we've agreed, I knew that because I'd been there anyway, and we sent it around and just said, this is what we've all agreed, is there any opposition to this? No, that's fine."*
>
> (Midwife, Mat 3, NHS Trust)

Table 6.2: Key actors in the decision stage of Unit A

Key actors	Functions
AHSN	Informed and engaged relevant parties Established and designed a formal contract
Chief executives of the participating hospitals	Provided support and commitment to the innovation Committed resources and shaped the contract
Midwives	Supported the decision to adopt magnesium sulphate
Obstetrics Network	Brought about consensus as to how the intervention was going to be adopted Involved in developing the guidelines and protocols

Table 6.2 above illustrates the identification of the key actors involved in the decision-making stage of the adoption of the Unit A intervention. In line with Rogers' (2003) stages, here the actors decided formally whether to or not to go ahead with the innovation (adopt or reject). It was also at this point that the key actors began to formalise how practitioners would use and integrate the innovation into their daily work routine. As can be seen in Table 6.2, other network actors identified in the persuasion stage that played significant role in the decision stage are the midwives, who played a significant role in supporting the decision to adopt the innovation.

The implementation stage

Despite the important role played by a formal contractual agreement, relational mechanisms were required to drive the implementation stage of the diffusion process. After the contractual agreement was established between the AHSN and external champions, there was a need for

relational mechanisms to reduce the occurrence of opportunistic behaviour and at the same time increase mutual understanding and trust amongst the participants. As one of the midwives stated:

> *"… No, I think that was really important, actually, because that was – those existing professional relationships were what facilitated a lot of the communication of the project and its purpose, and how it was carried out, and what it involved. So, I think without that, it wouldn't have been as successful as it was.".*

(Midwife, Mat 5, NHS Trust)

Trust derived from social interaction among the network members was an effective relational mechanism that positively influenced the implementation of the intervention in various maternity units. According to one midwife:

> *"… Well, I think what was really nice about it, from my point of view, is the three of us that were in the first group did support each other. We exchanged information – so, we sort of supported each other, as midwives, which was lovely. The support from the Academic Health Science Network was great in terms of encouragement and making sure that I collected the – you know, don't forget to – so, that was great, because it never sort of dropped off my radar, having that backup…"*

(Midwife, Mat 2, NHS Trust)

When there was mutual confidence that the network members would not exploit the interests of other network members, flexibility was introduced by the AHSN to further support the implementation stage. This is evidenced in the following statement:

> *"… Because we have, we kept the standards the same, but we were not rigid about how it was implemented and what people needed to implement it and influence it, and it's been the small tiny little things that have made a difference."*

(Director, AHSN)

Relational mechanisms provided the framework that supplemented the contract and enabled the actors in the network to implement the intervention. Hence, relational governance mechanisms were significant in driving the implementation stage beyond the point at which the reach and scope of the contractual governance mechanisms stopped. Consistent with these findings, the key actors that supported implementation stage are shown in Table 6.3.

Table 6.3: Key actors in the implementation stage of Unit A

Key actors	Functions
Director at the AHSN	Facilitated the exchange of information between relevant parties
Midwives	Integrated use of magnesium sulphate into working practice within the respective maternity units
Consultants	Supported the innovation
Obstetrics Network	
Chief Executives at the participating hospitals	

As can be seen in Table 6.3 above, the key actors that played a vital role during the implementation stage of Unit A intervention were the AHSN operations managers and the midwives. It can be seen that, in line with Rogers (2003), it was at the implementation stage that actors took on the responsibility for integrating magnesium sulphate into daily use, adapting their routines and practices in order to accommodate the innovation. Noticeably, it is the actors at the grassroots, the midwives, who were most actively involved at this stage. Although the consultants, Obstetric Network and chief executives had supported the intervention, they had now taken on more of a backseat role.

Unit B

The persuasion stage

During the persuasion stage, the AHSN played a significant role in getting key actors such as the industry partners on board. There was a formal contractual agreement between the AHSN and the industry partners. One of the medical directors at the Clinical Commissioning Group talked about how the industry partner was invited to participate, and about how the AHSN used a formal contract agreement to guide their role during this stage of adoption.

> *"… it was essentially a formal invitation then formal attendance; the minutes of the meetings were kept properly and so on. There were formal agreements in place with the industry partner, particularly when it came to making resources available to support the project…"*
>
> (Medicine director, NHS Trust)

When the participants from the industry were asked to describe their involvement, one industry partner stated:

"… but I think because it's very clear from the get-go that the AHSN are in a joint working agreement with the industry partner, they're working with other industry partners as well, that's just the way that they work, it's been accepted and that's why obviously all industry partners are engaged, to different extents, for different things."

(Industry partner, pharmaceutical company, UK)

When the participants from the industry partner were asked to discuss the benefits of formal contractual agreement in terms of their relationship with the AHSN, one industry partner said:

"It's very much about working in partnership… So it's all the lessons learned that are coming from that, in terms of how joint working agreements are set up, what the pitfalls are, how to avoid those. Also, the lessons learned from myself… It does give that broader understanding… but there's nothing quite like working and agreeing together… once we've entered into the joint working agreement, whatever outputs come from the project, are still perceived to be part of that joint working agreement."

(Industry partner, pharmaceutical company, UK).

In addition, it was found that the contractual agreement was essential in persuading the practitioners at the GP surgeries to agree to be part of the innovation diffusion process. One of the general practitioners said:

"There were certainly contract agreement between the AHSN and the practices directly so they obviously had to get the practices agreement to take part and then they obviously wanted the practices to agree that their staff could kind of come in and do various bits of work with data and whatnot so I'm sure there was contracts in place…."

(GP 3)

Evidently, the contractual agreement was an effective reinforcement that persuaded the practitioners at the practices to commit to the innovation, using their practice experiences and skills to support the diffusion process. This is evidenced in the following statement:

"They are set to help the practices out with a specific problem and that was very helpful, and you know I'm clinical and I'm quite good with the technical stuff as well and at the time I was self-employed so I could flex my amount of time that I gave to the job so I was available to support the project…"

(Practice pharmacist)

Table 6.4: Key actors in the persuasion stage in Unit B

Key actors	Functions
Industry partner	Worked in collaboration with the AHSN and other actors, using their industry experience to positively influence adoption
AHSN	Brought key actors on board to support the process of adoption
Practice manager	Facilitated the use of the intervention into the practice through a formal contract
Practice pharmacist	Agreed to be a potential user of the intervention, and actively used their skills to translate it into regular use within the practice.

As this point, it can be seen from Table 6.4 that, in line with Rogers' stages (Rogers, 2013), the industry partners were starting to show an interest in the potential project, and were keen to understand more and become closely involved about the innovation. Table 6.4 above shows various actors that influenced the diffusion of the Unit B intervention at the decision stage. The two key actors that influenced this stage of adoption were the AHSN and the industry partners.

The decision stage

Evidence from the primary and secondary data showed that in the Unit B project, a formal contractual agreement was required at the decision stage in order to initiate the relationships between the various participants: the AHSN, the Clinical Commissioning Group, the GP practices and the industry partners. A formal contract was required to motivate the interests of all actors in the intervention in order to establish, clarify and formalise the project's goals and objectives, and the expectations from each of the participants. By agreeing to the contractual terms and conditions, the AHSN and the Clinical Commissioning Group were able to bring the relevant parties on board. The following interview excerpt sums up the role of formal contracts in facilitating the implementation of the NOACs:

> *"… I am pretty certain that the Academic Health Science Network team would have sought sign-off at a senior level within the commissioning groups. So, it wasn't just about personal relationships, there was formal project sign off at probably senior management team, if not board, may even have been at board level at the commissioning group when it rolled out to one of the regions patch and I am sure there would have been some level of agreement and understanding around that."*

(Medicine director, NHS Trust)

An AHSN director explained:

> *"So, we've linked with the commissioning group, so we've got executive sign-off from their board to actually engage with us. We are… we've got a project working group together, which is made up of a clinical lead and a managerial lead, ourselves, and we're just starting up almost, starting to tell them what we know."*

(Director, AHSN)

As seen in the above excerpt, a formal contract was required to define the duties and responsibilities of the actors involved in the project. This implies that for all the actors to actively consider adopting the innovation, a formal contractual agreement was required to provide the framework for the obligations of the actors involved in the project. This is evidenced in the following interview:

> *"So, we have strategically been working with CCGs and we've now got sign-off from their board that they're going to roll the programme out. So I think they've got, off the top of my head, I think they've got three GP practices in the innovative practices, but they are now going to roll out all of their GP practices."*

(Director, AHSN)

A participant from the AHSN also stated:

> *"But also, because it's through the commissioning groups role, we've got a managerial lead at each area as well, and what they will do is help us to… we'll be able to co-design with them what our approach is gonna be to the […] project"*

(Operations Manager 1, AHSN)

The contractual agreement also helped in specifying how the AHSN would roll out information regarding the intervention and its use:

> *"With […] project, so, for example, we had a communications strategy meeting yesterday, and so we would provide all the messages and the form, and it would then go through CCG comms, so from the GP perspective it's just one of what the CCGs do – it's not us that's coming to do it from outside."*

(Operations Manager 1, AHSN)

The formal contract was useful in facilitating the decision to adopt NOACs, by establishing the agreements that brought the key actors in the Unit B project together. Here the CCGs played an important role:

"In terms of individual involvement, we probably approached individuals in the sense of our relationship with them… wanted to involve the heads of medicines management for each of the Commissioning Groups. We also I think extended the invitation to acute trusts pharmacists that we believe are interested in this project and are also part of our CCG."

(Director, CCG)

The analysed data showed how the GPs also established how they would communicate and share information:

"This level was very much about working with that 11 innovator practices to test various models, to get feedback from them, and also of the patients using the systems in terms of how we support shared decision-making, so with patient decision aids etc."

(GP 1, UK)

Beyond the definition of the roles and responsibilities, the formal contractual sign-off made it possible for the AHSN to identify other actors, such as the GP practices that were going to adopt the intervention. According to an AHSN operations manager:

"What we want the CCG to tell is, 'How does this link with your local conditions?' So, the way we're doing that is through the clinical lead, so in each CCG we're gonna work with… we're gonna have GPs essentially on the ground to act as our clinical champions."

(Operations Manager 2, AHSN)

The analysis of the findings presented above highlighted that contractual mechanisms were required during the decision stage. This shows that contractual mechanisms were significant in setting the rules, roles and responsibilities of the actors. As identified in the data, the key actors that functioned at this stage of adoption process of the intervention into the GP practices are presented in Table 6.5.

Table 6.5 Key actors at the decision stage in Unit B

Key actors	**Functions**
AHSN	Brought relevant parties together Provided information regarding the intervention Developed and established contractual agreements

Clinical Commissioning Group	Made the overall decision to adopt the innovation (NOACs) Identified managerial leads Promoted engagement
GPs	Clinical champions driving the intervention from the grassroots

Table 6.5 above illustrates the different actors that influenced the Unit B innovation at the decision stage. Central to the process were the CCGs in making the decision to sign off the intervention, i.e. deciding to adopt the innovation; the AHSN in bringing together the relevant parties; and the GPs acting as clinical champions, driving the intervention forward and sharing best practice.

The implementation stage

Relational mechanisms were found to accompany the formal contract and at the same time promoted the implementation of the innovation in Unit B. As one pharmacist summarised:

> *"I am the director of this unit which is the […]. I was asked by the AHSN because I have worked with some their team in the past… a couple of years ago to help with the project in terms of some initial thinking about the scope of the project and then once the project was approved I was the chair of the steering group which is the position I have sort of maintained until now."*

(Pharmacist 1, NHS Trust)

Another pharmacist in one of the GP practices emphasised the benefits of being part of a wider team of clinical practitioners and the influence of such relationships in the implementation of NOACs:

> *"… I think the other thing that's been helpful has been I think, is it has shown that involvement in a wider team of people in the care of the patient could be helpful. I think I am right in saying that one of the most successful parts of this project was actually involving clinical pharmacists in the review of patients, that's been a good lesson. I think the way we have collected data has been very powerful, I was talking to somebody a couple of weeks ago, they produced a huge toolkit resource on […] project and I kind of spoke to them about what we had done and actually having that outcome data has been very powerful."*

(Pharmacist 3, NHS Trust)

This study also demonstrated that trust and reputation were the key relational mechanisms that functioned alongside the formal contract support implementation of NOACs. As one of the anticoagulation nurses explained:

> *"… I think we are always quite keen to take on new things and be supportive with projects. So, the fact that actually somebody outside the usual sphere was actually looking to make a difference and to make changes, was actually quite motivating. So actually, we're quite a good resource for GPs, pharmacists, so actually we've got quite a good reputation and I think that's made it quite easy in terms of referring patients. They're quite confident that the decision we make is going to be the right decision and the support network is there for the patients afterwards…"*

(Anticoagulation nurse, NHS Trust)

As this section demonstrates, formal contractual mechanisms were crucial in supporting the adoption of NOACs in the GP practices. In addition, the analysed data showed that formal contractual mechanism improved the coordination of the roles of the actors and at the same time enhanced the decision to adopt and implement the intervention in Unit B. Nevertheless, relational mechanism was required to facilitate the actors' relationships. In view of this, the key involved in implementation stage identified in Table 6.6.

Table 6.6: Key actors in the implementation stage

Key actors	**Functions**
AHSN (operations managers)	Brought different and relevant parties together
GPs	Championed and drove the innovation from the grassroots up Promoted information exchange amongst participants
Pharmacists	
Anticoagulation Nurses	

As shown in Table 6.6 above, the key actors that supported the implementation stage of the Unit B intervention were the AHSN's operations managers, who brought relevant actors together with the GPs, pharmacists and anticoagulation nurses in driving the forward the use of the innovation from the grassroots up. It is important to note that other actors, such as the Clinical Commissioning Group, industry partners and medical directors also supported the implementation stage. However, it is clear from the data analysis that there was a group of individuals who took on the roles of boundary spanners and gatekeepers, bringing relevant parties together, enabling the translation of knowledge to other participants in the projects, and

connecting up participants with other external sources of expertise. The following sections will explore this in more details.

6.5 Boundary spanners

In both Unit A and Unit B, it was found that key actors adopted the roles of boundary spanners. They functioned as conduits, enabling innovation diffusion through idea exchange, particularly through enabling access to valuable information and operating as sources of knowledge.

Unit A

From the data it was evident that, for Unit A, the AHSN operated as a boundary spanner, providing valuable information that supported the midwives and the consultants throughout the project. As this midwife highlights:

> *"I found them really helpful. I was in touch with Mr […] So I really appreciated his support, and he came up to the site and visited, and kept in touch via email and I think that was really important, actually, because of the existing professional relationships with them, they facilitated a lot of the communication of the project and its purpose, and how it was carried out, and what it involved. I think, for me, I felt like I had very good support from Mr […] so I felt quite clear as to what was required of me; what I had to report on every month."*

(Midwife, Mat 4, NHS Trust)

The above excerpt suggests that as a boundary spanner, the AHSN was involved in providing knowledge and information to the midwives. In addition, interview data also revealed the importance of the AHSN in connecting the midwives with the information and resources that were required to implement and promote the uptake of magnesium sulphate use in the sampled maternity units. For instance, many of the midwives acknowledged that beyond providing support to both themselves and their teams, the AHSN was a source of knowledge and emotional strength to their team. According to one midwife:

> *"If I needed anything, they were always so positive, and even if they probably thought, 'We're not going to be able to do that,' they would be really positive but they would be honest, as well. Yes, they were great, weren't they? Really great."*

(Midwife, Mat 3, NHS Trust)

One of the consultants reflected on the benefits of obtaining information from the AHSN. When asked about what their maternity unit thought regarding the benefits of engaging with the AHSN, they replied:

"I think any communication between the Academic Health Science Network and the powers that be in the organisation are valuable, because otherwise there is a lot of local individual's time spent trying to persuade them… You see, so if people come in and update you in your work setting, you're more likely to retain that information and then put it into practice…"

(Consultant, Mat D, NHS Trust)

From the interview data, it is evident that the participants in the project had confidence in the AHSN's ability to provide the necessary support that enabled them to achieve the project's objectives. The data make it clear that when practitioner confidence in the intervention was reinforced, they were enthused about becoming involved in the intervention:

"The Academic Health Science Network was amazing. They were brilliant. You see, if you tell someone what they've got to do, you've also got to make them believe what they're doing is easy and worthwhile, because, you know, we're busy people and you can't just say do this, there's always more work that you could do, so you've got to make this project kind of rise to the top of their priority list, and that was what they did."

(Midwife, Mat 5, NHS Trust)

During steering group meetings, the AHSN enhanced midwife participation in the diffusion process by clarifying complex clinical information that could have hindered their participation if it had not been understood (Unit A steering group meeting note, 2014). It was observed during one of the meetings that the AHSN devoted much effort to ensuring that the midwives had a clear understanding of the evidence supporting the use of magnesium sulphate:

"There were a couple of little things that we'd – just minor sort of confusions that perhaps hadn't been ironed out prior to the project starting. So, clinical information, really, not anything – so, it was sort of some of the clinical information. Actually having the Academic Health Science Network, the team there, and the regular steering group meetings, we were able to take that back there and get some resolution on that. That was really sort of supportive, from my point of view."

(Observation notes, 2015)

It was apparent that the AHSN in the project played the role of host by being available and willing to support the maternity unit throughout the duration of the project. The AHSN's commitment to their role made it possible for them to invest time in engaging with the midwives to stimulate awareness of the intervention and opportunities for actions:

"So what we're not… we're not consultants, so we're not gonna come in and do one, two and get your figures up to this point and then just leave you to fall apart afterward. It was very much, 'Okay, well, so what? How are you gonna make sure that this is sustained in the longer term?' So, that's with magnesium sulphate, so it's getting the initial uptake, it's getting… so, obviously, it's all about patient benefits, getting the initial uptake, making sure that it sticks by making sure there's some sort of diffusion of learning within […]"

(Operations Manager 1, AHSN)

The operations manager continues:

"I mean, again, we… it's almost like the sort of… the additional brain that sits there. So, we can do all the developing – we've got… that's what we do, are we develop what the approach might be and what the options might be. And then, essentially, what we then… we can act as coaches and actually help people through this innovation."

(Operations Manager 1, AHSN)

Unit B

Similarly, in Unit B, the AHSN took on the role of boundary spanner, providing the core expertise on how to connect and engage with other practitioners involved in the project. The AHSN offered support to the GP practices in designing the materials that were required to effectively implement and promote the intervention. The documentary evidence shows that one of their roles was to ensure that they provided adequate access to valuable information, including project materials such as patient decision tools that enabled each of the participating practices to understand the risks and benefits of prescribing NOACs. According to the documentary evidence, the information that the AHSN provided during the project supported and enhanced the awareness of GPs regarding the processes that needed to be followed to achieve the required outcome (Unit B Group meeting note, 2014). Commenting on how the AHSN supported the work of the GPs, an Operations Manager from the AHSN revealed:

"….so, we've met our … what we wanted to do, which is to design models, to understand what the risks and benefits and what the opportunities are from each type of approach, to also … to review our project material, so the key things to support rollout, which is things like guidelines for GPs around current best practice, appropriate decision aids, knowledge about all the various things they would need to be able to make a change in their practice, and that includes a quality improvement approach".

(Operations Manager 2, AHSN).

Similarly, when asked about how the AHSN role supported practice, a participant in one the practices states that the energy of the AHSN representative in interacting with the other practices was exceptional. The Head of Medicine Management in the regions Clinical Commissioning Group (CCG) told of how the AHSN made the practices prioritise the intervention and set the wheels in motion. The manager further described the AHSN as a host and clarified that their role was significant in the way the practices implemented the intervention:

> *"…The Academic Health Science Network is a very useful contributor to this field of work because they can add momentum to things which didn't have momentum, they can effectively take something that's on your list of things to do but might not be prioritised and just kind of make it happen and that's a wonderful thing because we would obviously like to improve the health of everyone in…… but the reality is that you prioritise and you think well we need to do this first and then we'll come onto that so there are things you want to do which may not get to the top of the list for a while but Academic Health Science Network came along and said this is something we can do ……."*

(Head of Medicines Management, CCG)

For Unit B, the AHSN also installed confidence in the practitioners and would rely on the AHSN to provide further information and an update on progress:

> *"And they ask us, you know, they don't bombard us with requests and unnecessary demands, so, but they tend to access us when they want clinical information and they want to know what's happening".*

(Director, AHSN).

6.6 Gatekeepers

In both cases key actors adopted the roles of gatekeepers, their expertise and understanding enabling the translation of knowledge to other participants in the projects, and connecting up participants with other external sources of expertise. In both Units A and B, the gatekeepers were described as local champions, with the passion and desire to promote the interventions.

Unit A

For Unit A, the role of gatekeeper was played by midwives from each maternity unit that were keen to promote and champion the use of magnesium sulphate in at-risk patients. In Unit A, the gatekeepers were seen as vital in facilitating communication and knowledge exchange the

intervention. In one of the maternity units, a midwife talked about the influential role played by midwives:

> *"So you get one midwife in and then that member of staff learns and so she'll kind of snowball. So you then get more of the women involved and more doctors involved and then... But I think what made a difference to how it works in our hospital, was making sure that all the staff was aware of what was going on…."*
>
> (Midwife Mat 2, NHS Trust)

A consultant from Mat 4 told of one key midwife's role in championing the use of magnesium sulphate:

> *"There is midwife …... doing project and quite a visual thing. It was mainly that; she is speaking in meetings, using the Huddle and we have a safety briefing in the delivery suite every day, so she put it on there to raise awareness, so it would be mentioned at every report, every shift change.*
>
> (Consultant Mat 4, NHS Trust)

Another midwife from Mat 3 also reaffirmed the key role that was played by the midwives:

> *"Yeah, and I think it had a very different feel, that it came from a midwife. You know, midwives, our bread and butter is talking to women and telling them about different options for their pregnancies. So, you know, they tell the obstetricians, talk to the obstetricians but they might not remember to tell the paediatricians or the GPs, and they're all important as well, but midwives do all of that. If one of us says something, ten people know, and then another ten, you know…"*
>
> (Midwife Mat 3, NHS Trust)

There were other examples of the role played by the midwives. For instance, midwives were able to positively influence other members of staff, and benefitted from working at the grassroots as they were able to promote the benefits of magnesium sulphate to other colleagues. As confirmed by a midwife from Mat 5:

> *"…. yes, so we really just went for the key people that we thought would make the – that would be the most influential in making the intervention, really. And that's why we went for that group of people, and it seemed to work because they were often working and could influence other members of staff".*
>
> (Midwife Mat 5, NHS Trust)

Furthermore, the midwives were employed to champion the intervention from the outset, as the following documentary evidence demonstrates:

> *"Seeks to identify and appoint midwife "clinical champions" to promote the practice and to act as points of contact and information exchange for clinicians participating in the roll out of the standard. Potentially, clinical champions can deliver training to staff in order to promote sustainability beyond the end of the project involvement".*

(Unit A Project Initiation Document, 2014)

Many of the participants acknowledged that the midwives had a significant and positive influence due to their first-hand knowledge of the working environment. Consequently, the midwives knew what would and would not work, thus promoting the use of magnesium sulphate from the grassroots up, as establishes by an AHSN Operations Manager:

> *"If we'd talked to a senior manager in the organisation and it was very much a top-down approach, they would have probably not said that, and I think it's the human factors of that direct interaction. Because these project midwives, they were Band 7s, Band 8As, so they were there in the … they were there, and they knew they were involved in the clinical practice, they knew the real issues, rather than what someone in an office's view or my view might be".*

(Operation Manager 2, AHSN)

A similar account from one of the consultants revealed the significance of the midwives in promoting the administering of magnesium sulphate to at-risk patients:

> *"We have picked the research midwives to be the vehicles and to be the champions, very deliberately.*

(Consultant, Mat 4, NHS Trust)

A Consultant in Mat 4 emphasised the impact of having a midwife championing the intervention in their Unit:

> *"So she, I think, was really the brains behind the programme at the beginning, she's incredibly clever, she's got a public health background and she was the one really that I would say held the project together. Yeah, so she is an incredible resource and without her, I am sure we wouldn't be as advanced as we were, because she really grasped it".*

(Consultant, Mat 4, NHS Trust)

Unit B

For Unit B, clinicians took on the role of gatekeeper, particularly GPs, although pharmacist and anticoagulation nurses also adopted these roles in some instances. However, in Unit B, the gatekeepers were supportive, spoke positively about the benefits of the intervention, and influenced practitioners to be involved, as outlined by a GP:.

> *"…so Dr…., is the clinical lead, was pivotal, he was one of the innovator practices, but always spoke very positively about the benefits of the project. Yeah, I think so, so you need to have a clinician that's got a kind of special interest in the first place and then you know if you can capture their imagination get them on board then they can influence other people…."*
>
> (GP 1)

As gatekeepers, clinicians reduced the barriers, according to an AHSN Operations manager:

> *"But one of the things we have been able to do is to … by having clinicians involved upfront is immediate ownership, and so we're able to try to design an approach and materials that support and try and reduce those barriers, so I think it was …"*
>
> (Operations Manager 2, AHSN)

In a similar vein, a GP talked of his role as gatekeeper, ensuring the contract was followed and the intervention supported:

> *"We've looked at using pharmacists to actually support this work of assessing patients and one other model was the model of which my practice was involved which is basically where you have someone like myself who has perhaps more experience than most in looking after these patients and trying to use me to support this particular model, and from a personal point of view, although I will, you know, I would imagine that we were doing a fairly good job in my practice"*
>
> (GP 3)

In addition, as in Unit A, the use of gatekeepers who operated in the general practices were identified as essential in promoting the use of NOACS amongst the general practices:

> *"Yeah, and that's what we were talking about yesterday. We were talking about Phase two and we were talking about communications and our communications strategy, and we very much identified that a champion within a GP surgery is going to make all the difference".*
>
> (Operations Manager 2, AHSN)

6.7 Discussion of the findings

6.7.1 The role of contracts in supporting and motivating participant involvements

The study established that contractual governance has a positive influence on the interventions undertaken in both Unit A and Unit B. Most significantly contractual governance was found to play a significant role in:

- Supporting and motivating the interest of the clinical practitioners
- Improving co-ordination between the participants, resulting in improved performance
- Promoting communication

The findings also showed that the diffusion of innovation is supported further through the dual use of contractual and relational mechanisms as opposed to the isolated use of either contractual governance and relational mechanisms.

Supporting and protecting the interest of the clinical practitioners

Contractual governance supported and motivated the interest of the clinicians and practitioners that were involved in the. Most significantly, this study demonstrates that for an innovation to diffuse through a bottom-up approach, the diffusion process requires engagement and involvement from relevant parties such as the clinical practitioners at the low and mid-level of the organisation. The study also shows that for diffusion to occur at this level, the interests of the clinical practitioners must be formally protected. For both Unit A and Unit B interventions, this meant protecting the practitioners' time through formal provision in the contract and giving them space to engage with the projects through the formal provision and recognition of allocated research time. This approach was helpful in facilitating the diffusion of innovation as it encouraged their involvement in participating and driving the diffusion process. This finding is critical because motivating the clinical practitioners through contractual mechanisms empowered them to own the innovation, become part of the diffusion process and at the same time provided opportunity for them share ideas that supported diffusion of innovation.

Improved coordination and performance

In line with previous studies (Reuer and Arino 2007; Schepker et al. 2014) the contract can improve coordination and performance in exchange relationships. It was found that the formal contract had clauses that helped to define the project objectives, the roles and functions that were required from each of the clinical practitioners involved in the interventions. A clear definition of

roles and objectives made it possible for the clinical practitioners to align their efforts towards achieving the overall project objectives.

The coordination function of a contract has been described as one of the means through which actor's performance can be monitored (Schepker et al., 2014). This was evident in both of projects. This finding suggests that a definite agreement was important in promoting the diffusion of both innovations as it guided the appropriate behaviours of all the parties and participants involved. This finding is evident in studies such as (Lyons and Mehta, 1997; Lumineau 2014; Selviaridis 2016). Consequently, it can be suggested that to promote the diffusion of innovation it is important to identify clear common and agreed objectives from the outset. In this study, common and agreed objectives refer to a clear understanding of the key roles and responsibilities of all the actors involved in the project, which ultimately influenced actors approach towards promoting the diffusion process. For example, the AHSN used the contract terms to coordinate and promote the roles of the industry partners, which in effect gave them the credence to work with other clinical practitioners in promoting innovation diffusion. This is an exception rather than universal practice in the UK healthcare and it was essential in facilitating the diffusion of the innovation.

Promoting communication

It was found that formal contractual governance created a definite approach for the exchange of information between the AHSN, the clinical practitioners and industry partners involved in the projects. For example, infographics was an agreed format by which information could be presented and disseminated regarding both projects. In addition, the infographics were significant in initiating interest and momentum in the projects. It was found that infographics through the use of data and pictures, information can be presented in a logical way.

However, it was evident that for both projects the infographics used had to be user-friendly, easily accessible by the clinicians, the practitioners, and had information that was useful in educating patients. The infographics also facilitated the engagement amongst clinical staff, which in effect helped the staff to explore and analyse the benefits of the interventions and to standardise approaches across different practices and surgeries. Building on this finding, it is suggested that making provision for communication in the contract is essential not only in initiating the diffusion process, but also in promoting the decision to adopt and implement the innovations.

6.7.2 The Influence of relational governance mechanisms

Relational mechanisms were also found to play an important role, notably:

- Supporting competency-based trust
- Enabling a flexible approach in implementing the interventions

- Supporting informal communication

Competency-based trust

Throughout the study it was found that competency-based trust played a significant role, clinicians and practitioners believed in their counterparts' skills, competencies and capabilities which ensured the interventions were implemented successfully. This is an important finding which showed that competency-based trust complements contractual governance increasing clinicians and practitioners' confidence in achieving the diffusion expectations.

The importance competency-based trust was reflected in both Units. For example, one of the consultants in Mat 1 emphasised that some of the clinicians and practitioners have worked together in different teams and projects, meaning that they have known each other's strengths and weaknesses in terms of the skills required to deliver. As a result, the decision to agree to be part of the project became very easy.

For a bottom-up approach to innovation diffusion to occur, it is therefore important that the appropriate individuals are identified and engaged in using and implementing the innovation. This is important in this study because competency-based trust served as a conduit for innovation diffusion as it enabled the identification and engagement of the clinical practitioners (e.g., midwives etc.) at operational level of the organisations that championed the interventions. In addition, competency-based trust facilitated innovation diffusion from the bottom-up approach by allowing the identification of clinical practitioners that had the capability and competencies required to perform key tasks that enabled innovation diffusion.

Flexibility

Findings from this study suggest that flexibility was instrumental in providing the clinical practitioners with opportunities to tailor the way in which they put the intervention into practice. When the clinical staff was given some level of flexibility they were able to approach the interventions in a positive manner, allowing them to employ the intervention in way that fitted with their local working environment. Therefore, for innovation diffusion to occur from the bottom up, it is important that users are able to employ the innovation in a flexible manner that fits with their ways of working. Too rigid an approach may deter key users from engaging and implementing the innovation.

Importantly, the introduction of flexible implementation approach by the AHSN created the platform that allowed information to be exchanged among practitioners. For example, informal communication supported regular communication between other clinicians involved in the interventions. The value of such communication made it possible for the clinicians to identify best

practice; call for support when needed and provided the opportunity for them to ask questions. Therefore, with respect to enhancing our understanding of a bottom-up approach to the innovation diffusion, this research shows that flexible implementation approach encouraged informal communication which facilitates the diffusion of innovation by allowing clinical practitioners to share relevant information, enabling knowledge to spread faster amongst participating clinicians.

6.7.3 The dual roles of contractual and relational mechanisms (interplay)

In contrast to the claim that a formal contract may hinder the development of relational governance in an exchange relationship (Woolthuis et al., 2005), the findings from this study show that relational and contractual governance mechanisms exhibit a mutual relationship with one other during the innovation diffusion process, complementing each other and promoting the diffusion of innovation. Not only do the mechanisms complement each other, they also substitute one another. For instance, competency-based trust can increase relationship building by encouraging actors to take on responsibilities, even when a formal contract is not applied. As demonstrated by the study treated, in Unit A practitioners engaged in the project before a formal contract had been drawn up, due to the trust the practitioners had in each other, negating the need to wait until the contract was in place.

However, there was need to establish formal contracts that stipulated the roles, responsibilities and the expectations for each of the parties involved. The finding from this study affirms that contractual and relational mechanisms complement each other, enabling the diffusion of innovation. Therefore, when promoting the diffusion of innovation from the bottom-up, it is important to pay attention to the dual role of contractual and relational mechanisms. For example, in this study, formal contract provided motivation and support to the clinical practitioners while trust established appropriate behaviour among the practitioners. Also, formal contracts clarified the roles and responsibilities of the actors whilst relational norms allowed flexibility in how the actors approached the implementation of the interventions.

The study uncovered that a formal contract between the AHSN and the industry partners influenced outlined the level of involvement form the industry partners and in effect inspired confidence among other actors in the project, thereby promoting the development of relational mechanisms that facilitated innovation diffusion. The formal contract established performance expectations and created a defined approach for the exchange of information and trust created a relational basis of assurance that the actors would abide by the contractual terms. In this way, both contractual and relational mechanisms supported the flow of knowledge and information and promoted the diffusion of innovation from the bottom-up.

6.7.4 Boundary spanners

Boundary spanners enabled access to valuable information and facilitated communication between the participants. The findings show that during the innovation process, boundary spanners manage innovation opportunities and outcomes, and functioned as a conduit, enabling opportunities for innovation diffusion through idea exchange. Boundary spanners were also found to be important in promoting innovation diffusion from the bottom-up approach due to their in-depth understanding of the projects and this played a significant role in facilitating the interventions. For example, the boundary-spanners in this study interacted between different actors such as the clinical practitioners and industry partners, providing a valuable route for information to be shared. Most importantly, the boundary spanners aided innovation diffusion through a bottom-up approach by facilitating the joint work of distinct groups with no history of working together, further supporting a drive from the bottom-up.

Consequently, for innovation diffusion from the bottom-up to occur, it is important to identify and work with boundary-spanners that can connect experts and relevant stakeholders together that can drive the innovation diffusion process. At each stage of innovation diffusion process, the analysis of data showed that boundary spanners played different but positive roles and these are outlined in Table 6.1 and 6.2.

Table 7.1: Key actors involved in the diffusion of innovation for the Unit A intervention

Stages of adoption	Key actors	Functions
Persuasion stage of Unit A	AHSN	Raised awareness and set standards Made connections and promoted awareness of the interventions
	Consultants at Mat 1	Became a potential user of the intervention and actively considered how it could be adopted into regular activities
	Obstetrics Network	Acted as an external champion
Decision stage of Unit A	AHSN	Informed and engaged relevant parties Established and designed a formal contract
	Chief executives of the participating hospitals	Provided support and commitment to the innovation Committed resources and shaped the contract
	Midwives	Supported the decision to adopt magnesium sulphate

	Obstetrics Network	Brought about consensus as to how the intervention was going to be adopted Was involved in developing the guidelines and protocols
Implementation stage of Unit A	Director at the AHSN	Facilitated the exchange of information between relevant parties
	Midwives	Integrated use of magnesium sulphate into working practice within the respective maternity units
	Consultants	Supported the innovation diffusion process
	Obstetrics Network	
	Chief executives at the participating hospitals	

Table 7.2: Key actors involved in the diffusion of innovation for the Unit B intervention

Stages of adoption	**Key actors**	**Functions**
Persuasion stage of Unit B	Industry partner	Worked in collaboration with the AHSN and other actors, using their industry experience to positively influence adoption
	AHSN	Brought key actors on board to support the process of adoption
	Practice manager	Facilitated the adoption of the intervention into the practice through a formal contract
	Practice pharmacist	Agreed to be a potential user of the intervention and actively used their skills to translate it into regular use within the practice

Decision stage of Unit B	AHSN	Brought relevant parties together Provided information regarding the intervention Developed and established contractual agreements
	Clinical Commissioning Group	Made the overall decision to adopt the innovation (NOACs) Identified managerial leads Promoted engagement
	GPs	Clinical champions driving the intervention from the grassroots
The implementation stage of Unit B	AHSN operations managers	Brought different and relevant parties together
	GPs	Championed and drove the innovation from the grassroots up Promoted information exchange amongst participants.

6.7.5 The role of gatekeepers

In this study the gatekeepers were clinical practitioners and they played instrumental roles in innovations, through their expertise and understanding enabling the translation of knowledge to other participants in the projects, thus promoting innovation diffusion. Importantly, the findings also highlighted that the gatekeepers in enabling access to external resources and connecting up the practitioners involved in the projects, making it possible for the clinicians to positively engage in the interventions. The findings also showed that the gatekeepers reduced the barriers to adoption through their ability to influence and engage with the internal members operating at the grassroots, hence enabling diffusion through a bottom-up approach.

The detailed transfer of knowledge by the gatekeeper to the clinical teams contributed to the successful uptake of the interventions in both Unit A and Unit B. This demonstrates and thus supports Ettlie and Elsenbach (2007) view that gatekeepers perform two important functions, first: gatekeepers obtain and interpret external information and secondly, translate this information in a manner that is meaningful and useful to their local needs. As observed by Nonaka and Takeuchi (1995), knowledge transfer into local needs through the gatekeepers improves the

learning process of internal team members and at the same time facilitates diffusion process through the bottom-up approach.

This is reinforced by this study which found that the gatekeepers' knowledge and understanding of the local, clinical environment in which they worked also had a significant and positive impact in facilitating innovation diffusion through a bottom-up approach. It was clear that, through their previous knowledge and understanding of the working environment, the gatekeepers knew what would work and what wouldn't, and this was significant in the way in which external information was relayed to the respective teams. Consequently, gatekeepers play an essential role during the diffusion of innovation from the bottom up, on account of their local knowledge of the working environment, their passion, knowledge, expertise and external relationships promoting engagement and use of the innovation. Therefore, if a bottom-up approach to the diffusion of innovation is to be promoted, it is essential that suitable gatekeepers are identified and engaged. These individuals must have the ability draw on external and local knowledge that supports the diffusion process from the bottom-up. The gatekeepers in this study had strong internal relationships with their team members, which in effect positively influenced their commitment towards the interventions.

As established in the introduction of this section, the above discussions focused on three key topics:

1) The role of formal and relational mechanisms with a focus on the interplay between contractual and relational governance mechanisms.
2) Identification of key actors involved during the innovation diffusion process.
3) The roles played by these actors during the different stages of the innovation diffusion process.

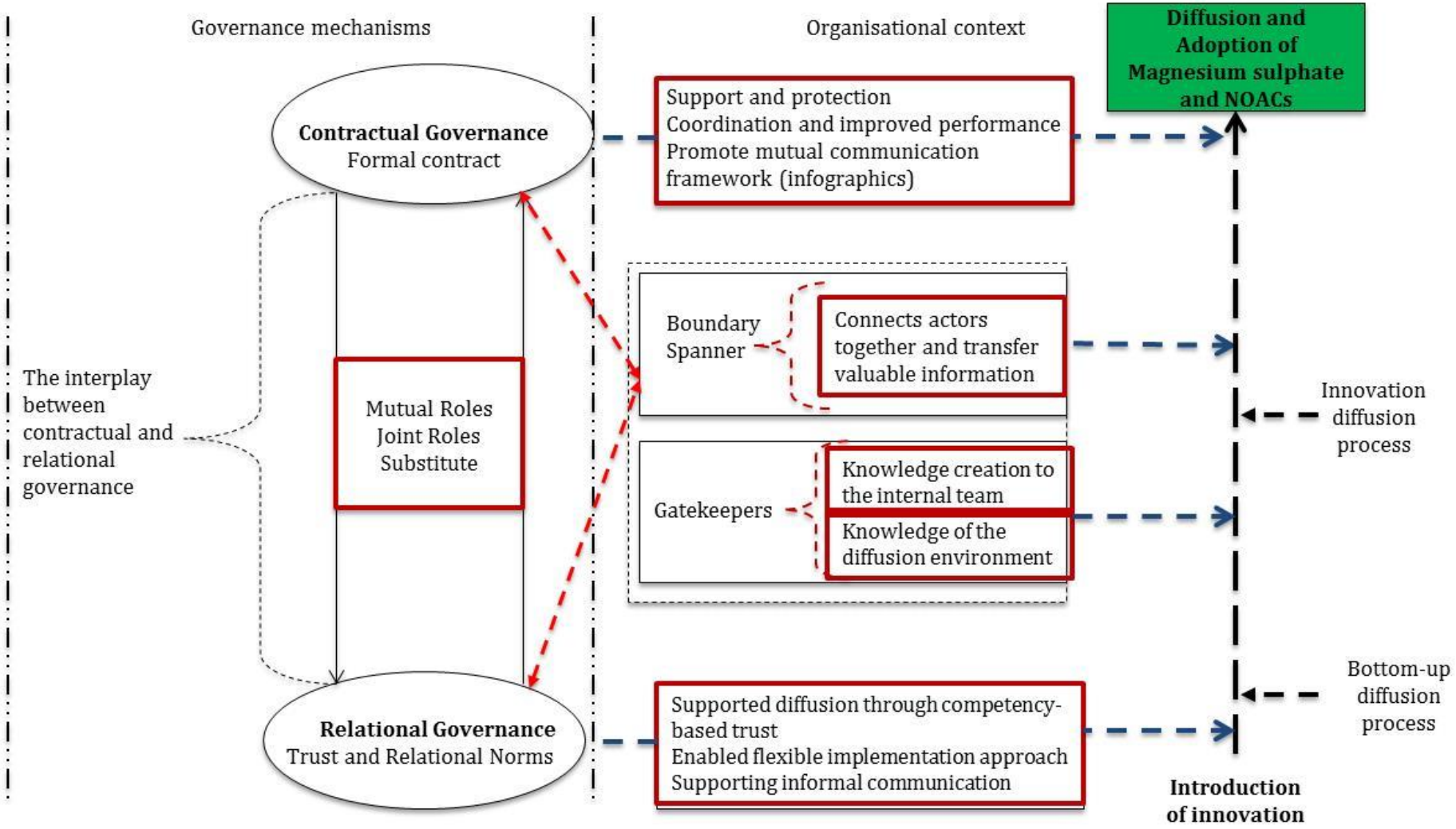
Having addressed the key topics, it becomes pertinent to revisit the initial conceptual framework to reflect the main findings of the study. The next section revisits the initial conceptual framework and refines it further to present the final version.

6.8 Towards a refined conceptual framework

As illustrated in Figure 4.1 (see chapter 4), the initial conceptual framework played a role in this study by outlining the key theories and delineating the scope of the research. Drawing on the findings of the study, the initial conceptual framework has been further refined (see Figure 6.1, in thick red lines). As can be seen in Figure 6.1, in terms of governance mechanisms, the conceptual framework established that both contractual and relational mechanisms positively influence the innovation diffusion process through a bottom-up approach. For instance, contractual

governance through a formal contract provided support and motivation to the clinical practitioners in both projects. In addition, it provided coordination and improved performance that enhanced the relationships between the actors in the projects. It was also found that contractual governance established a communication framework that was used to disseminate information regarding the interventions, thus promoting their diffusion.

Figure 6.1: Comprehensive conceptual framework showing the research findings



Relational mechanisms such as trust (particularly competence-based trust) and relational norms (such as informal communication and flexibility) helped in governing the relationships that existed between the actors involved in the projects, promoting knowledge transfer, and increasing confidence amongst the participants, hence promoting the diffusion of the innovations studied. The conceptual framework also shows that the parallel use of contractual and relational governance mechanisms, and the interplay between the two, promoted the diffusion of innovation, complementing and at times substituting for each other.

The findings reaffirmed the crucial role of boundary spanners and gatekeepers in promoting the diffusion of innovation. The research data showed that the gatekeepers, in this case the midwives, the GPs, anticoagulation nurses and practice pharmacists, played influential roles in translating external information to their internal team members. The gatekeepers also had a positive influence on the diffusion process, through their understanding of the local working environment and their passion to achieve positive healthcare outcome.

Consequently, the conceptual framework has been further refined, demonstrating the dual and complementary use of contractual and relational governance mechanisms. Importantly, the revised conceptual framework focuses on the particular roles of the contractual governance, relational mechanisms, boundary spanners and the gatekeepers. In addition, it incorporates the dual roles of contractual governance and relational mechanisms.

First, as shown in Figure 6.1, the revised conceptual framework recognises the key roles of contractual governance in influencing a bottom-up approach to innovation diffusion (the thick red lines). The roles include: supporting the clinical practitioners and motivating their interest in the innovation, and improved coordination between the participants, resulting in improved performance and communication.

Second, the revised conceptual framework identifies the relational mechanisms that support the innovation diffusion process, namely competency-based trust. It also shows that relational mechanisms promote a flexible approach to implementing the innovations, and that informal communication has a positive impact on the diffusion process.

Third, the refined conceptual model illustrates the key role played by boundary spanners in connecting relevant stakeholders together, promoting effective communication and the flow of valuable information and knowledge between actors. The refined conceptual framework incorporates gatekeepers, highlighting their understanding of the local working environment and their desire to champion the innovations, as well as their motivation to make a change. Furthermore, the refined conceptual framework shows that the gatekeepers enabled a bottom-up approach to diffusion through their ability to attract external knowledge and engage with the

internal members at the grassroots level. Above all, the refined conceptual framework highlights the dual roles of contractual and relational mechanisms, and emphasises the fact that, at times, contractual and relational mechanisms can adopt complementary roles and can substitute for one another when necessary.

6.8.1 Chapter summary

In this chapter, the findings from the data analysis have been presented and discussed. The chapter presented and discussed the roles of contractual and relational mechanisms, boundary spanners and gatekeepers on the diffusion of innovation when a bottom-up approach to innovation diffusion has been employed. Finally, the conceptual framework was refined to reflect the key findings of the research. Having presented the findings, the next chapter will conclude the study by drawing on the findings to address the initial research questions. The final chapter will then consider the limitations of the research and will end with recommendations for future research.

Chapter 7: Conclusions

7.1 Introduction

This chapter commences by addressing each of the research questions and goes on to discuss the research contributions and their implications for practice. Finally, the limitations of the study are considered, followed by suggestions for future research. The main aim of the research was to investigate the role of governance in the diffusion of innovation in healthcare networks when a bottom-up approach is employed and this was addressed by the following research questions:

1) How do contractual and relational governance mechanisms influence the diffusion of innovation in healthcare networks?
2) Who are the key actors involved in the diffusion of innovation in healthcare networks?
3) How do the different key actors influence the process of innovation diffusion in healthcare networks?

7.2 Research question 1: How do contractual and relational governance mechanisms influence the diffusion of innovation in healthcare networks?

7.2.1 Contractual governance role

The study revealed that contractual and relational mechanisms have a positive influence on the process of innovation diffusion when a bottom-up approach is employed. This occurred when the contractual mechanisms operated independently, but the study also found that contractual and relational mechanisms functioned together. In terms of driving the process of innovation diffusion from the bottom-up, this study found that contractual governance can positively influence diffusion by supporting and protecting the interests of the clinical practitioners and the actors involved in the diffusion process. For example, contractual provisions supported the involvement of the clinical practitioners operating at the grassroots by securing dedicated research time for the participants, which served to motivate the clinical practitioners, stimulating their engagement. This in turn helped to bring about diffusion of the innovation from the bottom up.

Contractual provisions were used to improve coordination between the actors, resulting in improved performance that was intrinsic in driving the diffusion of innovation from the bottom up. For example, the AHSN used the contract terms to coordinate and promote the roles of the industry partners involved in Unit B. This in effect gave them greater credibility amongst

healthcare staff, enabling them to interact more effectively with other clinical practitioners. Such engagement with industry partners is an exception rather than the rule in NHS England, and it was crucial in facilitating the diffusion of the innovation up through the healthcare network.

Furthermore, the coordination function of the formal contract was vital in identifying and defining the roles of the clinical practitioners who needed to be involved and who were able to support the adoption and use of the innovations. For example, the formal contract specified the use of "clinical champions", passionate clinical practitioners who had high levels of motivation and drive to promote the innovations to their colleagues and other interested parties. This ultimately had a positive impact on the innovation diffusion process, stimulating practitioner engagement and involvement, thus promoting use of the innovation from the bottom up.

Finally, contractual governance provided a defined communications approach (e.g., the use of infographics) for the exchange of information between the actors involved in the projects. For example, infographics were used to present data, pictures and information to educate staff and patients. They were also used to facilitate engagement amongst clinical staff, and to inform them of the benefits of the innovations, as well as how and when they should be administered to patients. The infographics were critical in driving innovation diffusion from the bottom-up, because they conveyed simple and succinct messages that were easy for clinical staff and patients to remember, thus facilitating and supporting both their involvement and their use of the innovations.

7.2.2 Relational mechanism roles

The study established that relational mechanisms have a positive influence on the diffusion of innovation when a bottom-up approach is employed.

Firstly, competency-based trust enabled the identification and engagement of clinical practitioners who had the skills and capabilities to champion the interventions in the various maternity units and general practices. This was fundamental in driving the innovations, particularly from the bottom up, because it gave participants in the projects the confidence to engage in the projects and actually use the innovations, since they had faith and trust in the clinical champions, whose experience and technical knowledge they respected.

Secondly, relational mechanisms enabled a flexible approach in how the innovations were implemented. Flexibility in the implementation approach was critical in driving innovation from the bottom-up, because it provided the clinical practitioners with opportunities to use the innovations in ways that would fit into their existing working practices and daily routines. This approach supported the diffusion process from the bottom up by giving clinical practitioners the opportunity to gain a sense of ownership of the intervention, and made the innovation more

usable. Therefore, for innovation diffusion to occur from the bottom up, it is important that adopters are able to employ the innovation in a flexible manner that aligns with their current ways of working. An approach that is too rigid may stop key adopters from engaging with and using the innovation. This is in contrast to the traditional approach to innovation diffusion in NHS England, which is often driven through rigid directives from the top. This insight suggests that if innovations are to diffuse successfully throughout the healthcare system from the grassroots upwards, users should be allowed to adopt a flexible approach to how they use and implement the innovations.

Thirdly, the study found that informal communication had a positive influence on the innovation diffusion process, promoting information exchange and knowledge transfer on matters regarding the innovation, its benefits and its use. Such communication enabled clinicians to promote best practice, and provided opportunities to ask questions about the interventions. This opportunity was important in driving innovation from the bottom up because it enabled knowledge transfer and information exchange. These increased the confidence and capabilities of the clinical practitioners in using the innovation, thus promoting engagement and uptake, which in turn promoted diffusion of the innovations through the healthcare network.

The dual use of contractual and relational mechanisms

Having explored the independent use of contractual and relational mechanisms, results from this study affirmed that contractual and relational mechanisms can also function together to drive innovation diffusion from the bottom up. For example, in the Unit B project, it was uncovered that although a formal contract was initially used, relational mechanisms such as trust were required to support interactions between the key actors, including the industry partners, the Clinical Commissioning Group and the general practices. This indicates that the formal contract provided the participants with confidence that opportunistic behaviour would be minimised, and thus increased mutual understanding and trust amongst the actors.

For Unit A, competency-based trust was essential in stimulating key actors' interest in the innovation. Afterwards, a formal contract was required to enable the decision to adopt and implement magnesium sulphate in the maternity units. Thus, although a high level of trust already existed between the key actors who were promoting interest in the innovation, a formal contract was required to coordinate the participants and define their roles, in order to ensure the effective uptake and use of magnesium sulphate in the maternity units. The empirical finding of this study therefore concludes that for innovation diffusion to occur through a bottom-up approach, considerable attention must be given to the dual role of contractual and relational mechanisms.

7.3 Research question 2: Who are the key actors involved in the diffusion of innovation in healthcare networks?

The study identified the key actors involved according to each of Rogers' (2003) stages, namely the persuasion, decision and implementation stages. As mentioned earlier, the final two stages of evaluation and confirmation were not included, since during the time at which this study was undertaken, each project had just reached the evaluation stage.

However, the study identified an essential set of individuals or actors that were instrumental in driving the diffusion of the innovations from the bottom up. They achieved this by bringing relevant parties together, enabling the translation of knowledge to other participants in the projects, and connecting up participants with other external sources of expertise. Each of these actors and their various roles in driving the diffusion of innovation from the bottom up in the sampled maternity units and general practices were illustrated in Tables 6.1 and 7.2 respectively.

The actors included the AHSN team, the chief executives of the participating hospitals, consultants at the maternity units, the midwives and the Obstetrics Network that played influential roles that supported the diffusion process from the persuasion and decision stages, through to the implementation stages of adoption. For example, at the persuasion stage, the AHSN team raised awareness, set standards, made connections and promoted awareness of the interventions. Later, at the decision stage, the chief executives at the participating hospitals provided support and commitment to the innovation through allocation of resources and shaping of the contract.

At the decision stage, the Obstetrics Network brought about consensus as to how the intervention was going to be adopted, and at the same time became involved in developing the guidelines and protocols that supported the diffusion process. Meanwhile, the consultants and midwives, who were the potential users of the intervention, actively considered how it could be adopted into regular activities by the team member. At the implementation stage, the AHSN facilitated the exchange of information between relevant parties, while the midwives used the information to integrate the use of magnesium sulphate into working practices within their respective maternity units.

For Unit B, the actors and their various roles that influenced the diffusion of innovation from the persuasion stag through to the decision and implementation stages were identified and presented in Table 6.2. The actors that supported the adoption at the persuasion stage included the AHSN team, who brought other key actors (e.g. the industry partner) on board to support the process of adoption. At this stage of adoption, the industry partner worked in collaboration with the AHSN and other actors, using their industry experience to positively influence adoption of the Unit B intervention. Other important actors at the persuasion stage were the practice manager and the

practice pharmacist. The practice manager facilitated the use of the intervention into the practice through a formal contract, and the practice pharmacist became the potential user of the intervention, actively using their skills to translate it into regular use within the practice.

Apart from the AHSN team and the GPs, other key actors that influenced the adoption of the innovation at the decision stage were the Clinical Commissioning Group, which played a vital role in making the overall decision to adopt the innovation, and helped to identify the managerial leads that championed the diffusion process. It is important to highlight that at the decision stage, the Clinical Commissioning Group promoted engagement and supported the GPs to champion the adoption from the grassroots perspective. However, at the implementation stage, actors such as the pharmacists and anticoagulation nurses championed and drove the innovation from the grassroots up, and at the same time promoted information exchange amongst participants that positively influenced adoption.

In line with Rogers' (2003) stages, here the actors first considered themselves as potential users of the innovations. Afterwards, they actively began the process of adoption through the use of a contractual agreement and relational exchange mechanisms, such as trust and relational norms. As found in the analysed data, the actors' acceptance of the contractual agreement represented an active choice of adopting the innovation into the various maternity units and GP surgeries. Afterwards, actors such as the midwives, the consultants, the GPs, the pharmacists and the anticoagulation nurses took active responsibility for integrating the innovation into their daily routines and practices. Hence, in order to ensure innovation diffusion through a bottom-up process, it is important to identify actors who have both an interest in the innovation and a commitment to support the diffusion process through their various roles and functions. In order to discuss how the actors' roles influence the diffusion, research question 3 is explored. The following sections shall explore these roles in more details.

7.4 Research question 3: How do the key actors influence the process of innovation diffusion in healthcare networks?

In response to the third research question, the identified individuals and organisations that operated as boundary spanners and gatekeepers were crucial in driving the innovation process from the bottom up.

Boundary spanners

In this instance, the AHSN, which functioned as a boundary spanner, provided valuable knowledge to the clinical practitioners, and promoted their engagement, commitment and

involvement in both interventions. As the AHSN interacted with the different actors, they enabled knowledge transfer, promoting enthusiasm for and confidence in the innovations.

As a boundary spanner, the AHSN played an essential role in supporting and promoting both innovations by connecting experts and relevant industry partners. For Unit B, the connection of clinical practitioners with industry partners was unique and exceptional. NHS clinicians are not generally encouraged to work closely with industry partners, due to a widespread assumption that they will always have different operational motives. However, for Unit B, the clinical practitioners and industry partners were able to support and drive the use of NOACs by working together. This finding indicates that to drive innovation diffusion from the bottom up, it is important to identify individuals or organisations that can operate as boundary spanners. By connecting experts and relevant stakeholders together, and enabling access to valuable information, the AHSN as the boundary spanners facilitated the diffusion of the innovation upwards through the healthcare network.

Gatekeepers

In this study, the clinical practitioners such as GPs, midwives and pharmacists served as gatekeepers. They were instrumental in connecting their internal teams to relevant external parties, and were significant in championing the innovations, harnessing their desire and motivation to make positive changes to healthcare, and to inform their colleagues of the benefits of the innovations. The gatekeepers' knowledge of the local clinical environment in which they worked had a significant impact in facilitating the diffusion of innovation from the bottom up. Their awareness of this working environment guided and shaped the use and implementation of the innovations. Consequently, the research findings indicate that gatekeepers play an essential role during the process of innovation diffusion due to their local knowledge of the working environment, as well as their passion, knowledge, expertise and external relationships. Therefore, if a bottom-up approach to the diffusion of innovation is to be promoted, it is essential that suitable gatekeepers are identified and engaged, in order to promote the diffusion of innovations from the grassroots upwards.

7.5 Theoretical implications

The study contributes to ongoing debates about the roles of governance mechanisms in the diffusion of innovation in interorganisational networks, and the role and interplay of contractual and relational mechanisms (e.g. Poppo and Zenger, 2002; Yang et al., 2012; Cao and Lumineau, 2015). This study adds new empirical contributions to these studies by not simply establishing the role of governance, but also by demonstrating the dual and parallel use of contractual and

relational governance mechanisms in facilitating a bottom-up approach to the process of innovation diffusion, particularly in healthcare settings.

The study also identified the key elements of contractual mechanisms, such as formal contracts, and relational mechanisms, such as relational norms (e.g. competency-based trust and flexibility). These interacted with each other throughout the innovation diffusion process. This is one of the core findings for this study particularly, for the healthcare sector as no existing studies have established or identified the key elements of contractual and relational governance mechanism that have worked parallel in driving healthcare innovation from the bottom-up. For example, studies such as Roehrich and Lewis (2014) and Cao and Lumineau (2015) argued that contractual and relational governance mechanisms can facilitate relational exchange. However, none of these studies considered these elements with respect to the bottom-up diffusion of innovation in the healthcare sector. Therefore, this finding is important in developing an understanding of innovation diffusion, because it provides an insight into which of the contractual and relational mechanisms to focus on when considering innovation diffusion from the bottom up, particularly, in the healthcare sector

This study has shown that, in order to drive the diffusion of innovation from the bottom up, there should be provisions in contracts that specify incentives designed to promote engagement and involvement from key actors. In this study, such incentives included the allocation of research time, and of dedicated time for clinical practitioners to be involved in the projects. As the study underlined, such incentives increased actors' willingness to engage, which in turn promoted the use and diffusion of the innovations. This evidence adds insight into the Diffusion of Innovation theory, by suggesting that diffusion of innovation in healthcare networks will be successful when contractual provisions exist that support actors' involvement. When a bottom-up approach to innovation diffusion is employed, it is important that these actors are working at the grass roots.

While prior research has focused on how the boundary spanner role facilitates the joint work of distinct groups (Tushman, 1977; Conway and Steward, 1998; Greenhalgh et al., 2004; Levina and Vaast, 2005; Patru et al., 2015), the findings from this study highlight that through a bottom-up approach, boundary spanners positively influence the diffusion of innovation by harnessing both contractual and relational mechanisms. This is an important contribution to theory, since it identifies that the boundary spanners in this study used contractual and relational mechanisms as a means of connecting discrete actors who had no history of working together, in order to drive innovation diffusion.

7.6 Implications for practice

In terms of implication for practice, the study suggests that the diffusion of innovation in NHS England requires resources, but can be further supported by the identification of boundary spanners (such as the AHSN) that connect clinicians, experts and relevant industry partners together even when there are no histories of the actors working together. This study also found that to drive innovation from the bottom-up requires gatekeepers with both an understanding of the local working environment, and the desire and motivation to make a change.

Although formal contractual and relational mechanisms on their own can influence innovation diffusion from the bottom-up, they do not need to operate in isolation, independently of one another. The study highlights the need to use both contractual and relational mechanisms when driving innovation from bottom-up. Drawing on their dual use, this study indicates that contractual provisions support the involvement of actors and clinical practitioners, while relational mechanisms allow flexibility in how different teams implement innovations. It also found that specifying the need for formal communications can be beneficial in driving the innovation process, particularly infographics, which in this case promoted engagement amongst the participants. It should be noted that, in order to be effective, such communication tools must resonate with the users in a manner that clearly demonstrates the value and benefits of the innovation.

Furthermore, this study suggests the need to focus on allowing flexibility in how practitioners employ and implement innovations, to enable practitioners to align the use of such innovations with their working practices and routines. For innovation diffusion to occur from the bottom up, it is important that adopters are able to employ the innovation in a flexible manner that aligns with their existing ways of working. An approach that is too rigid may prevent key adopters from engaging with and using the innovation.

For clinical practitioners, the study identified the benefits of informal communication in driving innovation diffusion from the bottom up, by promoting the exchange of information, knowledge and best practice on matters regarding the innovation, its benefits and its use. Such informal communication increased the confidence and capabilities of the clinical practitioners in using the innovation, thus promoting its use and uptake within the healthcare network.

The extant literature (Greenhalgh et al., 2004; Parnaby and Towill, 2008; Phillips et al., 2011) reviewed in chapter 2 of this thesis identified a top-down approach and government directives as being amongst the hindrances to the diffusion of innovation in NHS England. By contrast, the findings from this study identified the benefits of using a bottom-up, as opposed to top-down, approach to innovation diffusion in healthcare networks. Through the bottom-up approach,

uptake occurred from the grassroots upwards, encouraging a sense of ownership of the innovation and thereby promoting its use. Allowing flexibility in how the innovations were implemented enabled users to tailor the innovations in line with their working environments, thus encouraging uptake. Through informal communication, the benefits of the innovations were spread amongst the user community. This, again, supported the use and diffusion of innovations within the healthcare network. Since there is an increasing focus on the diffusion of innovation within NHS England, healthcare policy makers may need to consider in more depth the bottom-up approach to the innovation diffusion process.

7.7 Limitations of the study

This study was part of a wider project, designed to evidence the value of the AHSN, which was undertaken by a multidisciplinary group of academics drawn from three different universities and funded by the AHSN. As a result, this study investigated one single case (the AHSN), with two embedded sub-units of analysis identified in collaboration with the wider research team. This presented limitations to this study, since it meant that research data were collected across a sample that was identified by the AHSN and the wider research team, rather than the researcher.

The research data were collected across five maternity units and eleven GP practices within the focused healthcare region. It should be noted that the participants in the maternity units and the general practices were identified via convenience and purposive sampling, which focused on maternity midwives, GPs, pharmacists and practice managers. Other healthcare groups, such as foetal consultants, practice nurses and healthcare assistants, were excluded from the study. These omissions may limit the representativeness and generalisation of this study finding.

This study focused on NHS England, where ethics, data protection and privacy are a major issue in relation to health research. Because of the constraints connected with this emphasis, it took a great deal of time to acquire ethical agreement from all the relevant parties. This in turn limited the amount of time that could be dedicated to fieldwork.

To achieve data triangulation, as recommended by Yin (2014), the research data collection was reliant on secondary data, which included documentary data used in the wider project, particularly during the design and implementation of the magnesium sulphate and NOACs projects (Unit A and Unit B). This approach imposed some limitations on the research, since most of the data examined were not originally documented for this study. It is therefore possible that there may be some gaps in terms of the details of activities that occurred during the innovation diffusion process. Hence, this may have introduced bias into the findings presented in this study.

The focus of this study was on one healthcare region in England and utilised data from 23 semi-structured interviews. Due to pressures on clinical practitioners' time, it was often difficult to

schedule interviews with the clinical practitioners, especially the GPs and consultants. Initially, the intention was for over thirty interviewees to be interviewed. However, time constraints, critical incidents and changes in employment meant that several interviews could not be undertaken. Furthermore, if the study had had the opportunity to explore more healthcare regions in England, the analysis of the findings would have included more data, which would in turn suggest the findings would be more generalisable.

7.8 Recommendations for future research

The findings from the research study provide an understanding of the role of contractual and relational mechanisms in the diffusion of innovation in healthcare networks from the bottom up. Most importantly, the study suggests a number of avenues for further research in healthcare innovation.

First, this study focused only on one AHSN in one of the healthcare regions in England. This presents an opportunity for further case study research, which could focus on other AHSNs in other regions within England, enabling comparative study of the roles of governance, boundary spanners and gatekeepers during the process of innovation diffusion from the bottom up. Such comparative research would be possible since the fifteen AHNSs established by the NHS England have the same overarching objectives (see section 1.4 of chapter 1).

Second, in this study, the general roles of boundary spanners and gatekeepers have been investigated. Research on boundary spanners and gatekeepers (Cross and Prusak, 2002; Graf and Kruger, 2011) suggests that the behaviour of boundary spanners and gatekeepers is subject to variation depending on their personal motives and organisational context. This suggests that further research could be carried out in order to understand how the practices of boundary spanners and gatekeepers affect the process of innovation diffusion in healthcare networks.

Third, the research presented in this thesis focused on the healthcare sector. Future research could investigate other public sectors with similar network characteristics (e.g. education or defence), so as to understand the dual roles of contractual and relational mechanisms in the diffusion of innovation. Furthermore, this study identified different contractual and relational elements that positively influenced the process of innovation diffusion. Future studies could examine these elements in relation to innovation diffusion in other public sectors, to ascertain whether the contractual and relational elements have the same impact in other sectors.

Different innovation management studies have examined innovations in terms of their various attributes and characteristics, suggesting that they play a critical role in influencing the diffusion process (Rogers, 1995; Johannessen et al., 2001). As mentioned earlier, Rogers' studies (1995, 2003) present the attributes as: relative advantage, compatibility, complexity, trialability, and

observability. Rogers argued that an organisation's perception of each of the attributes determines the rates of adoption and diffusion of an innovation. It would have provided an added insight to this study if the attributes of the selected innovations could have been explored. However, it was not within the scope of this study to explore the attributes of the selected innovations relative to existing interventions, however, this could be the focus of future studies.

Last, the research employed Rogers' (2003) Diffusion of Innovation Theory, and in applying the different stages of the innovation decision process, this study focused on the persuasion, decision and implementation stages. Further research could therefore extend this study and investigate the evaluation and confirmation stages, as proposed by the DOI, which are designed to assess and confirm whether the innovations are meeting the desired expectations. In terms of meeting the current challenges faced by the NHS England, further study will be crucial in order to ascertain whether the sampled maternity units and GP practices are using the sampled innovations to their maximum potential.

Final words

The learning that was developed over the period of conducting this thesis cannot be overemphasised. The study provided a platform to understand how research can positively impact on practice. Most importantly, the researcher's ability to examine existing literature and develop insights was enhanced, increasing the researcher's skills and experience. Above all, the opportunity to be part of a larger collaborative project provided an invaluable opportunity to work with and learn from leading academics and experts.

In conclusion, this study has endeavoured to explore the role of governance in the diffusion of innovation within healthcare networks. Having considered the innovation challenge currently confronting NHS England, the study suggests a bottom-up approach to innovation diffusion may accelerate the uptake of innovations into the healthcare system, promoting patient access to innovative treatments and potentially improving patient outcomes and quality of life.

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Appendix 1

Interview guide

Research aims:

Thank you for agreeing to take part in our research study. This study investigated the factors affecting the diffusion of atrial fibrillation (AF) related stroke prevention projects in the NHS and its partners.

Anything you say within this interview will remain anonymous and confidential, and the names of all organisations involved will be disguised within the results.

Interviewee contact details:

Name: Position/organisation:

Date/time of interview:

Interviewee's background information:

Can you provide an outline of the innovation (product/service/process/organisational or blend of these)?

Was it predominantly a diffusion project (or were there elements of development/innovation too)?

Who were the main stakeholders? (perhaps divided into those involved in implementation of innovation, developers/innovators, and recipients to whom it was diffused)

What is/was your role and responsibility within the project?

What did your organisation want to achieve from engaging with other stakeholders?

Section 1

To understand the barriers and enablers of diffusion of AF-related stroke prevention projects.

What kind of changes would you expect to happen as a result of the project?

Could you describe any changes that have happened already?

Have there been attempts to measure these changes?

Have there been any difficulties/challenges in achieving the changes expected and if so, what were they?

How do you plan to overcome these challenges?

What were the significant information exchange activities during this stage? (Prompt: meetings, agreements, phone calls.) What kind of information was exchanged?

What lessons have you learnt in implementing the project?

Section 2

To explore how healthcare networks are used to introduce and diffuse AF-related stroke prevention projects in the NHS

Can you tell me who was involved as a collaborator (should use this in quite broad terms, i.e. to incorporate range of stakeholders) at the start?

Have the collaborations changed in any way, and if so how and why?

How are you working with these collaborators? (link to governance and information exchange questions below)

From a governance perspective, what significant events occurred throughout the project (e.g. CONTRACTUAL: business case, contract, NDA. RELATIONAL: regular meetings, development of friendships).

To what extent did you exploit shared resources with partner through interacting at this stage?

What were the significant information exchange activities during this stage? (Prompt: meetings, agreements, phone calls.) What kind of information was exchanged?

Section 3

To examine how the action of health care practitioners affects the diffusion of AF related stroke prevention projects in the NHS Trust.

How is innovation normally taken up (adopted) within the healthcare environment?

Which policies guide innovation implementation?

From your experience in this project, can you give me examples of what you think are the barriers to implementation of innovation or new ideas?

Can you tell me how the clinicians have influenced the implementation of the AF project in the local GP practices and NHS Trust?

Can you tell me how pharmacist, managers and non-clinical staff have influenced the implementation of the AF project in the local communities (GP practices) and NHS Trust?

Additional information

Thanks for your time:

Contact details of other project partners. Email introductions?

Is there anything else you would like to add?

Would it be ok to have a further conversation if necessary?

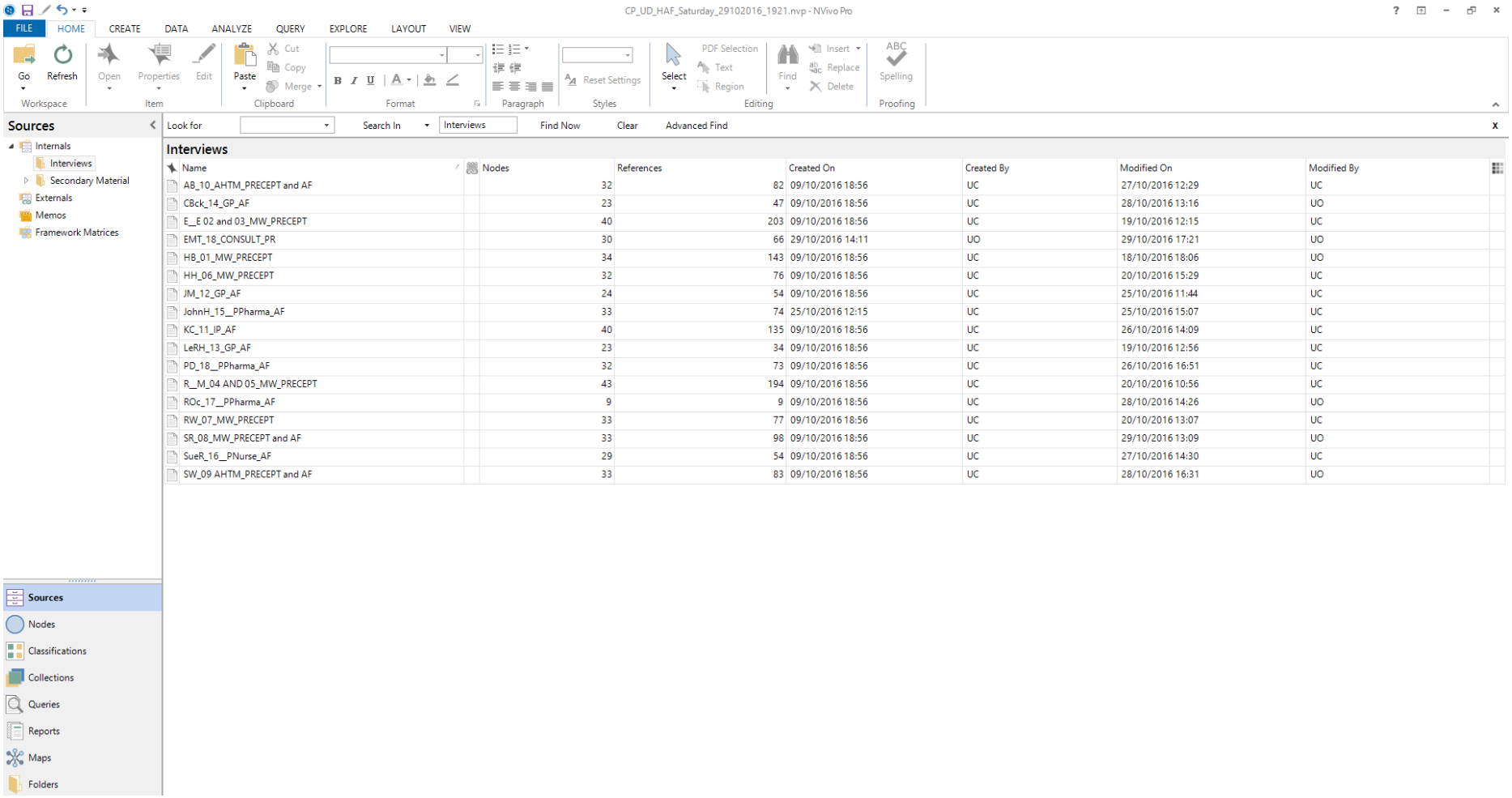
Contact details:

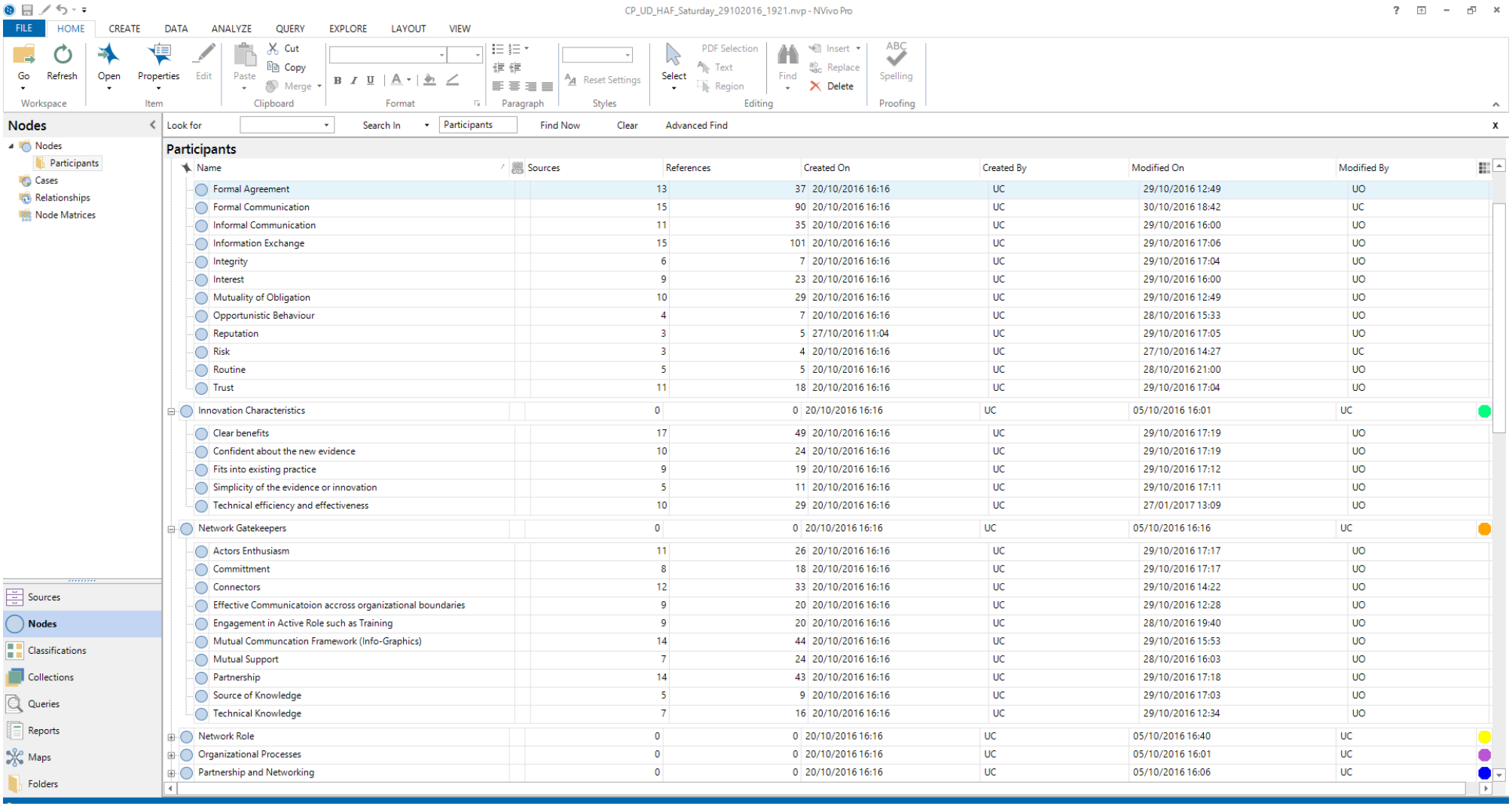
Udonna Okeke

07427 689 496

Udonna2.okeke@live.uwe.ac.uk

Appendix 2: Example from NVivo analysis

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Formal Agreement 13 37 20/10/2016 16:16 UC 29/10/2016 12:49 UO
Formal Communication 15 90 20/10/2016 16:16 UC 30/10/2016 18:42 UC
Informal Communication 11 35 20/10/2016 16:16 UC 29/10/2016 16:00 UO
Information Exchange 15 101 20/10/2016 16:16 UC 29/10/2016 17:06 UO
Integrity 6 7 20/10/2016 16:16 UC 29/10/2016 17:04 UO
Interest 9 23 20/10/2016 16:16 UC 29/10/2016 16:00 UO
Mutuality of Obligation 10 29 20/10/2016 16:16 UC 29/10/2016 12:49 UO
Opportunistic Behaviour 4 7 20/10/2016 16:16 UC 28/10/2016 15:33 UO
Reputation 3 5 27/10/2016 11:04 UC 29/10/2016 17:05 UO
Risk 3 4 20/10/2016 16:16 UC 27/10/2016 14:27 UC
Routine 5 5 20/10/2016 16:16 UC 28/10/2016 21:00 UO
Trust 11 18 20/10/2016 16:16 UC 29/10/2016 17:04 UO
Innovation Characteristics 0 0 20/10/2016 16:16 UC 05/10/2016 16:01 UC
Clear benefits 17 49 20/10/2016 16:16 UC 29/10/2016 17:19 UO
Confident about the new evidence 10 24 20/10/2016 16:16 UC 29/10/2016 17:19 UO
Fits into existing practice 9 19 20/10/2016 16:16 UC 29/10/2016 17:12 UO
Simplicity of the evidence or innovation 5 11 20/10/2016 16:16 UC 29/10/2016 17:11 UO
Technical efficiency and effectiveness 10 29 20/10/2016 16:16 UC 27/01/2017 13:09 UO
Network Gatekeepers 0 0 20/10/2016 16:16 UC 05/10/2016 16:16 UC
Actors Enthusiasm 11 26 20/10/2016 16:16 UC 29/10/2016 17:17 UO
Committment 8 18 20/10/2016 16:16 UC 29/10/2016 17:17 UO
Connectors 12 33 20/10/2016 16:16 UC 29/10/2016 14:22 UO
Effective Communicatoion accross organizational boundaries 9 20 20/10/2016 16:16 UC 29/10/2016 12:28 UO
Engagement in Active Role such as Training 9 20 20/10/2016 16:16 UC 28/10/2016 19:40 UO
Mutual Communcation Framework (Info-Graphics) 14 44 20/10/2016 16:16 UC 29/10/2016 15:53 UO
Mutual Support 7 24 20/10/2016 16:16 UC 28/10/2016 16:03 UO
Partnership 14 43 20/10/2016 16:16 UC 29/10/2016 17:18 UO
Source of Knowledge 5 9 20/10/2016 16:16 UC 29/10/2016 17:03 UO
Technical Knowledge 7 16 20/10/2016 16:16 UC 29/10/2016 12:34 UO
Network Role 0 0 20/10/2016 16:16 UC 05/10/2016 16:40 UC
Organizational Processes 0 0 20/10/2016 16:16 UC 05/10/2016 16:01 UC
Partnership and Networking 0 0 20/10/2016 16:16 UC 05/10/2016 16:06 UC
Sources
Nodes
Classifications
Collections
Queries
Reports
Maps
Folders

Appendix 3: Copyright clearance certificate 1

Copyright Clearance Center

Confirmation Number: 11675150
Order Date: 10/11/2017

Customer Information

Customer: Udonna Okeke
Account Number: 3001204754
Organization: University of the West of England UWE Bristol
Email: udonna2.okeke@live.uwe.ac.uk
Phone: +44 7427689496
Payment Method: Credit Card ending in 1212

This is not an invoice

Order Details

Course: PHD THESIS, THE ROLE OF GOVERNANCE MECHANISMS ON THE DIFFUSION OF INNOVATION IN HEALTHCARE NETWORKS

University/Institution: UNIVERSITY OF THE WEST OF ENGLAND BRISTOL UNITED KINGDOM
Start of term: 11/01/2017
Course number:
Number of students: 1
Instructor:
Your reference:
Accounting reference:
Order entered by: Udonna Okeke

Management research : an introduction

Billing Status: **Charged to Credit Card**

Order detail ID:	70739841
ISBN:	978-0-8039-8393-9
Publication Type:	Book
Publisher:	SAGE,
Rightsholder:	SAGE PUBLICATIONS LTD. BOOKS
Author/Editor:	Yin, Robert K.
Edition:	Fifth edition.

Permission Status: Granted

Permission type:	Use in electronic course materials
Type of use:	Post on an academic institution intranet
Per Page Fee:	$ 0.21
Page range(s):	9 ,45, 50,106
Total number of pages:	4
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Payment Method:	CC ending in 1212

Rightsholder terms apply (see terms and conditions)

$ 4.34
($4.34 per student)

Total order items: 1 **Order Total: $4.34**

Appendix 4: Copyright clearance certificate 2

Copyright Clearance Center

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1 PAYMENT 2 REVIEW 3 CONFIRMATION

Step 3: Order Confirmation

Thank you for your order! A confirmation for your order will be sent to your account email address. If you have questions about your order, you can call us 24 hrs/day, M-F at +1.855.239.3415 Toll Free, or write to us at info@copyright.com. This is not an invoice.

Confirmation Number: 11675154
Order Date: 10/11/2017

If you paid by credit card, your order will be finalized and your card will be charged within 24 hours. If you choose to be invoiced, you can change or cancel your order until the invoice is generated.

Payment Information

Udonna Okeke
University of the West of England UWE Bristol
udonna2.okeke@live.uwe.ac.uk
+44 7427689496
Payment Method: CC ending in 1212

Order Details

Course: COURSE: PHD THESIS, THE ROLE OF GOVERNANCE MECHANISMS ON THE DIFFUSION OF INNOVATION IN HEALTHCARE NETWORKS

University/Institution: UNIVERSITY OF THE WEST OF ENGLAND BRISTOL UNITED KINGDOM
Start of term: 11/01/2017
Course number:
Number of students: 1
Instructor:
Your reference:
Accounting reference:
Order entered by:

Management research : an introduction

Order detail ID:	70739849
ISBN:	978-0-8039-8393-9
Publication Type:	Book
Publisher:	SAGE,
Rightsholder:	SAGE PUBLICATIONS LTD. BOOKS
Author/Editor:	EASTERBY-SMITH, MARK ; LOWE, ANDY ; THORPE, RICHARD,

Rightsholder terms apply (see terms and conditions)

Permission Status:	**Granted**
Permission type:	Use in electronic course materials
Type of use:	Post on an academic institution intranet
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Page range(s):	27
Total number of pages:	1
Number of students:	1

$ 3.71
($3.71 per student)

Total order items: 1

This is not an invoice.

Order Total: 2.81 GBP (3.71 USD)