



The Influence of Organisational Variables on Knowledge Management in New Product Development

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Abstract

New product development (NPD) has been described as a complex and dynamic, knowledge-intensive process that relies heavily on the creation, sharing and utilisation of knowledge. The aim of the research study was to identify and evaluate the organisational variables that act as enablers and disablers of knowledge management in NPD. The variables, namely new product strategy, organisational culture, organisational structure, leadership and management, specialist roles and knowledge and ICT, systems and communication, were identified from a critical and analytical review of extant literature and collectively form the organisational infrastructure. Theorists espouse that the configuration of this infrastructure can enable the optimal management of knowledge. The research, which sought to answer the question “*how do organisational variables influence the management of knowledge in the new product development process?*” was conducted from an interpretivist perspective and utilised an inductive, exploratory, multiple case study strategy. This enabled in depth, cross-case analysis to be undertaken in two participant companies, who operate in the flooring manufacturing industry and engage in blue sky, new to market development and product modification.

Data was collected using triangulation. First, forty participants (twenty in each company), who had specific knowledge of, or input to, the NPD process were selected via purposive sampling and interviewed using a semi-structured interview guide. Second, participant observations of the Group R&D Director and Group Development Manager (Company A) and Technical Director (Company B) were conducted and third, documents, including laboratory reports and product development successes and failures were analysed. A conceptual framework was developed using themes that emerged from the literature and evaluated via the empirical research and verbatim transcripts that were analysed by utilising thematic analysis.

The findings identified that aspects of the six organisational variables enable and disable how knowledge is managed in both companies. Moreover, knowledge management activities are further hindered by the absence of a formal new product strategy, NPD process and cross-functional NPD team. In addition, communication was identified as a barrier to knowledge creation, dissemination and sharing and consequently impacted on both companies’ propensity to innovate effectively. The findings further revealed that specialist roles and knowledge has the most significant influence on how the Senior Management Teams manage their knowledge resources. Benchmarkable management practices are underpinned by an innovative and entrepreneurial culture and philosophy that imbues knowledge workers with personal autonomy to utilise and apply their specialist knowledge to core and peripheral NPD tasks.

The study concludes that a firm’s infrastructure containing the organisational variables has an enabling and disabling influence on how knowledge is created, shared, applied, utilised and, ultimately, managed in the NPD process. The researcher thus recommends the use of the evaluated conceptual framework as a business tool to reconfigure aspects of the organisational infrastructure in both companies, such as the implementation of a cross-functional NPD team, to enable the effective management of specialist knowledge for strategic and competitive advantage.

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Table of Contents

Abstract	i
Acknowledgements.....	ii
Chapter 1.....	1
Introduction	1
1.1: Introduction	1
1.2: Theoretical Background and Rationale	1
1.3: Addressing the Gaps Identified in the Literature	3
1.4: The Research Study	5
1.4.1: Aim of the Research Study	5
1.4.2: The Research Question	5
1.4.3: Objectives	5
1.5: Research Context	6
1.6: Structure of the Thesis	7
1.7: Publications and Conferences Resulting from this Research Study	9
1.7.1: Papers	9
1.7.2: Conferences and Seminars	9
Chapter 2.....	13
Contextualising and Conceptualising Knowledge Management and NPD.....	13
2.1: Introduction	13
Part One: The Knowledge Economy and Knowledge-Based View of the Firm.....	13
2.2: The Advent of the Knowledge Economy	14
2.3: The Knowledge-Based View of the Firm	15
Part Two: The Context and Concept of Knowledge Management	15
2.4: The Theoretical Foundations of Knowledge Management	17
2.5: The Nature of Knowledge	18
2.5.1: Defining Knowledge	19
2.6: Epistemologies of Knowledge	19
2.6.1: The Epistemology of Possession	20
2.6.2: Characteristics of the Objectivist Perspective	21
2.6.3: Critique of the Objectivist Perspective	21
2.6.4: The Epistemology of Practice	22
2.6.5: Characteristics of the Practice Perspective	22
2.6.6: Critique of the Practice-Based Perspective	24
2.6.7: Bridging Epistemologies	25
2.7: Defining the Concept of Knowledge Management	25
2.7.1 The Hard Approach	25
2.7.2: The Soft Approach.....	26

2.7.3: The Hybrid Approach	26
2.8: Organisational Knowledge	27
2.8.1: The Tacit and Explicit Nature of Organisational Knowledge	28
2.8.2: Defining Tacit Knowledge	29
2.8.3: Defining Explicit Knowledge	29
2.9: Knowledge Management Strategies	30
2.9.1 Defining Codification	30
2.9.2: Defining Personalisation	31
2.9.3: The Impact of Knowledge Management Strategies on the Firm	33
2.10	:
Knowledge Management Models	35
2.10.1	: The
Epistemology of Possession: Knowledge Category Model	35
2.10.2	: The
Nonaka and Takeuchi (SECI) Model	36
2.10.3	: The
Knowledge Spiral	39
2.10.4	:
Potential Problems of Knowledge Conversion	39
2.10.5	: The
Epistemology of Practice: Community of Practice Model	40
2.10.6	: The
Wenger, McDermott and Snyder Community of Practice Model	40
2.10.7	:
Collective Organisational Knowledge and Intelligence	41
2.10.8	: How
Communities of Practice Develop	42
2.10.9	:
Characteristics of a Community of Practice	45
2.10.10	: Benefits
of a Community of Practice in the Firm	45
2.10.11	:
Potential Problems with a Community of Practice	46
2.11: Summary of Knowledge Management Models	47
Part Three: The Context of New Product Development	47
2.12: New Product Development: A Knowledge-Creating Activity	48
2.12.1: Defining New Product Development	48
2.12.2: Defining Innovation	49
2.13: The NPD Process: Models for Best Practice	50
2.13.1: The Booz, Allen and Hamilton Eight-Stage Model	51
2.13.2: The Cooper and Kleinschmidt NPD Process Model	53
2.13.3: Critique of the Process Model	56
2.14: Summary of NPD Models	57
Part Four: Knowledge Management and the NPD Process	57

2.15: The Application of Knowledge Management to Innovation	57
2.15.1: An Epistemological Perspective of Knowledge Management in Innovation	58
2.16: Models of Knowledge Management and Innovation	60
2.16.1: The SECI Model: Knowledge Creation.....	60
2.16.2: Communities of Practice and Innovation.....	63
2.17: Chapter Summary	65
Chapter 3.....	69

The Influencing Mechanisms of Knowledge Management and NPD	69
3.1: Introduction	69
3.2: Organisational Infrastructure	69
3.2.1: Defining Organisational Infrastructure	69
3.3: The Organisational Variables	70
3.4: New Product Strategy	73
3.4.1: The Allocation of Resources in New Product Strategy	74
3.4.2: The Relationship between NP Strategy and Knowledge Management	75
3.4.3: Disablers of New Product Strategy	76
3.5: Organisational Culture	76
3.5.1: Dimensions of Culture	77
3.5.2: The Influence of Culture on Knowledge Management and NPD	79
3.5.3: Creating a Knowledge Culture	80
3.5.4: Is Culture Change Possible?	82
3.5.5: Organisational Climate	82
3.5.6: Culture as a Disabler of Knowledge Management and NPD	83
3.6: Organisational Structure	84
3.6.1: The Influence of Structure on Knowledge Management and NPD	85
3.6.2: Structure as a Disabler of Knowledge Management and NPD	86
3.6.3: Creating Enabling Structures	87
3.7: Leadership and Management	90
3.7.1: The Role of Leaders and Managers in Managing Knowledge in NPD	90
3.7.2: Transformational Leadership	91
3.7.3: Transactional Leadership	92
3.7.4: The Role of Senior Management in Managing Knowledge in NPD	93
3.7.5: The Disabling Influence of Leadership and Management	93
3.8: Specialist Roles and Knowledge	94
3.8.1: Defining Knowledge Workers	95
3.8.2: Types of Knowledge Used by Knowledge Workers	96
3.8.3: Knowledge Worker Skills	96
3.8.4: Knowledge Workers, Knowledge Processes and NPD	97
3.8.5: Specialist Roles in NPD	99
3.8.6: Enabling and Managing Knowledge Work	100
3.8.7: The Role of Cross-Functional Teams	101
3.8.8: Disablers of Knowledge Working	103
3.9: ICT, Systems and Communication	104
3.9.1: Defining ICT	104
3.9.2: Technological Infrastructure	105
3.9.3: The Role of ICT in Knowledge Management and NPD	105

3.9.4: ICT and the Epistemology of Possession	105
3.9.5: ICT and the Epistemology of Practice.....	106
3.9.6: ICT as a Disabler of Knowledge Management and NPD	107
3.9.7: Systems.....	107
3.9.8: Knowledge Management Systems.....	108
3.9.9: Disablers of Knowledge Management Systems.....	109
3.9.10: New Product Systems	109
3.9.11: Communication.....	111
3.9.12: Defining Communication.....	111
3.9.13: Enabling Optimal Communication.....	111
3.9.14: Disablers of Communication.....	114
3.10	: Chapter
Summary.....	114
3.11: The Conceptual Framework.....	117
Chapter 4.....	123
Research Methodology	123
4.1: Introduction	123
4.2: The Philosophical, Ontological and Epistemological Framework.....	124
4.2.2: Ontology	124
4.2.3: Epistemology	125
4.2.4: Axiology	126
4.3: The Methodological Framework	129
4.4: Research Approach.....	131
4.5: Research Strategy	131
4.4.1: Multiple Case Study Strategy.....	132
4.4.2: Case Selection and Research Access.....	133
4.4.3: Purposive Sampling of Participants.....	135
4.4.4: Development of Case Study Interview Questions	138
4.5: Data Collection.....	138
4.5.1: Pilot Study	138
4.5.2: Main Data Collection Stage	139
4.5.3: Semi-Structured Interviews.....	139
4.5.4: Observations	141
4.5.5: Document Analysis	144
4.5.6: Data Analysis.....	145
4.6: Ethical Considerations	151
4.7: Chapter Summary	151
Chapter 5.....	155
Findings from Case Study 1: Company A.....	155
5.1: Introduction	155

5.2: The Context.....	155
5.3: New Product Strategy.....	157
5.4: Organisational Culture.....	162
5.5: Organisational Structure.....	169
5.6: Leadership and Management.....	173
5.7: Specialist Roles and Knowledge.....	175
5.8: ICT, Systems and Communication.....	180
5.9: Chapter Summary.....	184
Chapter 6.....	189
Findings from Case Study 2: Company B.....	189
6.1: Introduction.....	189
6.2: The Context.....	189
6.3: New Product Strategy.....	191
6.4: Organisational Culture.....	194
6.5: Organisational Structure.....	199
6.6: Leadership and Management.....	203
6.7: Specialist Roles and Knowledge.....	205
6.8: ICT, Systems and Communication.....	209
6.9: Chapter Summary.....	214
Chapter 7.....	219
Cross-Case Analysis.....	219
7.1: Introduction.....	219
7.2: New Product Strategy.....	219
7.3: Organisational Culture.....	223
7.4: Organisational Structure.....	228
7.5: Leadership and Management.....	231
7.6: Specialist Roles and Knowledge.....	235
7.7: ICT, Systems and Communication.....	237
7.8: Chapter Summary.....	241
Chapter 8.....	247
Discussion.....	247
8.1: Introduction.....	247
8.2: The Inextricable Link between Knowledge Management and NPD.....	247
8.3: New Product Strategy.....	248
8.4: Organisational Culture.....	253
8.5: Organisational Structure.....	260
8.6: Leadership and Management.....	263
8.7: Specialist Roles and Knowledge.....	265
8.8: ICT, Systems and Communication.....	267

8.9: Summary	272
8.10.....: The Evaluated Conceptual Frameworks.....	277
8.9.1: Knowledge Management Strategies and Models.....	282
8.11: Chapter Summary	286
Chapter 9.....	289
Conclusions	289
9.1: Introduction	289
9.2: Objectives of the Research Study.....	289
9.3: Summary of the Findings.....	291
9.4: Contribution to Academic Knowledge	294
9.5: Implications of the Findings for Senior Management.....	298
9.6: Corporate Benefits of Participating in the Research.....	301
9.7: Limitations of the Study.....	302
9.8: Further Research	304
9.9: Reflections on the Research Process.....	309
References	313
.....	343
Appendix 1: Research Instruments	343
Invitation Letter.....	343
Participant Information Sheet: Company A.....	345
Consent Form: Interview	348
Appendix 2	351
Interview Questions Context	351
Appendix 3	363
Semi-Structured Interview Guide	363

List of Figures and Tables

Figure 1.1: Company A and B Group Structure	7
Figure 1.2: Structure of the Thesis	8
Figure 2.1: The Tree of Knowledge Management	17
Figure 2.2: Potential Implications of Codification and Personalisation Strategies	33
Figure 2.3: The Knowledge Conversion Process	37
Figure 2.4: The Knowledge Spiral	39
Figure 2.5: CoP Contribution to Collective Organisational Knowledge and Intelligence	41
Figure 2.6: Stages of CoP Development	43
Table 2.1: Types of Community of Practice	44
Figure 2.7: Benefits of a Community of Practice	46
Figure 2.8: The Booz et al Eight-Stage NPD Model	52
Table 2.2: Cooper and Kleinschmidt New Product Process Activities	55
Table 2.3: Epistemological Perspectives of the Role of Knowledge Management in Innovation	59
Figure 2.9: The SECI Model and Innovation	62
Table 2.4: Communities of Practice and Innovation	64
Figure 3.1: The Organisational Variables	71
Table 3.1: Global Organisation Structures	88
Figure 3.2: The Integrated R&D Network	89
Table 3.2: Types of Knowledge Used by Knowledge Workers	96
Table 3.3: An Example of Specialist Roles in the NPD Process	100
Table 3.4: Internal Communication Matrix	112
Table 3.5: Evaluation of Examples of ICT for NPD Teams	113
Figure 3.3: The Conceptual Framework	118
Figure 4.1: The Research Onion	123
Table 4.1: Research Philosophies and Perspectives	127
Table 4.1: Research Philosophies and Perspectives (continued)	128
Table 4.2: Sampled Participants in Company A	136
Table 4.3: Sampled Participants in Company B	137
Table 4.4: Technical Director Participant Observation Notes	142
Table 4.4: Technical Director Participant Observation Notes (continued)	143
Figure 4.2: Example of Open Coding	147
Table 4.5: Example of Axial Coding	148
Table 4.6: Example of Selective Coding	150
Table 7.1: New Product Strategy Enablers	220
Table 7.2: New Product Strategy Disablers	221
Table 7.3: Organisational Culture Enablers	223
Table 7.4: Organisational Culture Disablers	225
Table 7.5: Organisational Structure Enablers	228
Table 7.6: Organisational Structure Disablers	230

Table 7.7: Leadership and Management Enablers	232
Table 7.8: Leadership and Management Disablers	233
Table 7.9: Specialist Roles and Knowledge Enablers.....	235
Table 7.10: Specialist Roles and Knowledge Disablers	237
Table 7.11: ICT, Systems and Communication Enablers	238
Table 7.12: ICT, Systems and Communication Disablers	239
Figure 8.1: Evaluated Conceptual Framework (Company A).....	279
Figure 8.2: Evaluated Conceptual Framework (Company B).....	280
Table 8.1: Using Specialist Tacit Knowledge to Enhance NPD through the Product Council/CoP	283
Table 8.2: Managing Knowledge for NPD through the SECI Model	285

Chapter 1

Introduction

Chapter 1

Introduction

'In a knowledge-based economy, the new coin of the realm is learning.'

Robert Reich

1.1: Introduction

The twenty first century business environment is in the throes of a new era, the like of which the corporate world has never witnessed before (Prasad and Prasad, 2013; Johannessen and Olsen, 2010; Brinkley, 2008). Prasad and Prasad (2013:82) suggest *"we are living in an era of intensifying globalisation"* where technological and product development, along with more demanding and exacting consumer requirements, are dramatically increasing (Johannessen and Olsen, 2011). Moreover, intense competition, environmental turbulence, uncertainty, complexity and ambiguity have carved a globalised competitive landscape and marketplace (Leal-Rodríguez *et al.*, 2013) in which knowledge is not only a key characteristic of the post-industrial economy (Prasad and Prasad, 2013) but also *the* critical resource *"and driver of economic development and success for nations, companies and individuals alike"* (Rylander, 2009:1). In this economy, knowledge has rapidly become a core commodity and its management, utilisation and exploitation as a strategic resource is fundamental to innovation, organisational survival and sustainable competitive advantage (Leal-Rodríguez *et al.*, 2013).

1.2: Theoretical Background and Rationale

In the new competitive landscape as cited above, Sandhawalia and Dalcher (2011) suggest that a firm's ability to thrive and survive and meet the demands of more discerning customers will be heavily reliant on its intangible assets, specialist knowledge and knowledge-based capabilities from multiple sources, which enable the continuous and innovative development of new products. According to Tzokas *et al.* (2004), the process of developing new products is one of the most challenging and critical tasks that managers face; it is also important to firms from a competitive perspective (Goffin and Koners, 2011). Therefore, as knowledge is *the* single most important factor of production to firms and the means by which they develop highly

successful new products (Shankar *et al.*, 2013; Revilla *et al.*, 2009), the management of knowledge and indeed knowledge work in innovation becomes a key strategic and managerial objective (Newell *et al.*, 2009). It further highlights the need to have the appropriate support mechanisms in place to enable a conducive environment to manage knowledge (Sandhawalia and Dalcher, 2011; Stonehouse and Pemberton, 1999).

The requirement for this enabling environment, as highlighted by Sandhawalia and Dalcher (2011) and Stonehouse and Pemberton (1999) above, is becoming more and more important for firms, particularly as NPD requires the input of multidisciplinary and cross-functional sources of knowledge (Hirunyawipada *et al.*, 2010). In addition, as knowledge management has such a widespread and substantial effect on the success or otherwise of a firm's business operations, it is a vital tool in the organisational armoury (Yeh *et al.*, 2006) that can be used to enable knowledge to be utilised and commoditised as a strategic asset (Lengnick-Hall and Griffith, 2011; Bollinger and Smith, 2001; Magnier-Watanabe *et al.*, 2011).

According to Ho (2009) and Stonehouse and Pemberton (1999), a conducive environment that facilitates the effective management of knowledge is referred to as the organisational infrastructure, which comprises of the organisational variables (Lee and Choi, 2003; Ichijo *et al.*, 1998) or "*knowledge management enablers*" (Yeh *et al.*, 2006:794). These enablers, such as organisational culture and structure (Magnier-Watanabe *et al.*, 2011; Lee and Choi, 2003) and leadership and IT (Sandhawalia and Dalcher, 2011), are the influencing mechanisms through which firms implement knowledge management and make optimal use of the organisational (tacit and explicit) knowledge they have at their disposal (Goffin *et al.*, 2010; Wild and Griggs, 2008).

Yeh *et al.* (2006) and Ho (2009) attest that the enablers influence how firms develop, create, share and protect knowledge. In addition, they improve the effectiveness of knowledge management related activities, such as empowering individuals to use their knowledge (Ichijo *et al.*, 1998; Stonehouse and Pemberton, 1999; Theriou *et al.*, 2011) for NPD, especially since the process of developing new products is both a knowledge-creating and knowledge-intensive one (Goffin and Koners, 2011; Goffin *et al.*, 2010; Nonaka and Takeuchi, 1995). It is worthy to note that although the

organisational variables can have a positive influence on how knowledge is managed within the auspices of the firm's infrastructure (Stonehouse and Pemberton, 1999), Magnier-Watanabe *et al.* (2011) and Lee and Choi (2003) caveat that they can also constrain and disable knowledge management in NPD. Therefore, a challenge for firms is to ensure there is synergy between them in order to optimise the influence they have on how knowledge is managed (Yeh *et al.*, 2006; Lee and Choi, 2003).

In order to explore past research that had been undertaken on NPD and determine the extent to which knowledge management was represented in prior research studies, given its espoused importance to the process of developing new products, the researcher engaged in an extensive and detailed literature search. It also enabled her to become familiar with the academic discourse and debate that surrounded and underpinned the organisational phenomena (O'Leary, 2014). The search unearthed that knowledge management is an under-researched area and was thus ripe for more widespread research. Other points of note are that knowledge management enablers or organisational variables are not well-represented as a field of research, despite their espoused importance to the effective management of knowledge (Stonehouse and Pemberton, 1999; Lee and Choi, 2003; Yeh *et al.*, 2006; Theriou *et al.*, 2011). Further gaps in the literature and how they will be addressed is discussed in the next section.

1.3: Addressing the Gaps Identified in the Literature

Based on the results of the extensive literature search, the researcher resolved to base her study on 'The Influence of Organisational Variables on Knowledge management in New Product Development' for the following reasons. First, only a relatively small amount of research has been conducted on knowledge management and NPD, especially in relation to organisational infrastructure/the enablers. This presented the researcher with an opportunity to conduct major research in this area and build on a very small, but existing, body of knowledge.

Second, despite the burgeoning literature that professes NPD as a knowledge-intensive, knowledge-creating process (e.g. Goffin and Koners, 2011; Goffin *et al.*, 2010; Nonaka and Takeuchi, 1995) and various theorists espousing that the relationship between knowledge management and NPD is both close and obvious (e.g. Cantner *et al.*, 2011), the connection that exists between the two concepts was not outlined in sufficient detail. Thus, the researcher identified a gap in the literature for

extensive research to be conducted that would showcase the interrelationship that clearly exists between them.

A further opportunity to bridge a literature gap related to the enablers themselves. A variety of articles such as Revilla *et al.* (2009) appeared to treat the enablers as if they were independent of each other. The enablers, or variables, such as organisational culture, structure and leadership (power structures) form part of the cultural web (Johnson and Scholes, 1999). They are thus interconnected and can have a major influence on symbolic, political and behavioural aspects of organisational life (Sun, 2008; Johnson *et al.*, 2008), as well as impact on how knowledge is managed and utilised to develop new products (Holsapple and Joshi, 2000; Ho, 2009; Cooper and Kleinschmidt, 1995). Consequently, these enablers are not mutually exclusive and thus do not lend themselves to separate investigation. As Lee and Choi (2003:180) point out, *“an integrative perspective of the knowledge variables based on relevant theories is a necessity.”* In addition, Gupta and Govindarajan (2000) advocate treating the enablers as a holistic system, as a symbiotic relationship exists between them.

Third, although many authors of the articles that were reviewed in the literature search engaged in positivistic, large scale research (e.g. 1,425 middle managers in 147 organisations; Lee and Choi, 2003) and used highly complex statistical analyses, the researcher concluded they had not focused on *how* the variables cited enable *and* disable the management and leverage of knowledge, specifically at the beginning of and indeed throughout the NPD process. Again, this gave the researcher the opportunity to fill a gap in the literature and also engage in an in depth, interpretivist, qualitative and exploratory study that enabled her to investigate complex organisational phenomena in two real life case study contexts. Moreover, this gave her the chance to make a major contribution to knowledge in the field of NPD and fulfil the plea of Biemans (2003) to make best practice recommendations with regard to how senior executives can configure the organisational variables to ensure the right specialist and cross-functional knowledge is disseminated to the right people at the right time (O'Dell and Grayson, 1998), to enable new products to be developed or modified (du Plessis, 2007; Leal-Rodríguez *et al.*, 2013).

1.4: The Research Study

Based on the theoretical background and rationale and critical search of extant literature on knowledge management and NPD, the researcher formulated the following aim, research question and objectives.

1.4.1: Aim of the Research Study

The aim of the research study is to identify and evaluate the organisational variables that act as enablers and disablers of knowledge management in new product development.

1.4.2: The Research Question

In view of the above aim, the research question is:

“How do organisational variables influence the management of knowledge in the new product development process?”

1.4.3: Objectives

In order to achieve the aim and answer the research question, the following objectives were identified:

1. To critically review and analyse extant literature on knowledge management in order to identify and analyse the organisational variables that enable and disable the management of knowledge in the new product development process.
2. To develop an espoused conceptual framework, from a critical and analytical review of the literature.
3. To critically evaluate the espoused conceptual framework, to determine whether there are any incongruities between espoused theory and theory-in-use from the data gathered from the fieldwork.
4. To build and evaluate a revised conceptual framework, following an in depth analysis of the fieldwork data and make a significant contribution to existing knowledge in the area of new product development; thus enabling the sharing and application of knowledge across the academic and business/practitioner communities.

A detailed outline of the epistemological and methodological framework underpinning this research study can be found in Chapter 4: Research Methodology.

1.5: Research Context

The research study was undertaken as part of an exploratory, inductive, multiple case study strategy in two companies that operate in the flooring manufacturing industry. Headquartered in the North West of England, Company A Ltd and Company B Ltd are part of the same corporate group, but separate legal entities in their own right. Historically, both companies began life as one business. In the early 1980s, Company B was established by two ambitious entrepreneurs, who based their NPD on innovative designs and the utilisation of raw materials that gave them competitive advantage in the industry and marketplace. In the mid-1990s, following a period of rapid growth and the implementation of their globalisation strategy, the founders divided the business in two, creating Company A, which became the Group's central innovation hub and strategic administrative arm. The company engages in new-to-market NPD and oversees the network of global business entities that are based in countries as far afield as Australia, Malaysia and South Africa.

Following the reorganisation, Company B retained its responsibility for product modification and manufacture and oversees the operations of the UK and European entities in countries such as France, Germany and Sweden. Over the years, both companies have developed an international reputation as highly successful innovators and have an extensive and competitive product portfolio. To cement their growth further, in the mid-noughties, the group of companies was acquired by a large, US conglomerate (the Parent Company), which has generated increased sales revenue and more widespread innovation. The group structure is illustrated in Figure 1.1.

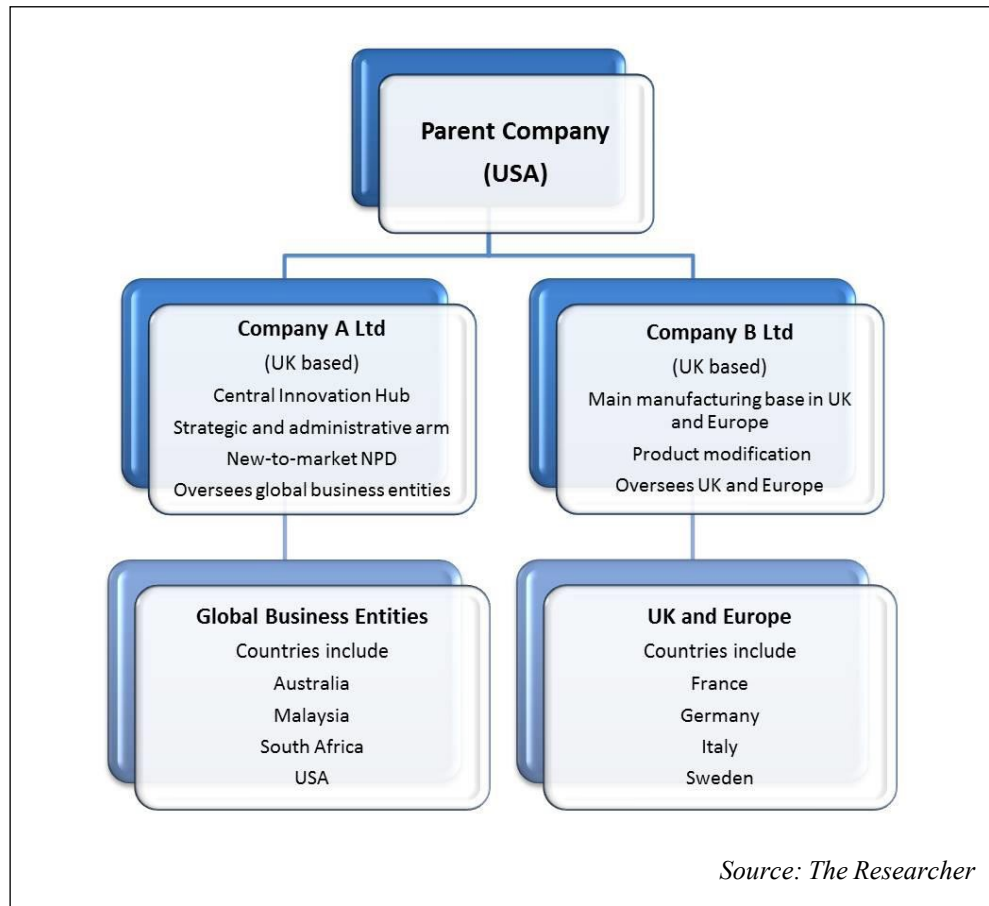


Figure 1.1: Company A and B Group Structure

Company A and B, as sister companies, are located on the same UK site, but occupy separate buildings. They share the same infrastructure and utilise similar systems, although Company B's systems are more oriented towards product manufacture. As knowledge-intensive firms, both companies rely heavily on the knowledge of their highly qualified and experienced knowledge workers, many of whom have been with their employer for over twenty years. Thus, each company has built up a considerable stock of individual and organisational knowledge. More detailed information about each company is prefaced at the beginning of Chapter 5 (Company A Findings) and Chapter 6 (Company B Findings).

1.6: Structure of the Thesis

The thesis is structured into the following chapters, as illustrated in Figure 1.2.

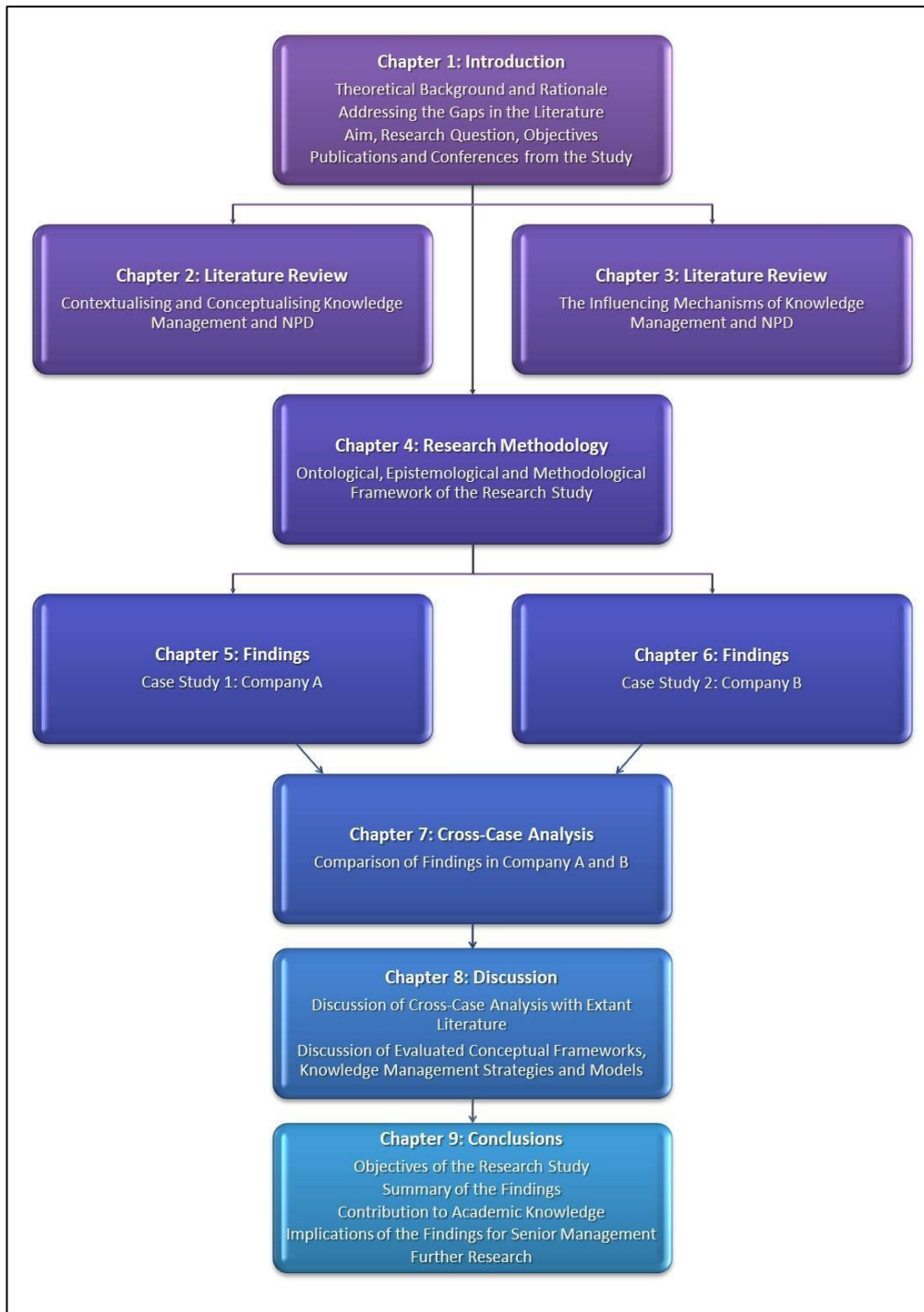


Figure 1.2: Structure of the Thesis

As Figure 1.2 illustrates, the thesis follows a logical sequence, from identifying the theoretical background and rationale to reporting and discussing the findings in both companies with extant literature. It culminates with the conclusions, a summary of the findings, the contribution the research study has made to academic knowledge and the implications of the findings for senior management.

1.7: Publications and Conferences Resulting from this Research Study

Subsequent to completion of the thesis, early conceptual and empirical findings of the research study were presented at a range of international academic conferences and published in a four star refereed academic journal. The researcher was also asked by both case study companies to present the findings to the Board of Directors and Senior Management Teams.

1.7.1: Papers

Paraskevas, A., Altinay, L., McLean, J. and Cooper, C. (2013) 'Crisis Knowledge in Tourism: Types, Flows and Governance', *Annals of Tourism Research*, Vol 41, pp130-152 <http://www.sciencedirect.com/science/article/pii/S0160738312001727>

McLean, J., Altinay, L., James, P. and Adesola, S. (2013) 'The influence of organisational variables on knowledge management in new product development.' Work in Progress Paper presented at the *6th International Conference on Services Management*, Cyprus, 23-25 June

1.7.2: Conferences and Seminars

McLean, J., Altinay, L., Adesola, S. and James, P. (2014) 'The influence of organisational variables on knowledge management in new product development.' Work in Progress Paper presented at the *Research Seminar*, Oxford Brookes University, Oxford, 19 March

McLean, J., Altinay, L., James, P. and Adesola, S. (2013) 'The influence of organisational variables on knowledge management in new product development.' Work in Progress Paper presented at the *6th International Conference on Services Management*, Cyprus, 23-25 June

McLean, J., Altinay, L., Adesola, S. and James, P. (2010) 'The influence of organisational variables on knowledge management in new product development.' Work in Progress Paper presented at the *Doctoral Research Conference*, Oxford Brookes University, Oxford, 18 June

McLean, J. (2010) 'The influence of organisational variables on knowledge management in new product development.' Work in Progress Paper presented at the *Doctoral Research Seminar*, Oxford Brookes University, Oxford, 23 April

McLean, J. (2009) 'The influence of organisational variables on knowledge management in new product development.' Work in Progress Paper presented in the Doctoral Track at the 4th *International Conference on Services Management*, Oxford, 8-9 May

Chapter 2 contextualises and conceptualises knowledge management and NPD.

Chapter 2

Contextualising and Conceptualising Knowledge Management and NPD

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Contextualising and Conceptualising Knowledge Management and NPD

'In an economy where the only certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge'

Nonaka and Takeuchi (1995)

2.1: Introduction

The previous chapter introduced the background to, and aims and objectives of, this research study. This first of two literature review chapters presents a critical review and analysis of extant conceptual and empirical research underpinning knowledge management and new product development (NPD) and is structured into four parts. Part One provides an overview of the knowledge economy and knowledge-based view of the firm and highlights the change in paradigm that showcases knowledge as a core organisational commodity. Part Two contextualises and conceptualises knowledge and knowledge management from the epistemologies of possession and practice and critically examines key models that establish how knowledge can be managed and utilised from these epistemological perspectives. Part Three evaluates the context and concept of NPD and the seminal models that have helped to shape the development and modification of new and existing products. Finally, Part Four draws elements of knowledge management and NPD together and examines how organisational (tacit and explicit) knowledge can be managed and utilised in the NPD process using the knowledge management models that were critically examined in Part One.

Part One: The Knowledge Economy and Knowledge-Based View of the Firm

In an economy where knowledge is viewed as both a strategic and commoditable resource (Lengnick-Hall and Griffith, 2011; Bollinger and Smith, 2001), many corporate leaders are now appreciating the importance of knowledge management as a tool for maintaining and enhancing the knowledge capital of their firms (Bigliardi *et al.*, 2014). The now famous quote *"if only HP knew what HP knows, we would be three times more productive"* cited by Lew Platt, former CEO of Hewlett-Packard, sent a profound message to corporate leaders that knowledge capture, sharing and application should be an integral part of their business operations (Pertusa-Ortega *et al.*, 2010), if they wish to know what they know, exploit knowledge in more effective

ways, become more adaptive to change and be more responsive to customers and competitors in the marketplace (Carlucci *et al.*, 2004).

2.2: The Advent of the Knowledge Economy

The development of knowledge management is one of several managerial responses to empirical trends associated with the shift to the post-industrial knowledge economy and the recognition that knowledge is an intangible, commoditable asset (Vasconcelos, 2008; Chae and Bloodgood, 2006; Zanini and Musante, 2013). The change in paradigm outlined above has moved the focus from managing and distributing physical goods to concentrating on applying “*knowledge to knowledge*” (Bang *et al.*, 2010:617). Although interest in the knowledge economy has escalated and the concept has captured the imagination of academics, business leaders and practitioners alike, (Archibugi and Coco, 2005), it has been described as ambiguous (Raspe and Van Oort, 2006), “*a widely-used metaphor, rather than a clear concept*” (Smith, 2002:6) and a premise that is very difficult to pin down (Brinkley, 2008). Smith (2002:7) suggests that the “*weakness, or even complete absence, of a definition is actually pervasive in the literature.*” He attests that these definitional problems stem from the fact that knowledge is often treated in a very superficial way and is not considered in either cognitive or epistemological terms.

Raspe and Van Oort (2006:1212) proffer that the term ‘knowledge economy’ was first introduced into the dictionary in 1999. It defined the concept as “*an economy in which the production factors labour and capital are aimed on the development and application of new technologies.*” The authors argue that this definition fails on two key aspects. First, the knowledge economy cannot be contextualised and understood without an underpinning definition of knowledge. Second, it suggests that the primary goal of the knowledge economy is the development and application of new technologies, rather than a focus on the utilisation of knowledge to innovate new products. In contrast, a more knowledge-centric definition was proffered by Powell and Snellman (2004), who view the economy as encapsulating production and services, which are based on knowledge intensive activities that contribute to the advancement of science and acceleration of technology. They add that a knowledge economy creates a greater reliance on, and the application and utilisation of, intellectual capabilities to improve R&D, production and interface with customers. This emphasises the importance of intangible assets, such as knowledge, to the

innovation of products, services and processes (Goffin *et al.*, 2010; Wild and Griggs, 2008).

2.3: The Knowledge-Based View of the Firm

An emerging theory that derived from discourse and theorisation on the knowledge economy is the knowledge-based view of the firm (Leiponen, 2006; Grant, 1996). The knowledge-based view portrays the firm as competencies and repositories of knowledge, which when leveraged, transferred and subsequently exploited, gives firms competitive advantage over market rivals (Kogut and Zander, 1996; Spender, 1996a). This view emanates from the resource-based view, which posits that *“firms exist because they have unique, often historically dependent, abilities to accumulate specific resources that lead to differential levels of firm performance”* (Kaplan *et al.*, 2001:5). Von Krogh (1998) adds that the resource-based view is characteristic of the cognitivist perspective of knowledge, which suggests that the firm can manage knowledge using defined action, tight procedures and policies.

In contrast, the knowledge-based view focuses on knowledge as the firm’s key strategic resource (Grant, 1996) and the firm as a *“knowledge-creating entity”* (Nonaka *et al.*, 2000:1). It is premised on the constructionist view of knowledge, which asserts that a firm cannot completely control knowledge, but instead can merely facilitate an infrastructure and climate that enables knowledge resources to be managed, coordinated and utilised (Von Krogh, 1998; Spender, 1996b) for innovation and sustained competitive advantage (Nonaka *et al.*, 2000).

To summarise, a paradigm shift has occurred in the business environment. The advent of the knowledge economy and the knowledge-based view of the firm highlight the importance of knowledge as a commoditable resource and a key factor in innovation within firms.

Part Two: The Context and Concept of Knowledge Management

Over the past two decades, there has been increasing discourse and debate regarding the importance of knowledge management within the business environment and society at large (Rasmussen and Nielsen; 2011; Edvarsson, 2008). The concept has fuelled theorisation from academics and practitioners in diverse disciplines, ranging from economics, management science and sociology (Chae and Bloodgood, 2006; Jashapara, 2011). Clarke and Rollo (2001:206) profess that within a firm’s knowledge

management activities is the implicit belief that “*knowledge can be stored, measured and moved around the enterprise*” to be exploited in the form of new products or process and service innovation.

As a concept, theory and management discipline, Brinkley (2008) and DiMattia and Oder (1997) posit that the development of knowledge management has been influenced by three significant changes in the business environment, namely globalisation, downsizing and advances in technology. First, the advent of globalisation has opened up markets and generated the internationalisation of knowledge-based industries, such as education, research and development and IT services. It has created a global market for knowledge workers and enabled firms to exploit the continuous flow of individuals’ knowledge and ideas via the innovation of new technologies, products and services through global networks.

Second, during the 1980s and 1990s, the drive for organisational leanness led to many firms adopting a strategy of downsizing in a bid to reduce overheads and increase profits. While it may have been the right strategic choice to make initially, firms began to realise that in scaling down their operations and shedding jobs, significant parts of their knowledge base had exited with their employees; thus creating a significant knowledge gap (Piggott, 1997). DiMattia and Oder (1997) reported that as a prevention strategy, firms began to implement knowledge management strategies in a bid to protect their knowledge base by storing and retaining individual knowledge that could be utilised for future use. Firms deployed technology and systems to identify and capture tacit knowledge, which Polanyi (1967) attests resides in individuals’ heads. Goffin *et al.* (2010) suggest that once this tacit knowledge is articulated and stored, it provides a reusable resource that provides the firm with a bank of potential competitive advantages, including enhancing the development of new products, which is a complex and iterative process in itself (ibid).

Third, advances and developments in technology, such as the internet and intranets, have enabled firms to deal with sudden increases in the availability of information and manage the stock of knowledge within the workplace more effectively (DiMattia and Oder, 1997). Such technology can also facilitate knowledge and information sharing across geographical boundaries (ibid).

Nonaka and Takeuchi (1995), Chang *et al.* (2014) and Goffin and Koners (2011) attest that as innovation and new product and service development are heavily dependent upon knowledge, firms are challenged to create, disseminate, utilise and manage specialist individual and organisational knowledge to support these processes. This therefore places the onus on firms to design and implement an appropriate infrastructure that will effectively and efficiently manage and leverage knowledge for competitive advantage and facilitate change (Stonehouse and Pemberton, 1999; Lee and Choi, 2003).

2.4: The Theoretical Foundations of Knowledge Management

According to Jasimuddin (2006), there appears to be some consensus within extant literature as to where the theoretical foundations or roots of knowledge management lie. Theorists such as Jashapara (2011) and Chae and Bloodgood (2006) attest that the concept is rooted in a multiplicity of disciplines and activities, as illustrated in Figure 2.1.

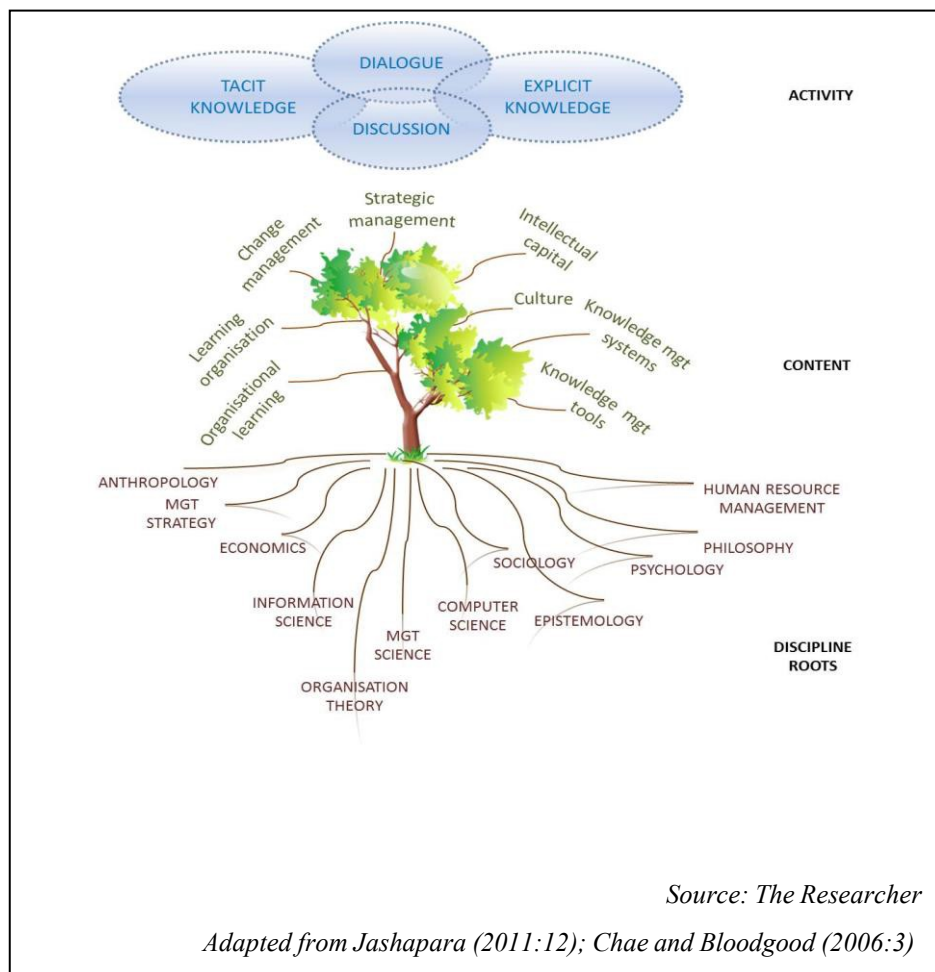


Figure 2.1: The Tree of Knowledge Management

As Figure 2.1 illustrates, knowledge management has become an interdisciplinary concept, with empirical research being undertaken in diverse fields such as organisational theory, management strategy, epistemology and computer science (Chae and Bloodgood, 2006) to name a few. Jashapara (2011) attests that a wide theoretical foundation serves to stimulate debate and strengthen the concept of knowledge management; thus enabling a better understanding of how knowledge is created, stored, retrieved, shared and applied within firms (Janz and Prasarnphanich, 2003).

However, amid the positivity, Jasimuddin (2006) caveats that a downside of such diverse practical and academic roots may be managerial uncertainty as to what the concept of knowledge management is all about and how it can be implemented as a strategy in their firms. While this may be a barrier to knowledge management being adopted, a diverse multiplicity of views, perspectives and research findings may ultimately reinforce the concept as a bona fide management discipline (ibid). In order to understand the concept of knowledge management and its link to the development of new products, it is necessary to explore the nature of knowledge.

2.5: The Nature of Knowledge

According to Blackman and Henderson (2005:152) “*debates about the nature of knowledge have lasted at least 4,000 years and show no signs of reaching any lasting, unequivocal conclusion.*” It has been described as a critical weapon in an organisation’s competitive armoury and a mechanism for leveraging the collective skills and intelligence of its employees from knowledge creation, sharing and exploitation in the form of new products and services (Goffin *et al.*, 2011; Linzalone, 2008). David and Foray (2002) state that although knowledge has a multiplicity of meanings and interpretations, it has a profound effect on an organisation’s ability to innovate and regenerate.

The quest for knowledge and how it is managed is an old one and has been at the forefront of human thought since the beginning of time (Jashapara, 2011; Kalkan, 2008). Even though this is the case, the last decade has witnessed the renaissance of knowledge as a major body of theory, which Teece (2002) agrees has been a long time coming. The blame for the lag in proclaiming knowledge as the darling of the new economy should, he feels, rest at the door of strategy analysts who for years wore ‘intellectual blinkers’ and relegated the concept to the backwater of mainstream

economics. Having broken loose from its theoretical shackles, the study of knowledge, how it is transferred and its role in innovation, has now taken its place as a bona fide contributor to the wealth and growth of nations (ibid).

2.4.1: Defining Knowledge

Knowledge can be defined as *“information that changes something or somebody, either by becoming grounds for actions or by making an individual (or an institution) capable of different or more effective action”* (Drucker, 2007:24). Drucker attests that action, as a dynamic process, unlocks the value of information and knowledge; a view shared by Nonaka and Takeuchi (1995:59), who consider knowledge as being *“essentially related to human action,”* through the creation of a flow of messages/information that is *“anchored in the beliefs and commitment of its holder.”* Davenport and Prusak (1998:5) observe it as something of importance to both individuals *and* organisations. They describe knowledge as:

a fluid mix of framed experiences, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organisations, it often becomes embedded, not only in documents or repositories, but also in organisational routines, processes, practices and norms.

Tsoukas and Vladimiron (2001) argue that while Davenport and Prusak’s definition has a dynamic character, it does not advocate how individuals and organisations exploit the embedded nature of knowledge to their advantage. Although these definitions highlight the diverse nature of knowledge, Sabri (2005:115) maintains that knowledge is *“people, money, learning, power and competitive advantage”* and a resource that should be carefully managed, rather than left to serendipity (Amidon, 1997).

The following section will critically analyse differing epistemological perspectives of knowledge, how they apply to knowledge management and evaluate their implications for knowledge-intensive firms.

2.5: Epistemologies of Knowledge

Classical Greek philosophers, including Plato and Aristotle, and twentieth century thinkers such as Polanyi (1967) and Ryle (1949), have debated various questions about the origins and nature of knowledge (Newell *et al.*, 2009; Hislop, 2009) from an epistemological perspective. Epistemology can be defined as the branch of philosophy

that seeks to study the theory of knowledge and ways of knowing within the context and limitations of the validity of knowledge (Nonaka *et al.*, 2006). Epistemological and ontological debates about knowledge have resulted in a multiplicity of perspectives and practices (Asimakou, 2009; Akehurst *et al.*, 2011), a menagerie of metaphorical conceptualisations (Andriessen, 2006) and arguments about whether knowledge exists independently of individuals or whether the individual *is* knowledge (Nonaka and Peltokorpi, 2006). According to Blackler (1995), further propositions include whether knowledge can be regarded as something individuals have (epistemology of possession; Cook and Brown, 1999) or whether it is best viewed as something they do (epistemology of practice; *ibid.*). Both perspectives will now be explored.

2.5.1: The Epistemology of Possession

The ‘knowledge as possession’ paradigm is largely implicit within the majority of literature on managing knowledge in contemporary firms (Newell *et al.*, 2009). Thus underlying, and the researcher would argue, taken-for-granted assumptions about the essence of knowledge: what it is, whether it is something individuals possess (have) or practice (do), may be a profoundly influential factor on the kind of strategies, tactics and analytical tools firms employ to manage knowledge and knowledge workers more effectively. Cook and Brown (1999) attest that the epistemology of possession is the traditional, dominant discourse of knowledge in knowledge management. They caveat that within organisational literature, knowledge is “*typically spoken of as though it were all of a piece, as though essentially it comes from one kind*” (p381). This notion of ‘knowledge being of one kind’ is refuted by knowledge as practice protagonists, such as Aase and Nybø (2002), who argue that practice-based perspectives are just as important and valid when contemplating the application and added value of knowing in the firm.

Although the epistemology of possession is widely cited in knowledge management literature, Hislop (2009) prefers to use the term ‘objectivist perspective’ because a vast amount of organisational knowledge (which will be explored later in the chapter) is typically deemed as having inherently objective characteristics. Arguably, as this is the case, knowledge can be separated from individuals via a strategy of codification (Hansen *et al.*, 1999); thus rendering it an explicit entity or object.

2.5.2: Characteristics of the Objectivist Perspective

According to Hislop (2009), knowledge from an objectivist perspective possesses four main characteristics. First, it is viewed as an entity, object or commodity that individuals possess and thus exists independently in humans' minds (embrained knowledge; Blackler, 1995). Within this paradigm, knowledge is an asset that firms possess and can therefore objectify, commoditise and transfer it within and between organisations (Sveiby, 1997). Knowledge management therefore becomes a tool to codify articulated knowledge, via ICT (Mason and Pauleen, 2003) into documents or computer systems, or be embedded in 'repositories' such as the firm's employees, its culture, roles and physical structure (Gourlay, 2006). Second, knowledge is regarded as objective facts and as such, both knowledge and understanding can be developed that are free from bias and individual subjectivity. Nonaka and Peltokorpi (2006) advocate that objectivism is framed within the positivist ontology, which is premised on the belief that objective facts about the world exist that do not rely on interpretation or the presence of an individual. Thus, the world is created through causal relationships between objects.

Third, the objectivist perspective privileges explicit or analysable knowledge (Akehurst *et al.*, 2011) that is codified, easy to articulate, communicate and transfer between individuals and firms (Ahmed *et al.*, 2002) over tacit knowledge, which is personal, context-specific and very hard to describe and express (*ibid.*). Polanyi (1967) challenges the subordination of tacit knowledge in favour of explicit knowledge and argues that objective knowledge does not exist, as *all* knowledge is tacit in nature. Finally, the objectivist perspective treats knowledge as derived from an intellectual process and an intellectual/cognitive entity that has codifiable properties. As knowledge is held in individuals' heads (Cook and Brown, 1999), its development and production can be seen as a cognitive process that emanates from individual or collective, intellectual reflections (Hislop, 2009). Therefore, it cannot easily be captured (Goffin *et al.*, 2010); thus, the researcher would argue, problematising, though not prohibiting, the transfer, sharing and utilisation of knowledge.

2.5.3: Critique of the Objectivist Perspective

The epistemology of possession or objectivist perspective (Hislop, 2009) has courted controversy and contention among the research community for a variety of reasons (Newell *et al.*, 2009). First, it fails to take into account the subjective, dynamic and

highly equivocal nature of knowledge. Second, the privileging of explicit over tacit knowledge is overstated, particularly as Polanyi (1967) contends that all knowledge has personal/tacit components. Gourlay (2006) and Tsoukas (1996) concur and agree that tacit and explicit knowledge are mutually constituted and mutually supportive, insofar as they are defined by each other, rather than in competition with each other.

Finally, the epistemology of possession has been heavily criticised on the grounds that it ignores the importance of social interaction and the major influence it has on the exchange of knowledge within firms (Easterby-Smith and Lyles, 2003). In addition, McElroy (2000) attests that cognitive-objectivist perspectives overlook the creation, dissemination, renewal and application of knowledge; processes that are influenced by, and situated in, the context of practice (Hislop, 2009). Thus, practice perspectives of knowledge are becoming more prevalent in extant knowledge management literature and research (ibid).

2.5.4: The Epistemology of Practice

The strategy of objectification or codification of knowledge as a means of capturing and transferring individual knowledge has failed within many firms (Newell *et al.*, 2009). As such, attention has now shifted to research and theories that not only focus on the development of enabling contexts and processes that are supportive of knowledge work within the firm, but which also concentrate on knowing as both an organisational and social activity, rather than knowledge as an entity or object (ibid). Cook and Brown (1999) support this paradigm and advocate the recognition of an epistemology of practice, as an adjunct to possession perspectives, which focuses on various forms of *knowing* and how inseparable it is from, and embedded within, a firm's work-based activities and practices (Hislop, 2009). This practice-based perspective (ibid) is closely associated with other paradigms including constructivism (Akehurst *et al.*, 2011), ethnomethodology (Tsoukas, 1996) and American pragmatism (Cook and Brown, 1999).

2.5.5: Characteristics of the Practice Perspective

According to Hislop (2009), this perspective is characterised by six main factors. First, knowledge is embedded in practice and is inseparable from individual/human actions. All human activity is therefore knowledgeable, whether it involves the creation, utilisation or sharing of knowledge. As Blackler (1995:1023) states "*rather than regarding knowledge as something that people have, it is suggested that knowing*

is best regarded as something they do.” Fundamentally, theorists such as Tsoukas and Vladimirou (2001), Lam (2000) and Lave and Wenger (1991) suggest that this perspective emphasises knowledge as being situated in cultural and organisational practices and relationships. As such, knowledge is assumed to be tacit and implicit and difficult to transfer.

Second, tacit and explicit knowledge are inseparable (Akehurst *et al.*, 2011; Polanyi, 1967) and mutually defined (Jasimuddin *et al.*, 2005), rather than being binary opposites (Schultze and Stabell, 2004). Third, knowledge is embodied in people. As it is *“always embodied in a person; carried by a person; taught and passed on by a person; used or misused by a person”* (Drucker, 1993:210), it means that knowing, which is rooted in individual action, cannot be totally disembodied from people and converted into explicit knowledge. Fourth, knowledge is socially constructed, which makes it subjective and open to interpretation (Hislop, 2009). Knowledge is thus axiologically value laden and as a consequence, can never be neutral, nonbiased and separated from the value systems of those who produce it (*ibid*). Social constructionist/process approaches advocate the importance of individuals/actors in the production of knowledge and how it is interpreted and applied within the firm (Newell *et al.*, 2009). Therefore, the emphasis should be placed on the provision of an enabling context/infrastructure that facilitates the social interaction between individuals and groups, such as communities of practice (Cheng and Lee, 2014), in order to engender the creation and utilisation of knowledge for key organisational activities, such as innovation (Newell *et al.*, 2009; Stonehouse and Pemberton, 1999).

Fifth, knowledge is culturally embedded as well as socially constructed. As a consequence, both factors are *“closely interwoven”* (Hislop, 2009:38), reflecting the inseparability of tacit and explicit knowledge. Knowledge *“cannot be understood outside of the cultural parameters that condition its emergence and modes of reproduction”* (Weir and Hutchins, 2005:89). So, in this respect, the meanings and interpretations individuals assign to various events that occur on a day-to-day basis are shaped by the assumptions and values associated with the cultural and social context in which they work and live (Hislop, 2009). Finally, knowledge is contestable and therefore open to debate. This refutes objectivist tenets, which posit that truly objective knowledge can be produced. One could argue that this sets the stage for the legitimisation of knowledge by objectivist and subjectivist protagonists, as they argue

that their view of knowledge is ‘true’ based on varying interpretations and contradictory and incompatible analyses of the same or similar events (ibid).

This paves the way for the introduction of power and politics into the equation (Schultze and Stabell, 2004), as interest groups within the firm vie for control of knowledge management initiatives and strategies (ibid), such as the codification or personalisation of knowledge (Hansen *et al.*, 1999; Jasimuddin *et al.*, 2005) and how they are exploited for competitive advantage (Ambrosini *et al.*, 2009). Like Cook and Brown (1999), Hood (2006:221) argues for epistemological plurality and states “*the goal is not to substitute one ‘truth’ for another, but rather to demonstrate that a great deal of knowledge is contestable.*”

2.5.6: Critique of the Practice-Based Perspective

Based on an analysis and evaluation of extant epistemologies of knowledge, the researcher would argue that the epistemology of practice is diametrically opposed to the epistemology of possession. Schultze and Stabell (2004) refer to them as ‘binary opposites’ and researchers such as Hislop (2009), Marshall (2008) and Newell *et al.* (2009), claim that both paradigms appear to be rather dismissive of each other’s tenets. In fact, Marshall (2008) attests that practice-based theories are quite justified in their criticism of objectivist perspectives, which view knowledge as a ‘static’ and ‘ultimately individualistic’ conception; thus rendering individuals as detached and passive participants in the acquisition of knowledge. Flipping the coin, practice-based perspectives treat knowledge as culturally-embedded (DeLong and Fahey, 2000), emergent, inescapably social, dynamic and positioned within particular contexts of practice (Marshall, 2008). As such, each context can be viewed from a multiplicity of perspectives by every individual (actor).

The researcher would argue that although knowledge as practice has its advantages, insofar as it emphasises the collegial and collaborative nature of knowledge, firms may face the challenge of managing individuals who feel they cannot or vehemently refuse to share their knowledge with others (Connelly *et al.*, 2012; Newell *et al.*, 2009) for fear of losing ownership of it or that senior management will not reward them for sharing it (Szulanski, 1996). One could argue that this may not occur within the frame of the objectivist perspective, as the codification of knowledge renders knowledge an object that is independent of knowing individuals, free from bias and interpretation and capable of being shared and utilised throughout the firm, without

the constraint of power, politics and deeply entrenched cultural norms. These may not only hinder the NPD process but also the development of individual and organisational knowledge per se.

2.5.7: Bridging Epistemologies

As this section has demonstrated, the epistemologies of possession and practice have their place in knowledge management theory and practice. It has further demonstrated the metaphorical ‘tug-of-war’ between the two paradigms, both of which expose their ‘Jekyll and Hyde’ traits that appear to be deeply entrenched within espoused theory and theory-in-use. However, rather than adopt a tug-of-war approach, Cook and Brown (1999) propose a ‘marriage of convenience’, a bridging of epistemologies that facilitates the generative dance between knowledge (objectivism) and knowing (subjectivism) and supports innovation within firms. By bridging epistemologies, they claim that the relationship between what individuals know and what they do can be accounted for; thus enabling firms to observe, and utilise, the generation of new knowledge and knowing.

2.6: Defining the Concept of Knowledge Management

Having defined and evaluated knowledge from differing epistemological perspectives, it is now appropriate to define the concept of knowledge management. As identified earlier in the chapter, knowledge management and a firm’s ubiquitous quest for competitive advantage through the acquisition, dissemination, utilisation and exploitation of knowledge has become a major development in contemporary management and organisation theory (McLean, 2005), even though it is still considered to be an emerging discipline (Rasmussen and Nielsen, 2011; Jashapara, 2011). Knowledge management can be defined from two distinct dimensions: hard and soft (Mason and Pauleen, 2003), which are outlined below.

2.6.1 The Hard Approach

The hard or technology approach (Mason and Pauleen, 2003; Hlupic *et al.*, 2002) focuses on the deployment and utilisation of appropriate technology and, essentially, the management of information. In this dimension, knowledge is viewed as an object that can be managed and controlled by information management systems. A major goal of the hard approach is to maximise access to information via enhanced methods of retrieving and reusing documents, such as databases. This approach is predicated on explicit knowledge and the way in which firms capture, codify, store, retrieve and

utilise it for their benefit (ibid). In this respect, Bassi (1997:26) defines knowledge management as “*the process of creating, capturing and using knowledge to enhance organisational performance.*” He adds that the management of knowledge is linked to two technology-based activities. First, enabling the sharing of knowledge via collaborative software, such as groupware. Second, codifying and disseminating knowledge through the appropriation and documentation of individuals’ knowledge. Such activities are, by and large, reliant on corporate-wide databases of best practice, expert directories and employees’ experiential learning (ibid).

Theorists, such as McDermott (1999) and Davenport and Prusak (1998) attest that although IT may have catalysed knowledge management, it can neither deliver the concept within firms, nor make those firms more knowledgeable. Importantly, placing an emphasis on the explicit, codifiable facets of knowledge may overlook its important tacitness, which theorists attest is so important to innovation (Nonaka and Takeuchi, 1995; Goffin and Koners, 2011; Goffin *et al.*, 2010).

2.6.2: The Soft Approach

In contrast, the soft or humanist approach (Mason and Pauleen, 2003; Hlupic *et al.*, 2002), places an emphasis on capturing and transforming knowledge into a corporate and strategic asset via the management of individuals (Lengnick-Hall and Griffith, 2011; Bollinger and Smith, 2001). Knowledge is therefore a process that is characterised by a complex, dynamic and constantly changing set of know-how and skills. From this perspective, uit Beijerse (1999) defines knowledge management as a tool to achieve organisational goals via the strategy-driven facilitation and motivation of knowledge workers to develop, enhance and utilise their ability to interpret and give meaning to data and information through, for example, their experience, skills and personality. The definition emphasises the soft, people element of the management of knowledge and the important role knowledge workers play in giving their firms a competitive edge (Prahalad and Hamel, 1990).

2.6.3: The Hybrid Approach

While the hard and soft approaches have their own unique role to play in managing knowledge within the workplace, Davenport (1997:188) acknowledges a need for firms to deploy “*hybrid solutions of people and technology,*” or a socio-technical approach (Carayanis, 1998), whereby technology and people coexist and complement each other. To this end, Jashapara (2011) and Hislop (2009) suggest that knowledge

management as a hybrid encapsulates the implementation of effective learning processes that facilitate the exploration, exploitation and sharing of individual knowledge via the utilisation of appropriate people management practices, technology and enabling cultural contexts. Thus enhancing a firm's intellectual capital base and optimising performance for innovation (Newell *et al.*, 2009).

2.7: Organisational Knowledge

As highlighted throughout the chapter thus far, the realisation that knowledge is an important component to organisational success and survival is endemic within extant knowledge management literature. The important role knowledge plays in product innovation is acknowledged and viewed as a key contributor to competitive advantage (Jimes and Lucardie, 2003; Nonaka and Takeuchi, 1995). Although studies on organisational knowledge have taken on greater significance in recent years (Huang, 2013; Yang *et al.*, 2010), like knowledge and knowledge management, it has suffered the same fate in terms of definitional problems. In epistemological terms, theorists such as Tsoukas and Vladimirou (2001), Grant (1996), Nonaka (1994), Hedlund (1994) and Spender (1996a,b) view the concept from the metaphor of 'knowledge as practice,' emphasising its interpretivist/subjectivist traits, which is a shift from recognising the concept as a "*positivistic...objectified and monastic absolute truth*" (Stenmark, 2001:10).

Scarbrough (2008) defines organisational knowledge as a set of learned norms, practises and shared understandings that integrate artefacts and actors to produce outcomes that are valued within specific social and organisational contexts. He advocates that the development of shared, culturally embedded individual and group behaviours, beliefs and routines help to mould the firm's capabilities and, ultimately, how it crafts and utilises specific strategies, tactics and tools to effectively manage knowledge and knowledge work (Newell *et al.*, 2009). Donnellan and Fitzgerald (2003) caveat that they can also be major disablers to the implementation of knowledge management initiatives because they help to shape the assumptions about what knowledge is, which knowledge is worth managing and who owns it, shares and hoards it. As a result it can have both an enabling and disabling effect on the outcomes of NPD (de Brentani and Kleinschmidt, 2004).

Knowledge is a highly commoditable, personal and human asset (Linzalone, 2008; Rasmussen and Nielsen, 2011) and organisational knowledge encapsulates the pooled

efforts and expertise of the firm's alliances and networks (Wild and Griggs, 2008). Capturing, storing, disseminating and utilising organisational knowledge is important for a number of reasons (Goffin *et al.*, 2010; Smith, 2001:312). First, when organisations merge, downsize, reorganise or the culture changes, priceless knowledge is lost or buried under new information. Second, employees exiting the firm take their valuable knowledge, skills, experiences and resources with them. Finally, employees who remain may be assigned to new tasks and never use the wealth of accumulated knowledge they may have spent years developing. Smith (2001) caveats that unless managers recognise this and take steps to counter the negative outcomes arising from these scenarios, valuable knowledge, in particular specialist tacit knowledge, will be lost (Linzalone, 2008).

2.7.1: The Tacit and Explicit Nature of Organisational Knowledge

From the early 1960s, the dichotomy between tacit and explicit knowledge has been heavily debated and contested between theorists and practitioners (Hislop, 2009). Knowledge management advocates, such as Hall and Andriani (2003) and Kogut and Zander (1992), suggest that instead of treating tacit and explicit knowledge as binary opposites (Schultze and Stabell, 2004) and two separate and distinct types of organisational knowledge, it should be recognised and accepted that all knowledge contains tacit and explicit components and as a consequence, both types of knowledge are inseparable (Jasimuddin *et al.*, 2005).

Following on from this point, Cook and Brown (1999:385) propose that “*tacit knowledge cannot be turned into explicit knowledge, nor can explicit knowledge be turned into tacit.*” Therefore, each type of knowledge can be deployed in order to enable the creation of the other, insofar as individuals can apply their tacit knowledge to produce explicit knowledge in the form of reports, products and services and so on (Evans and Easterby-Smith, 2001). Debates about dichotomy aside, Hislop (2009) attests that tacit and explicit knowledge are fundamentally different and possess distinctive characteristics that have a major influence on the way in which each type of knowledge can be shared, and the researcher would argue, managed and utilised within the firm.

2.7.2: Defining Tacit Knowledge

Jasimuddin *et al.* (2005) and Nonaka (1991) proffer that tacit knowledge is one of the firm's most critical resources, as much of the knowledge that is utilised in designing and developing new products is tacit in nature (Goffin *et al.*, 2010). Gourlay (2002:2) defines it as "*a non-linguistic, non-numerical form of knowledge that is highly personal and context specific and deeply rooted in individual experiences, ideas, values and emotions.*" The highly idiosyncratic and deeply ingrained nature of tacit knowledge (Dixon, 2000) makes it extremely costly and difficult to access, transfer and disseminate throughout the firm (Jasimuddin *et al.*, 2005) and hard for competitors to imitate (Sobol and Lei, 1994). According to Gore and Gore (1999) and Sternberg (1997), tacit knowledge is made up of two key components: technical tacit knowledge and cognitive tacit knowledge. First, technical tacit knowledge encapsulates information, expertise, knowledge and skills that are developed and utilised by, for example, master craftsmen over a period of time. Second, cognitive tacit knowledge encompasses implicit perceptions, beliefs, mental models and values that are so deeply ingrained in individuals, they are, more often than not, taken for granted; to the extent where it becomes a natural part of what individuals are, think and do.

2.7.3: Defining Explicit Knowledge

Choo (1998) defines explicit knowledge as knowledge that is articulated through symbols, language, artefacts and objects. He states that there are two types of explicit knowledge: a) object-based, which is manifest in the form of patents, technical drawings and blueprints, databases, statistical reports and business plans, and b) rule-based, which is expressed as routines, rules and procedures. Choo stresses that firms have a tendency to rely on articulated and explicit knowledge, as it is embedded within their institutionalised standard operating procedures and utilised within key problem solving and decision-making processes. Alternatively, Winter (1987:71) defines explicit knowledge as 'objective knowledge,' which can be "*communicated from its possessor to another person in symbolic form and the recipient of the communication becomes as much 'in the know' as the originator.*" Like Choo (1998), Sobol and Lei (1994) argue that explicit or objective knowledge contains two strands. The first strand refers to its communicable characteristics, insofar as it can be articulated, encoded, explained and understood. The second strand relates to its

possession. As knowledge is an object and is therefore not idiosyncratic or specific to the firm or individuals possessing it, it has the capacity to be shared (ibid).

McCall *et al.* (2008) and Roberts (2000) advocate that explicit knowledge, or ‘know-what’ can be disseminated throughout the firm and be made available to large numbers of people more cost effectively than tacit knowledge. On that note, Smith (2001) and Sanchez (2005) contend that firms must invest in appropriate infrastructures to support not only the articulation of tacit or personal knowledge into explicit knowledge assets, but also to fund investment in appropriate ICT systems that are capable of disseminating explicit knowledge intra organisationally, via the firm’s intranet or inter organisationally through the internet.

2.8: Knowledge Management Strategies

As organisational knowledge is considered to be a major source of competitive advantage for firms (Lakshman, 2009), they are challenged to develop appropriate strategies to manage knowledge (Jasimuddin *et al.*, 2005). Two such strategies are codification, which places an emphasis on both the collection and organisation of knowledge and personalisation that focuses on human resources and communication processes (Hansen *et al.*, 1999).

2.8.1 Defining Codification

As knowledge resides in the heads of individuals and is “*always embodied in a person; carried by a person; taught and passed on by a person; used and misused by a person*” (Drucker, 1993:210), one could argue that any attempt to codify it would be futile. However, Wong and Tianen (2004) suggest that codification can add value to the firm, insofar as it has the capacity to facilitate the flow and reuse of knowledge intra and inter organisationally. Johnson *et al.* (2002) define codification as an information-transforming process that converts knowledge into storable formats. Davenport and Prusak (1998) view the transformation of tacit into explicit knowledge (externalisation; Nonaka and Takeuchi, 1995), as an enabler to facilitate the retention of organisational knowledge capital, should individuals leave and take their knowledge elsewhere.

Codification could be viewed as the ‘hard approach’ to knowledge management (Mason and Pauleen, 2003; Hlupic *et al.*, 2002) and akin to the epistemology of possession (Cook and Brown, 1999), whereby knowledge is an object that can be

controlled, managed and manipulated by sophisticated information management systems for the benefit of the firm. Although it affords several benefits to firms, Hendricks (2001) attests that codification has its drawbacks, insofar as it depersonalises individuals' tacit knowledge and thus essentially removes its personal nature (Hislop, 2009). Moreover, the researcher would argue that the codification of knowledge could be seen as a way of politicising knowledge, reducing it to a tool of management domination to control individuals' knowledge (Schultze and Stabell, 2004). This may, arguably, discourage individuals from articulating and sharing their embrained knowledge (Blackler, 1995), which resides in their heads.

Furthermore, codification may result in firms incurring considerable costs in creating, maintaining and constantly updating information stored in organisational repositories, such as intranets and knowledge management systems (Jasimuddin *et al.*, 2005; Schulz and Jobe, 2001). It may result in the leakage and (albeit involuntary) transfer of strategic information to competitors, such as blueprints, specifications and chemical formulae. Based on this scenario, firms may opt out of implementing a codification strategy in favour of retaining and exploring the tacitness of knowledge (Schulz and Jobe, 2001).

2.8.2: Defining Personalisation

As highlighted above, the leakage of strategically significant knowledge to competitors, however unintentional or involuntary, coupled with the potential overload that intense knowledge flows can spawn (Schulz and Jobe, 2001), may lead some firms to adopt a personalisation strategy to, the researcher would argue, 'protect' their valuable knowledge assets. Hansen *et al.* (1999:107) define personalisation as a strategy whereby *"knowledge is closely tied to the person who developed it and is shared primarily through direct person-to-person contact."* Edvarsson (2008) describes it as a strategy for the development of tacit knowledge, based on an individual's intuition, personal skills and insights in solving complex problems. The definitions emphasise the highly personal nature of knowledge and the need for it to be shared through contact with others via communities of practice, for example, or the exchange of dialogue with individuals and teams, supported by ICT (Cheng and Lee, 2014; Jasimuddin *et al.*, 2005).

Personalisation could be viewed as the humanist or 'soft' approach to knowledge management and related to the epistemology of practice (Cook and Brown, 1999;

Hislop, 1999) and communities of practice, as it focuses on the exploration and management of individuals' tacit knowledge (Mason and Pauleen, 2003; Hlupic *et al.*, 2002; Cheng and Lee, 2014) and on the value that such knowledge adds to innovation, creativity and NPD within the firm. The researcher would add that in this respect, tacit knowledge is privileged over explicit knowledge. Like codification, personalisation can yield a number of benefits to firms. First, it is considered to be 'secure' and strategically significant and therefore hard to understand and imitate by competitors (Spender, 1995; Johannessen *et al.*, 2001). Second, retaining the tacitness of knowledge means that it is kept in a "*state of fluid gestation*" (Schulz and Jobe, 2001:144) and hence constantly grows and evolves.

Third, it focuses on the innovative thinking and expertise of individuals as 'knowledge carriers' within the firm. Therefore, as their knowledge is embedded in products or services (Lee and Choi, 2003; Stonehouse and Pemberton, 1999), knowledge-intensive firms (entities whose work is largely of a cerebral or intellectual nature and the majority of the workforce comprises of qualified, well-educated employees or knowledge workers; Alvesson, 2000; Hislop 2009), would need to focus on providing an infrastructure and culture that supports ideation, risk taking and the creation and sharing of their specialist knowledge (Edvarsson, 2008).

The researcher would argue that the adoption of a personalisation strategy is not a panacea. For example, if individuals are 'knowledge carriers' and they possess a certain type of expertise which is rare, valuable and non-substitutable (Bollinger and Smith, 2001), it could potentially cause problems if they exit the firm and take their knowledge with them. In addition, even though firms may, as Stonehouse and Pemberton (1999) suggest, implement enabling structures and knowledge cultures, individual knowledge carriers may resist sharing their tacit knowledge because they fear they will lose ownership of it (Szulanski, 1996), particularly if they work on the premise that 'knowledge is power' (Sir Frances Bacon, 1597, cited in Kurtz, 2009:100). Such internal vulnerability (Hall and Andriani, 2003) may encourage firms to adopt a codification strategy, in order to shield themselves against the potential loss of valuable and specialist tacit knowledge.

2.8.3: The Impact of Knowledge Management Strategies on the Firm

The impact of codification and personalisation, in terms of positives and negatives, are illustrated in Figure 2.2.

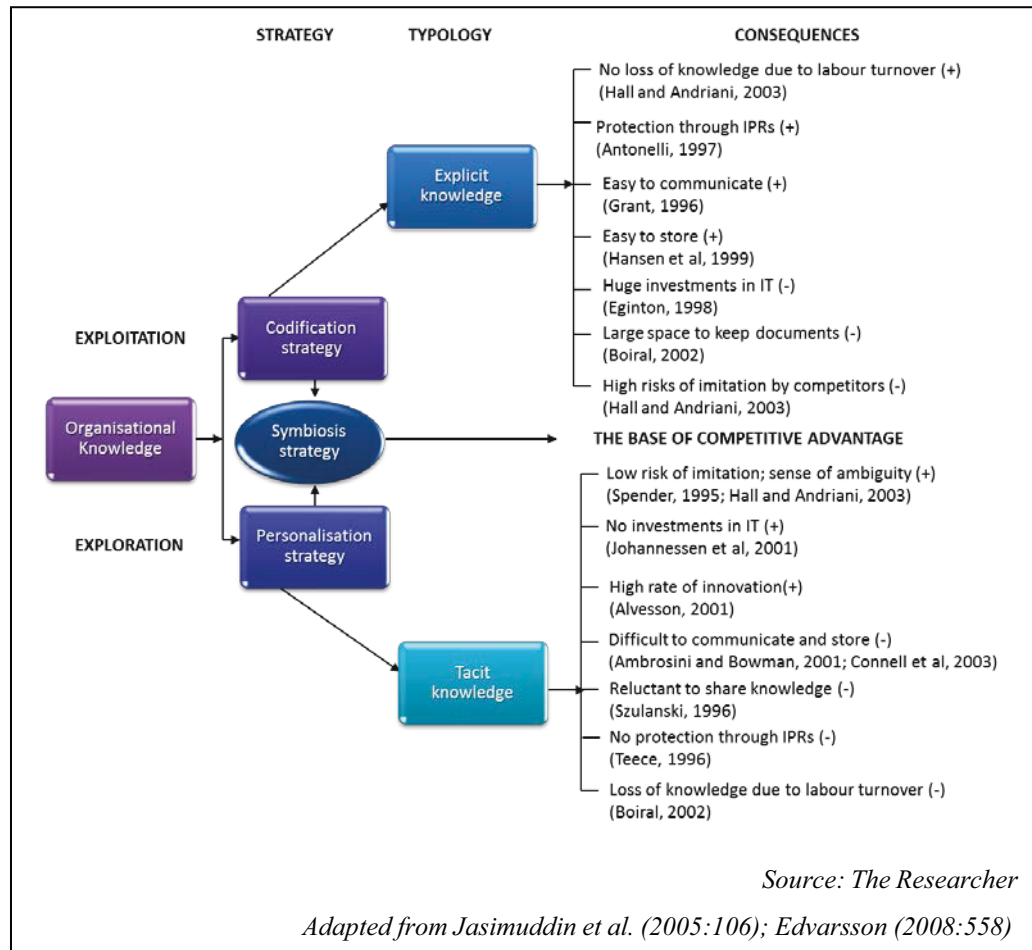


Figure 2.2: Potential Implications of Codification and Personalisation Strategies

As Figure 2.2 demonstrates, codification and personalisation have strong and weak points. Both strategies can give firms sustainable competitive advantage – but in different ways. The decision to implement one strategy over another may not be an easy or straightforward one for firms, but as Hansen *et al.* (1999) point out, deployment is dependent on a number of factors. First, if firms sell standardised products without much variety, a codification strategy may be adopted, based on the utility and reuse of knowledge. Personalisation may support the selling of customised products and services that meet the unique, bespoke needs of customers.

Second, a business strategy based on mature products may be supported by codification, as NPD and sales processes involve knowledge and well-understood tasks that can be codified. Personalisation could support a product innovation-based

strategy, as individuals might need to share information with each other that may otherwise become lost in codified documents. Finally, a reliance on documents, such as market data or software codes to complete a variety of organisational tasks, may be underpinned by codification, while the personalisation strategy may be adopted, in situations where firms predominantly use tacit knowledge, such as in the consultancy industry.

In addition to the above, Edvarsson (2008) suggests that firms can adopt either an exploitation or exploration strategy, which is akin to codification and personalisation. Exploitation places an emphasis on knowledge capture, storage and distribution, using ICT solutions, and has minimal focus on the creation of new knowledge. With exploration, tacit knowledge is transferred via human interaction and the socialisation process (tacit to tacit; Nonaka and Takeuchi, 1995) and engenders the creation of new knowledge; thus increasing innovation capacity and capability.

Research into knowledge management practices conclude that firms who utilise a hybrid approach, i.e., both strategies side-by-side, achieve the greatest outcomes and rewards (Wong and Tiainen, 2004; Scarbrough, 2003; Davenport and Prusak, 2000). This concurs with Hansen *et al.* (1999:112), who espouse that firms who make the most effective use of knowledge predominantly pursue one strategy and utilise the second to support the first. They advocate an 80/20 split, whereby “80% of their knowledge sharing follows one strategy, 20% the other” but caveat that firms risk failure if they attempt to excel at using both strategies equally, rather than adopting the Pareto 80/20 rule. Jasimuddin *et al.* (2005) recommend the utilisation of a symbiosis strategy, as illustrated in Figure 2.2, whereby tacit and explicit knowledge are considered to be inseparable (epistemology of practice; Hislop 2009) and thus organisational knowledge is managed as a balance of tacitness and explicitness.

To summarise, both tacit and explicit knowledge serve their purpose within firms. Their level of importance is relative to the type of industry or markets in which they operate, whether they have standardised and routinised operations or whether their success is built on innovation, creativity and the development of new products, services and processes. Either way, the paradoxical and the researcher would argue oxymoronic nature of knowledge management per se, makes the choice of whether to adopt a codification or personalisation strategy all the more challenging.

2.9: Knowledge Management Models

The next section of this chapter focuses on two of the most influential models that have helped to shape the context and concept of knowledge management. As this thesis has demonstrated thus far, knowledge management can be viewed as a rather complex, multidisciplinary and heterogeneous concept, upon which there is no solid and agreed framework for how knowledge should be managed in an individual and organisational context (Lloria, 2008). Praxis and literature suggest that there are a wide range of knowledge management models in the field, each serving to unearth underlying assumptions, enable a plethora of diverse viewpoints to be critiqued and facilitate the translation and application of such models to everyday organisational practice (Kakabadse *et al.*, 2003; McAdam and McCreedy, 1999). In this way, the researcher attests that both firms and practitioners can develop a variety of methods to leverage organisational knowledge for competitive advantage.

A critical analysis of extant literature identified that knowledge management models encompass different epistemological and ontological orientations and include frameworks that are inherently systems and technology-based. However, an exposé of all knowledge management models is not the remit of this thesis. Instead, the researcher intends to focus on two major models that most closely pertain to her research and which are pivotal to gaining an understanding of the influence that knowledge management and, indeed, organisational variables have on the NPD process. Thus, the epistemologies of possession and practice will be used to frame, explain and critique the selected models.

Although theoretical models can provide a certain degree of insight and facilitate a multiplicity of perspectives to be gleaned, McAdam and McCreedy (1999) caveat that models should be treated with an element of caution, insofar as they are useful if they are critiqued to enable an understanding of their underlying assumptions, rather than accepting them purely as objective representations of reality. Morgan (1997:8) concurs and states that *“there are no right or wrong theories in an absolute sense, for every theory illuminates and hides.”*

2.9.1: The Epistemology of Possession: Knowledge Category Model

The epistemology of possession is largely implicit within the majority of literature on managing knowledge in contemporary firms and is the dominant discourse of knowledge in knowledge management (Newell *et al.*, 2009). McAdam and McCreedy

(1999) attest that a school or approach that is represented within this paradigm is the knowledge category model, whereby knowledge is categorised and classified into discrete elements and criteria (Schultze, 1999), including:

- a. Its location, i.e., individual, group and organisational knowledge and knowledge that is embodied in products and services, and
- b. Its form, with regard to accessibility, for example tacit or explicit knowledge.

A critical review of theories in this genre identified the Nonaka and Takeuchi SECI Model as being the most pertinent to this thesis. The model will now be explored.

2.9.2: The Nonaka and Takeuchi (SECI) Model

Nonaka and Takeuchi (1995) are one of the most prolific and widely cited writers on organisational knowledge and the role knowledge creation plays in innovation and NPD (Ahmed *et al.*, 2002; Dalkir, 2005). Their model, often referred to as ‘SECI’ (socialisation, externalisation, combination, internalisation; Nonaka, 1994; Nonaka and Takeuchi, 1995), is based on a study of Japanese firms and their success in innovation and creativity. Their findings led them to conclude that organisational innovation was not based on the rather automatus processing of objective knowledge, but was instead borne from individuals’ highly personal, subjective insights. Further, they stipulate it was the utilisation of tacit approaches to knowledge management that was the driving force behind Japanese firms’ success as innovators and manufacturers of innovative products (Chang *et al.*, 2014).

Firms create knowledge via the interactions that take place between tacit and explicit knowledge (Nonaka, 1994; Nonaka and Takeuchi, 1995; Nonaka *et al.*, 2000; Akehurst *et al.*, 2011); otherwise known as the knowledge conversion process. This is illustrated in Figure 2.3.

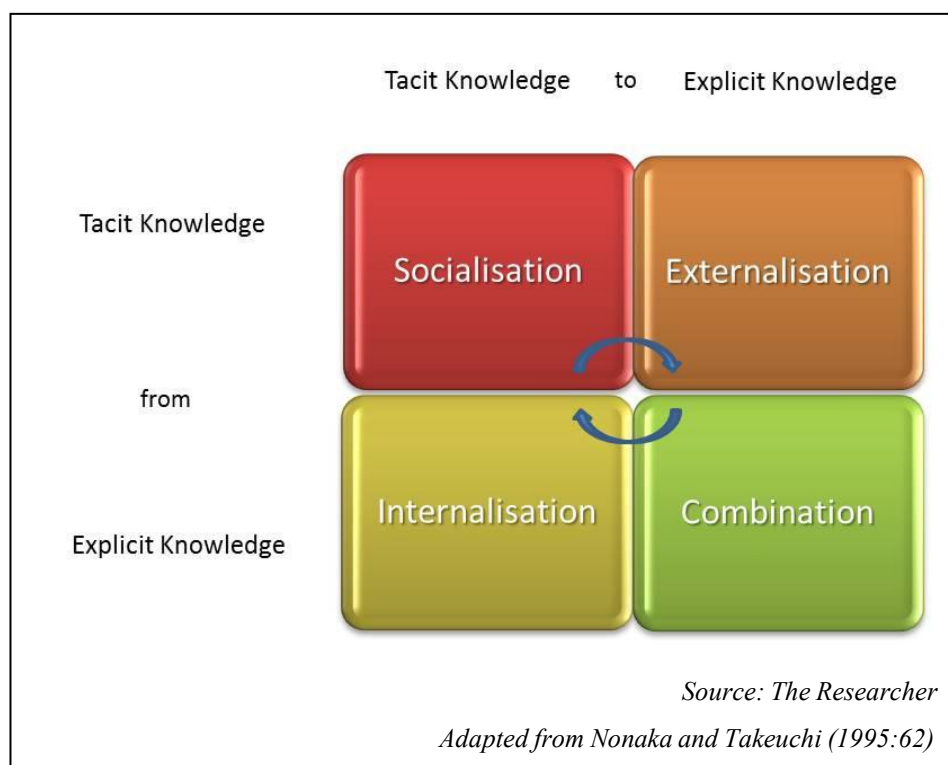


Figure 2.3: The Knowledge Conversion Process

As Figure 2.3 demonstrates, the model incorporates four quadrants or modes of knowledge conversion (Nonaka *et al.*, 2000; Dalkir, 2005; Richtner and Åhlström, 2010), which are explained below:

i. Socialisation (tacit to tacit)

This process converts new tacit knowledge through individuals' shared experiences, via face-to-face, group social interactions or imitation and practice. Through this process, individuals share and create knowledge by building mutual trust, sharing dialogue and mental models. Keeping knowledge tacit means it cannot be easily replicated by competitors and can therefore provide the firm with a source of competitive advantage. However, as knowledge resides in the heads of individuals and is *“developed and internalised by the knower over a long period of time, it is almost impossible to reproduce in a document or database”* (Davenport and Prusak, 1998:70). Therefore, the researcher would argue that this scenario could somewhat preclude the next stage of the process - externalisation (tacit to explicit) from effectively taking place.

ii. **Externalisation (tacit to explicit)**

This is the process of codifying or articulating tacit knowledge into explicit knowledge “*in order to facilitate flows of organisational knowledge*” (Schulz and Jobe, 2001:139). Once codified and externalised, knowledge becomes tangible and permanent (Dalkir, 2005), though the researcher would argue that it is semi-permanent, insofar as knowledge becomes obsolete very quickly and thus the knower and owner of the original knowledge would need to update the articulated knowledge.

iii. **Combination (explicit to explicit)**

This process converts explicit knowledge into more complex forms of explicit knowledge and can take the form of corporate or marketing intelligence being collected from both inside and outside the firm and synthesised, combined or processed into new knowledge to be used in the NPD process (Goffin *et al.*, 2010). Such new knowledge could include a report, manuals, databases or other documents (Richtnér and Åhlström, 2010).

iv. **Internalisation (explicit to tacit)**

This final process transposes explicit knowledge embedded in manuals, other documents or oral stories (Richtnér and Åhlström, 2010) into tacit knowledge. Explicit knowledge is disseminated throughout the firm and internalised or converted into tacit knowledge by individuals, who reframe it within their own tacit knowledge bases and experiences. Nonaka (1994) likens internalisation to ‘learning by doing’ or experiential learning (Kolb *et al.*, 1971), whereby individuals utilise new knowledge to do their jobs more proficiently and effectively (e.g. technical know-how; Dalkir, 2005; Richtnér and Åhlström, 2010). Internalised knowledge then becomes a valuable asset, both to individuals and firms.

Nonaka *et al.* (2000) and Dalkir (2005) advocate that internalised knowledge, which is accumulated at individual level, can trigger a new conversion process. In this respect, tacit knowledge is then socialised or shared with others through, for example, communities of practice.

2.9.3: The Knowledge Spiral

Although knowledge creation is an iterative process (Dalkir, 2005), it is not sequential. Instead, it is a continuous and dynamic interaction between tacit knowledge and explicit knowledge throughout all four quadrants, as demonstrated in Figure 2.4.

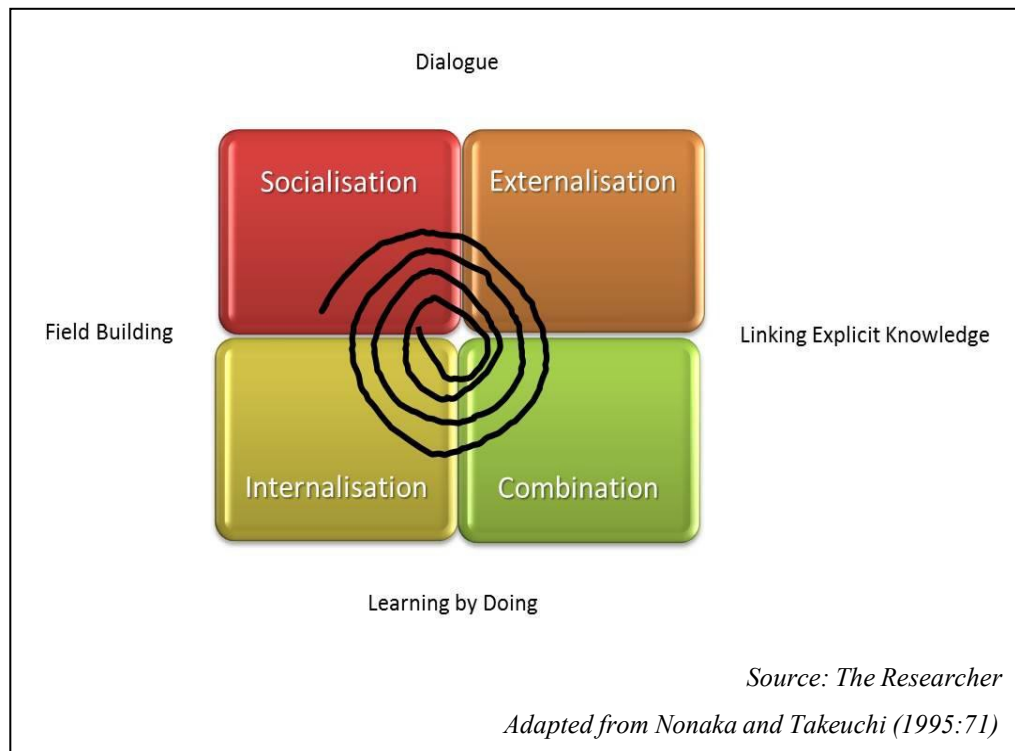


Figure 2.4: The Knowledge Spiral

As Figure 2.4 illustrates, the knowledge spiral indicates how firms go through the process of articulating, organising and systematising personal tacit knowledge. Firms design, develop and implement tools, models and structures to assist in the accumulation and sharing of knowledge and the knowledge spiral thus enables a continuous activity of knowledge flow, sharing and conversion by individuals, communities and firms (Dalkir, 2005).

2.9.4: Potential Problems of Knowledge Conversion

While the process can enable the different types of knowledge to be used, Dalkir (2005) and McAdam and McCreedy (1999) caveat that knowledge conversion is not a straightforward process. Externalisation and internalisation can be problematic insofar as they warrant high degrees of personal commitment and may also involve building shared visions, sharing mental models, values and personal beliefs; activities which may culturally and practically be difficult for individuals to do (Senge, 1990). In order

for the knowledge creation process to be a ‘successful’ one, Nonaka and Takeuchi (1995) attest that firms must provide an enabling context or infrastructure that engenders the creation of new knowledge for NPD.

2.9.5: The Epistemology of Practice: Community of Practice Model

The epistemology of practice advocates the development of enabling contexts and processes that are supportive of knowledge within the firm and the focus on knowing as an organisational and social activity (Newell *et al.*, 2009). The school of thought that dominates this paradigm is the socially constructed models of knowledge management (McAdam and McCreedy, 1999). A critical review of theories in this genre that most pertain to this thesis identified the Community of Practice Model, which will now be examined.

2.9.6: The Wenger, McDermott and Snyder Community of Practice Model

Like knowledge management, the community of practice concept has generated discourse and debate among researchers and practitioners (Schenkel and Teigland, 2008). It has been described as one of the most important ways of promoting knowledge management in the twenty first century (du Plessis, 2008) and has been hailed by Wenger and Snyder (2000) as the new ‘organisational frontier’ and a means by which firms can externalise, share and integrate tacit knowledge that may be securely embedded in the minds of the firm’s members (Jashapara, 2011).

The community of practice concept places a greater emphasis on the firm’s processes and the ways in which they can enable the creation of new knowledge (McElroy, 2000; Nonaka and Takeuchi, 1995) through the utilisation of social and cognitive aspects of tacit knowledge (Cheng and Lee, 2014). Like knowledge management, it is by no means a new phenomenon. Wenger *et al.* (2002:5) suggest they were society’s “*first knowledge-based social structures, back when we lived in caves and gathered round the fire to discuss strategies for cornering prey...or which roots were edible*” and were prevalent in the social and business practices of corporations and guilds in ancient Rome and the Middle Ages. Importantly, from a modern-day perspective, the concept has proven to be an essential building block of the knowledge economy (Schenkel and Teigland, 2008).

A community of practice (CoP) is defined by Wenger *et al.* (2002) and Hackett (2002) as a group of individuals who share particular practices, interests, concerns, tacit

knowledge and information through social interaction on an on-going basis. Participation in a CoP therefore requires a commitment from members to share and utilise their collective tacit knowledge and collaborate via social networks that can exist both inside and outside the firm's boundaries (Ruikar *et al.*, 2009; Wenger *et al.*, 2002).

2.9.7: Collective Organisational Knowledge and Intelligence

CoPs make a valuable contribution to collective organisational knowledge and intelligence (Ruikar *et al.*, 2009), as illustrated in Figure 2.5 below.

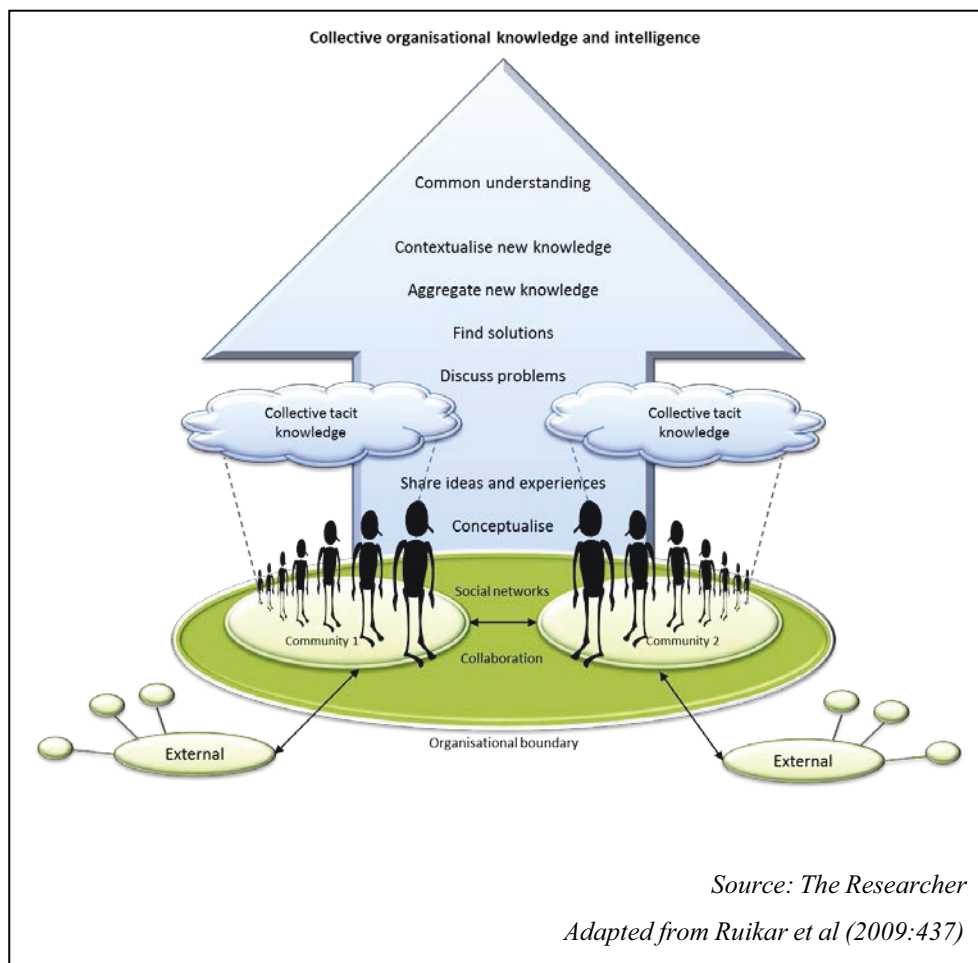


Figure 2.5: CoP Contribution to Collective Organisational Knowledge and Intelligence

As Figure 2.5 shows, CoPs can be a dynamic and versatile resource and enhance the firm's ability to learn and propensity to innovate (Wenger, 1998). CoPs are tied together by a common sense of purpose and a need to know what each other knows. By collaborating intraorganisationally, CoPs can share knowledge, ideas and experiences and solve problems through engaging in dialogue (*ibid*). The discourse involved in this process leads to the aggregation, contextualisation and creation of

new knowledge, which can then feed the organisational knowledge pool (Ruikar *et al.*, 2009) and importantly be a source of specialist knowledge for NPD (Goffin and Koners, 2011). One could argue that this process could develop double-loop learning (Argyris, 1999), insofar as the firm moves towards questioning, challenging and modifying, among other things, existing norms, goals and objectives (McLean, 2009).

2.9.8: How Communities of Practice Develop

CoPs are not static or stable entities and therefore cannot be formed in a conventional sense (Roberts, 2006). A CoP can also take the form of a product council (Bresman *et al.*, 2010; Karlsson and Åhlström, 1997), which is defined by Fitzgerald *et al.* (2013) as a body whose purpose is to set overall objectives for new products, approve key phases in the NPD process and make relevant strategic decisions. Council membership can include representatives from the Senior Management Team, R&D, Sales and Marketing and Quality.

While a firm can establish a team to complete a particular project, which may subsequently go on to emerge as a CoP, managers cannot establish one (Roberts, 2006). Instead, they can enable its spontaneous emergence and devise appropriate strategies to support any communities that develop. Wenger (1998:2) and Wenger *et al.* (2002:69) propose that CoPs develop in the following way, as illustrated in Figure 2.6.

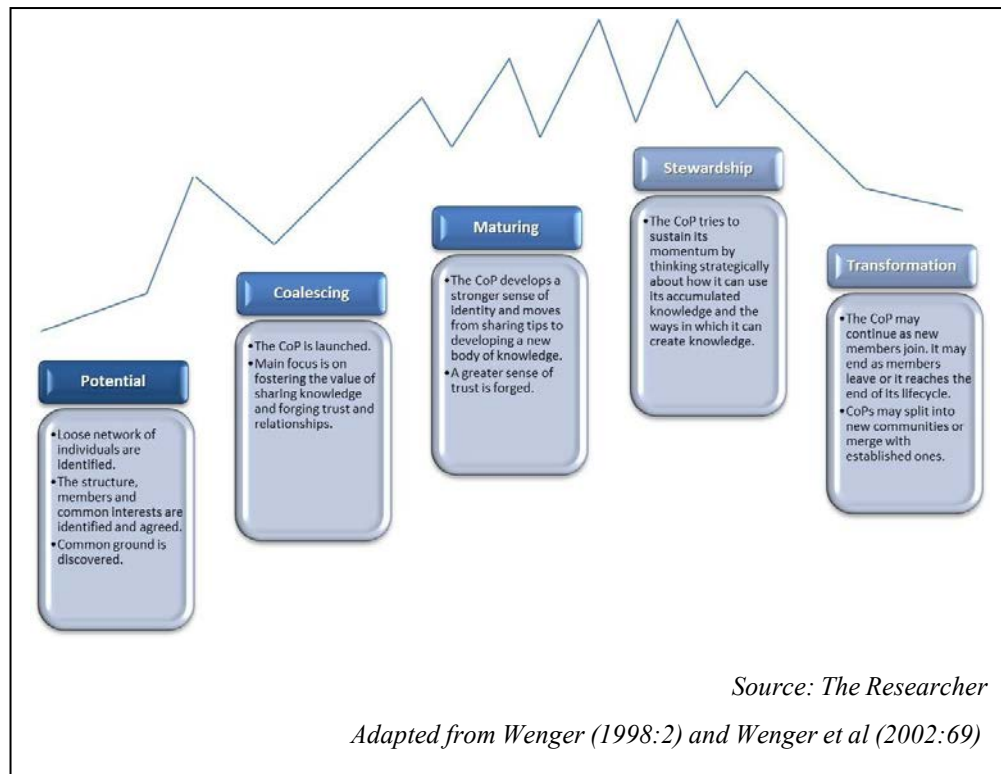


Figure 2.6: Stages of CoP Development

As Figure 2.6 demonstrates, the jagged line represents the peaks and troughs that the CoP goes through during its life cycle (Wenger *et al.*, 2002). Whether or not it survives beyond transformation may be within the gift of the Senior Management Team (Roberts, 2006), particularly if they are cultivated, leveraged and utilised for strategic advantage (Wenger *et al.*, 2002). CoP or indeed product council survival could further be dependent on its type and specific objectives, as shown in Table 2.1 below (Tremblay, 2007:71).

Table 2.1: Types of Community of Practice

Aspects	Informal Type A	Supported Type B	Structured Type C
Objective	Provide a discussion forum for people with affinity of interest or needs within their practice.	Build knowledge and capability for a given business or competency area.	Provide a cross-functional platform for members who have common objectives and goals.
Affiliation	Self-joining or peer invited.	Self-joining, member invited or manager suggestion.	Selection criteria outlined. Invited by sponsors or members.
Sponsorship	No organisational sponsor.	One or more managers as sponsors.	Business unit or senior management sponsorship.
Mandate	Jointly defined by members.	Jointly defined by members and sponsor(s).	Defined by sponsor(s) with endorsement of members.
Organisational support	General endorsement of communities of practice. Provision of standard collaborative tools.	Discretionary managerial support in terms of resources and participation. Supplemented array of tools and facilitation support.	Fully-fledged organisational support on the same basis as organisational segments. Budget allocation is part of business plans.
Infrastructure	Most likely meets face-to-face; primary contact. As a means of communication for secondary contact.	Uses collaborative tools. Meets face-to-face on a regular basis.	Uses sophisticated technological infrastructure to support collaboration and store knowledge objects generated in the community. Highly enabled by technology.
Visibility	So natural that it may go unnoticed.	Visible to colleagues affected by the community's contribution to practice.	Highly visible to the organisation through targeted communication efforts that are stewarded by sponsors.
<p style="text-align: right;"><i>Source: The Researcher Adapted from Tremblay (2007:71)</i></p>			

Theorists suggest that firms are increasingly seeking to develop, nurture and support CoPs as part of their knowledge management strategy (Wenger *et al.*, 2002; Wenger and Snyder, 2000) and product councils as part of their product development strategy (Karlsson and Åhlström, 1997), particularly if they are Types B and C. Furthermore, Wenger *et al.* (2002) advocate that in many firms, CoPs are being recognised as a supplementary organisational form, as indicated in Type C.

2.9.9: Characteristics of a Community of Practice

Regardless of the type of CoP that exists in firms (as outlined in Table 2.1) they all share a number of basic characteristics, three of which have been cited by Wenger (1998) as fundamental to community cohesiveness. First, joint enterprise can be described as the metaphorical glue that binds the community together. This includes their reasons for wanting to interact with each other and the goals they want to achieve as a collective (Dalkir, 2005). The researcher would argue that the level of joint enterprise may vary dependent on the type of CoP that evolves, i.e., whether it is purely informal (Type A) or one that forms part of the firm's knowledge management or product strategy (Type C). Second, mutual engagement encapsulates the way in which members become part of the community, which includes agreeing to carry out particular roles and responsibilities and adhering to CoP rules (ibid). Again, it is argued that the depth of mutual engagement could depend on the formality and overall objectives of the CoP and the engagement with, and sponsorship by, the Senior Management Team.

Finally, shared repertoire incorporates the shared workspace, which could be virtual (Ardichvili *et al.*, 2003); in which case, CoP members can communicate with each other and share knowledge through an intranet, technical blog (user generated content; Akehurst *et al.*, 2011) or shared meeting places, where both social and human capital can be created by them (Bontis, 1998). Arguably, the formality of the CoP, coupled with the provision of an appropriate infrastructure, would depend on the type of CoP (Type A, B or C) and the extent to which its outcomes (collective tacit and organisational knowledge) are leveraged for competitive advantage.

2.9.10: Benefits of a Community of Practice in the Firm

In addition to enabling the socialisation, externalisation and internalisation of knowledge (Nonaka and Takeuchi, 1995), increased knowledge flows and enhanced innovation and creativity through the utilisation of collective organisational knowledge (Ruikar *et al.*, 2009), CoPs can yield the individual, community and firm a myriad of benefits (Allee, 2002; Wenger and Snyder, 2000), as highlighted in Figure 2.7 below.

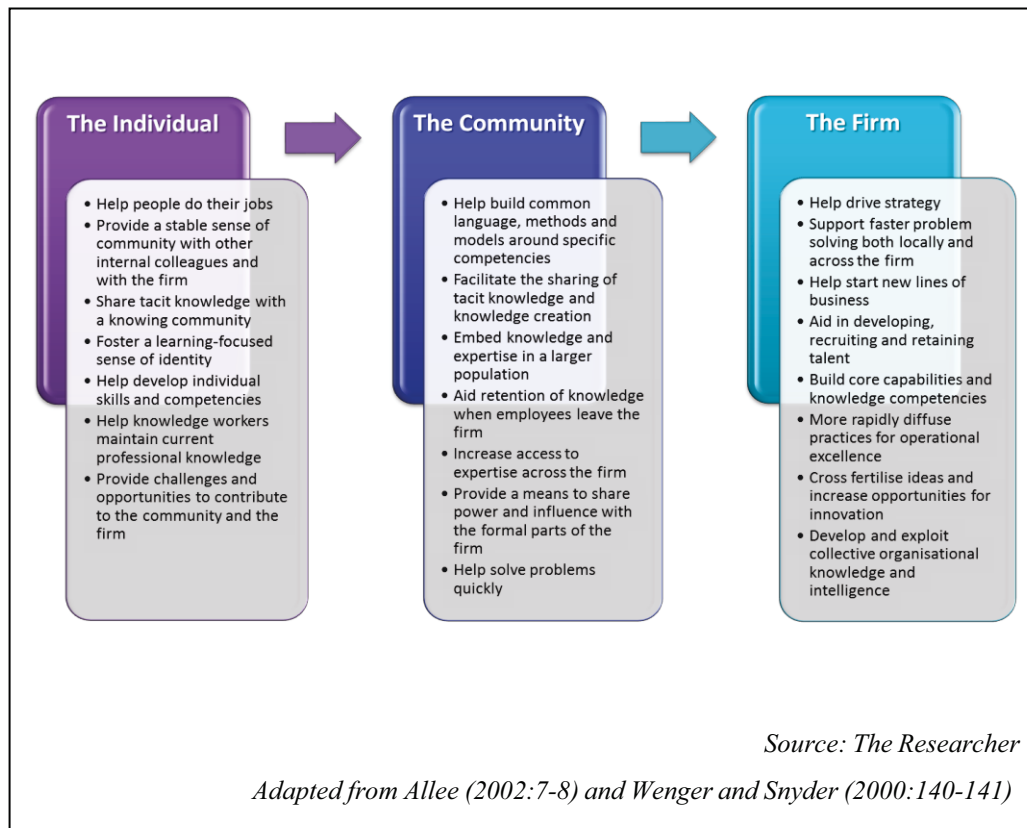


Figure 2.7: Benefits of a Community of Practice

While the benefits that can be yielded are considerable, Wenger and Snyder (2000) caveat that CoPs must be cultivated by first identifying ones that have the potential to enhance the firm's strategic capabilities, particularly to support knowledge sharing in firms that are geographically-distributed, through the use of social media (Annabi and McGann, 2013). Second by providing an infrastructure that facilitates the effective application of CoP members' specialist knowledge and expertise (Cross and Sivaloganathan, 2007). In doing so, Wenger and Snyder (2000) believe that CoPs will remain the new organisational frontier.

2.9.11: Potential Problems with a Community of Practice

While theorists such as Wenger *et al.* (2002) and Bolisani and Scarso (2014) advocate the benefits of CoPs, Hislop (2009) and Roberts (2006) caveat that their presence and evolution comes with its own set of tensions. Roberts advises that firms cannot ignore the impact of power dynamics within a CoP and how it could adversely affect the creation and dissemination of knowledge. Unequal distributions of power between different experts, established members and newcomers, may result in power conflicts (Lave and Wenger, 1991), which could disable the effective management, dissemination, sharing and utilisation of specialist knowledge and the way in which

ideas are generated for NPD. Furthermore, Roberts (2006) suggests that a lack of trust, mutual understanding and familiarity, all of which are developed within individuals' social and cultural contexts, may disable how tacit knowledge is transferred and shared.

Furthermore, Hislop (2009) advocates that a disabler of the effective evolution of CoPs within firms is senior management hostility and 'fear' that they may undermine established formal systems and structures. CoP effectiveness may further be blinkered by members transmuting into exclusive 'cliques' or clubs (Wenger *et al.*, 2002) because of the strong sense of identity that has been developed over time. The researcher would argue that this may, again, serve to disable the generation of ideas for activities such as NPD and lead to the CoP becoming "*poor at absorbing new, external knowledge and ideas*" (Hislop 2009:179). Based on this thinking, Roberts (2006) counsels firms to develop additional mechanisms to manage tacit knowledge, as the concept may not always serve to be an appropriate knowledge management tool.

2.10: Summary of Knowledge Management Models

The models presented in this section illustrated a snapshot of the diverse concepts that pervade within the epistemology of possession (knowledge category capital model) and the epistemology of practice (socially constructed model). Such models enable us to "*put the disparate pieces of the puzzle together in a way that leads to a deeper understanding of both the pieces and the ensemble they make up*" (Dalkir, 2005:72). Although knowledge management models represent the way ahead for knowledge-intensive firms, (ibid), they are by no means a panacea. On that note, McAdam and McCreedy (1999:95) attest that they should be used with caution, as they do not necessarily represent "*objective representations of reality.*"

Part Three: The Context of New Product Development

New product development has been described as one of the most critical and important activities for firms (Zhen *et al.*, 2013). In the global knowledge economy, which is characterised by increased consumer demand for novel products and shorter product lifecycles, the development and launch of new products has become a corporate mainstay for firm growth and survival (Shankar *et al.*, 2013). Firms are therefore challenged to launch new products to market better and faster than their competitors in order to maintain their competitive edge (Goffin and Koners, 2011).

2.11: New Product Development: A Knowledge-Creating Activity

As well as being an organisational and strategic necessity (Acur *et al.*, 2012; Craig and Hart, 1992), NPD is both a knowledge-intensive and knowledge-creating activity (Goffin and Koners, 2011; Nonaka and Takeuchi, 1995), within which knowledge plays a central role (Yu *et al.*, 2014; Shankar *et al.*, 2013). This further challenges senior management teams to not only stimulate innovation within their firms but also engender an environment that is conducive to the creation and utilisation of organisational (tacit and explicit) knowledge (Richtnér and Åhlström, 2010).

2.11.1: Defining New Product Development

The task of identifying a salient definition of NPD was not an easy one for the researcher. Often subsumed, buried deep within the annals of research and literature proffered in the mid to late eighties and nineties, the term ‘new product development’ is often used as a pseudonym for innovation. Delving beneath the surface, the researcher identified that new product development is innovation; but innovation is not necessarily new product development. However, Barclay and Benson (1990) empathise with the researcher’s plight and note that the iterative and inherently complex nature of NPD makes it difficult to define. Craig and Hart (1992) counsel that a variety of terms are used to describe the NPD process, including innovation and design. Significantly, they propose that it is used interchangeably with innovation, to reflect their interdisciplinary and symbiotic nature. As the following definitions of NPD and innovation suggest, there are subtle nuances between them.

NPD is defined as the process of bringing a new product or service to market, including how it is designed, created and marketed (Stark and Brierly, 2009). Taha *et al.* (2011) view it as the complete process of identifying a market opportunity, creating a product that appeals to said market and then testing, modifying and refining it until it is ready for the production stage. As both definitions suggest, NPD comprises of a myriad of multifunctional, transformational and dynamic market-driven activities that are conducted by a firm in order to satisfy customers’ needs and wants and deliver successful products to the marketplace for survival and competitive advantage (Browning and Ramasesh, 2007; Ilori *et al.*, 2000).

The ‘new’ in new product development is highlighted by Cetindamar *et al.* (2010), who state that products can be:

- Completely new: new to the firm and market,
- New to a particular market, but not the firm ('repositioned' products), and
- Neither new to the market, nor the firm: incremental changes are made to the product.

Whether products are depicted as new, repositioned or incrementally changed, Lehmann and Winer (2004) advocate that NPD activities form part of the overarching process of innovation management.

2.11.2: Defining Innovation

The advent of the Industrial Revolution in the eighteenth century catalysed the widespread innovation of technologies, processes, products and services and changed the economic landscape of societies around the world forever (Burnes, 2004; Carlaw *et al.*, 2006). The scale of innovation experienced during that period has not slowed down. The intensification of global competition, coupled with the need to locate and penetrate new markets with novel products and services has challenged firms to develop innovation strategies that will not only respond to macro environmental changes but also take into consideration the needs and expectations of a variety of stakeholders (Dasgupta and Gupta, 2009). The importance of innovation to firms is highlighted by Drucker (2011:149), who cautioned *"an established company...which is not capable of innovation, is doomed to decline and extinction."*

Adopting the knowledge-based view, Freeman (1982) cited in Narvekar and Jain (2006:174), defines innovation as *"the use of new knowledge to offer a new product or service that customers want."* This supports the view that innovation is both a knowledge creating process (Nonaka and Takeuchi, 1995) and learning process *"in which valuable ideas are transformed into new forms of added value for the organisation and its stakeholders"* (Dasgupta and Gupta, 2009:206); a theme that resonates throughout this thesis. Finally, McAdam and McClelland (2002:87) view it as a *"process where ideas are generated and transformed into implementable business products."* Drawing the definitions together, Zhuang *et al.* (1999) conclude that innovation can be characterised as:

- a. An invention or creation of something entirely new,
- b. An improvement or refinement of what has been developed, or

- c. The diffusion or adoption of an innovation developed elsewhere.

Parallels can be drawn between the above typology and Cetindamar *et al.*'s classification of NPD; thus reinforcing Craig and Hart's view that innovation and NPD are interchangeable, dynamic and complex processes.

From a definitional perspective, NPD closely resembles the innovation process (Gerhard *et al.*, 2008). However, the researcher would argue that rather than both concepts being interchangeable, innovation is the overarching, managing *process* and NPD is just one of the possible *outcomes* of the innovation process. For this purpose, this thesis will focus on NPD as an outcome, within the wider context of innovation management.

2.12: The NPD Process: Models for Best Practice

Over the past three decades, the NPD process has been widely researched by a variety of theorists (Cooper and Kleinschmidt, 2007; Johne and Snelson, 1988; Bertels *et al.*, 2011), by universities, manufacturing companies and consultancy firms (Booz *et al.*, 1982) and from a multiplicity of diverse disciplines, including engineering, business policy, technology management and marketing (Kalluri and Kodali, 2014). Such research has focused on identifying critical success factors and developing product strategies and process-related activities that support NPD (Johne and Snelson, 1988; Cooper and Kleinschmidt, 2007; Cooper and Edgett, 2010).

The NPD process involves a series of activities/stages and decisions (e.g. the Stage-Gate model; Cooper, 2008), which begin from the moment an idea is generated and ends when the product is launched to market or commercialised (Craig and Hart, 1992). Cetindamar *et al.* (2010) attest that the aim of these stages is to capture exploitable knowledge that is created by R&D activities. As well as identifying the factors that influence NPD success or failure, a further strand of NPD research is the espousal of normative models, which recommend an 'ideal' process and descriptive models that unearth and evaluate actual practice (Bigliardi *et al.*, 2013). Such models are aimed at reducing some of the complexity and uncertainty surrounding the process and providing firms with a sense of structure and useful roadmaps to guide their NPD activities, from ideation to commercialisation and successful launch to market (Baker and Hart, 2007; Bigliardi *et al.*, 2013). An evaluation of all these models is not the remit of this thesis. Thus, the following section will focus on exploring two of the

most widely cited models, which showcase the NPD process as a series of pre-determined stages and interrelated activities (Avlonitis and Papastathopoulou, 2001). These are the Booz, Allen and Hamilton (1982) Eight-Stage Model and the Cooper and Kleinschmidt (1986) Process Model.

2.12.1: The Booz, Allen and Hamilton Eight-Stage Model

The seminal NPD model, proposed by management consultants Edwin Booz, James Allen and Carl Hamilton is, without doubt, *the* model upon which all others are based (Avlonitis and Papastathopoulou, 2001). The activity-stage model, which focuses on actual activities carried out during the NPD process (Trott, 2005), was created in 1968 and modified in 1982, following a ground-breaking study of over 700 Fortune 1000 companies in the US (Zirger and Maidique, 1990). Originally a seven-stage model (Barclay and Benson, 1990), an eighth component, new product strategy, was added to the front-end of the process, in response to further empirical research and to symbolise the importance of strategic input from the firm to guide its NPD efforts (Baker and Hart, 2007). The Booz *et al.* (1982) model is illustrated in Figure 2.8.

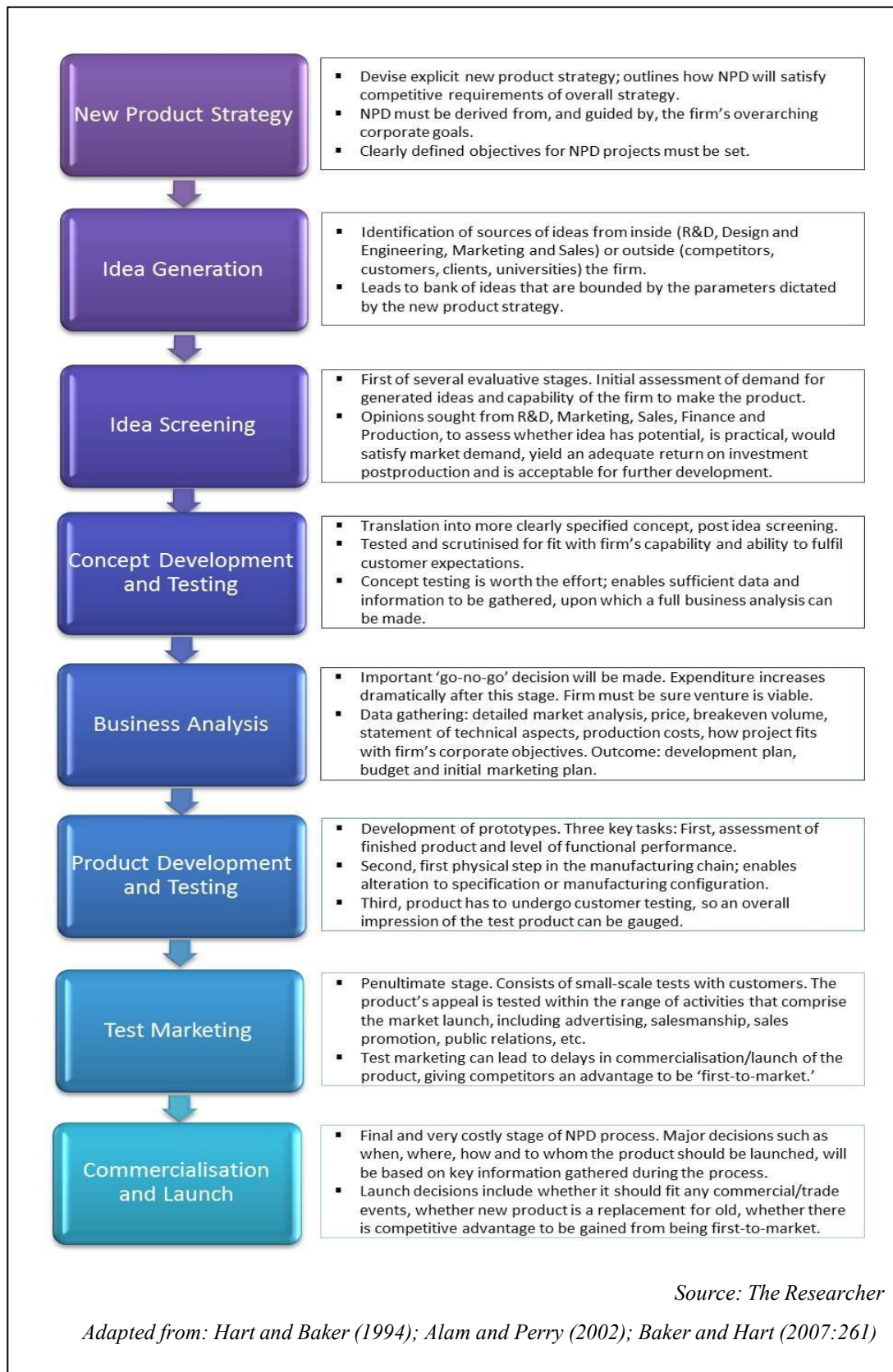


Figure 2.8: The Booz et al Eight-Stage NPD Model

Figure 2.8 illustrates the sequential activities that firms can use to guide the execution of their NPD projects. It also emphasises the cross-functional, multi-disciplinary

nature of the NPD process and, importantly, the systemic role functions such as Marketing play in the overall procedure (Drechsler *et al.*, 2013).

Although Booz *et al.*'s pioneering research identified the important contribution that a formal and structured NPD process makes to successful new product performance (Wang and Lee, 2011; Cooper and Kleinschmidt, 1991) and despite the fact that the model has influenced the espousal of a raft of similar models (Biemans, 2003), it and other frameworks in the genre have been subject to a number of criticisms. First, King and Anderson (2002) question whether the NPD process traverses through such discrete stages. Second, Pelz (1983) suggests that although it is possible for activities within the process to progress in a linear fashion, this only occurs in a limited number of cases. More often than not, NPD activities can coincide and overlap, although sequentially-performed NPD activities may catalyse long development lead times, increased costs and communication problems (*ibid*; Clark and Fujimoto, 1991). Negativity aside, De Jong *et al.* (2003) maintain that activity-stage models illustrate NPD as a gradual uncertainty-reduction process, which moves through the stages of problem-solving, scanning, selection and implementation.

2.12.2: The Cooper and Kleinschmidt NPD Process Model

Cooper and Kleinschmidt (1986) profess that the development of new products is critical to the growth and prosperity of most firms. However, they caveat that product innovation is dogged by high risk and equally high probability of failure. In 1985, research undertaken in 123 firms with senior management and managers, who had the most responsibility for NPD, sought to answer three specific questions (p73):

- What happens as a new product moves from idea to launch? What occurs within each stage of the process – what do people do?
- How well are the tasks or activities undertaken and what improvements are needed?
- What is the impact of each of these activities on project outcomes: commercial success or failure? Does excellence in each of these tasks really matter?

The interviews were carried out in three stages. Stage one required respondents to give a detailed account of NPD projects that took place in their company, from idea to launch. Stage two involved asking respondents to report on thirteen activities they

believed comprised the NPD process, based on brief descriptions they were given of each activity. The thirteen-stage process, as outlined in Table 2.2 below, was designed from empirical and normative based descriptions of the NPD process, including Booz *et al.* (1982) and Cooper (1984).

Table 2.2: Cooper and Kleinschmidt New Product Process Activities

Activity	Description
1. Initial screening	The initial go/no go decision where it was first decided to allocate funds to the proposed new product idea.
2. Preliminary market assessment	An initial, preliminary, but non-scientific, market assessment; a first and quick look at the market.
3. Preliminary technical assessment	An initial, preliminary appraisal of the technical merits and difficulties of the project.
4. Detailed market study/market research	Marketing research, involving a reasonable sample of respondents, a formal design, and a consistent data collection procedure.
5. Business/financial analysis	A financial or business analysis leading to a go/no go decision prior to product development.
6. Product development	The actual design and development of the product, resulting in, e.g., a prototype or sample product.
7. In-house product testing	Testing the product in-house; in the lab or under controlled conditions (as opposed to in the field or with customers).
8. Customer tests of product	Testing the product under real-life conditions, e.g., with customers and/or in the field.
9. Test market/trial sell	A test market or trial sell of the product-trying to sell the product but to a limited or test set of customers.
10. Trial production	A trial production run to test the production facilities.
11. Pre-commercialisation business analysis	A financial or business analysis, following product development but prior to full-scale launch.
12. Production start-up	The start-up of full-scale or commercial production.
13. Market launch	The launch of the product, on a full-scale and/or commercial basis; an identifiable set of marketing activities specific to this product.
<i>Source: Cooper and Kleinschmidt (1986:74)</i>	

The results of Cooper and Kleinschmidt's 1985 study found a distinct gap between what the literature espouses and what occurs in practice in respondents' NPD endeavours. For example, only 1.9% of all projects described by respondents included all thirteen stages. In addition, important aspects of NPD, such as conducting a market research study or a detailed business analysis, were only undertaken in less than half the reported projects within the study. Three further key findings from their research

study were identified (Cooper and Kleinschmidt, 1986:84-85); these may resonate with the researcher's investigation. First, individuals (knowledge workers) undertaking tasks relating to developing new products, and doing them well, make a strong contribution to the process. Cooper and Kleinschmidt noted that the outcomes of NPD projects are very much in the hands of knowledge workers and, arguably, the specialist knowledge they utilise in traversing the project from ideation to launch.

Second, many of the respondents reported the absence of an NPD process or if there was a procedure, there were "*glaring deficiencies*" (p84). Cooper and Kleinschmidt (1986) advocate the need for a disciplined NPD process model, similar to the one highlighted in Table 2.2, which can be tailored to the specific needs of the firm. It would not only ensure key stages are not omitted but also enable sufficient resources, such as specialist knowledge, to be allocated to various activities (Castellion, 2005; Empson, 2001; John and Snelson, 1988; Cross and Sivaloganathan, 2007). Third, a recurring theme from the study was the need for more human resources, time and money to be allocated to various stages of the NPD process, including key marketing activities such as undertaking market studies, initial screening and preliminary market assessment. Such activities are a major influential factor of firm performance, even more so than R&D (Drechsler *et al.*, 2013).

2.12.3: Critique of the Process Model

Although Cooper and Kleinschmidt's model presented what appeared to be a robust blueprint against which firms could benchmark their NPD activities, Millson (2012) notes that the model, unlike Booz *et al.* (1982), does not include new product strategy and idea generation. Despite their model being proffered in 1982, Booz *et al.* advocate that all NPD projects should be overarched and underpinned by the firm's corporate goals and strategies. They suggest that all other activities lead directly from the new product strategy and the firm's overall strategy. However, further empirical research conducted by Cooper and Kleinschmidt (e.g. 1987; 1995; 2007) has sought to refine their model and enhance the systematic ways in which firms can utilise the results of empirical studies to develop different approaches, guidelines and blueprints for implementation that can be applied to idiosyncratic NPD processes (Hart and Baker, 1994; Ahmed and Shepherd, 2010).

2.13: Summary of NPD Models

The Booz *et al.* (1982) and Cooper and Kleinschmidt (1986) models are useful to firms, insofar as they capture the essence of the scale and magnitude involved in developing and launching a new product to market (Cooper, 2008; Baker and Hart, 2007). While they are often criticised for not being generalisable or applicable to specific situations (ibid) “*no single model will perfectly fit the niceties of innovation*” (De Jong and den Hartog, 2003:24). One could argue that the progression from each stage of the NPD process could have the potential of creating new knowledge, particularly when project managers, gatekeepers and multidisciplinary/multi-functional teams engage in dialogue (tacit knowledge; Nonaka and Takeuchi, 1995; Goffin and Koners, 2011) and consult market and product intelligence (explicit knowledge; Nonaka and Takeuchi, 1995; Drechsler *et al.*, 2013). Either way, Revilla *et al.* (2009) advocate that the process of developing a new product is a knowledge-intensive one; thus, firms can gain competitive advantage by consistently embodying specialist knowledge into new products and technologies (Nonaka, 1991; Bigliardi *et al.*, 2012).

The role of knowledge management in NPD is discussed in the final part of the chapter.

Part Four: Knowledge Management and the NPD Process

The link between knowledge management and innovation is both close and obvious (Cantner *et al.*, 2011). This is reinforced by Moustaghfir and Schiuma (2013) and Pitt and McVaugh (2008), who proffer that extant literature has long portrayed innovation as a knowledge-intensive process and knowledge as a key factor in fostering innovation in the firm.

2.14: The Application of Knowledge Management to Innovation

Du Plessis (2007) claims that a firm’s innovative capability and competitive advantage can be created, built and maintained through the application of knowledge management practices and strategies, along with the integration of internal and external knowledge. The adoption of strategies such as boundary scanning (Pedler *et al.*, 1991) can not only reduce some of the complexity involved in the innovation process, but also enable knowledge to be exchanged, shared, evolved, refined and made available to individuals at the point of need. Shani *et al.* (2003) advocate that the configuration of knowledge management and innovation largely determines how firms

create and exploit new knowledge, leading to the effective design, development and completion of new product projects.

2.14.1: An Epistemological Perspective of Knowledge Management in Innovation

From an epistemological perspective, the role knowledge management plays in innovation can be identified by examining and comparing and contrasting the two perspectives that were critically discussed in Part Two of the chapter: the epistemologies of possession and practice (Cook and Brown, 1999; Hislop, 2009). This is illustrated in Table 2.3 below.

Table 2.3: Epistemological Perspectives of the Role of Knowledge Management in Innovation

Epistemology of Possession	Epistemology of Practice
Knowledge	Knowing
Cognitive model	Community model
People to documents approach. Development of an electronic document system that codifies, stores, disseminates and facilitates the reuse of knowledge	Person to person approach. Development of networks for linking individuals/ knowledge workers, to facilitate the sharing on tacit knowledge
Codification strategy	Personalisation strategy
Explicit knowledge	Tacit knowledge
Knowledge for innovation is equal to objectively defined concepts and facts	Knowledge for innovation is socially constructed and based on experience and practice
Knowledge as object	Knowledge as practice
Knowledge can be codified and transferred through text via ICT	Knowledge can be tacit and transferred through participation in social networks, such as communities of practice, occupational groups and teams. This facilitates the exchange of new product ideas
Exploitation through existing knowledge	Exploration through the synthesis and sharing on tacit knowledge among different social groups and communities, which is critical for a firm's innovation capability
Primary function of knowledge management is to codify and capture knowledge and product development routines, to ensure knowledge transfer adequately takes place	Primary function of knowledge management is to encourage knowledge sharing through networking
Critical success factor is technology for making explicit knowledge accessible and available through knowledge management systems	Critical success factor is trust and collaboration between cross-functional teams (social capital), customers and other key stakeholders (customer/relational capital), which positively impacts on innovation capability. Enables the gathering of collective know-how, which could potentially reduce risk and cost in innovation; thus shortening development cycles and ensuring effective innovation takes place
Explicit knowledge is important to innovation and features strongly in research and development	Tacit knowledge is important to innovation and features strongly in idea generation
Embrained and encoded knowledge	Embodied, encultured and embedded knowledge. Knowledge is embodied in new products
Enhancing exploitation by capturing, transferring and deploying knowledge in other similar situations. This reduces problems of 'reinventing the wheel' by ensuring that existing knowledge is used more efficiently, which is important for innovation	Enhancing exploration, where knowledge is shared, synthesised and new knowledge is created. Exploration, through knowledge sharing, greatly enables the development of genuinely novel approaches in the innovation process
Invest heavily in ICT, in order to connect individuals with reusable, codified knowledge	Invest moderately in ICT, in order to facilitate dialogue/conversation and enable the exchange of tacit knowledge
<p><i>Source: Swan et al (1999:262); Sørensen and Lundh-Snis (2001:86); Blackler (1995); Du Plessis (2007:23-26); Scarbrough (2003); Kim and Kogut (1996); Zahra and George (2002); Hansen et al (1999); McAdam (2000); Bollinger and Smith (2001); Bontis (1998); Nonaka and Takeuchi (1995)</i></p>	

Table 2.3 compares and contrasts the differing epistemological perspectives and visibly demonstrates the important role both epistemologies play in the innovation process. Newell *et al.* (2009) suggest that, a priori, from the knowledge as possession

perspective, innovation may be facilitated by increased amounts of explicit organisational knowledge. However, they caveat that the preponderance of information may lead to overload and thus reduce the effectiveness of a firm's propensity to innovate. On the other hand, while the virtues of the epistemology of practice appear to outweigh the epistemology of possession, because the individual *is* knowledge and knowledge is subjective, dynamic and highly equivocal (ibid), personality clashes, conflict, power and political interplay may stifle creativity and hinder innovation from taking place.

Individuals may also be tempted to hoard, rather than share, their knowledge, as it provides knowledge workers (individuals who possess the intellectual capability, expertise and aptitude to create and utilise knowledge to generate ideas and develop new products; Markova and Ford, 2011) with a sense of power (Newell *et al.*, 2009). A key solution to this may be to adopt a hybrid approach to applying knowledge management to innovation, by bridging epistemologies and creating a generative dance between knowledge and knowing (Cook and Brown, 1999:393) as it is "*the source of innovation.*" They profess that the generative dance between knowledge and knowing not only generates new knowledge but also novel ways of using knowledge, which the knowledge as possession perspective, on its own, cannot do.

2.15: Models of Knowledge Management and Innovation

During a critical review of knowledge management models earlier in this chapter, the researcher identified two models that may support the development of new products within the firm: the SECI model (Nonaka and Takeuchi, 1995; epistemology of possession) and the Communities of Practice model (Wenger *et al.*, 2002; epistemology of practice). Both will now be examined in terms of the ways in which they enable and support the development of new products.

2.15.1: The SECI Model: Knowledge Creation

As highlighted throughout this chapter, the generation or creation of knowledge has become one of the most prominent and important issues in business (Rasmussen and Nielsen, 2011). The knowledge-based view of the firm advocates that firms have the ability to exploit, explore, protect, leverage and create *new* knowledge to support the development of innovative, novel products (Madhavan and Grover, 1998; Goffin *et al.*, 2010; Wild and Griggs, 2008; Nonaka *et al.*, 2000). To recap, Nonaka and Takeuchi (1995) contend that organisational knowledge creation occurs when the four

modes of knowledge creation (socialisation, externalisation, combination and internalisation) ‘spiral’ to enable a generative dance (Cook and Brown, 1999) and continuous interaction (Nonaka, 1994) between tacit and explicit knowledge. Such interplay has empowered innovative Japanese firms, such as Honda, Sharp and Matsushita, to successfully create new markets, quickly respond to customers, dominate emergent technologies and increase the speed at which they develop new products (ibid). The ways in which the SECI model can enable and support the NPD process is illustrated in Figure 2.9.

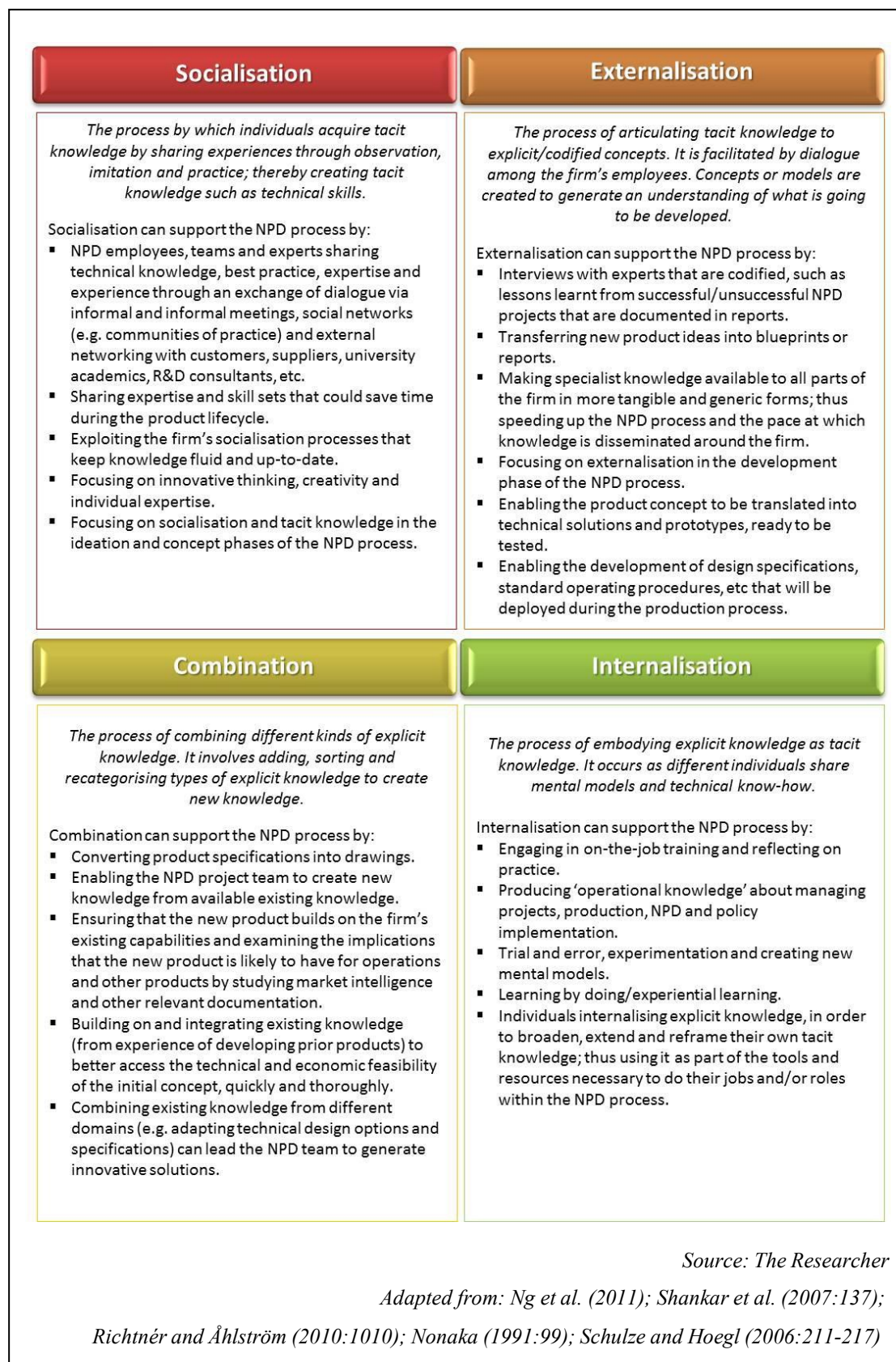


Figure 2.9: The SECI Model and Innovation

As Figure 2.9 demonstrates, the four modes of knowledge creation play their own unique role in enabling the efficient and effective application of the NPD process. This is supported by research conducted by Schulze and Hoegl (2006) and Ng *et al.*

(2011). Their findings suggest that socialisation, combination and internalisation are the greatest influence on the NPD process. For example, socialisation is most useful to NPD teams during the idea generation and concept phases, while combination underpins the technical development phase (Schulze and Hoegl, 2006). Ng *et al.* (2011) contend that the conversion from explicit to tacit knowledge (internalisation) produces ‘operational knowledge’ or action-oriented technical know-how, which NPD teams can share and apply to a variety of activities within the NPD process.

One could argue that this facilitates double and triple loop learning (Argyris and Schön, 1978), whereby NPD teams use explicit organisational knowledge of past NPD successes and failures to question why mistakes were made and generate ideas as to how the process could be improved in future. This engenders cultural, strategic, operational and behavioural change and encourages individuals to learn how to learn through trial and error, experimentation and experiential learning (Senge, 1990; Kolb *et al.*, 1971).

To summarise, Schulze and Hoegl (2006) counsel that managers and NPD teams should develop an awareness of how each knowledge creation mode influences various stages/phases of the NPD process. This, they attest, will enable team members to select and deploy the ‘right’ type of knowledge to support the idiosyncratic (Hart and Baker, 1994; John and Snelson, 1988) and often chaotic (Cooper, 1990) NPD process within firms.

2.15.2: Communities of Practice and Innovation

The second knowledge management model that may support the development of new products within the firm is the concept of communities of practice. To reiterate, a CoP is a group of individuals who share particular interests, information and tacit knowledge and to nurture new knowledge to stimulate innovation (Hackett, 2002). The benefits of the CoP is widely empiricised in extant literature (Annabi and McGann, 2013; Allee, 2002; Wenger *et al.*, 2002). Theorists such as du Plessis (2008) and Bertels *et al.* (2011) espouse that CoPs are a vital source of innovation due, primarily, to the focus on tacit knowledge sharing and the creation of new knowledge. Table 2.4 illustrates the ways in which CoPs can enable innovation/NPD within firms.

Table 2.4: Communities of Practice and Innovation

Supporting Innovation with a Community of Practice
A community of practice can support the innovation/NPD process by:
<ul style="list-style-type: none"> ▪ Each CoP member bringing a unique knowledge base and skill set the community. It is then shared to create a wider body of knowledge and skills that enable knowledge creation and innovation across the firm.
<ul style="list-style-type: none"> ▪ Facilitating the cross-fertilisation of ideas and knowledge between different experts involved in the NPD/innovation process. This then acts as a catalyst for innovation.
<ul style="list-style-type: none"> ▪ Enabling the application of the knowledge management cycle (creation, sharing, harvesting and leveraging); thus ensuring knowledge is made available to those who need it, when they need it.
<ul style="list-style-type: none"> ▪ Being utilised at the beginning of the NPD process, as activities such as idea generation and concept definition cannot be externalised into explicit knowledge. These stages are reliant on tacit knowledge, gut-feel, intuition, insight and experiential knowledge of prior NPD projects.
<ul style="list-style-type: none"> ▪ Facilitating the exchange of tacit knowledge through conversations and storytelling, which serves to increase the cross-pollination of ideas and thus stimulate creativity.
<ul style="list-style-type: none"> ▪ Being deployed to give technical advice on unique problems that are often generated during the NPD/innovation process; advice that would be extremely difficult to pass on via explicit, codified knowledge.
<ul style="list-style-type: none"> ▪ Enabling the rapid flow of information and knowledge and propagation of innovation.
<p style="text-align: right;"><i>Source: Johannessen and Oleson (2011:142); Wenger (1998); Nonaka and Takeuchi (1995)</i></p>

As Table 2.4 demonstrates, one of the key aspects of CoPs is members' engagement in the exchange of tacit knowledge through socialisation; which is a key tenet of Nonaka and Takeuchi's knowledge creation model. Parallels can be drawn between the SECI model and communities of practice, as the key focus is on tacit knowledge and exploiting it as an organisational and strategic resource (Leal-Rodríguez *et al.*, 2013). Furthermore, as tacit knowledge is highly idiosyncratic (Dixon, 2000), is embodied and embrained (Blackler, 1995) and is deeply rooted in individuals' experiences, values and ideas (Gourlay, 2002), it has the potential to be explored, in order to increase the firm's propensity to create new products (Edvarsson, 2008).

To summarise, CoPs are a primary source of innovation within the firm, due to the focus on the exchange of both cognitive and technical tacit knowledge (Gore and Gore, 1999; Sternberg, 1997), which can be utilised in various key stages of the NPD process. Moreover, although the knowledge creation and communities of practice models may support the NPD process within firms, De Jong and Den Hartog (2003:24) caveat that "*no single model will perfectly fit the niceties of innovation.*"

2.16: Chapter Summary

This chapter has sought to contextualise and conceptualise knowledge management and the role it plays in supporting the NPD process within firms. By framing the concept under the umbrella of the knowledge economy and knowledge-based view of the firm, it highlighted the importance of knowledge as a commoditable resource and a key driver of a firm's competitiveness. As innovation and NPD are heavily dependent upon knowledge, knowledge-intensive firms are therefore challenged to create, disseminate, leverage and manage individual and organisational knowledge through the use of knowledge management strategies, such as codification and personalisation, to support these key processes.

As the chapter has also illustrated, firms can utilise a variety of both knowledge management and NPD models to enhance their propensity to innovate and develop new products. The Booz *et al.* (1982) and Cooper and Kleinschmidt (1986) models stressed the importance of deploying disciplined NPD processes, to ensure key resources, such as specialist knowledge workers, are allocated to specific projects. These models can be adapted and utilised according to each firms' individual and idiosyncratic context. The important use of tacit knowledge in innovation and NPD was also showcased as an organisational necessity. On this note, socialisation through the SECI and community of practice models can ensure that knowledge is kept fluid and gestating, through face-to-face contact and exchange of dialogue.

To conclude, knowledge management plays a pivotal role in the innovation/NPD process within firms. It enables the generative dance between knowledge and knowing, the utilisation of tacit and explicit knowledge and their application to the development of new products. The facilitation of a knowledge-driven culture, in which innovations, including new products, can be incubated and creative thinking and knowledge generation and sharing can be nurtured, is vital. Overall, this is highly beneficial to innovation programmes, insofar as it recognises and exploits knowledge as a strategic resource and therefore develops products that are competitively advantageous to firms.

The next chapter critically examines the influencing mechanisms of knowledge management and NPD.

Chapter 3

The Influencing Mechanisms of Knowledge Management and NPD

Chapter 3

The Influencing Mechanisms of Knowledge Management and NPD

*As the soil, however rich it may be, cannot be productive without cultivation,
so the mind, without culture, can never produce good fruit.*

Seneca, Roman Senator (60BC – cAD37)

3.1: Introduction

The previous chapter contextualised and conceptualised knowledge management and NPD. This chapter critically reviews extant literature underpinning the organisational variables that enable and disable the management of knowledge in the development of new products.

3.2: Organisational Infrastructure

As this thesis has highlighted, the NPD process has been described as a knowledge-intensive, knowledge-creating activity and is thus heavily dependent upon the knowledge stored or embedded in individuals' minds and in firms' existing products (Goffin and Koners, 2011; Goffin *et al.*, 2010; Yu *et al.*, 2014; Belassi *et al.*, 2007). As such, firms should place an emphasis on creating the right conditions that enable knowledge management to support not only the generation, sharing and utilisation of knowledge but also the innovation process and the speed at which valuable, rare, inimitable and non-substitutable new products are launched to market ahead of competitors (Lin, 2014; Shani *et al.*, 2003). In order to facilitate this, Esterhuizen *et al.* (2012), Holsapple and Luo (1996), Lee and Choi (2003) and Stonehouse and Pemberton (1999) advocate the design and implementation of a supportive infrastructure, which facilitates the supply of the right knowledge to the right people at the right time (O'Dell and Grayson, 1998), to engender its management and leverage for competitive advantage (Lin, 2014; Edvarsson, 2008; Shani *et al.*, 2003).

3.1.1: Defining Organisational Infrastructure

Like knowledge, knowledge management, innovation and NPD, organisational infrastructure has a multiplicity of meanings. First, Holsapple and Luo (1996) describe it as the skeleton and backbone of the firm, which is underpinned by a foundation of structure, roles, relationships and regulations that enable it to realise its objectives and,

importantly, contribute to the innovation of new products, services and processes. In a similar vein, Henderson and Venkatraman (1993) suggest that a firm's infrastructure also regulates the ways in which decisions are made to support its strategic orientation, how information flows and to whom, and how the skills and competencies of its human resources are developed and utilised to accomplish organisational activities. Holsapple and Luo (1996) and Migdadi (2009) attest that it is capable of both enabling and constraining what the firm and its members can accomplish.

To this end, Najjaran *et al.* (2014), Meso and Smith (2000) and Davenport *et al.* (1998) advocate that well-developed infrastructures are necessary to successfully implement knowledge management in the firm and enable knowledge to be a source of sustainable competitive advantage (Leal-Rodríguez *et al.*, 2013). Further to the espousal of Holsapple and Luo (1996) and Migdadi (2009), Davenport *et al.* (1998) suggest that organisational infrastructure also defines the firm's philosophy and management style, shapes how the firm's employees are organised into formal and informal teams and identifies team goals and roles and how these relate to the firm's strategy. One could argue that this highlights the importance of knowledge workers to a firm's performance and the specialist individual and collective knowledge they can bring to knowledge-related tasks such as, for example, the development of new products (Kelly *et al.*, 2011; Migdadi, 2009).

Stonehouse and Pemberton (1999) and Allameh *et al.* (2011) caveat that firms who wish to become knowledge-managing, 'intelligent' organisations must configure and synergise a host of infrastructural elements, including strategy, structure, systems, people and processes. If improved and enhanced, they can provide a conducive environment that develops individual and organisational learning and knowledge. These elements are also referred to as 'organisational variables' (Lee and Choi, 2003), the nomenclature of which will be adopted throughout the rest of this thesis.

3.3: The Organisational Variables

As highlighted in Chapter 1, organisational variables are referred to as the enablers or influencing mechanisms that systematically and consistently foster, stimulate, protect and facilitate the creation, sharing, development and management of knowledge within firms (Ichijo *et al.*, 1998; Yeh *et al.*, 2006; Lee and Choi, 2003; Magnier-Watanabe *et al.*, 2011). Migdadi (2009) and Poolton and Barclay (1998) describe the variables as 'critical success factors', insofar as they are the driving force in

implementing knowledge management initiatives and the essential building blocks for improving the effectiveness of the processes and activities that govern the way in which knowledge is managed and new products are developed within the firm. Ho (2009) and Yeh *et al.* (2006) advocate that the enablers are focused on building an infrastructure that supports both knowledge management and NPD by integrating and synergising the variables to promote organisational and process improvement.

Having conducted a literature search adjunct to the exercise that was outlined in Chapter 1, the researcher identified the following six variables that most pertained to the context of this research study. These are identified in Figure 3.1.

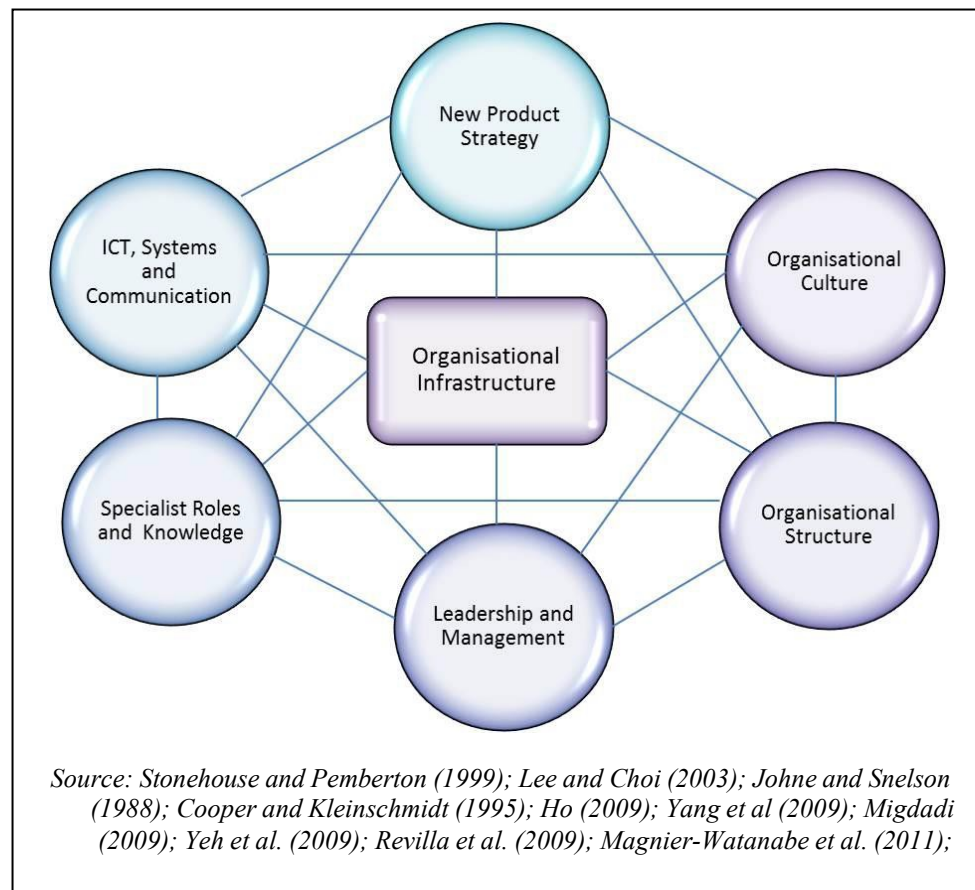


Figure 3.1: The Organisational Variables

A rationale for the choice of variables, as illustrated above, now follows. During the extensive literature search, strategy was identified by Ho (2009), Migdadi (2009) and Yeh (2006) as an enabler, though it was centred on general organisational strategising, rather than being targeted at the innovation of new products. As the research study was framed within the context of NPD, the researcher studied the work of Johnne and Snelson (1998) and Cooper and Kleinschmidt (1995), which showcased new product

strategy as a key feature of the successful development of new products through, for example, the appropriate allocation of material, financial and human resources. Therefore, this variable was selected as the first influencing mechanism.

Second, organisational culture was recognised by numerous theorists in the literature search as having a major impact on knowledge management. However, its effect on NPD was not explicitly identified. In addition, culture is at the heart of everything a firm is and does (Ho, 2009) and can therefore have an enabling or disabling influence on how knowledge is managed (Zheng *et al.*, 2010; Holsapple and Joshi, 2000). Moreover, it can also determine the success or otherwise of NPD (Belassi *et al.*, 2007). Third, organisational structure was only viewed by a fraction of theorists (Magnier-Watanabe *et al.*, 2011; Yang, Marlow and Lu, 2009; Lee and Choi, 2003), as an important enabler. Yet, it is considered to be one of *the* most significant influencing mechanisms (Pertusa-Ortega *et al.*, 2010; Martinez-Léon and Martinez-Garcia, 2011). Furthermore, Ahmed and Shepherd (2010) caveat that structure can considerably impact on a firm's innovation endeavours and capability to meet its stated objectives. Therefore, the researcher felt this was an important aspect of the study. In addition, as an under-researched area, it gave the researcher the opportunity to add to a small but existing body of knowledge.

Fourth, leadership was cited by the majority of authors as an important enabler. However, in some cases, it was categorised alongside strategy (Yeh *et al.*, 2006; Ho, 2009). The researcher opted to use Leadership and Management as the variable, as the roles and responsibilities for the firm span the spectrum of the organisational hierarchy, including middle and senior managers (Ahmed and Shepherd, 2010). At senior and top management levels, management of the firm and its global operations have far reaching consequences for its survival and longevity (*ibid*). Fifth, although Lee and Choi (2003), Yeh *et al.* (2006) and Theriou *et al.* (2009) focused on people as an enabler, they did not present them as knowledge workers, neither did they place an emphasis on their specialist knowledge or the roles they portray, especially in the context of NPD. Therefore, the researcher opted to use Specialist Roles and Knowledge, rather than people, as the nomenclature, as their knowledge and practice are embedded in the new products they contribute to developing (Bigliardi *et al.*, 2012).

Finally, while the majority of theorists focused solely on information technology, this study decided to concentrate on information and communication technology (ICT), systems and communication, to encompass the importance of knowledge management and NPD systems, the dissemination of knowledge using intranets (Barnes and Vidgen, 2012), enabling communication flows through social media and other mediating technologies (Annabi and McGann, 2013) and optimising communication throughout the firm (Welch and Jackson, 2007).

As Figure 3.1 demonstrates, the variables are interconnected and thus share a symbiotic relationship. This means that they can have a significant influence on the symbolic, political and behavioural aspects of organisational life (Sun, 2008; Johnson *et al.*, 2008) and ultimately on how knowledge is managed and utilised to develop new products (Holsapple and Joshi, 2000; Ho, 2009; Johne and Snelson, 1998; Cooper and Kleinschmidt, 1995). To reiterate the points made by the researcher in Chapter 1, the variables are not mutually exclusive and thus do not lend themselves to separate investigation. Lee and Choi (2003) and Gupta and Govindarajan (2000) advocate that examining the variables from a holistic, systems perspective and framing them within relevant theories is a necessity. On that note, each of the variables will now be explored in detail, to assist the researcher make sense of their complexity, rather than to understand “*each and every aspect of that complexity*” (Johne and Snelson, 1988:117).

3.4: New Product Strategy

The advent of hypercompetition, the rapidity of change in the marketplace and technological and scientific advances has resulted in much shorter product lifecycles (Liu *et al.*, 2005). As newly-developed products are more at risk from failure than success (Klingebiel and Rammer, 2014), firms are challenged to continuously innovate by engaging in new product research and developing products with appropriate new technologies, in order to cope with increasingly demanding customers and threats from new competitors entering the market (ibid).

Developing a clear and visible new product strategy, which explicitly defines the goals and role of NPD in the firm’s overall strategy, specifies the new product/technology/market arenas as areas on which to focus and designs the necessary organisation structures for strategy implementation, should be at the forefront of every firm’s strategic activity (Cooper and Kleinschmidt, 2007). Cooper and Edgett (2010)

assert that adopting a new product strategy is essential and is strongly correlated to the achievement of positive innovation performance. Defined as the “*set of choices that developers make when building a plan of action for converting a new product concept into a product*” (Castellion, 2005:29), new product strategy seeks to answer the following questions (op cit):

- Who are the new product’s target customers?
- Which three or four critical benefits of the new product will create enough value for customers to choose to buy the new product, rather than a competitor’s offering?
- How can the firm cost effectively produce these benefits and correctly price the product?

Cooper and Kleinschmidt (2007) add that the adoption or absence of a new product strategy, the way in which it is implemented within the firm and how it is communicated to individuals, has a distinct effect on performance. Results from their research identified that firms who possess an explicit new product strategy achieve more positive performance from the development and launch of new products.

3.3.1: The Allocation of Resources in New Product Strategy

Within the context of new product strategy is the issue of resource allocation. Klingebiel and Rammer (2014) assert that it can be a rather daunting task for a firm’s decision makers and can also have significant ramifications on its viability. A firm’s Senior Management Team must decide the level of funding, if any, it is prepared to assign to strategic NPD initiatives (Hutchison-Krupat and Kavadias, 2013). It becomes a more challenging process because key knowledge about the execution of NPD or other plans is dispersed throughout the various layers of the firm’s hierarchy. This in itself generates significant asymmetries in information between senior management and middle and operational managers, who are often closest to the development and execution of the project and thus have more explicit knowledge of it (ibid).

Cooper and Edgett (2010:38) suggest that the adoption of a viable product portfolio management system can assist the Senior Management Team to allocate financial, material and human resources to the “*right areas and to the right strategic projects.*”

This becomes all the more significant in terms of allocating key knowledge workers to projects because as Ahmed and Shepherd (2010:292) pointed out, “*innovation without people is simply not possible.*” Furthermore, the system also enables NPD projects to be aligned with the firm’s business strategy and gives a further layer of ‘protection’ to ensure that development projects are appropriately prioritised and the Senior Management Team can make certain there is a suitable balance between the number of projects and available resources to support them (Cooper and Edgett, 2010).

In order to assist firms maintain a degree of equilibrium in allocating resources to projects, Cooper and Edgett (2010) and Hutchison-Krupat and Kavadias (2013) suggest the use of strategic buckets, which serve to aid the Senior Management Team in the decision making process regarding resource deployment. Such decisions involve choosing where and how resources should be spent, for example, by market, product or project type or geographical area (Cooper and Edgett, 2010). Breaking it down further, the ‘bucketing’ process commences with an identification of business or corporate strategy. The Senior Management Team then assess the knowledge and information they have at their disposal and make strategic decisions about the amount of resources they feel should go into each bucket. Buckets could be represented by different types of projects, such as new products, improvements and modifications, sales force requests and cost reductions (ibid).

Cooper and Edgett (2010) strongly advocate that utilising the strategic bucket system can enable the allocation of resources to be guided and driven by strategy, allowing each bucket to be ranked and then funded in order of ranking until each one is depleted. Importantly, utilisation of this system mitigates against two buckets such as ‘new products’ and ‘improvements and modifications’ competing against each other. Moreover, it results in not only a more a balanced product portfolio but also ensures that resources are closely monitored and product projects, whether new or modified, reflect the strategic priorities of the firm (ibid).

3.3.2: The Relationship between NP Strategy and Knowledge Management

A new product strategy is an information processing tool, insofar as its formulation is dependent on the integration of cross-functional knowledge capabilities (Clark and Wheelwright, 1993). This involves the creation, dissemination, sharing and utilisation of specialist tacit and explicit knowledge (Nonaka and Takeuchi, 1995). The strategy formation process, albeit strategising for new products, has been recognised by Pedler

et al. (1991) as a learning experience in itself. Their call for a learning approach to strategy, as part of their theory of the learning company, advocates the inclusion of as many people as possible in not only planning for the short, medium and long term future of the firm but also the policy making process; thus ensuring the widest possible range of knowledge is utilised and embedded into new products and services (Goffin *et al.*, 2010; Kirwan, 2013).

3.3.3: Disablers of New Product Strategy

As the NPD process is highly complex, idiosyncratic to each firm (Johne and Snelson, 1988) and knowledge-intensive (Corallo *et al.*, 2009), problems with formulating new product strategy may stem from the firm's ineffective exploitation of cross-functional, specialist knowledge (Castellion, 2005). Attempts to assimilate and coordinate vast amounts of data, which is generated from the NPD process, without appropriate systems support, may disable or hinder how specialist knowledge is accessed, shared and leveraged (*ibid*). A further disabler may be the lack of time managers have to access knowledge and thus are unable to keep up-to-date with developments in their sectors, markets or the wider business environment that may impact on the knowledge required to strategise (Liu *et al.*, 2005).

Castellion (2005) and Cooper and Kleinschmidt (2007) conclude that having a clear and realistic strategy for transforming a product concept into a viable and successful new product is an important part of the firm's NPD endeavours. Further, Castellion advises that people involved in developing the product should also be included in the strategy-making process (Kirwan, 2013); thus generating learning and ensuring the firm maximises the utilisation of cross-functional specialist knowledge and experience.

3.4: Organisational Culture

Organisational culture has been described as the most important input to the successful implementation of knowledge management and a key influencer of a firm's strategy, processes and thus the outcome of its NPD projects (Lopez-Nicolas and Meroño-Cerdán, 2009; Belassi *et al.*, 2007; Park *et al.*, 2004). It can be defined as the shared values, symbols, norms, assumptions, beliefs and attitudes that steer the actions, practices and behaviours of individuals within the firm (Schein, 2010; Goffee and Jones, 2003; Yeh *et al.*, 2006; Stonehouse and Pemberton, 1999; Ho, 2009; De Long, 1997). From this perspective, culture is axiologically important to the firm,

insofar as its core values serve to shape the way individuals think, act and behave towards each other within the firm's context (Lopez-Nicolas and Meroño-Cerdán, 2009; Hislop, 2009; McDermott and O'Dell, 2001). It also determines work systems and structures that could enable or disable collaboration, knowledge creation, sharing and ultimately decision making (Allameh *et al.*, 2011; Janz and Prasarnphanich, 2003). Thus, culture becomes a key influential factor on individuals' propensity to share their knowledge and the way in which knowledge is used to innovate and develop new products (Belassi, 2013; Holsapple and Joshi, 2000; Ho, 2009; Johnne and Snelson, 1988; Cooper and Kleinschmidt, 1995).

3.4.1: Dimensions of Culture

Borrowing heavily from the fields of anthropology and sociology (Dalkir, 2005), culture manifests itself in three layers within the firm (Schein, 1985). The first level, artefacts, describes elements of the firm's culture that are visible, but often unreadable, and difficult to interpret, such as structure and rituals and routines. These artefacts are often referred to as organisational climate (which will be covered later in the chapter), insofar as they are more evident and malleable than other aspects of culture (Clegg *et al.*, 2011). In addition, many of these artefacts are symbolic (Hatch and Cunliffe, 2009) and are thus capable of holding multiple meanings and interpretations by the firm's members.

The second level, espoused values, represents non-visible facets of culture that are encoded in explicit forms, such as mission or values statements (Clegg *et al.*, 2011). At this level, individuals are more aware of the basic assumptions that underpin the firm's culture (Owens and Steinhoff, 1993). The values of the firm are frequently relayed and transferred by small groups of individuals who have regular contact with each other, work together or share knowledge, experiences and ideas (McDermott and O'Dell, 2001). Thus, peer groups and teams are a portal through which individual and organisational expectations are communicated and where key collaboration takes place (Allameh *et al.*, 2011).

Finally, Level 3 encapsulates the invisible, subconscious, taken for granted basic assumptions that in essence, shape individuals' beliefs, norms and perceptions of reality (Clegg *et al.*, 2011; Owens and Steinhoff, 1993). Also known as the firm's paradigm (Johnson *et al.*, 2011), these assumptions are seldom explicitly expressed, but guide and steer individual behaviour and relationships that are developed and

interplayed with others in the firm. Importantly, deep-rooted, perpetuated and pervasive underlying assumptions covertly influence everything the firm is and does (Clegg *et al.*, 2011; McDermott and O'Dell, 2001). As a powerful, cognitive defence mechanism, assumptions can result in challenging, time-consuming and anxiety-provoking culture change (Dalkir, 2005; Clegg *et al.*, 2011). This may have implications for firms wishing to implement knowledge management initiatives (Migdadi, 2009; McDermott and O'Dell, 2001) or develop a knowledge culture (Oliver and Kandadi, 2006).

A framework that enables a deeper understanding of organisational culture is the typology proposed by Goffee and Jones (2003). They suggest that culture is characterised by the extent to which firms display varying levels of sociability (the social interaction, friendliness and collegiality that is expressed by colleagues towards each other) and solidarity (colleagues' shared goals, mutual interests and pursuit of common tasks and objectives). It is based on four types of culture that pervade in firms, each of which can impact on innovation and, importantly, knowledge and information sharing. First, with high sociability and low solidarity, the networked culture is characterised by a sense of friendship, kindness and trust, which facilitates communication across functional areas and between groups. However, the formation of tight cliques, along with organisational politics, can stifle collaboration and lead to the selective dissemination and sharing of information and knowledge.

Second, the mercenary culture is rooted in low sociability and high solidarity, resulting in a clear demarcation between colleagues' work and social lives. Work is the priority, loyalty is low and the focus is on performance and the achievement of objectives and targets. It can enable fast action but may hinder collaboration and the exchange of ideas, information and knowledge that aid innovation. Third, the fragmented culture is characterised by low sociability and low solidarity and manifests itself in colleagues who are unsupportive of each other and their firm's goals and objectives. Although it gives colleagues a modicum of autonomy, flexibility and freedom to work remotely, it can hinder tacit knowledge sharing, creativity and innovation due to the absence of regular meetings or co-location (see Ahmed and Shepherd, 2010: Chapter 3, Section 3.7.7).

Finally, the communal culture is typified by high sociability and high solidarity and is symbolic of the combined networked and mercenary cultures; the result of which is a workforce that is geared towards commitment and high levels of friendship and collegiality. It is characteristic of firms that are at the birth and maturity stages of their lifecycles. Colleagues share the founder's beliefs, enthusiasm and passion for the product, but his/her exit can lead to weakened social relationships. The culture supports high impact innovation that could not be completed without extensive cross-functional teamwork. Goffee and Jones (1996) profess that managers should utilise the framework to develop cultures that support their firm's business environments and, importantly, their innovation endeavours.

3.4.2: The Influence of Culture on Knowledge Management and NPD

As highlighted in extant literature, Dalkir (2005), Hislop (2009), McDermott and O'Dell (2001), Belassi *et al.* (2007), Cooper and Kleinschmidt (1995) and Davenport *et al.* (1998) espouse that culture is a vital linchpin in the success, or otherwise, of knowledge management activities within firms. DeLong (1997) and DeLong and Fahey (2000) identify four ways in which culture influences knowledge management. First, cultures (and sub-cultures) greatly influence what the firm deems as useful, important or valid knowledge. Some cultures only value explicit, encoded (Blackler, 1995) or objective knowledge (Hislop, 2013) that is embedded in processes or systems. Others favour tacit knowledge, which is encultured (Blackler, 1995) and the product of social interactions between the firms' members. Therefore, this will ultimately impact on the type of knowledge management strategy that firms adopt (Hansen *et al.*, 1999; Jasimuddin *et al.*, 2005).

Second, culture mediates the relationship between individual and organisational knowledge. It encapsulates the unspoken rules and norms about how knowledge is distributed between the firm and its members – and who owns it. Culture questions whether there is shared agreement about who has ownership of specific types of knowledge to be managed; who are the firm's most valued experts; to what degree individuals trust the firm with their knowledge and what strategically-critical knowledge is embedded in the firm's systems, processes and individuals. Culture then becomes the mediator or 'silent broker' between individual and organisational knowledge and thus impacts on the access to, and ownership and distribution of, knowledge (DeLong, 1997). Third, culture creates a context for interaction that

determines the value a firm derives from knowledge. If knowledge is viewed as practice (Hislop, 2009) and a product of social interaction (e.g. in a community of practice; Wenger *et al.*, 2002; Cheng and Lee, 2014) rather than an object (e.g. embedded in a product or patent; Hislop, 2009), culture becomes key to understanding how best to leverage knowledge, as it creates the context for individuals to share their valuable experiences and, ostensibly, tacit knowledge.

Finally, culture shapes the processes by which the firm creates, reacts and adapts to new knowledge. A firm's culture has a major influence on the speed at which it captures, legitimises (or rejects) and disseminates organisational knowledge and how adaptive and responsive it is to changes in strategic direction. This therefore impacts on the firm's ability to compete in turbulent environments and also its capacity to learn better and faster than competitors (De Geus, 1998). DeLong (1997) and DeLong and Fahey (2000) posit that the four ways cited above provide an alternative lens for appraising the fit between the firm's current behaviours and its objectives for managing knowledge.

In terms of NPD, Belassi (2013) and Belassi *et al.* (2007) suggest that organisational culture affects how a firm conducts its day to day business activities. It influences the firm's strategy and processes and as a consequence, the outcome of its NPD endeavours. The authors caveat that as innovation and NPD are critical factors to a firm's success, if its culture does not support NPD, it may not occur – to the firm's detriment.

3.4.3: Creating a Knowledge Culture

Oliver and Kandadi (2006), Janz and Prasarnphanich (2003), Robertson and Swan (2003), DeLong (1997) and Stonehouse and Pemberton (1999) claim that learning and knowledge can be enabled by leaders and managers developing a culture and climate where they are highly valued and individuals are empowered, motivated, willing to experiment and constantly question existing practice (double-loop learning; Argyris and Schön, 1978); thereby creating new knowledge (Nonaka and Takeuchi, 1995). Even though enabling cultures are important to the implementation of knowledge management initiatives and NPD (Belassi *et al.* 2007; McAdam, 2000), there is general agreement that relatively little conceptual and empirical research has been conducted on the key cultural characteristics that support the effective creation,

sharing and utilisation of knowledge (Park *et al.*, 2004; Hislop, 2009; Oliver and Kandadi, 2006; Belassi, 2013).

Whatever state of play exists in terms of a lack of research in this field, Oliver and Kandadi (2006:8) advocate that creating a knowledge culture is a major linchpin to promoting the effective management of knowledge within firms. They define it as “*a way of organisational life that enables and motivates people to create, share and utilise knowledge for the benefit and success of the organisation.*” This view is echoed by Riege (2005), who attests that firms can create a knowledge culture in three ways. First, by motivating, encouraging and stimulating individuals to purposefully and willingly capture, disseminate, transfer and apply existing and newly-created useful (tacit) knowledge. Second, by implementing flat and open organisation structures, which facilitate transparent knowledge flows, processes and resources that provide a continuous learning culture. In addition, firms must clearly communicate corporate goals and strategies and link knowledge sharing practices and its benefits to them. Third, by providing modern technology that integrates mechanisms and systems, to provide a suitable sharing platform that is accessible to all those who are in need of knowledge from diverse internal and external sources.

Walczak (2005) attests that the presence of a knowledge culture highlights a commitment from leaders and managers to the implementation of knowledge management initiatives and the promotion of tacit knowledge sharing. However, Hislop (2009) adds that cultures will only enable the management of organisational knowledge if:

- Sharing is regarded as a norm,
- Individuals have a strong sense of collective identity,
- Organisational processes are regarded as fair, and
- Individuals have a high level of trust in, respect for and commitment to, each other and management.

Moreover, Stonehouse and Pemberton (1999) suggest that developing an enabling and supportive culture is largely dependent on the firm's structure and infrastructure. However, they caveat that achieving such a culture is both difficult and demanding. While the above conditions are espoused in extant literature, Hislop (2009) caveats

that there is a distinct lack of empirical evidence, or theory-in-use (Argyris and Schön, 1978), to advise firms of what they are required to do in order to achieve a knowledge culture and indeed, what barriers they may encounter in their quest to do so.

3.4.4: Is Culture Change Possible?

This is a question upon which academics and researchers cannot agree. Culture change protagonists such as Oliver and Kandadi (2006), Pan and Scarborough (1999) and Davenport *et al.* (1998), attest that knowledge cultures *can* be developed by firms – but caution that it is a daunting, complex and time-consuming process. On the other hand, Sabri (2005) and McDermott and O'Dell (2001) concur that a knowledge culture *cannot* be established and suggest that firms who successfully implement knowledge management initiatives do not attempt to change their culture to fit knowledge management; they instead develop their knowledge management endeavours to fit the culture. This results in multiple ways to encourage individuals to share their knowledge and is heavily dependent upon the firm's values, behaviours and style (Belassi, 2013; Sabri, 2005; McDermott and O'Dell, 2001; Hislop, 2009).

This argument may, according to the researcher, be linked to the knowledge management strategies of Hansen *et al.* (1999). They posit that the decision to keep knowledge tacit and fluid (personalisation strategy), or extract it from the knower into explicit forms (codification strategy), is contingent upon a number of factors, including the existing modus operandi and culture within the firm, whether it uses tacit or explicit knowledge to solve problems and whether it produces mature or innovative products. Thus, knowledge management strategies are moulded to fit the current way of doing things within the firm (McDermott and O'Dell, 2001). McDermott and O'Dell's pessimism is embedded in their view that cultural change on a large scale cannot be achieved. In essence, if appropriate knowledge behaviours and values are not enmeshed within the existing culture, firms face an uphill struggle to change their culture to make them so (Hislop, 2009).

3.4.5: Organisational Climate

Whereas McDermott and O'Dell (2001) espouse that changing culture to fit the implementation of knowledge management initiatives is both foolhardy and unachievable, Sanchez (2004), Chen *et al.* (2010) and Ahmed *et al.* (2002) espouse that an 'easier' option is to adapt the firm's *climate*, which is "*short term and highly susceptible to forces at work in any dynamic environment*" (Sanchez, 2004:20).

Organisational climate can be viewed as an intervening variable between a firm's context and the behaviour of its members and defined as the representation of employees' perceptions of the firm's policies, procedures and practices and subsequent patterns of behaviours, values systems and interactions that assist creativity, innovation or service within the firm (Patterson *et al.*, 2005).

As a surface-level manifestation of culture (Schein, 1985), organisational climate may play a fundamental role in shaping individuals' perceptions and behaviours towards knowledge management (Chen *et al.*, 2010). Furthermore, Jashapara (2011) states that, unlike culture, climate is often deemed 'temporary', subject to direct control by management and is focused mainly on aspects of the firm's social environment that its members consciously perceive. A supportive climate that engenders individual autonomy, trust, reciprocity, collaboration, rewards, etc., may motivate individuals to willingly create and share their tacit knowledge (Janz and Prasarnphanich, 2003; Chen *et al.*, 2010; Ahmed *et al.*, 2002).

3.4.6: Culture as a Disabler of Knowledge Management and NPD

Although culture has been described by Lopez-Nicolas and Meroño-Cerdán (2009), Belassi *et al.* (2007) and Park *et al.* (2004) as the most important input to the successful implementation of knowledge management and the outcome of a firm's NPD projects, it has also been labelled as a key disabler (Park *et al.*, 2004; Donnellan and Fitzgerald, 2003), mainly because it shapes assumptions about what knowledge is, what knowledge is worth managing and who owns it, shares it and hoards it. As a result, it can have both a positive and negative influence on not only the management of knowledge but also the outcomes of a firm's NPD endeavours (de Brentani and Kleinschmidt, 2004). Riege (2005) suggests that the identification and recognition of the factors that inhibit, for example, knowledge sharing and transfer, is an important part of implementing a knowledge management strategy. He suggests that the main reason why firms experience problems in reaching their knowledge sharing goals is because there is incongruence between their strategy for managing knowledge and corporate goals. Riege (2005) identifies other cultural disablers as follows:

- A lack of leadership and managerial direction in clearly communicating the benefits and values of knowledge sharing practices and poor provision of formal and informal spaces within the firm to enable the generation of new knowledge.

- The lack of a transparent rewards and recognition system that would motivate individuals to share more of their knowledge.
- The existing culture, climate and infrastructure does not provide sufficient underpinning and overarching support for knowledge sharing (and transfer).
- Instead of collaboration and teamwork, a culture of internal competitiveness within business units, functional areas and subsidiaries is perpetuated.

Riege (2005) advocates that there are no hard and fast rules that can be used to negate these barriers. However, he does advise all firms to take a long, in depth look at their practices to ensure their modus operandi does not prohibit the right type of knowledge being disseminated to the right individuals at the right time. Levy *et al.* (2010), Allameh *et al.* (2011), Stonehouse and Pemberton (1999), Goh (2002) and Goffee and Jones (2003) attest that these barriers suggest the need for the development of a cooperative, supportive culture and climate that not only enables individuals to understand what aspects of their knowledge ought to be shared with others but also engenders openness, two-way, top-down and bottom-up communication.

3.5: Organisational Structure

Organisation structure is considered to be one of the most important organisational variables and influencing mechanisms of knowledge management and NPD and a key shaper of communication patterns in firms (Mahmoudsalehi *et al.*, 2012; Pertusa-Ortega *et al.*, 2010; Stonehouse and Pemberton, 1999; Lee and Choi, 2003). As a visible object of culture and principal driver of change (Wang and Ahmed, 2002), structure serves several important functions (Schein, 1985), including organising the firm's business activities and processes, shaping individual attitudes and behaviours, optimising organisational performance and coordinating the interaction the firm and its members have with the business environment (Sabri, 2005; Chen and Huang, 2007). It also affects the efficiency and effectiveness with which ideas are implemented (Mahmoudsalehi *et al.*, 2012). Yet, despite this, the researcher found that only a limited amount of research has been conducted to investigate the role structure plays in knowledge management processes and outcomes (Chen and Huang, 2007).

3.5.1: The Influence of Structure on Knowledge Management and NPD

Simply defined, structure is “*the way an organisation is configured into work groups and the reporting and authority relationships that connect individuals and groups together*” (Brooks, 1999:170). Structure also enables the construction of a framework through which firms can plan, organise, direct and control their business activities in accordance with their stated targets (Mullins, 2013). Martinez-Léon and Martinez-Garcia (2011) posit that organisation structure reflects the way in which knowledge and information are distributed and efficiently utilised within the firm. Thus, how the firm is configured either hinders or enables its capacity to innovate, adapt to change, learn or improve its capability to generate added value for its customers and clients (ibid).

Organisational structure is typically categorised into three elements: formalisation, centralisation and integration (Chen *et al.* (2010; Pertusa-Ortega *et al.*, 2010; Chen and Huang, 2007; Brooks, 1999). First, formalisation describes the extent to which a firm’s formal (codified) rules, standard operating procedures and policies govern its decision making, working relationships, work processes and employee behaviours and type and quantity of knowledge that is exchanged in the firm. Formalisation also:

- Facilitates the inter-functional transfer of explicit knowledge by means of rules and procedures.
- Reduces ambiguity by utilising rules and procedures to increase the integration of knowledge into different organisational units, and
- Codifies best practices, in order to stabilise and disseminate new knowledge; thus enabling individuals to acquire and utilise it to improve performance.

Although formalisation provides a certain degree of structure, it can also act as a disabler by stifling interaction and communication and impeding the spontaneity and flexibility individuals need to create and share knowledge and generate ideas for activities such as innovation (Pertusa-Ortega *et al.*, 2010; Lee and Choi, 2003). Second, centralisation refers to the extent to which the authority for decision making is centralised, so it rests with the strategic apex or top management. The concentration of authority and power at the top of the hierarchy may inevitably increase the time it takes to disseminate knowledge around the firm. It may also disengage individuals, inhibit the opportunities they have to express themselves freely and creatively, reduce

their chances of generating and experimenting with novel ideas and thus diminish the creation of organisational knowledge (Stonehouse and Pemberton, 1999; Lee and Choi, 2003).

A solution to this could be the adoption of decentralised structures, such as the network (Wang and Ahmed, 2002), which encourages knowledge workers to have some autonomy in completing important tasks and take responsibility for making decisions, applying their specialist knowledge and thus improving the utilisation and flow of knowledge around the firm (Ho *et al.*, 2014). They may also foster the development of communities of practice, which could promote a greater degree of social interaction, engender the exchange of important tacit knowledge and enable more collaborative knowledge management behaviours (Ruikar *et al.*, 2009; Chen and Huang, 2007; Wenger *et al.*, 2002). Third, integration refers to the degree of coordination and interaction that takes place between different departments or functional areas with task interdependence. Integration can be vertical and horizontal (Huczynski and Buchanan, 2001). With integration and coordination, individuals are able to enjoy and exploit the interrelatedness of their work activities and thus share ideas, cross-fertilise expertise and knowledge and learn from each other.

Firms who adopt high levels of horizontal integration enable increased levels of knowledge transfer and utilisation of technical knowledge, which is vital to NPD and cross-functional interaction between departments (Nahm *et al.*, 2003; Loch and Kavadias, 2008). Organic structures that adopt horizontal integration also enable the formation of multidisciplinary teams, who are able to cross-fertilise specialist knowledge and ideas and embed them into the design and development of complex products (Martinez-Léon and Martinez-Garcia, 2011).

3.5.2: Structure as a Disabler of Knowledge Management and NPD

Donnellan and Fitzgerald (2003), Stonehouse and Pemberton (2000) and Goh (2002) caveat that organisation structure can be viewed as a disabler of knowledge management and the NPD process because harsh, bureaucratic structures and formal communication channels may hinder the effective traverse of tacit knowledge up, down and across the firm's boundaries and thus stifle creativity and innovation. Bartlett and Ghoshal (1998) caution that hierarchical structures perpetuate 'sticky' knowledge, or silos, that reside in one area of the firm and, consequentially, reduce its transference to areas where it is needed.

A further inhibitor to the kind of specialist knowledge sharing required for NPD is the growth of firms (Riege, 2005). Certain processes and structures that were manageable as small entities may become obsolete as the firm evolves over time. They may therefore become inefficient and serve to hinder knowledge flows and collaboration (ibid), especially in terms of cross-functional teams and the ways in which they interact (Ahmed and Shepherd, 2010).

3.5.3: Creating Enabling Structures

The increase in knowledge-intensive work, such as R&D, being geographically distributed has become a “*widespread phenomena in the global economy*” (Gokpinar *et al.*, 2014:1509) As such, firms who innovate on a global basis are adopting structures that best support their innovation and globalisation strategies (Ahmed and Shepherd, 2010). Chandler (1962) and Ahmed and Shepherd (2010) suggest that there is a direct link between strategy and structure, insofar as a shift in, for example, the product-market strategy of the firm should be complemented by a change in structure to assist strategy implementation. As the firm grows and expands into geographically dispersed business operations, the introduction of supporting structures that enable the coordination and integration of its business activities becomes necessary. On that note, Ahmed and Shepherd (2010:362-367) identify a number of different structural configurations firms can adopt when organising their NPD/innovation to suit their global operations. These are presented Table 3.1 below.

Table 3.1: Global Organisation Structures

Structure	Characteristics
Ethnocentric centralised R&D organisation	<ul style="list-style-type: none"> ▪ R&D activity is concentrated in home nation. ▪ Home country centre is superior in technology and knowledge compared to subsidiaries in other countries. ▪ Centre is think tank; ideas are generated, progressed and developed. ▪ Core knowledge is protected within the home environment. ▪ Can be highly effective for innovation, despite lack of sensitivity to emerging international demands and trends.
Geocentric centralised R&D (centralised hub)	<ul style="list-style-type: none"> ▪ Appropriate for situations where the firm becomes more dependent on foreign sales and sensitivity to local markets. ▪ Responds to local sensitivities by recruiting multicultural, multinational workforce. ▪ Maintains efficiency advantages of a centralised innovation and knowledge base. ▪ First step towards internationalising R&D, while maintaining advantages of high degree of central control.
Polycentric decentralised R&D (decentralised federation)	<ul style="list-style-type: none"> ▪ Most appropriate for firms who favour local responsiveness. ▪ Centre provides capital investment to set up subsidiaries, which operate as fully integrated business units with considerable management and strategic autonomy. ▪ R&D innovation takes place in foreign subsidiaries. ▪ Little exchange of knowledge between various units. ▪ Often duplication of effort.
R&D hub (coordinated federation)	<ul style="list-style-type: none"> ▪ Strong central R&D home base supported by R&D outposts. ▪ Tight central control and coordination is provided from the centre; centre takes the lead in most innovations/developments. ▪ Foreign subsidiaries are able to adapt products and strategies to account for local market tastes, but dependent on parent for new products, process and ideas. ▪ Requires more coordination and control than the ethnocentric, geocentric or polycentric structures.
<i>Source: Ahmed and Shepherd (2010:362-367)</i>	

In addition to the structural forms highlighted above, Boutellier *et al.* (2008) point out that the trend towards the adoption of an additional structure, the integrated R&D network, is increasing because among other things, it strikes a balance between local responsiveness and global efficiency. The network is illustrated in Figure 3.2 below.

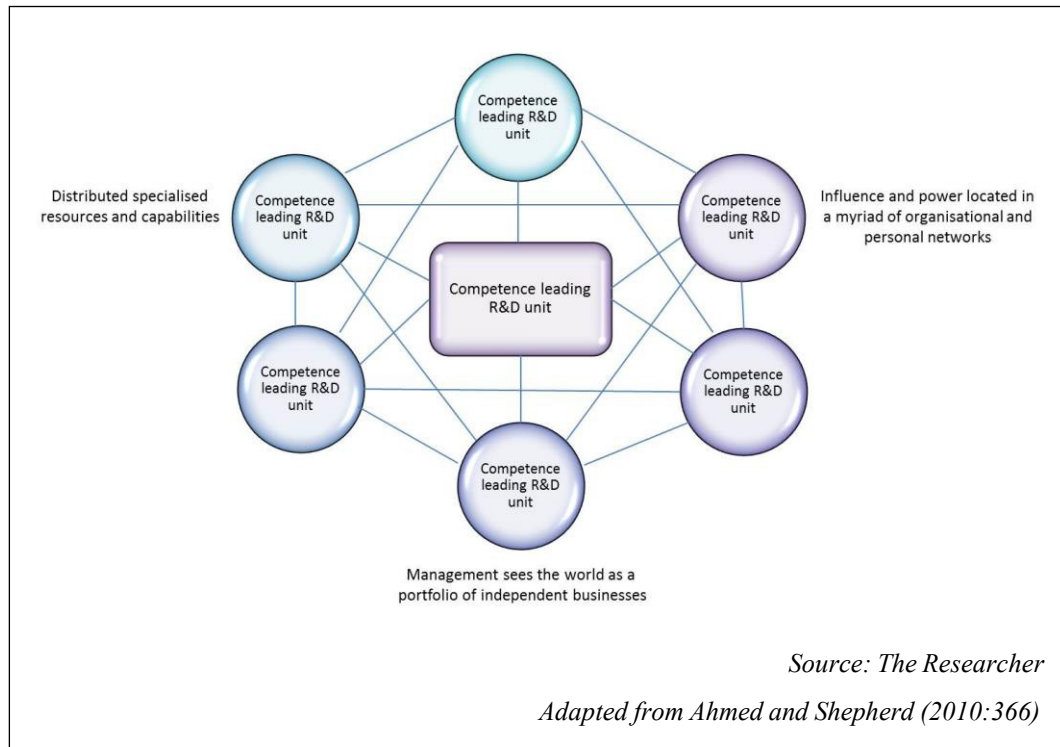


Figure 3.2: The Integrated R&D Network

The integrated R&D network structure has a number of characteristics, which make it an attractive choice for globalised businesses (Ahmed and Shepherd, 2010). First, each unit has dispersed competencies and R&D that are highly interconnected within the network. As legally independent business entities that accrue their own profit, each unit specialises and leads in a particular product, technology or function. This makes it the *lead centre* in developing and stimulating competence in that specified role or region. Second, units can lead on the value generation of products and coordinate their manufacturing, product introduction and marketing. Units can also lead research in specific product categories and have said research translated into manufactured products in other units, which possess higher capabilities to deliver global efficiencies in production.

The inception of the network structure is contingent on a number of factors including the firm's management heritage, its management style and the commercial environment in which it operates (Birkinshaw, 2002). The structure also has implications for specialist roles and knowledge. First, the role of the R&D business entities and knowledge workers involved should be clearly defined (Boutellier *et al.*, 2008). Knowledge, learning processes and communication should be enabled by special coordination between all network nodes/business entities and the identification

and utilisation of different knowledge types should also be considered (ibid). On that note, Birkinshaw (2002) advises that in order to manage an integrated R&D network effectively, the Senior Management Team must have a clear grasp of the type of knowledge assets the business needs and structure itself accordingly. This includes identifying what knowledge can be easily codified and thus disseminated throughout the network via an appropriate medium, such as an intranet (Gressgård *et al.*, 2014).

Furthermore, it also encompasses recognising what knowledge needs to be kept tacit because it is embedded in a particular system or location and is thus better managed in an autonomous fashion. Either scenario poses its own set of challenges for senior managers. The way in which they manage and utilise specialist knowledge can be best enabled by understanding the nature of the firm's knowledge base and working in harmony with, as opposed to against, the knowledge resources they have at their disposal.

3.6: Leadership and Management

Leaders and managers have a major impact on the firm's culture and its overall attitude to, and influence on, knowledge management and NPD (Richtnér and Åhlström, 2010; Holsapple and Joshi, 2000; Cooper and Kleinschmidt, 2007). Thus, they play a primary role in safeguarding the success of the firm's knowledge management and innovation endeavours. Leadership has been defined by Clegg *et al.* (2011:126) as *"the process of directing, controlling, motivating and inspiring staff towards the realisation of stated organisational goals"* and by Mullins (2013:369) as *"a relationship through which one person influences the behaviour of other people."* Clegg *et al.*'s definition highlights essential aspects of management as endemic within a leader's responsibility (Fayol, 1916), while Mullins showcases the role influence plays in engaging people as social actors. As well as influencing the way in which knowledge is managed within the firm (Bryant, 2003), leaders and managers have a key role in shaping innovation and NPD (Paulsen *et al.*, 2013). These aspects will now be explored.

3.6.1: The Role of Leaders and Managers in Managing Knowledge in NPD

Bryant (2003) emphasises the key role leaders play in managing organisational knowledge by promoting vision, motivation, structures and systems at all levels of the firm, to enable the conversion of knowledge into sustainable competitive advantage. Organisational culture largely determines what leaders and managers do and how they

do it (Nguyen and Mohamed, 2011). In addition, Analoui *et al.* (2013) and Stonehouse and Pemberton (1999) advocate that leadership is an important component in devising and maintaining a knowledge culture and climate, where the sharing of tacit and explicit knowledge is encouraged and an atmosphere of trust is created that enables individuals to engage in experimentation, with the aim of creating new knowledge (Nonaka and Takeuchi, 1995).

Bryant (2003) suggests that knowledge management requires leaders at all levels to make a conscious effort to manage three key processes: creating, sharing and exploiting knowledge. First, leaders provide an organisational context in which individuals create knowledge and thus directly influence levels of creativity in the firm. Leaders have direct control over aspects of the firm's climate, such as reward for various activities that are carried out, what behaviours are encouraged and how work will be valued. Bryant (2003) proposes that these factors influence individuals' motivation, willingness and ability to create new knowledge through converting their new ideas and personal experiences into personal insights (Nonaka, 1991).

Second, leaders encourage individuals to share ideas by creating a receptive climate. Bryant (2003) suggests that individuals may be more inclined to share their knowledge if they are praised by managers/team leaders, if knowledge forms part of their performance management reviews and if financial and non-financial rewards are offered. Bryant adds that while team leaders have some control over praise and performance reviews, pay rises, bonuses and other rewards for sharing knowledge is within the gift of senior management. Finally, he advocates that leaders have a major role in providing enabling systems that exploit knowledge by converting individuals' creative ideas into valuable, revenue-generating products and services (Boisot, 1998). Thus, ensuring knowledge becomes a strategic resource for the firm (Lengnick-Hall and Griffith, 2011).

3.6.2: Transformational Leadership

Birasnav *et al.* (2011), Bryant (2003) and Crawford (2005) attest that transformational and transactional neo-leaders have their own role to play in the management, creation, sharing and exploitation of knowledge in the NPD process. From a transformational leadership perspective, it is defined as a leader who has the ability to “*envision the organisation's future, articulate that vision to organisational members and inspire and facilitate higher levels of motivation than those members thought possible*”

(Neumann and Neumann, 1999:73). Oke *et al.* (2009), Hannagan (1999) and Bass (1985) posit that transformational leaders are characterised by four distinguishing features, which have the capacity to enable the management of knowledge. First, they are charismatic and as role models can encourage individuals to have pride, faith and respect in themselves, their firm and its leadership. They are inspirational insofar as they have the ability to motivate followers to create and share new knowledge, largely through the communication of high and realistic expectations in carrying out their roles. In addition, as coaches, mentors and advisors they are able to encourage individuals to seek out new learning opportunities, be innovative and creative, solve problems and experiment and take risks when testing out new ideas.

Transformational leadership shares many of its characteristics with knowledge leadership, as it involves the constant development and innovation of knowledge and individual skills (Viitala, 2004; Singh, 2008).

3.6.3: Transactional Leadership

While the above suggests that transformational leaders have a pivotal role to play in enabling the right conditions to support knowledge creation, sharing and exploitation, Bryant (2003) advises that transactional leaders also play their part in managing knowledge. Transactional leaders “*guide or motivate their followers in the direction of established goals by clarifying role and task requirements*” (Robbins, 2003:343). This neo-leadership style is premised on a transaction that takes place between the leader and follower and promotes ‘acceptable’ levels of organisational performance when the firm is going through periods of low growth, change and high uncertainty (Neumann and Neumann, 1999).

Described as a ‘non-charismatic’ leadership style, transactional leaders display two main characteristics (Bryant, 2003; Clegg *et al.*, 2011). First, the transactional leader recognises the contribution of followers and is able to reward, engage and motivate them by linking into intrinsic and extrinsic motivators. They also clarify expected outcomes, what will be delivered and how performance will be rewarded. Second, the leader monitors followers’ performance and solves problems as they arise, in order to maintain performance. Bryant (2003) attests that transactional leaders work towards the utilisation of knowledge and other resources from all parts of the firm to transform individuals’ good ideas into products and services that can be commercialised/launched to market (Boisot, 1998). Bass (1985) and Conger and Kanungo (1998)

profess that to a greater or lesser extent, all leaders demonstrate both transformational and transactional leadership traits. Therefore, both types of leaders are needed to effectively manage knowledge within the firm.

3.6.4: The Role of Senior Management in Managing Knowledge in NPD

While transformational, transactional and knowledge leadership are all required to effectively manage knowledge, Davenport *et al.* (1998) profess that knowledge management efforts are futile without the on-going commitment and support from top management; literally the key strategists and decision-makers. However, they caveat that middle management positions are just as important in the equation. On this note, Ahmed and Shepherd (2010) recognise this significance and suggest that their roles and responsibilities for knowledge management and NPD are far more critical to the firm at large, especially in terms of global innovation. They add that senior and top level managers have the juxtaposition of juggling the provision of corporate direction and guaranteeing cohesive action from diverse business units with instituting new ways of conducting their modus operandi, new norms and values, while grappling with the validity of their own jobs (*ibid*).

A further key challenge senior management faces is managing and coordinating the diverse flow and allocation of financial, material and human resources, as highlighted in the New Product Strategy variable. They must maintain this control through a continuous flow of knowledge and information, which is highly dependent on good communication between, for example, R&D, Marketing and Production Teams (Cetindamar *et al.*, 2010). Therefore, the integration and collaboration between these teams and knowledge workers is vital (Drechsler *et al.*, 2012; Sherman, Berkowitz and Souder, 2005).

3.6.5: The Disabling Influence of Leadership and Management

Although leadership and senior/top management support is a key enabler of knowledge management and NPD within the firm (Richtnér and Åhlström, 2010; Cooper and Kleinschmidt, 2007), it can also be a disabler for the following reasons (Holsapple and Joshi, 2000; Riege 2005; Bryant, 2003; Richtnér and Åhlström, 2010; Cooper, 2008; Boutellier *et al.*, 2008). First, top/senior management may not provide an appropriate infrastructure, including ICT, to support knowledge creation and sharing practices, particularly in geographically dispersed R&D network structures. This may extend to the allocation of resources to complete NPD projects. Second, the

firm's leaders and managers may not effectively communicate the importance, benefits and value of knowledge and knowledge sharing to knowledge workers and the business in general and also in NPD.

Third, they may exercise too much direct control by setting tight deadlines, rigid budgets and targets and may lower individual and team performance results by reducing the autonomy of NPD teams. Finally, there may be a lack of transparent recognition and reward systems that would empower, engage, motivate and encourage individuals to share and codify more of their tacit knowledge. Richtnér and Åhlström (2010) suggest that top management face the challenge of striking a balance between exercising a degree of control over NPD projects and providing the autonomy needed for developing a flexible, knowledge-creating and innovative firm. On this note, Takeuchi and Nonaka (1986) advocate that top management's control over innovation should be subtle but visible enough to oversee the setting of the firm's goals for product development. In addition, top management should endow workers and change agents involved in the innovation process with the discretionary power to carry out their work.

In order to enable the *right* type of leadership to be used in the right context, Bryant (2003) concludes that senior management can make their firms more effective by attracting and retaining knowledge workers, intentionally managing their knowledge as a strategic resource and increasing their propensity to create, share and exploit knowledge by using a fusion of enabling leadership styles.

3.7: Specialist Roles and Knowledge

With the advent of the knowledge economy (Zanini and Musante, 2013; Powell and Snellman, 2004) and the knowledge-based view of the firm (Kogut and Zander, 1996; Spender, 1996b; Hislop, 2013), people (hereinafter knowledge workers; Hislop, 2013; Bigliardi *et al.*, 2012; Ahmed and Shepherd, 2010) and their knowledge are at the heart of the creation of organisational knowledge (Yeh *et al.*, 2006; Theriou *et al.*, 2011). As knowledge resides in individuals' heads (Goffin *et al.*, 2010) and is embodied in people and carried, taught, passed on, used and misused by them (Drucker, 1993), the management and utilisation of their knowledge for key activities such as NPD is important for firms to remain competitive, efficient and effective (Bigliardi *et al.*, 2012). On this note, Ahmed and Shepherd (2010:30) eloquently

stated “*the logic is simple: from knowledge comes innovation, from which in turn comes further knowledge and economic prosperity.*”

3.7.1: Defining Knowledge Workers

Davenport (2005) defines knowledge workers as individuals who have high degrees of education, expertise or experience and their primary role involves creating, distributing or applying knowledge. In contrast, Bigliardi *et al.* (2012:38) define a knowledge worker as any worker who possesses “*specialist knowledge or know-how, who is involved in consultancy based on their specialist knowledge or know-how or research and development work for new products, services or processes.*” They go on to say that such workers use their knowledge, creativity and experience to create a network in the firm, in order to complete their working roles and tasks.

Kelly *et al.* (2011) argue that knowledge workers not only possess knowledge that is specialised, deeper and embedded and invested within particular knowledge domains in the firm (Kang and Snell, 2009), they also undertake specialist roles, insofar as they possess skills, expertise and knowledge that are rare and of strategic advantage to the firm (Lakshman, 2009; Bollinger and Smith, 2001). They also perform specialist roles such as R&D, Scientists, Engineers and Marketers (Bigliardi *et al.*, 2012). As their specialist knowledge and skills contribute to the development of new products, processes or services, the challenge for firms is to maximise the utilisation of their knowledge and unique skill sets through efficient and effective management (*ibid*).

In addition, Cross and Sivaloganathan (2007) attest that as NPD is a complex process, it requires a level of industry-specific knowledge to enable the production of commercially viable business solutions to aid the development of strategic and competitive advantages in the markets in which the firm operates. Importantly, the authors point out that specialist knowledge is a strategic asset insofar as it is specific to a particular product type or industry and is therefore fundamental to the development of that type of product. As it is rare, inimitable and non-substitutable, it is valuable to the firm and can therefore yield greater revenue generation (*ibid*; Bollinger and Smith, 2001).

3.7.2: Types of Knowledge Used by Knowledge Workers

Empson (2001) suggests that knowledge workers utilise two types of knowledge during the course of their work: technical and client, as outlined in Table 3.2.

Table 3.2: Types of Knowledge Used by Knowledge Workers

Types of Knowledge	Subcategories	Description
Technical Knowledge	Sectoral	Technical knowledge, commonly understood and shared at a sectoral level by staff from a range of companies.
	Organisational	Organisation specific knowledge, such as company products, processes, routines and procedures.
	Individual	Personal knowledge acquired through formal education or work experience.
Client Knowledge	Industry Level	Knowledge of industry level factors, such as the factors shaping the dynamics of competition.
	Company	Knowledge of specific organizations, such as having an understanding of and sensitivity to their cultures and ways of working.
	Individuals	Having a knowledge of and acquaintance with key individuals in specific organizations.
<i>Source: Empson (2001:842-843)</i>		

In terms of NPD, one could argue that a high level of technical/specialist knowledge of the firm's products/processes, routines and procedures would be an important prerequisite to ensure client requirements and needs for bespoke/customised products and services, which are fit for their intended purpose, are met; thus providing the firm with strategic knowledge resources at its disposal (Empson, 2001; Bollinger and Smith, 2001). Moreover, client knowledge is equally important to ensure experts, new product developers, consultants or other specialist individuals are familiar with their clients' cultures, ways of working and the dynamics of competition within the industry (Empson, 2001).

3.7.3: Knowledge Worker Skills

As well as the two types of specialist knowledge (technical and client; Empson, 2001) that are deployed by knowledge workers in activities such as NPD, Cooper and Kleinschmidt (2007), John and Snelson (1988) and Song and Parry (1997) attest that

a range of skills directly impact on the effectiveness of a firm's NPD endeavours. These include:

- NPD planning skills: such as considering whether a strategy of innovation or imitation is the best course of action to follow to secure competitiveness (Day, 1975).
- Technical development skills: utilised to identify a technically sound and reliable product (Maidique and Zirger, 1984).
- Marketing development skills: used in generating, evaluating and testing marketing options, based on product testing and market forecasting (Johne and Snelson, 1988), and
- Launch/commercialisation skills: demonstrated in identifying the best ways and strategies to launch and commercialise the developed product (Johne and Snelson, 1988). Research has found that managers cite poor execution of a new product's launch as the main reason for its ultimate failure. Therefore, these skills are a vital part of the NPD process (ibid).

In addition to the skills outlined above, Hendarman and Tjakraatmadja (2012) suggest that the twenty first century knowledge economy demands a new set of knowledge worker competencies. These include hard skills, such as ICT and also soft skills, for instance, problem solving, effective communication, analytical skills, working in a team-based environment and group learning.

3.7.4: Knowledge Workers, Knowledge Processes and NPD

Hislop (2009) posits that knowledge workers are engaged in three key knowledge processes that take place within knowledge-intensive firms: knowledge creation/application, knowledge codification and knowledge acquisition/sharing. In terms of knowledge creation/application, many knowledge-intensive firms typically provide bespoke, specifically-designed products and services for clients or customers, rather than off-the-shelf solutions. This therefore requires knowledge workers to utilise different types of knowledge (e.g., technical and client) and create and apply new knowledge through continuous interaction with customers/clients and key individuals within and outside the firm. With knowledge codification, knowledge workers enable an increase in innovation by externalising tacit knowledge into explicit knowledge and

passing tacit knowledge to others through a process of socialisation (Nonaka and Takeuchi, 1995).

As previously highlighted, the knowledge created and developed within knowledge intensive firms is typically held by individual knowledge workers or by associated individuals working on particular projects (Hislop, 2009). In order to ensure that project specific knowledge, tacit knowledge and learning is shared across the firm, a strategy of codification can be implemented (Hansen *et al.*, 1999; Jasimuddin *et al.*, 2005). Thus, a key role of knowledge workers will be to articulate their tacit knowledge into explicit forms, such as materials and blueprints, intranets, databases and knowledge repositories. However, Hislop (2009) and Newell *et al.* (2009) caveat that codification is not a straightforward process and is fraught with difficulties. For instance, most knowledge is highly tacit and hard to codify. In addition, a great deal of NPD project knowledge is specialised and context specific and may only be relevant to a limited audience. Furthermore, and importantly, knowledge workers may not be prepared to articulate their specialist knowledge for codification purposes.

Finally, due to the problems associated with, and limitations of, codification and the firm's need to continuously acquire and share knowledge in order to provide customised products and services to clients and customers, other ways of acquiring and sharing knowledge need to be identified. This is typically done through interpersonal interaction and the utilisation of social networks of personal relationships. Such networks can include knowledge worker engagement in communities of practice (Wenger *et al.*, 2002; refer to Models of Knowledge Management in Chapter 2). Participation in social networks not only facilitates the creation and exchange of potentially relevant knowledge but also enables knowledge workers to access key resources across the firm, in order to undertake their jobs more effectively (Nahapiet and Ghoshal, 1998; Swart and Kinnie, 2003). As Hislop (2009) points out, the three types of knowledge are important for the different interactions knowledge workers have with others, both inside and outside the firm. This extends to the social relationships they share with clients and customers, which generates valuable relational capital (ibid; Isaac *et al.*, 2009).

3.7.5: Specialist Roles in NPD

The specific roles and responsibilities of individuals involved in the NPD/innovation process differs widely and is largely dependent upon their knowledge, skills, experience, attributes and seniority (Ahmed and Shepherd, 2010). Knowledge-intensive or innovative firms can be viewed as independent communication networks of individuals, where each person is a discrete repository of knowledge (Newell *et al.*, 2009). Such knowledge includes facts, ideas, insights based on experience, working procedures, etc. Revilla *et al.* (2009) attest that knowledge workers involved in NPD bring their expertise of their particular academic or professional communities and use these as a basis to tackle any problems they may face in the process. Therefore, Ahmed and Shepherd (2010) advocate that an important challenge for firms is to tap into knowledge worker repositories, expertise and capabilities and mobilise them for competitive advantage. Some of the specialist roles in the NPD process are highlighted below in Table 3.3 (Ahmed and Shepherd, 2010).

Table 3.3: An Example of Specialist Roles in the NPD Process

Specialist Roles
<p>The Review Board</p> <ul style="list-style-type: none"> ▪ The Board determines the selection, continuation and termination of projects. ▪ Its senior managers set the vision and strategic direction for the firm.
<p>The Technical Advisory Board</p> <ul style="list-style-type: none"> ▪ Members include a number of senior technical personnel, who check, monitor and make decisions on the availability, readiness and source (internal or external) of required technologies. ▪ The Board also ensures the ‘engineering’ part of the firm appropriately assesses and scopes an innovation project prior to the deployment of significant resources. They are thus responsible for aligning the firm’s technologies to its ascribed strategies and infrastructure.
<p>The Executive Sponsor</p> <ul style="list-style-type: none"> ▪ Member of the firm’s management team and is likely to be a member of the Review Board. ▪ Sponsor offers support for a specific product development project and often supports the Project Champion (The Programme Manager) in ensuring that barriers are removed and projects are aligned to the firm’s business objectives.
<p>The Programme Manager</p> <ul style="list-style-type: none"> ▪ Has general responsibility for overseeing multiple projects, which are usually interrelated by similar business interests, such as market segments, technical solutions, for example product family and customer base. ▪ As a senior role within the firm, the Programme Manager is sometimes referred to as the Project Champion, as it is a cross-functional role with ultimate responsibility and accountability for the success of the project, securing financial return on investment and for influencing others within the firm.
<p>The Project Manager</p> <ul style="list-style-type: none"> ▪ Responsible for planning and executing all the phases of the product lifecycle. ▪ Key role involves managing the project’s resource utilisation and performance, meeting targets, working with budgetary constraints, identifying and managing risks and fulfilling project deliverables and objectives. ▪ The Project Manager may assume the role of Programme Manager/Champion in small-scale NPD/innovation projects.
<p>The Project Team Members</p> <ul style="list-style-type: none"> ▪ Individuals, for example upstream knowledge workers (e.g. design engineers) and downstream knowledge workers (e.g. market experts; Hong et al, 2005, cited in Revilla and Curry, 2008) are responsible for the planning and execution of tasks assigned by the Project Manager. ▪ Such tasks may be within the context of the cross-functional team or specifically focused on the functional area they represent. ▪ Team members generally report direct to the Project Manager or through a Project Team member, who has been assigned an interim management or technical leadership role.
<i>Source: Ahmed and Shepherd (2010:313-314)</i>

Ahmed and Shepherd (2010) advocate that the knowledge, skills and experience of these key knowledge workers must be brought together to drive innovation performance. Therefore, firms must establish the right mix of technical, product quality and market skills through the capabilities and competencies of their workforce, which they add are vital in the innovation game.

3.7.6: Enabling and Managing Knowledge Work

Extant research that has been conducted on knowledge workers suggest that they thrive in supportive and innovative cultures (Bigliardi *et al.*, 2012), where they can create and apply their specialist knowledge (Cetindamar *et al.*, 2010). Supportive

cultures engender knowledge worker confidence and collaboration and promote an open and harmonious working environment that is conducive to trust and knowledge sharing (Bigliardi *et al.*, 2012). Innovative cultures provide knowledge workers with a workplace that is dynamic and exciting and encourages them to take risks and be creative (ibid). Further to this, Bennet and Bennet (2004) espouse that firms should support an ‘action culture’ that enables knowledge workers to create, leverage and apply their knowledge wherever and whenever it is needed.

DeTienne *et al.* (2004) counsel that reward is a powerful motivational tool in influencing knowledge workers to generate and implement innovative ideas and engage in knowledge sharing. As knowledge workers are considered to have a modicum of ‘expert power’ (the specialist is perceived to have valued knowledge, skill, judgement or experience that others need but do not possess themselves), they enjoy a large degree of strategic and operational autonomy (Ahmed and Shepherd, 2010; Newell *et al.*, 2009) and prefer to work without close supervision or direct control (Janz and Prasarnphanich, 2003). This therefore suggests that in order to manage, encourage and motivate knowledge workers to engage in the creation, sharing and utilisation of their specialist knowledge, firms must provide a culture and climate that actively supports them to do their jobs efficiently and effectively. This includes giving them access to colleagues whose skills complement their own (Kelly *et al.*, 2011).

3.7.7: The Role of Cross-Functional Teams

As a collective of specialist knowledge workers, cross-functional teams play an important role in NPD (Ahmed and Shepherd, 2010; Drechsler *et al.*, 2013; Gemser and Leenders, 2011; Sherman *et al.*, 2005). They are “*responsible for executing projects within specific time, cost and quality constraints*” (Ahmed and Shepherd, 2010:303) and are drawn from different functions and levels in the firm. In organising the team to optimise successful performance, the Senior Management Team must achieve effective coordination, communication and decision making, particularly in terms of R&D and Marketing colleagues, as their relationship with each other is key to NPD (Drechsler *et al.*, 2013; Sherman *et al.*, 2005).

The responsibility for identifying and assessing a firm’s opportunities for developing new products usually falls within the remit of the Marketing function (Drechsler *et al.*, 2013). The NPD models proposed by Booz *et al.* (1982) and Cooper and Kleinschmidt

(1986), as evaluated in Chapter 2, suggested that Marketing involvement should be at the start, rather than at the end of the NPD process. This therefore showcases the important synergy between Marketing and R&D. Research conducted by Drechsler *et al.* (2013) found that firms who have a strong Marketing function enjoy more successful new products. In addition, the Marketing Department should be seen and utilised as an expert resource, to ensure that key and relevant NPD activities are executed (*ibid*).

In general, Ahmed and Shepherd (2010) suggest that cross-functional teams require a number of support inputs to enable the effective utilisation of their specialist knowledge. First, they should have the backing of senior and middle managers, especially in terms of being given the autonomy and accountability to make decisions. Second, an environment that facilitates co-location, i.e., opportunities to get together at the same physical location, is important as it enables easier and more frequent interaction between the team members. This in turn helps build the trust that is necessary for such teams to exist (Cetindamar *et al.*, 2010). The absence of co-location can create problems with cross-functional team communication and collaboration and additional resources, such as ICT, may have to be implemented in order to maintain the effectual operation of the team (*ibid*).

On this note, Ahmed and Shepherd (2010) proffer that co-location can yield further benefits via the reinforcement of shared values, expectations and social similarity. Co-location can come in the form of a Type C community of practice (Tremblay, 2007) or product council (Fitzgerald *et al.*, 2013; Bresman *et al.*, 2010; Karlsson and Åhlström, 1997), which would give the team an ‘official’ feel and remit and engage members in working towards shared objectives (Gemser and Leenders, 2011). Of course, certain situations often preclude co-location, such as a firm’s adoption of geographically dispersed/distributed business operations within an integrated R&D network (Ahmed and Shepherd, 2010; Boutellier *et al.*, 2008). In such cases, the use of global virtual or NPD teams may suffice (Rahman, 2012; Salomo *et al.*, 2010).

Such teams work in geographically or organisationally distributed business entities (Rahman, 2012) and work and live in a range of different countries (Ahmed and Shepherd, 2010). Cultural diversity, along with their geographical location is an added challenge for senior management, especially when implementing suitable support

mechanisms (ibid). They can be an important tool to enable innovation for global markets, as the firm can draw on local knowledge, talent and expertise when needed (Salomo *et al.*, 2010).

A number of disablers can impact on the operationalisation of the team, though (Ahmed and Shepherd, 2010). Geographical distance can impact on trust and hinder communication, coordination and problem solving abilities. In addition, cultural differences, coupled with linguistic misunderstanding, can cause further issues (ibid), as can limited social interface with other members of the R&D network (Boutellier *et al.*, 2008). A further challenge senior managers face is ensuring that geographically dispersed teams are supported by adequate resources, such as an underpinning ICT infrastructure that includes the use of videoconferencing, to enable a degree of social interaction to take place (Ahmed and Shepherd, 2010; Rahman, 2012; Salomo *et al.*, 2010).

3.7.8: Disablers of Knowledge Working

There are two main factors that have the potential to inhibit or disable knowledge workers from participating in a firm's knowledge management efforts (Hislop, 2009). First, there is the probability of conflict occurring between knowledge workers and their employer, which is embedded in the employment relationship. Second, intra-organisational and departmental conflict between individuals and teams is also likely to take place. However, conflict is not necessarily a negative, insofar as it may serve to promote inter-team and/or inter-departmental/cross functional dialogue between key individuals in the NPD process and speed up the rate at which decisions are made or ideas for the development of new products are generated (Lam *et al.*, 2007).

Other key disablers include knowledge workers not having the freedom to determine or organise their own work practices and not being given appropriate opportunities to share knowledge (Newell *et al.*, 2009). Riege (2005) suggests that a further disabler could be the lack of transparent rewards and recognition procedures and systems that would engage and motivate people to feel inclined to share, rather than hoard, more of their specialist knowledge. Whatever the disablers, specialist roles and knowledge are key to improving a firm's competitive advantage through innovation (Ahmed and Shepherd, 2010).

3.8: ICT, Systems and Communication

Developments in information and communication technologies (ICTs) have helped to provide the vital infrastructure needed to support organisational learning and knowledge within, and between, collaborating firms (Chuang *et al.*, 2013; Migdadi, 2009; Ho, 2009; Hislop, 2009). As one of the most dominant themes in contemporary knowledge management literature (Revilla *et al.*, 2009), ICT has been described as an enabler of the management of knowledge and knowledge processes (Pérez-López and Allegre, 2012; Alavi and Leidner, 2001) and a catalyst for the leverage of organisational knowledge (Hendriks, 2001). However, despite the claims that ICT has had a transformational effect on a firm's ability to exploit its tacit and explicit knowledge assets for competitive advantage (Stonehouse and Pemberton, 1999; Bollinger and Smith, 2001; Lee and Choi, 2003), McDermott (1999) and Davenport and Prusak (1998) caveat that information technology can neither deliver knowledge management within firms nor make those firms more knowledgeable.

These claims aside, advocates of an ICT-driven approach to the management of knowledge attest that it maximises access to information via enhanced methods of accessing and re-using documents, enables knowledge management to be a workable and implementable strategy for firms and facilitates the capture, codification, storage, retrieval and utilisation of knowledge for the benefit of the firm (Hlupic *et al.*, 2002; Mason and Pauleen, 2003; see Chapter 2: the Hard Approach to Knowledge Management).

3.8.1: Defining ICT

ICT has been defined by Hislop (2009) as technologies that facilitate the management and/or sharing of information and knowledge. It encompasses a wide ranging diversity of heterogeneous technologies that include computers, email, databases, search engines, data mining systems, videoconferencing equipment and the internet. In contrast, Beynan-Davies (2009) defines it as a designed technological system of artefacts that are used to enable the collection, storage, processing and dissemination of data. One could argue that both definitions highlight ICT as a portal, conduit or technical/electronic vehicle to support the effective transfer of knowledge and information around the firm, to enhance knowledge sharing.

3.8.2: Technological Infrastructure

Further to this, Pérez-López and Allegre (2012) and Meso and Smith (2000) attest that ICT forms part of the technological infrastructure, which consists of the hardware, software, middleware, resources, protocols and staff, who support and enable the codification and electronic exchange of knowledge and its dissemination around the firm. Holsapple and Luo (1996) assert that it should be aligned with, and complemented by, the organisational infrastructure, in order to enable both individuals and the firm to carry out key tasks and activities that would not be possible without the support of computer and mediating technologies.

3.8.3: The Role of ICT in Knowledge Management and NPD

The role of ICT in knowledge management and NPD is both an important and controversial one (Hislop (2013; Alavi and Leidner, 2001; Hendriks, 2001; Swan *et al.*, 1999). Hendriks (2001:68) describes the coming together of knowledge management and ICT as the “*clash of two titans of quite different characters*,” suggesting that the relationship between both conceptions is not only complex but also problematic, insofar as ICT has been widely cited in extant literature as being responsible for the depersonalisation and commoditisation of knowledge (ibid).

Whatever the depiction of the relationship between the two concepts, Van den Brink (2003) claims that the role IT plays in NPD is critical, as it enables explicit knowledge to stored, transacted, processed and transferred to people through coordinated and collaborative interfaces. Hislop (2009:224-226) advocates that the role of ICT in knowledge management (and the researcher would argue, NPD) can be examined from the epistemologies of possession and practice; two themes that have been prevalent throughout this thesis.

3.8.4: ICT and the Epistemology of Possession

As highlighted in Chapter 2, theorists within this perspective view knowledge as an object that can be separated from the knower and codified/articulated into explicit knowledge. In this sense, the first role of ICT is to execute searchable libraries or repositories of codified knowledge, which enables individuals to look for particular types of knowledge, rather than develop solutions of their own (Revilla *et al.*, 2009). This is based on the codification strategy (Hansen *et al.*, 1999) and the divergent dimension of IT (Revilla *et al.*, 2009), which connects people to explicit knowledge through the internet, electronic libraries, office applications, etc.

The second role of IT from this perspective is to codify task-related knowledge, which is embedded in the firm's standard operating procedures (SOPs) and other key documentation. It can support knowledge management and NPD by enabling codifiable knowledge to be accessed, replicated, transferred and shared more easily at low or no marginal cost to the firm (Stonehouse and Pemberton, 1999; Roberts, 2000; Chuang *et al.*, 2013; Revilla *et al.*, 2009).

3.8.5: ICT and the Epistemology of Practice

In this perspective, theorists contend that all knowledge is socially constructed and is thus highly subjective (Leonard and Sensiper, 1998). Therefore, it is doubtful whether the codification and storage of tacit knowledge in ICT-based repositories will lead to the production of 'useful' knowledge (Hislop, 2009). From the epistemology of practice, ICT can enable knowledge management in two key ways (Hislop, 2009). First, it can facilitate the production of expertise maps, which allows individuals to look for experts with specialist knowledge throughout the firm via corporate 'yellow pages' or searchable web portals, for example. The major difference between this and the knowledge repository approach of the epistemology of possession is once experts are identified, knowledge is exchanged via interpersonal interaction and communication through, for example, videoconferencing and virtual project rooms (Roberts, 2000).

Second, it can support the use of collaboration and communication tools, such as instant messaging, chatrooms and virtual cafes, to facilitate the interaction of individuals who may be spread across geographically-dispersed locations. ICT mediated tools may also enable the creation of virtual communities of practice (VCoPs); thereby assisting in the creation and sharing of tacit knowledge (Ardichvili, *et al.*, 2003). This does, however, call for a culture or climate of reciprocal trust (Zuo and Panda, 2013) and the sharing of socially embedded values and expectations between each individual and the firm (Boisot, 1998; Roberts, 2000). Revilla *et al.* (2009) concur and suggest that this convergent IT approach, which connects people to people, can enable an improvement in communication, coordination and collaboration between individuals, using applications such as videoconferencing, groupware and email.

3.8.6: ICT as a Disabler of Knowledge Management and NPD

As highlighted at the beginning of this section, ICT plays an important, yet controversial, role in enabling the creation, dissemination, transfer and utilisation of both tacit and explicit knowledge (Lee and Choi, 2003; Hendriks, 2001; Pérez-López and Alegre, 2012; Chuang *et al.*, 2013), which is vital for the effective development of new products and innovation within the firm (du Plessis, 2007; Cantner *et al.*, 2011). ICT is blessed with the ability to enable instant access, 24/7, to vast amounts of data and information and facilitate collaboration between individuals and teams and business functions and subsidiaries across geographically-dispersed and diverse locations (Riege, 2005). However, ICT can also act as a disabler of the creation, dissemination, sharing, transfer, utilisation and management of knowledge and NPD. On this note, Gammelgaard and Ritter (2005) advise that ICT disables effective knowledge transfer by creating information overload (Zhuang *et al.*, 2011). Allowing vast amounts of information to be available may lead to low usage rates and the perception of repositories and databases as ‘information junkyards’ (McDermott, 1999).

In addition to this, Riege (2005) attests that ICT may restrict knowledge sharing practices due to a mismatch between individuals’ need requirements, integrated IT systems and processes. He also suggests that individuals may have unrealistic expectations of what IT can and cannot do. Therefore, knowledge workers may not fully utilise the resources at their disposal and may overestimate the utility of new ICTs for delivering required organisational performance improvements (Swan *et al.*, 1999). Furthermore, Stonehouse and Pemberton (1999) identify three key disablers. First, individuals may resist sharing their knowledge because they view its release as a potential loss of organisational or personal power. Second, some firms may find it difficult to codify individuals’ tacit knowledge into a stored, sharable format. Finally, technological and communication problems may occasionally result in a loss of knowledge in the transfer process and as a consequence hinder the sharing of the cross-functional knowledge that is required for NPD (Kang and Kim, 2010).

3.8.7: Systems

Xu and Quaddus (2005) advocate that a key objective of firms is to manage and utilise knowledge more strategically and effectively. This can be facilitated by providing enabling systems and technologies such as knowledge management and NPD systems,

which form a major part of a firm's organisational infrastructure (Stonehouse and Pemberton, 1999; Lee and Choi, 2003; Najjaran *et al.*, 2013; Migdadi, 2009).

3.8.8: Knowledge Management Systems

Knowledge management systems are types of information systems that firms deploy to enable the creation, dissemination and utilisation of organisational knowledge (Alavi and Leidner, 2001). Their role is to support and enhance the creation, storage/retrieval, transfer and application of knowledge throughout the firm and thus generate sustainable competitive advantage (Pfaff and Hasan, 2011; Bollinger and Smith, 2001). From a knowledge work perspective, knowledge management systems provide for the “*creation of new knowledge, the assembly of externally-created knowledge, the use of existing knowledge and the finding of knowledge from internal and external sources*” (Meso and Smith, 2000:226). As both definitions suggest, a primary aim of knowledge management systems is to enable knowledge workers to create, organise and make important business knowledge available whenever and wherever it is needed in the firm (Pfaff and Hasan, 2011; Khalifa *et al.*, 2008).

As well as facilitating the sharing and dissemination of both tacit and explicit knowledge, Chait (1999) posits that knowledge management systems, as information systems, enable the following key information to be made available throughout the firm:

- Information about staff, practices and groups, which improves the firm's ability to identify individuals with the necessary knowledge and skills and which keeps everyone in the firm up-to-date at anytime and anywhere regardless of location.
- Information about customers and clients, which helps the firm to support and serve them, and
- Information about methodologies and tools, which allows the firm to deliver quality and service consistently, efficiently and effectively.

While extant literature espouses the use of knowledge management systems as an information portal underpinned by IT, Yeh *et al.* (2006), Migdadi, (2009), Ho (2009) and Lee and Choi (2003) advocate that other aspects are important and should not be ignored, including variables such as organisational culture, structure and people (end

users). As such, knowledge management systems should be viewed as a socio-technical system comprising of tacit and explicit business practices and policies that are enabled by the strategic integration of business processes, IT tools and intellectual, human and social capital (Carayanis, 1998). Thus, the needs and expectations of the people who will be using the system should be taken into consideration (Quaddus and Xu, 2005; Chuang *et al.*, 2013).

3.8.9: Disablers of Knowledge Management Systems

From an analysis of extant literature, one can see that knowledge management systems and, ostensibly, ICTs, enable the management of knowledge within the firm. However, barriers or disablers of such systems have been identified (Damodaran and Olphert, 2000; Gallivan *et al.*, 2003; Stonehouse and Pemberton 1999). First, the system may be poorly designed and not user-friendly. Therefore, users may see it as an imposition and not accept it as part of the culture and their working practices. Second, the firm may not provide adequate user support and education and training on how to manage the information generated by the system; thus disabling user acceptance and uptake. Third, and importantly, employees may not be willing to articulate and share their knowledge and information with others, as it may be perceived as a recipe for job losses or loss of personal and expert power.

In order to generate sustainable competitive advantages, Gallivan (1997) and Stonehouse and Pemberton (1999) concur that knowledge management systems must underpin the firm's knowledge management activities and fit its existing culture, norms and reward/incentive schemes. Ignoring such factors, they caveat, may reduce the successful outcome of a firm's knowledge management endeavours.

3.8.10: New Product Systems

In the previous part of this chapter, a variety of information and communication technologies were proffered as a vehicle through which knowledge management and NPD can be undertaken in the firm (Yeh *et al.* (2006), Migdadi, (2009), Ho (2009). A further stream of ICTs is an enterprise system, which is an amalgam of IT and business processes that make up an integrated enterprise computing system (Farzaneh *et al.*, 2013). Enterprise systems are important, insofar as they support the conducting of knowledge work within the firm (Newell *et al.*, 2009) and reinforce the infrastructure through the automation of core corporate activities, such as NPD. They also coordinate the flow of knowledge, information and financial resources between

functional areas, for example, product planning and scheduling, inventory control, purchasing, financial and human resources and sales (Chang *et al.*, 2008; Ifinedo, 2008)

The utilisation of enterprise systems can be seen through the lens of the epistemologies of possession and practice (Newell *et al.*, 2009). From the possession or knowledge as an object paradigm (Hislop, 2009), the aim of the system is to disseminate and transfer knowledge relatively quickly around the firm, regardless of time, distance and location (Newell *et al.*, 2009). The vehicle could be email or a repository such as the intranet, which would then guide how work should be undertaken to maximise efficiency and control costs (ibid; Nicolaou, 2004). The effort would be expended on implementing a codification strategy (Hansen *et al.*, 1999; Jasimuddin *et al.*, 2005); thus ensuring the diffusion of explicit knowledge to distributed locations.

The use of such systems is unsurprising, given that there is a preponderance of very large firms that are geographically dispersed (Newell *et al.*, 2009). Such structural types, for example the geocentric centralised R&D (centralised hub; Ahmed and Shepherd, 2010; Boutellier *et al.*, 2008), often preclude the utilisation of more knowledge as practice (Hislop, 2009), tacit approaches to knowledge sharing, which can be enabled via technologies such as Web 2.0 (O'Reilly, 2005, cited in Akehurst, 2009), Wikis discussion fora (Pfaff and Hasan, 2011) and social media/social networking (Annabi and McGann, 2013; Newell *et al.*, 2013). These systems are becoming more contemporary and more widely adopted because they enable communication barriers between knowledge workers and functional areas to be broken down and facilitate virtual communities of practice (Ardichvili *et al.*, 2003) to be born through social networks and the exchange of social capital (Pfaff and Hasan, 2011).

Given the proliferation of such technologies, firms must consider not only the socially-constructed nature of knowledge when designing and implementing enabling ICT systems to manage knowledge and NPD, but also the sociotechnical, cultural, political and infrastructural factors within the workplace that will indubitably impact on knowledge creation and sharing in the NPD process (Pfaff and Hasan, 2011; Hislop, 2009; Cartelli, 2007).

3.8.11: Communication

The NPD process is an iterative procedure that gathers, creates and evaluates information that is necessary for the development of new or modified, defect-free products (Shankar *et al.*, 2013). The process requires the bringing together of diverse opinions and ideas from across functional areas, which evidence suggests many firms find difficult and challenging to do. This is particularly so with gathering and exchanging information from multiple teams spread across geographically diverse and distributed locations (ibid; Newell *et al.*, 2009; Ahmed and Shepherd, 2010; Jacobsen *et al.*, 2014). However daunting the challenge may be for firms, Shankar *et al.* (2013:2052) caveat that inadequate communication both within and across the firm will result in an “*extensive loss of time and money.*”

3.8.12: Defining Communication

Clegg *et al.* (2011:296) define communication as the “*exchange of ideas, emotions, messages, stories and information through different means including writing, speech, signals, objects or actions.*” Jacobsen *et al.* (2014) suggest that the exchange of ideas, messages and information as espoused by Clegg *et al.* in the above definition is a major feature of NPD within firms. Senior management should thus focus on identifying enabling factors that not only support the optimisation of internal communication flows, but also importantly develop the relationship between the R&D and Marketing functions, as stated earlier (Drechsler *et al.*, 2013; Sherman *et al.*, 2005).

3.8.13: Enabling Optimal Communication

Before managers can enable optimal communication between internal stakeholders and functional areas, Welch and Jackson (2007:186) suggest that they need to ask themselves a series of questions, specifically “*who communicates, to whom, in what way, with what content and...for what purpose?*” Table 3.4 provides an outline of the dimensions of internal communication, participants who engage in the process and the likely information being exchanged.

Table 3.4: Internal Communication Matrix

Level	Direction	Participants	Content
Internal Line Management Communication			
Line managers/ supervisors	Predominantly two-way	Line managers to employees	Employees' roles Personal impact, e.g., appraisal discussions, team briefings Access to resources, financial management, HRM
Internal Team Peer Communication			
Team colleagues	Two-way	Employee to employee Peer to peer	Team information, e.g., team task discussions
Internal Project Peer Communication			
Project group colleagues	Two-way	Employee to employee Employee to manager as project team members	Project information, e.g., project issues Delivering specified project or team goals
Internal Corporate Communication			
Strategic managers/ top management	Predominantly one way	Strategic managers to all employees	Organisational/corporate issues, e.g., goals, objectives, new developments, activities and achievements
<i>Source: Welch and Jackson (2007:185)</i>			

Welch and Jackson (2007) advocate that the fourth dimension, internal corporate communication, is of particular importance to firms because its main focus is on optimising communication with, and engagement of, all employees. Furthermore, the objective is to promote commitment to the firm, a sense of belonging and an awareness of the strategic and operational aims of the business and the changing commercial environment in which it operates. A further challenge for firms is to imbibe better communication in geographically dispersed business units (Ahmed and Shepherd, 2010).

As outlined in the Specialist Roles and Knowledge variable, Ahmed and Shepherd (2010) suggest that fostering more free flowing communication can pose problems because knowledge workers in global or virtual teams are not co-located and therefore have minimal face-to-face contact with each other. Therefore, developing suitable communication flows, enabled by technology such as instant messaging, audio conferencing and virtual whiteboards (Malhotra and Majchrzak, 2005), can help to build trust between knowledge workers and the firm and generate the level of

knowledge sharing required to develop new products (Cooper, 2008; Ahmed and Shepherd, 2010; Kandemir *et al.*, 2006). Further ICT enabled mechanisms that can optimise communication throughout the firm, but especially for teams operating in geographically dispersed locations, are illustrated in Table 3.5.

Table 3.5: Evaluation of Examples of ICT for NPD Teams

Technology	Developing an informal network	Promotion of creativity	Information exchange	Coordination support	Efficiency	Examples from software development
Videoconferencing	5	5	3	3	1	Project control, meetings, concept
Teleconferencing	5	4	2	5	2	Project control, definition of interfaces,
Telephone, voicemail	5	3	5	5	3	Definition of interfaces, project progress
Groupware	4	5	3	5	5	E-brainstorming, process documentation
Fora	4	4	5	3	5	Exchange of info, questions and answers
Intranet	4	4	5	5	5	Email, communication
Client/server environ	4	4	3	1	3	Development environ, shared databases
Email, memos	4	3	5	5	5	Mails, revisable documentation
LAN/WAN/GAN	3	4	5	4	3	Development library, development environ
File transfer	3	4	3	5	5	Presentations, spreadsheets, messages, file transfer pro
CAD	2	4	4	3	4	Hardware, display
CASE tools	2	2	4	3	4	Design, concept, code generation
Electronic calendar	2	1	2	5	4	Organising meetings
Project mgt systems	2	1	2	5	5	Project planning and control
Software library (db)	1	2	5	5	4	Progress of testing, source code
Remote systems	1	2	2	1	4	Compiling, driver development, tests
Not suitable	1	2	3	4	5	Highly suitable
Source: The Researcher Adapted from: Bouteiller, Gassman, Macho and Roux (1998), cited in Bouteiller et al (2008:241)						

Table 3.5 evaluates the suitability of different types of technology for activities such as developing an informal network in Column 1 or information exchange in Column 3. Importantly, senior management can utilise its contents to identify appropriate

media for optimising communication in a cost and time saving manner (Boutellier *et al.*, 2008). In addition, Snyder and Lee-Partridge (2013) claim that the use of the ‘right’ technology can not only improve knowledge sharing among teams and across the firm, but can also enhance efficiency and raise levels of communication.

3.8.14: Disablers of Communication

As well as some of the issues highlighted above, Jacobsen *et al.* (2014) identified a number of disablers of communication, based on their review of relevant literature. First, a lack of formal procedures can lead to spates of sporadic information sharing between knowledge workers (Lievens and Moenaert, 2000). Second, communication can be impeded by a lack of common goals that are identified and agreed between knowledge workers and teams, which can lead to cross-functional teams working in isolation of each other or in separate directions because the information is interpreted differently (Adams *et al.*, 1998). In addition, the quality and quantity of knowledge and information exchange between teams and functional areas can be affected by the relationship that exists between functional areas (Song *et al.*, 1996).

In order to optimise internal communication, Shankar *et al.* (2013) attest that there should be coordination between knowledge workers, the specialist roles they undertake and the needs of the firm in terms of managing knowledge. Jacobsen *et al.* (2014) add that firms are minded to adopt the right structure to suit their contexts and ensure teams are empowered to make informed decisions. Furthermore, as highlighted earlier, teamwork between R&D and Marketing should be prioritised, particularly when key internal knowledge and information are required to feed the NPD process (Drechsler *et al.*, 2013; Sherman *et al.*, 2005).

3.9: Chapter Summary

As this chapter has identified, the organisational variables have a significant influence on the management of knowledge within the context of the NPD process. The interconnected nature of the variables, as evidenced in the literature review, demonstrates the importance each one plays in symbiotically enabling both individual and organisational knowledge to be effectively managed and utilised for the development of new products. Notably, the variables have the capacity to also act as disablers.

In terms of new product strategy, theorists espouse the importance of having a formal new product strategy to not only define the role of NPD but also help shape how products are developed and modified and guide how resources, such as specialist knowledge workers, are allocated to each project. Formulating the strategy is a knowledge-creating, learning process in itself and therefore requires cross-functional knowledge input from various parts and levels of the firm. Importantly, evidence suggests that the absence of a new product strategy can have a significantly negative impact on a firm's innovation performance.

Organisational culture was shown to be a further significant influencing mechanism of knowledge management and NPD, especially since it axiologically shapes everything the firm is and does through its shared norms, values, beliefs and assumptions, which are often taken for granted. Culture also influences the firm's work systems and structures and can thus enable or disable communication, collaboration and mutual trust and ultimately how knowledge is managed, created and shared for NPD. Moreover, culture shapes assumptions about what knowledge is, which knowledge is worth managing and who owns, shares and hoards it. This intelligence therefore equips senior management with the tools they need to design a supportive infrastructure and culture that champions innovation and enables them to manage specialist knowledge as a strategic asset.

Along with culture, organisational structure is a key shaper of organisational behaviour and communication in the firm and coordinating mechanism for business activities and processes. It influences the management of knowledge in NPD by implementing processes and procedures to disseminate knowledge and information around the firm for utilisation in NPD activities. Structure also controls the extent to which knowledge workers and teams have contact with each other through co-location, are able to enjoy autonomy and spontaneity in their roles and share knowledge face-to-face or through mediating technologies. The literature has highlighted that innovative, organic structures such as the integrated R&D network can enable better communication and knowledge sharing throughout geographically distributed business entities. However, structure can serve to disable knowledge sharing if there is too much formalisation and bureaucracy through the presence of hierarchical structures, leading to silos of knowledge and poor communication flows between functional areas.

A key linchpin in the management of knowledge in NPD is the leadership and management team within the firm. Fundamental to this is the exercising of transformational leadership that engenders the generation and maintenance of a culture and climate that encourages and supports the sharing and exploitation of tacit and explicit knowledge and inspires knowledge workers to collaborate with their colleagues and engage in idea generation and knowledge sharing. Leadership and management roles can disable the management of knowledge by not providing rewards, an enabling infrastructure and appropriate levels of support to knowledge workers, particularly those who work in geographically dispersed business entities.

In the knowledge economy, the role of knowledge workers in the firm takes on a key significance, as their specialist knowledge, roles and skills are central to the development and production of strategically advantageous products. Therefore, the management and utilisation of their knowledge becomes all the more important. Knowledge workers require the right culture, climate, structure, leadership, management, strategic and operational autonomy, rewards, technology, systems and communication channels to enable the creation, sharing and application of their specialist knowledge in NPD. Additionally, they also need to cross-fertilise their knowledge with other experts, such as R&D and Marketing, in order to service key activities in the NPD process. Knowledge workers can be hindered from doing their jobs by intraorganisational or interdepartmental conflict and the lack of freedom to exercise autonomy and share their knowledge with others.

Finally, ICT underpins and enables a firm's operational and business activities, the way in which it develops new products and how it manages and utilises individual and organisational knowledge in this process. It further enables different types of technologies to be used to support globally distributed teams as part of an R&D network. Systems such as knowledge management and enterprise resource planning facilitate knowledge to be codified, stored in repositories and disseminated around the firm and business entities to develop new and modify existing products. Ultimately, none of this is possible without optimal communication and the underpinning and mediating technologies that enable good communication flows between all internal stakeholders and facilitate knowledge sharing across the business. However, leaders and managers are required to monitor the situation and ensure that knowledge workers are not hindered from doing their jobs by information overload, cross-functional teams

such as Marketing and R&D working in isolation of each other and using systems and technology that discourage and preclude their use.

3.10: The Conceptual Framework

A major objective of this research study was to develop an espoused conceptual framework from a critical and analytical review of extant literature underpinning organisational infrastructure, knowledge management and NPD. The conceptual framework was a visual interpretation and synthesis of extant empirical and conceptual viewpoints and models that emanated from the literature. It was also influenced by the researcher's experiences and observations of lecturing on, and writing about, knowledge management, organisational culture and climate and the factors that can serve to enable and disable how firms manage their specialist knowledge resources. The framework underpinning the study is illustrated in Figure 3.3 below.

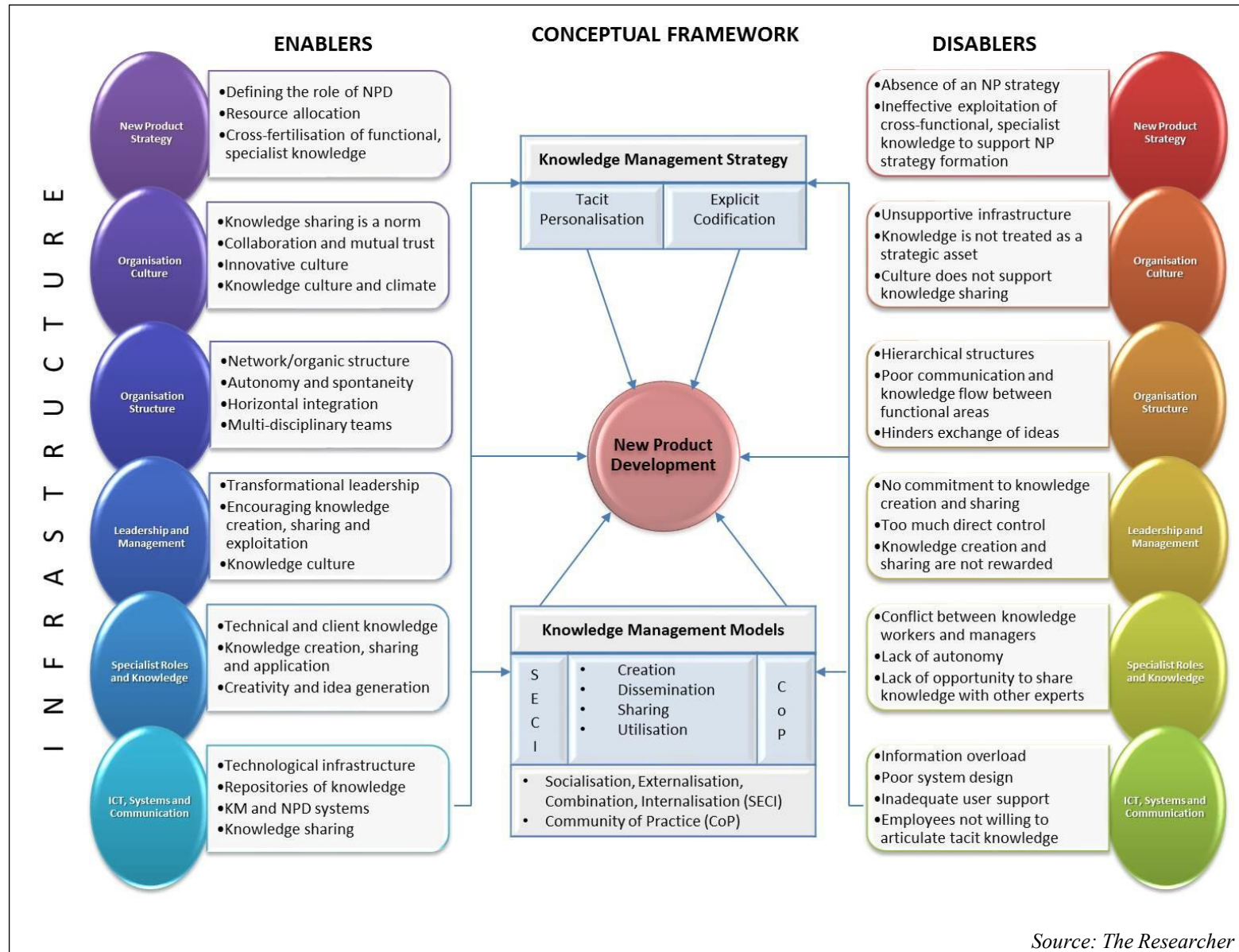


Figure 3.3: The Conceptual Framework

As Figure 3.3 illustrates, the overlap of the variables indicates the interconnectedness and symbiosis that exists between them and also emphasises the synergy that is necessary to create a supportive infrastructure to enable knowledge to be managed effectively. Each variable node was populated with the espoused enablers and disablers of the management of knowledge in the context of the NPD process. The diagram showcases each set of variables as two opposite ends of a spectrum. However, they were not selected or intended to be polar opposites, but representations or examples of some of the factors that support or hinder how knowledge is managed. In stating the enablers and disablers, the researcher provided a series of signposts against which the findings, cross-case analysis and discussion would identify any congruencies or incongruities between the espoused theory highlighted in extant literature and theory in use emanating from the fieldwork in both case study companies.

As well as the variables working together synergistically, the arrows feed up into the knowledge management strategies of personalisation and codification and across to the SECI and communities of practice models. These then filter into NPD and serve two purposes. The first is to identify whether current organisational practices resonate with those espoused in the literature. The second is to provide a point of reference for the proposal of appropriate best practice recommendations for implementation.

Finally, the conceptual framework was developed to guide the design of the research, inform the writing of the semi-structured interview questions (as outlined in Chapter 4: Research Methodology) and shape the collection and analysis of the data. It was also intended to assist the researcher to work towards the fulfilment of three further important research objectives. First, to build and evaluate a revised conceptual framework following the in depth analysis of the fieldwork data. Second, make a significant contribution to existing knowledge and third, share and apply the knowledge in the academic and business and practitioner communities. These objectives will be revisited later in the thesis.

To summarise, the building of the conceptual framework afforded the researcher the opportunity to synthesise the theoretical perspectives that were identified in the literature into a graphical, interpretive representation of the research study. It also guided the way in which the research was designed, the questions that were asked and,

importantly, enabled the research question '*how do organisational variables influence the management of knowledge in the new product process?*' to be answered. Furthermore, it informed how the findings, cross-case analysis, discussion and conclusions were presented and provided a platform to inductively build theory and make a significant contribution to knowledge.

The next chapter critically examines the research methodology that was adopted for this research study.

Chapter 4

Research Methodology

Chapter 4

Research Methodology

No problem can be solved from the same consciousness. We must learn to see the world anew.
Albert Einstein

4.1: Introduction

The previous chapter critically evaluated extant literature underpinning the influencing mechanisms of knowledge management and NPD, from which six organisational variables were identified. This chapter presents the philosophical, epistemological and methodological framework that underpinned the way in which the research study was designed and conducted within ethical guidelines and limitations. The chapter is structured around the research onion framework, as proposed by Saunders *et al.* (2012) and is illustrated in Figure 4.1 below.

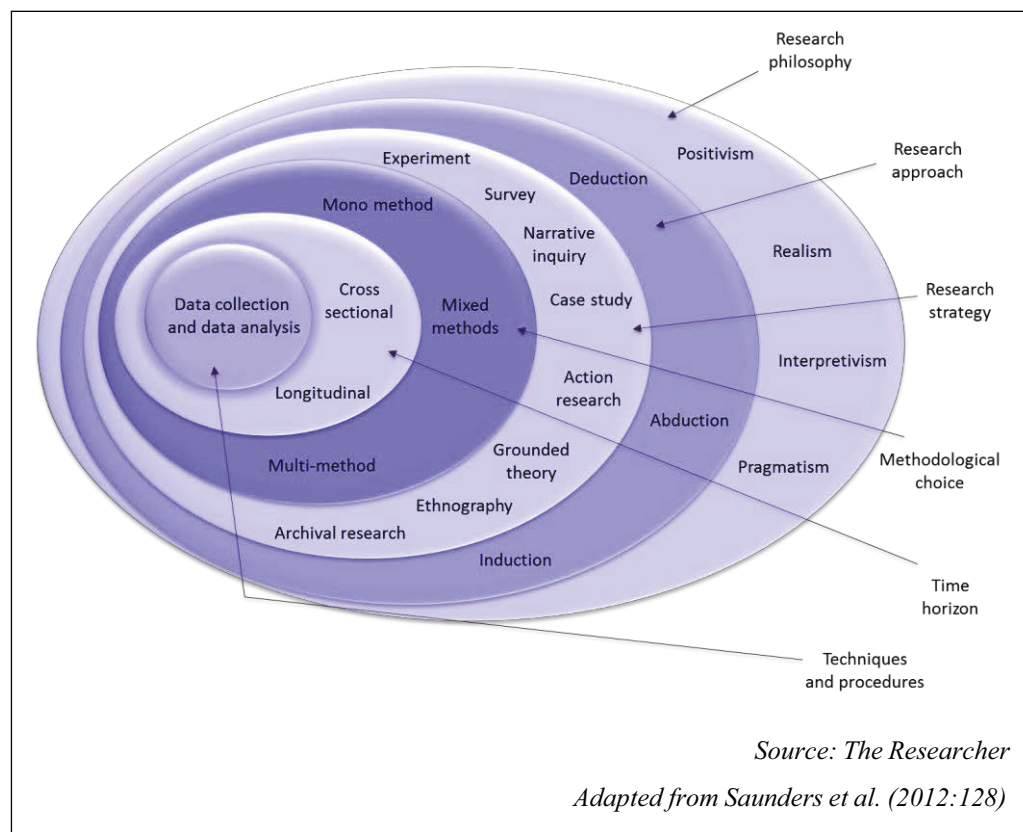


Figure 4.1: The Research Onion

Each layer of the onion will be explored within the context of the research study. Rather than focusing on a discussion of each individual approach, strategy, methodology and technique, which is not the remit of this chapter, the researcher will instead present and defend the reasoning behind the choice of the most appropriate design to support the achievement of the aim, research question and objectives of the study.

4.2: The Philosophical, Ontological and Epistemological Framework

The relationship between theory and data has been subject to debate by philosophers for centuries (Easterby-Smith *et al.*, 2012). Much of the discourse has centred on ontological paradigmatic thinking and their respective merits (Hammond and Wellington, 2013; Neuman, 2014). As Easterby-Smith *et al.* (2012), Saunders *et al.* (2012) and O’Leary (2014) espouse, the researcher was cognisant that she had to think carefully about her philosophical orientation and the likely impact that her underlying assumptions and beliefs may have on her research study. In this respect, she focused on an examination of the two main ontological and epistemological paradigms that are predominantly discussed in extant methodological literatures: objectivism/positivism and subjectivism/interpretivism (Shah and Corley, 2006), as they are central to the quantitative-qualitative divide and debate that is endemic in business and management research (*ibid*). As an adjunct to ontology and epistemology, the researcher also explored axiology and the ways in which values influence the choice of methodology (Hammond and Wellington, 2013; Tracy, 2012).

4.2.2: Ontology

Ontology is concerned with the nature of reality or the assumptions individuals or researchers have about the world, how it operates, what exists and what they consider to be ‘real’ within this context (Saunders *et al.*, 2012; Neuman, 2014). This perspective encompasses two dominant themes: objectivism and constructivism (Bryman and Bell, 2011; Saunders *et al.*, 2012). First, objectivism posits that social phenomena and the meanings that are attached to them exist independently of social actors and beyond their influence (Bryman and Bell, 2011). Moreover, Collis and Hussey (2014) suggest it is representative of the assumption that the world is an objective reality and thus exists externally to the researcher.

From a knowledge management perspective, the epistemology of possession describes knowledge as an entity, insofar as it is a commodity that individuals possess and as

such exists independently in their minds (Hislop, 2013). In addition, knowledge can also be described as objective facts; in which case, knowledge and understanding can be developed that are free from bias, individual subjectivity and interpretation (ibid; refer to Chapter 2: Contextualising and Conceptualising Knowledge Management and NPD).

Second, constructivism or constructionism (Bryman and Bell, 2011) postulates that social phenomena and meanings are created from the interplay between the perceptions and actions of social actors (Saunders *et al.*, 2012). As the world or individuals' contexts change, so do their perceptions and subsequent actions (ibid). Examining this from a knowledge management perspective, the epistemology of practice asserts that all knowledge is socially constructed, which therefore renders it subjective and open to interpretation (Hislop, 2013). Furthermore, knowledge is culturally embedded in individuals with values and culturally generated behaviour (DeLong and Fahey, 2000). Thus, the perceptions, meanings and interpretations that individuals assign to various events that occur daily are shaped by the assumptions and values associated with the cultural and social context in which they work and live (Hislop, 2013: refer to Chapter 2).

4.2.3: Epistemology

Akin to ontology is epistemology, which Hammond and Wellington (2013) define as being concerned with the nature of knowledge and what researchers consider as acceptable knowledge (Bryman and Bell, 2011). Moreover, it involves examining the relationship between the researcher and topic with which he or she is researching (Collis and Hussey, 2014). From an epistemological viewpoint, two further dominant paradigms were examined by the researcher: positivism and interpretivism (Bryman and Bell, 2011; Saunders *et al.*, 2012).

First, positivism is positioned in the natural sciences epistemology (Bryman and Bell, 2011) and can be classed as "*the scientific approach to research*" (Hennink *et al.*, 2011:14) or functionalist paradigm (Burrell and Morgan, 1979). The goal or objective here is to identify causal relationships between variables and test and refine theory in such a way that data collection, analysis, findings and results can be replicated under similar conditions; such that the validity of the theory can be established (Shah and Corley, 2006). The methodological heritage of positivism is quantitative data collection and rigorous statistical analysis (ibid).

Second, interpretivism, as the name suggests, involves qualitative data collection, analysis and findings that represent the interpretation of various phenomena under study (Shah and Corley, 2006). Furthermore, a rigorous interpretation of the phenomena enables the plausible development of theory, facilitates a deeper understanding of the situation at large (ibid) and enables researchers to study the subjective meanings social actors attach to their experiences within their own contexts (Hennink *et al.*, 2011; Bryman and Bell, 2011).

4.2.4: Axiology

Underpinning ontology and epistemology is the philosophy of axiology, which is concerned with the judgements, ethical principles or values that are called into play when conducting research or theorising (Duffy and Chenail, 2008; Saunders *et al.*, 2012; Tracy, 2012). Saunders *et al.* (2012) espouse that the role researchers' values play in the entire research process is vitally important if they wish their results to be credible. From a positivist or quantitative perspective, science and the research process is value free; therefore, positivist researchers can consider themselves to be objective and detached from their participants as objects of their research (Collis and Hussey, 2014). Moreover, from this stance, researchers separate themselves from the research and therefore do not recognise the co-constructive and interactive nature of data collection with human participants (Hennink *et al.*, 2011).

On the other hand, interpretive researchers consider that their values and beliefs help to shape what are acknowledged as facts and the various interpretations that are elicited or formed from them (Collis and Hussey, 2014). From this stance, researchers could be described as being directly involved with the topic under study (ibid). Table 4.1 illustrates the comparisons between positivist and interpretivist research from ontological, epistemological, axiological and methodological perspectives (Saunders *et al.*, 2012:140; Creswell, 1994, cited in Collis and Hussey, 2003:49; Cepeda and Martin, 2005:856; Hennink *et al.*, 2011:16).

Table 4.1: Research Philosophies and Perspectives

Philosophy	Positivism	Interpretivism
Ontology The researcher's view of the nature of reality	External, objective and independent of social actors.	Socially constructed, subjective; may change; multiple.
	Person (researcher) and reality are separate.	Person (researcher) and reality are inseparable (life-world).
	Reality is objective; apart from the researcher.	Reality is subjective and multiple, as seen by participants in a research study.
Epistemology The researcher's view regarding what constitutes acceptable knowledge. The relationship of the researcher to that which is being researched	Only observable phenomena can provide credible data; facts. Focus on causality and law-like generalisation, reducing phenomena to simplest elements.	Subjective meanings and social phenomena. Focus on the details of the situation, a reality behind these details; subjective meanings motivating actions.
	Objective reality exists beyond the human mind.	Knowledge of the world is intentionally constituted through a person's lived experiences.
	Resources researcher.	Feelings researcher.
	Researcher is independent from that which is being researched.	Researcher interacts with that which is being researched.
Axiology The researcher's view of the role of values in research	Research is undertaken in a value-free way; the researcher is independent of the data and maintains an objective stance.	Research is value-bound; the researcher is part of what is being researched, cannot be separated and so will be subjective.
	Research is unbiased and value-free.	Research is biased and value-laden.
Methodology The process of research Objective Purpose Data Study population Data collection methods Analysis	Quantitative.	Qualitative.
	Deductive process.	Inductive process.
	To quantify data and extrapolate the results to a broader population.	To gain an understanding of underlying reasons, beliefs and motivations.
	To measure, count, quantify a problem. How much? How often? What proportion? Relationships in data.	To understand why? How? What is the process? What are the influences or contexts?
	Data are numbers or numerical data.	Data are words (called textual data).
	Large sample size of representative cases.	Small number of participants or interviewees selected purposively (non-randomly).
	Referred to as respondents or subjects.	Referred to as participants or interviewees.
	Population surveys, opinion polls, exit interviews.	In depth interviews, observations, group discussions.
	Analysis is statistical.	Analysis is interpretive.

Table 4.1: Research Philosophies and Perspectives (continued)

Philosophy	Positivism	Interpretivism
Researcher's role	Detachment and impartiality.	Personal involvement and partiality.
	Objective portrayal.	Empathetic understanding.
	Etic (outsider's point of view).	Emic (insider's point of view).
	Uses abstract language in the write-up.	Uses descriptive write-up.
Outcome	To identify prevalence, averages and patterns in data. To generalise to a broader population.	To develop an initial understanding, to identify and explain behaviour, beliefs or actions.
Validity	Certainty; data truly measures reality.	Defensible knowledge claims.
Reliability	Replicability; research results can be reproduced.	Interpretive awareness; researchers recognise and address implications of their subjectivity.
<p style="text-align: right;"><i>Source: The Researcher</i></p> <p><i>Adapted from: Saunders et al. (2012:140); Cresswell (1994), cited in Collis and Hussey (2003:49); Cepeda and Martin (2005:856); Hennink et al. (2011:16); Glesne and Peshkin (1992); Lincoln and Guba (1985), cited in Yilmaz (2011:314)</i></p>		

Having evaluated the characteristics of both paradigms in Table 4.1 above, the researcher concluded that interpretivism is of particular relevance to, and is more appropriate for, this research study for a number of reasons. First, the study aims to identify the extent to which organisational variables, such as organisational culture, enable or disable the management of knowledge in the NPD process. Implicit within this is the concept of knowledge. The epistemology of practice asserts that all knowledge is socially constructed, which renders it subjective and open to interpretation (Hislop, 2013). Furthermore, knowledge is culturally embedded in individuals' values and culturally generated behaviours (DeLong and Fahey, 2000). Thus, the perceptions, meanings and interpretations that the study's participants, as social actors (Saunders *et al.*, 2012) assign to various events that occur on a daily basis, are shaped by the assumptions and values that are associated with the cultural and social contexts in which they work and live (Hislop, 2013). Therefore, multiple social and cultural realities exist surrounding particular phenomena because the actors or participants perceive and interpret them differently (Shah and Corley, 2006).

Moreover, the epistemology of practice has a closer synergy with this study rather than the epistemology of possession, which like positivism, views knowledge as an objective reality and objective facts that exist separately from individuals (Shah and Corley, 2006). Second, ascertaining the interpretations, assumptions and views of participants about their own knowledge and that of their peers, including what it is

(e.g., technical and/or client knowledge) and how it can be underpinned by the organisational variables and leveraged by the business to support NPD, is also an important feature of the study.

Third, epistemologically, the study is of professional interest to the researcher. As a Senior Lecturer in what could be termed a knowledge-intensive firm (a University), the creation, dissemination, sharing and utilisation of knowledge is an integral part of her job. She also lectures on the subjects upon which this study is based. Along with her personal beliefs about constructivism/subjectivism, the researcher feels she will closely interact with that which is being researched. Therefore, as an interpretive ‘feelings’ researcher (Saunders *et al.*, 2012), her own multiple perspectives of reality and interpretation of events, phenomena or the situation at large within the participating case study companies, cannot be separated and therefore cannot be unbiased. The research process is, as a consequence, value laden (Collis and Hussey, 2014). It also makes it impossible to entirely separate the research study from the previous knowledge and interests of the researcher (Markula and Friend, 2005). Hence, the meaning the researcher attaches to the study should not and cannot be excluded from the overall research process (*ibid*).

By immersing herself in the organisational context within which the phenomena is occurring, she acknowledged how important interpretation and observation are in understanding the social world and organisational life (Snape and Spencer, 2003). Developing her interpretations of ‘real time’ corporate life, based on her own personal experiences and those of her participants, she was able to develop insights that would not have been possible using other analytical methods (Shah and Corley, 2006). Finally, NPD has been described as a complex and dynamic knowledge intensive process (Goffin *et al.*, 2010; Goffin and Koners, 2011; Nonaka and Takeuchi, 1995; Yu *et al.*, 2014), which directly involves the creation, dissemination, sharing and utilisation of knowledge. Accordingly, close synergies between the researcher and the topic under study exist.

4.2: The Methodological Framework

Like the research philosophies, consideration of methodology is an important aspect of a research study, as it enables researchers to make informed choices about the design of their research (Saunders *et al.*, 2012). Simply defined, methodology concerns the theory of how a research study should be undertaken, including its

philosophical and theoretical assumptions and the implications for the method/s adopted (ibid). Methodology, they caveat, should not be confused with methods, which describes the techniques researchers use, such as qualitative interviews and observations, to collect and analyse data. As an interpretivist, 'feelings' researcher, the study adopted a qualitative methodology, which enabled her to conduct an in depth, probing study of participants' experiences, perceptions, emotions, attitudes and beliefs as situated and embedded in their natural work contexts (Altinay and Paraskevas, 2008; Yilmaz, 2013); thus achieving 'Verstehen' or an understanding of the issues from an emic or insider's perspective (Hennink *et al.*, 2011; Yilmaz, 2013).

The choice of methodology was also inspired by the research topic. As there is a small, but existing, body of knowledge within the field, it afforded the researcher the opportunity to offer new, original and rich insights (Kapoulas and Mitic, 2012) into how a firm's organisational variables can enable or disable the management of knowledge in the NPD process. Adopting a qualitative research methodology challenged the researcher to:

- Conduct the research study reflexively, acknowledging that her background, philosophical orientation, idiosyncrasies, axiological values and emotions are an integral part of the process of collecting, analysing and producing data (Hennink *et al.*, 2011; Burke-Johnson *et al.*, 2007) and may therefore influence the findings, and
- Compress voluminous qualitative data from forty verbatim transcriptions into narrative text, which illustrates, describes, explains and builds theory, while exercising caution that the meaning of the data is not compromised (Black, 2006).

Whatever the challenges the researcher faced during the research process, O'Leary (2014) asserts that a qualitative research methodology can be a powerful tool to enable researchers to make a contribution to organisational decision-making based on empirical evidence, to share stories and influence people through change in ways that are difficult to achieve via the quantification of experiences through statistical analysis. This, O'Leary claims, is the 'power' of qualitative research. This is also important insofar as both Company A and B have expressed an interest in operationalising the findings of the study. This will then influence and inform

decision-making concerning how knowledge is managed and utilised to enhance NPD within these companies and across other corporate contexts (Yin, 2009).

4.3: Research Approach

From an interpretivist/qualitative stance, the research study will utilise an exploratory, inductive, theory building approach (Saunders *et al.*, 2012). Induction is the “*process of observing facts to generate a theory*” (Ghauri and Grønhaug, 2005:16), through which general conclusions can be drawn from empirical observations of reality (Collis and Hussey, 2014). Of course, each individual participant representation of the reality of corporate life will be different as they will each experience different and multiple social and cultural realities (Shah and Corley, 2006). Saunders *et al.* (2007) posit that induction is characterised by:

- a. A close understanding of the research context, which the researcher has by virtue of her experiences of, and contact with, knowledge management and innovation,
- b. The collection of qualitative data. In depth semi-structured interviews were triangulated with participant observations and document analysis in order to strengthen the validity of the research study (Jonsen and Jehn 2009), and
- c. A more flexible structure, to permit changes of research emphasis as the research progresses.

The inductive approach was privileged over deduction because of its propensity to design a strict methodology that does not allow different accounts of what is occurring in the specific context being studied (Saunders *et al.*, 2012). Coffey and Atkinson (1996) assert that theory building involves work that is both intellectual and creative in nature. This challenged the researcher to go beyond the rich data she had collected and link concepts, explore ideas and examine patterns and themes that emerged from the data (ibid).

4.4: Research Strategy

As a complement to the interpretivist epistemology, qualitative methodology and inductive approach outlined above, the researcher adopted the case study strategy. Defined as a strategy for conducting research that involves an empirical investigation of a contemporary phenomenon in its real live context using multiple sources of

evidence (Robson, 2002), case studies have been used extensively in the knowledge management (Grant, 2011) and NPD (Rahman, 2012) fields. The decision to opt for this type of strategy was made for a number of reasons. First, the researcher believes it enabled her to achieve ‘Verstehen’, a richer understanding of the meanings, interpretations, perceptions and subjective experiences of the research participants as played out in their real-life context, from an emic or insider’s perspective of the case study companies involved (Hennink *et al.*, 2011; Yilmaz, 2013).

Second, case studies are an ‘ideal’ strategy when ‘how’ questions are being utilised, as is the case in this research study (Yin, 2009). Third, it enabled the researcher to utilise multiple sources of data collection to generate rich data, to assist in the theory building process (Sigglekow, 2007). Fourth, as the organisational variables at the centre of the study are essentially cultural, i.e., four of the variables appear in the cultural web (Johnson and Scholes, 1999), it was deemed an appropriate strategy because it would facilitate a thorough investigation of the phenomena by learning about the companies and their history and interviewing and observing people in action (Hennink *et al.*, 2011; Schein, 1999). In addition, as there are six variables, the case study strategy would enable multiple dimensions of the phenomena or context to be rigorously studied (Oliver and Kandadi, 2006). Finally, make a contribution to a small but existing body of knowledge and make best practice recommendations for implementation in the case study companies.

4.4.1: Multiple Case Study Strategy

Due to the small body of knowledge that surrounds the subject matter, a multiple case study strategy (two companies) was used as the basis for the research. The research study is exploratory in nature and characteristic of situations where the researcher seeks to investigate an aspect of organisational or social life that is under-researched (Hesse-Biber and Leary, 2011) or where a limited body of knowledge exists (Collis and Hussey, 2014). Thus, from the findings, the researcher aims to make a significant contribution to a small, but existing body of knowledge.

Yin (2009), Bryman and Bell (2011) and O’Leary (2014) concur that the multiple case study strategy enriches the inductive, theory building process by yielding more robust, compelling and generalisable evidence than that which is collected via a single case. It also enables researchers to compare and contrast rich, qualitative data. Gummesson (2014) adds that such data can be generated from the utilisation of triangulated data

collection methods, such as the semi-structured interviews, participant observations and document analysis that were used in this study (see Section 4.5.2). Researchers can then generalise the findings across different contexts; thus refuting routine claims that case study results cannot be generalised (ibid).

In general, Gummesson (2014) fervently attests that a case study strategy, single or multiple, enables business and management researchers to explore complex phenomena that are enmeshed with a multiplicity of complex issues and an infinite number of variables. It also gives researchers the opportunity to engage in “*interactive research*” (p12) by interacting with the rich data that their fieldwork generates; with their participants through, for example, participant observation in their natural work context, and with themselves via activities such as reflexivity (Finlay, 2002) and reflecting on the research process. The researcher can say with confidence that she fully interacted with all aspects of the case study research.

Finally, Gummesson (2014) caveats that academic researchers have a scholarly responsibility to proffer theories that are actionable and which contribute to developing better theories and generating new knowledge. Case study research, he decrees, makes it possible to do so.

4.4.2: Case Selection and Research Access

A key problem researchers face when aiming to conduct in depth qualitative case study research into organisational phenomena is gaining access to companies (Okumus *et al.*, 2007). Thus, the choice of appropriate case study companies was an important decision, as the context of the research study was NPD and the companies therefore had to be currently engaging in innovation activities, from idea to commercialisation and launch (Cooper and Kleinschmidt, 2007). They also needed to be knowledge-intensive firms, i.e., have a high concentration of knowledge workers in the workforce (Hislop, 2013). As NPD is a knowledge-intensive process, (Belassi *et al.*, 2007; Yu *et al.*, 2014; Shankar *et al.*, 2013) it narrowed down the field somewhat. Thus, it was an important aspect of the design that the chosen cases should correspond to the theoretical framework underpinning the research and the variables being studied (Ghauri and Grønhaug, 2010).

The size and location of the companies was also an important consideration, as a criteria for selection was the proximity to her place of work; they also needed to have

the right number of employees, as the researcher wanted to make the research comprehensive, robust and representative of the workforce, even though she was not trying to achieve statistical significance (Saunders *et al.* 2012). The charge to navigate access to a company was a strategically planned process, rather than a case of “*hard work and dumb luck*” (Van Maanen and Kolb, 1985:11). The researcher experienced very few problems in gaining access. At the first attempt, a formal letter was sent to a global market leading company in the high-tech industry, which yielded a nil response. A change of tactics ensued and the researcher decided to put her extensive network of business contacts to good use and target someone who may end up being a key informant and open doors that may have otherwise remained closed (Robson, 2002). Thus, initial telephone contact was made with the HR Manager of a highly successful company that operated in the flooring manufacturing industry. This led to an e-letter being sent to the Group MD and the former owner. Email confirmation from the Group MD was received six days later and a meeting arranged four weeks after that.

Utilising Laurila’s 1997 typology, the three types of access were successfully achieved and led to the researcher securing the second case study company:

- a. **Formal access:** at a meeting with the Global MD at the company, the research study was explained in detail along with the aim, research question and objectives. The benefits of participating in the research were also highlighted by the researcher. In addition, she was introduced to the Group R&D Director and taken on a tour of the site.
- b. **Personal access:** the researcher attended a number of follow-up meetings, at which she met the Senior Management Team. A number of years went by, during which time the researcher conducted the literature review, devised the conceptual framework and research instruments and conducted the pilot stage. Contact was maintained with the company throughout.
- c. **Fostering individual rapport:** the researcher kept in close contact with the company before, during and after the empirical stage of the research. Importantly, at this stage, the researcher secured the second case study company – its sister company, at the suggestion of the Group MD. A good rapport was established and built up with participants and this was a

contributory factor in gleaning the rich data that emanated from the semi-structured interviews.

Before both the pilot and the main fieldwork stages of the research study commenced, the researcher developed a set of research information documents, which Saunders *et al.* (2012) espouse is a necessary part of the research process as it helps prepare participants for the interviews. All participants that were selected through heterogeneous purposive sampling were sent an Information Pack, which comprised of an Invitation Letter, Participant Information Sheet and Interview Consent Form, all of which can be found in Appendix 1. Importantly, the Participant Information Sheet provided a detailed outline of the research study, including the potential benefits that could be derived by the companies, the opportunity to opt out of participating in the study, confidentiality and ethical issues. A set of documentation was replicated for the pilot study. The Consent Forms were managed by the researcher's named contacts: the PA of the Chief Executive Officer in the pilot case study company and HR Manager of Company A and B. For ethical purposes, interviews were only conducted with participants who had given informed consent (Collis and Hussey, 2014) and were held on company premises during normal working hours. A private room was allocated for the interviews to take place, which made the participants feel at ease.

4.4.3: Purposive Sampling of Participants

In order to recruit participants to take part in the research study, the researcher utilised heterogeneous purposive (non-probability) sampling in the main data collection stage (Johnson *et al.*, 2007; Saunders, 2012), which identified the key individuals who have specific knowledge and expertise of, and influence upon, knowledge management and the NPD process within both companies. The choice of a particular sample is dependent on the premise that it will enable researchers to use their judgement to select participants, who will best to facilitate the achievement of the aim and research question to be answered (Saunders, 2012). Patton (2002:230) advocates that the power of purposive sampling lies in choosing cases and indeed participants who will generate information-rich insights and in depth understanding of the phenomena, rather than “*empirical generalisations.*”

The sample contained twenty participants from each case study company comprising of individuals whose characteristics, job roles and functions were suitably diverse to give the best possible variation in the data collected (Saunders *et al.*, 2012). The

sampling exercise ensured that a range of participants were included from all departments and hierarchical levels (ibid). Table 4.2 illustrates the sampled participants in Company A.

Table 4.2: Sampled Participants in Company A

Job Title	Role in NPD Process
Group MD	Strategy, general management, business analysis
International MD-Malaysia	Strategy, general management, business analysis
International MD-USA	Strategy, general management, business analysis
Group R&D Director	Strategy, product development, business analysis, idea screening
Group Finance Director	Strategy, business analysis, financial resourcing
IT Director	Strategy, ICT and systems
Group Development Manager	Blue sky NPD, design, prototype and testing
Development Technologist	Concept development, prototype and product testing
Creative Manager	Marketing, commercialisation and launch
Creative Design Coordinator	Marketing, commercialisation and launch
Communications Coordinator	Marketing, commercialisation and launch
Supply Chain Manager	Product development, procurement
HR Manager	Human resourcing, knowledge worker support
Head of Group Training	Knowledge worker technical training and support
Group HR Coordinator	Human resourcing, knowledge worker support
Group Financial Controller	Financial analysis
Help Desk Manager	IT support
Third Line Systems Engineer	IT and systems support
Third Line Systems Engineer	IT and systems support
Applications Analyst	Specialist IT and systems support
<i>Source: The Researcher</i>	

The above participants were carefully sampled using the company's organigram, in consultation with the HR Manager and Group Finance Director, in part. This was done to facilitate participation in the research from across the NPD spectrum. Company A

is the strategic, administrative arm of the Group of companies and oversees its global operations, so everyone has their unique input into the process. Table 4.3 highlights the sampled participants in Company B.

Table 4.3: Sampled Participants in Company B

Job Title	Role in NPD Process
Europe MD	Strategy, general management, business analysis
UK MD	Strategy, general management, business analysis and sales
European Manufacturing Director	Strategy, general management, business analysis, production
Technical Director	Strategy, product development, idea screening, modification
General Manager	Strategy, business analysis, development and sales
Samples Manager	Prototype, product development, testing, quality control
Samples Technician	Samples, testing
Technical Advisor	Product development, advisory, customer liaison
Technical Advisor-I	Product development, advisory, customer liaison
Application Development Chemist	Product development and testing
Data Administrator	Health and safety/product data sheets
Manufacturing Manager	Production and testing
Resource Manager	Production, resourcing
Production Scheduler	Production, resourcing, scheduling
Senior SOP Coordinator	Sales order processing
Assistant Project Manager	Project management, advisory
UK Marketing Manager	Marketing, commercialisation and launch
Regional Manager	Sales, commercialisation and launch, customer interface
Finance Manager	Financial analysis and monitoring
Cost Accountant	Costing, financial resourcing
<i>Source: The Researcher</i>	

As Table 4.3 demonstrates, Company B's sampled participants, who were also selected in conjunction with the HR Manager, have more hands-on, operational duties associated with NPD. The company is the UK's main manufacturing plant and one of

the largest in the Group. In addition, Company B engages in product modification and samples development; this is reflective in the range of roles selected. With Company A and B combined, the researcher felt her sample was wide enough to enable the aim to be achieved and the research question to be answered. Of course, importantly, the researcher was cognisant of the specialist roles that were specified in extant NPD literature (Ahmed and Shepherd, 2010); this was at the forefront of her mind when participant recruitment took place (Hennink *et al.*, 2011).

4.4.4: Development of Case Study Interview Questions

As previously reported, the conceptual framework helped to shape the semi-structured interviews that were utilised both for the pilot study and the major fieldwork stage. Thus, a semi-structured interview guide, which is utilised in exploratory studies (Hennink *et al.*, 2011) was developed in three stages. The first stage involved the drafting of sixteen questions that were framed around knowledge management and NPD. The next stage comprised of writing the Interview Questions Context document, which can be found at Appendix 2. This contained an outline of the theoretical background to each question, the responses the researcher intended to get and aspects of the literature and conceptual framework the question covered. The Interview Questions Context was a useful document, insofar as it enabled the researcher to take an overview of how the questions and the likely responses they could yield would enable the research aim to be achieved and the research question to be answered. The final stage of setting the definitive semi-structured interview questions was engaging in the pilot stage of the research study to evaluate not only whether they would work in practice, but also if they were logically ordered (*ibid*).

4.5: Data Collection

As outlined above, data collection was completed in two stages: the pilot and main fieldwork.

4.5.1: Pilot Study

The pilot study was undertaken in a highly successful company in the printing services industry. Four participants were purposively sampled (Saunders, 2012) using the company's organisation chart and the role each individual played in the firm, along with the contribution they made to the NPD process, were carefully studied. A number of changes were made, along with lessons learned, as a result of the pilot. First, the variables, along with their associated questions, were reordered into a more

logical sequence, to facilitate a better flow of information to aid data analysis (Hennink *et al.*, 2011). Second, two of the questions yielded similar responses, so they were refined into one; thus reducing the overall number to fifteen. Finally, the researcher felt that not enough emphasis was placed on knowledge management. This resulted in some of the questions being amended to reflect the espoused importance of knowledge to the process of developing new products; thus highlighting that the process is fundamental to the data collection stage (Creswell, 2013).

On reflection, the pilot study was a useful exercise because the researcher was able to check that the questions were easy to understand and that the length and sequencing of them were correct (Ghauri and Grønhaug, 2010). In addition, it afforded her the opportunity to have a dry run with verbatim transcription and manual analysis of the data, in preparation for the main stage (*ibid.*).

4.5.2: Main Data Collection Stage

This stage of the research study involved utilising triangulation to enrich the data collection process and strengthen its validity (Jonsen and Jehn, 2009; Gummesson, 2014). As part of the qualitative, exploratory nature of the study, three methods were adopted: semi-structured interviews, participant observations and document analysis. Triangulation enables researchers to stave accusations that the findings are “*simply an artefact of a single method, a single source, or a single investigator’s biases*” (Patton, 1999:1197) by utilising multiple qualitative methods to harvest a diverse range of views and experiences from observers and individuals (Easterby-Smith *et al.*, 2012).

Utilising mixed qualitative methods can yield a number of benefits to researchers. First, it can avoid the misunderstandings or problems that may emanate from using a single method and enable a deeper understanding of complex concepts and phenomena (Chambliss and Schutt, 2013). Second, it can facilitate the collection of in depth data from multiple sources that engages the researcher in identifying individual perceptions, feelings, beliefs, experiences and actions, as interplayed in their socio-cultural and organisational contexts (Hennink *et al.*, 2011).

4.5.3: Semi-Structured Interviews

The semi-structured interviews were undertaken using the Interview Guide or protocol (Creswell, 2013) that was refined following the pilot study (see Appendix 3). Thirty-seven out of the forty interviews were conducted face-to-face; three in Company A

were carried out by telephone, which will be discussed later. The flexible nature of the interviews (Qu and Dumay, 2011) enabled the researcher to quickly develop a rapport with participants, which helped when probing or follow-up questions were being asked. It was interesting, from an interpretivist perspective, to observe the interplay of perception, emotion, power and politics, particularly when participants recalled their experiences of various aspects of organisational life through their eyes and their familiarity with, or nescience of, knowledge management and NPD. Parts of the interviews were difficult, especially when trying to prompt discussion with those who perceived that they had little to do with NPD, even though their job roles suggested otherwise. The interviews were digitally recorded with the consent of participants.

Semi-structured interviews do have their limitations. For example, Myers and Newman (2007) claim that data gathering may be impinged by a lack of trust between the interviewer and participants. In addition, they suggest that starting the interviews at too low a level may make it difficult to interview the Senior Management Team at a later date. To counter this, the researcher's first interviewee was the Group MD, which she feels set the scene for the rest of the interviews and secured his seal of approval for the research study.

Finally, a major pitfall in semi-structured interviews can be the halo or horns effects. Myers and Newman (2007) caveat that this may 'interfere' with interviewees' behaviour and may therefore bias the information that is conveyed. Importantly, the researcher spent some time at the company prior to the fieldwork commencing and developed a relationship with some of the participants. She feels this helped to build the essential rapport that was needed. Certainly, having the support of the Group MD and other Senior Directors was vital. The interviews lasted between 20 minutes and 120 minutes.

Three of the interviews were conducted by telephone, namely the International MDs in Malaysia and USA and the Group HR Coordinator in the UK. The interviews were also digitally recorded by a speakerphone handset and lasted between 40 and 90 minutes. Although telephone interviews have often been criticised for the lack of physical and non-verbal interaction and potential problems of not building sufficient rapport for participants to give open and detailed responses (Cachia and Millward, 2011), they are often a necessary part of the interpretivist researcher's toolkit

(Creswell, 2013). Travelling to Malaysia and the USA was logistically prohibitive, so it gave the researcher an opportunity to gather their specialist knowledge and expertise without incurring costs (Saunders *et al.*, 2012). Initial contact was made by email, so the researcher and participants were able to develop some kind of rapport before the interviews commenced. Follow-up emails were also sent to, and received from, the International MD (Malaysia) to clarify various snippets of information.

4.5.4: Observations

The second data collection method utilised was participant observation. Defined as a method that allows researchers to methodically observe and note participants' behaviour, actions and interactions (Hennink *et al.*, 2011), the researcher acted as a participant observer (Creswell, 2013) and participated in a day in the life of the Group R&D Director and Group Development Manager in Company A and Technical Director in Company B. This gave her a rich insight into the interaction they had with their teams and also various aspects of the NPD process. The aim of the observation was to observe the application and utilisation of specialist and industry-specific knowledge to both direct and indirect tasks associated with NPD. It also enabled her to see how key specialist roles work with the complexities of using tacit (personal) knowledge and explicit (objectified) knowledge to innovate. The observations were recorded using an Observation Guide, which was designed by employing the Fayol (1916) Five Functions of Management model, namely planning, organising, coordinating, directing/leading and controlling. Creswell (2013:169) advocates the importance of using such guides or "*observational protocol*" to record the collection of information during observations, which he notes are a popular feature in case study research.

A snapshot of how observees plan, organise, coordinate, direct/lead and control systems, processes, activities, resources and knowledge workers encapsulated within the NPD and modification process within both companies was captured. The Technical Director's observation notes are illustrated in Table 4.4 below.

Table 4.4: Technical Director Participant Observation Notes

Observation Guide and Notes	Observee: Technical Director (Company B) Date: Monday 21 st October 2013
<p>Planning and Directing/Leading</p> <ul style="list-style-type: none"> Technical Director held a Monday morning scheduling/planning meeting with two key members of his team (Technical Advisor and Application Development Chemist). Worked through the priorities for the week; identified and discussed any issues that had arisen with projects over the weekend. Delivery times and logistics were discussed, along with the stock levels held in the warehouse. Priority was given to make room for new stock. The team discussed the liaison/consultation with the Company A Development Technologist regarding the use of a chemical that will lighten an existing product. Technical Director engaged in modelling using a computer package to work out the most cost effective logistics model. Transport costs are high at the moment. He is visiting the Germany business entity on Wednesday and Thursday this week to do the ISO quality audit. The high transport costs are eating into the company's margins it makes on the products; thus, he and his staff need to work out a more cost effective way of transporting the materials. Technical Director explained that he is currently engaged in developing a project with a cruise liner company. Company B was using a resin product, but it failed on testing. He is therefore planning to use a different product (TZO/MD). Planning product modifications; the researcher accompanied the Technical Director to the Samples Laboratory where he checked on a number of products that were in the process of being tested. He engaged in discussions with a member of the Samples Team (Samples Manager) regarding the products that are currently undergoing the product testing phase of the NPD/modification process. 	
<p>Organising</p> <ul style="list-style-type: none"> Technical Director organises/prioritises his time by making a 'to do' list each day. He advised that this is an important part of his job because much of his time is taken up with dealing with problems and crises that occur on a daily basis. Thus, prioritising tasks enables him to keep a handle on development/modification work and the constant firefighting that is an endemic part of the role. Technical Advisor has been promoted to Technical Manager. This will enable the Technical Director to delegate some operational work to him. Technical Advisor now has the technical and samples staff reporting to him. The promotion of Technical Advisor will enable Technical Director to deal with more strategic issues and get involved in the European side of the business. He will take on responsibility for more 'blue sky' development, specifically for the European market. Most of Technical Director's time is spent in the office or in the laboratory, but he also spends a considerable amount of time or travelling between the global business entities attending sales conferences and meetings. 	
<p>Coordinating</p> <ul style="list-style-type: none"> Technical Director is responsible for coordinating the product modification activities for the UK market and for coordinating the core activities of his small technical team, including samples. Technical Director engaged in discussions with his team about the coordination of logistics/distribution between Germany and the UK. Discussed the coordination of data entry to the Syspro system, which controls, among other things, data batch sheets, product formulations, bills of materials and determines the margins that are made on each product. Discussed with his team the full implementation of the Product Vision system, which will be rolled out by January 2014. 	

Table 4.4: Technical Director Participant Observation Notes (continued)

Observation Guide and Notes	Observee: Technical Director (Company B) Date: Monday 21 st October 2013
<p>Controlling</p> <ul style="list-style-type: none"> ▪ Technical Director has overall responsibility for the modification and quality control of products within the UK market. ▪ Technical Director and his staff worked out the minimum stock levels that need to be held in the warehouse using Excel. ▪ It is the Technical Director's responsibility to check the Syspro database for errors. ▪ Company B control the technical formulations and forms that are contained stored in Syspro. ▪ Technical Director explained that his team member, Data Administrator, must check over twenty thousand product lines/product components, to ensure the data entered onto Product Vision, which has not yet been fully implemented (roll out will be January 2014) is accurate. ▪ Technical Director and his team must check the integrity of the data that will be input into Product Vision. The Parent Company's IT people are helping with the input of the data. ▪ Technical Director explained that Product Vision will 'talk' to Syspro. It will update itself every night and sync with Syspro, to ensure there is coordination between the two systems. ▪ In the Samples Laboratory, discussions took place between Technical Director and Samples Manager on the progress of samples and products that are currently in the process of being modified. ▪ They compared colour swatches to try and closely match the specifications of the customer. ▪ The researcher observed some of the colour mixing and marbling that takes place on prototype products. ▪ Technical Director discussed potential routes to market for the prototype products with Samples Manager. ▪ The researcher accompanied Technical Director and Samples Manager to the Product Testing Laboratory. They demonstrated the differences light can make to various products and the chemicals that can be used to prevent discolouration. ▪ The researcher accompanied Technical Director to the Product Training Room, where he explained the process of testing particular products and training applicators. ▪ Technical Director explained that visitors and potential clients are given a tour of the site and Product Training Room, so they can see how rigorously the applicators of the products are trained and the ways in which the company implements quality control and assurance. <p>Overall observations:</p> <p>The Technical Director appears to spend most of his time on undertaking planning and controlling activities. He certainly has a wide job brief! It is interesting to note the importance of both tacit and explicit knowledge to what they do as a team and indeed to NPD and modification. The work generates huge amounts of paperwork and audit trails, but from what I've seen, tacit knowledge is very highly rated, as is the utilisation and application of specialist knowledge, skills and experience of everyone involved to the job and process.</p> <p>There appears to be a great deal of trust between the Technical Director and his team to get on with the job, without him constantly looking over their shoulder. I guess this is important, as he spends so much time away on business or out on site troubleshooting and managing various crises.</p> <p>Seeing the products being developed and tested was great! It demonstrated just how important specialist knowledge is to the business, as the products are so specialised and innovative. I have learned a great deal.</p> <p>All in all, a great observation.</p> <p><i>Jem</i></p>	

Being a participant observer enabled the researcher to not only witness the interplay of NPD and modification activities but also be a part of the work, social and cultural context of the companies. She was able to make notes, as demonstrated in Table 4.4 above, take photographs (with consent), ask impromptu questions for clarification of certain points and see products being designed, manufactured and tested in real time.

Moreover, importantly, it enabled her to appreciate the complexities of, and generative dance between, knowledge and knowing and the intricacies involved in managing knowledge effectively for NPD. As the observations took place a while after the interviews, a rapport and relationship had already been established with participants, which aided the process (Hennink *et al.*, 2011). Utilising reflexivity, the researcher was able to stand back from the observations and suspend interpretation of the events (Easterby-Smith, 2012). However, at times, this felt incongruous with being an interpretivist, as organisational life is open to interpretation from multiple perspectives (Morgan, 1997).

The observations informed the data collection process but did not contribute to the research findings.

4.5.5: Document Analysis

The final strand of data collection was document analysis, which Bowen (2009:27) simply defines as a “*systematic procedure for reviewing and evaluating documents.*” The researcher reviewed documents relating to the NPD process in both companies, including product successes, failures and modifications and also laboratory reports containing detailed data about the results of product testing. The researcher also engaged in meetings with the Development Technologist in Company A and Technical Director in Company B, to discuss points raised from the review. Furthermore, the researcher studied samples, prototypes and finished products on which the documents were based. From this, she was able to ascertain the types of specialist knowledge that were utilised not only to design, develop and make the products, but also test them.

Of course, document analysis has its own set of limitations. First, Bowen (2009) suggests that the documents under scrutiny are produced for purposes other than research, so may not provide the detail required to enable the research question to be answered. Hence, the researcher engaged in follow-up meetings with the parties concerned. Second, an incomplete set of documents may be given by participants that protect certain aspects of organisational practice. In both cases, the companies were completely open about the documents to which researcher was given access. A spread of evidence as mentioned earlier (successes, failures and modifications), gave the researcher a balanced view.

The document analysis informed the data collection process and together with the semi-structured interviews and participant observations provided the researcher with the knowledge that her data was rich and robust and the confidence and credibility to engage with the Senior Management Teams.

4.5.6: Data Analysis

Data analysis has been described as the “*most difficult phase in case study research*” (Rahman *et al.*, 2003:34). It was certainly a challenge to make sense of the raft of rich qualitative data that had emerged from the interviews, observations and document analysis. The decision to use thematic analysis to analyse the data seemed to be in keeping with other qualitative data analysis methods (Ericsson and Kovalainen, 2008). Defined by Willig (2013:57) as a method for “*recognising and organising patterns in content and meaning in qualitative data,*” thematic analysis offers researchers a flexible research tool through which they can identify themes that emerge from the literature and data that are important to describe the phenomena under study (Daly *et al.*, 1997).

A key point to note is although the use of thematic analysis is now more widespread (Willig, 2013), Braun and Clarke (2006) report that there is no concrete agreement about what it is and how researchers engage in it. This was important to the researcher insofar as the theoretically flexible characteristics of the technique enabled her to step outside its boundaries (Willig, 2013) and utilise it, alongside manual analysis, to analyse the data and produce a coherent set of findings, conclusions, contribution to knowledge and recommendations for best practice. Although the overall research study followed an exploratory, inductive methodology (Saunders *et al.*, 2012), the approach taken during the thematic analysis was deductive (Willig, 2013), insofar as it utilised a theoretically-informed template through which the data was coded and further themes derived from it (Crabtree and Miller, 1999).

With this in mind, the data was analysed in three stages (Neuman, 2014). First, following the in depth, semi-structured interviews, the digital recordings were transcribed verbatim (Bryman and Bell, 2011) by a paid transcriber. Although this was a very costly exercise, it was a necessary one, as it enabled the researcher to commence analysis after each transcript was checked for accuracy (Saunders *et al.*, 2012). While the initial intent was to utilise NVivo to engage in computer-assisted analysis (Bryman and Bell, 2011), the researcher chose to use manual analysis

(Adams *et al.*, 2014), as she did with her pilot study, to enable the use of her initiative and interpretation as an emic, feelings researcher (Hennink *et al.*, 2011), in what has been described as a “*dynamic, intuitive and creative process of inductive reasoning, thinking and theorising*” (Basić, 2003:143). Of course, various researchers argue that computer-assisted analysis software, such as NVivo, enables data analysis to be undertaken more speedily, more efficiently and with more flexibility as to how the data is manipulated and used (Davies and Meyer, 2008; Bazeley and Jackson, 2013). However, the researcher is confident she used the right technique for her epistemological stance and experience.

Before the interviews began, the researcher had a ‘start list’ of themes that emerged from the literature, in the form of the organisational variables and the enablers and disablers that had been graphically represented in the conceptual framework. This followed the thoughts of Braun and Clarke (2006:10), who espoused that a theme “*captures something important about the data in relation to the research question and represents some level of patterned response or meaning within the data set.*” These themes that are present in the conceptual framework, as derived from extant literature, were used to help shape the semi-structured interview questions, as outlined earlier in this chapter. Thus, the researcher had an idea of the type of ‘themes’ she was looking for in the data. Of course, further themes not identified in the literature were also being analysed. Importantly, throughout the analysis, the researcher was aiming to use the themes that emerged from the data to enable her to make connections and draw interpretations from them, in order to tell a meaningful story about the organisational phenomena under study (Willig, 2013).

Second, the next stage of data analysis after transcription was open coding (Neuman, 2014). The researcher went through each transcript line by line, question by question, and highlighted key themes that were emerging from each variable, along with other themes that she felt may be of import to other variables. This was an important phase, as organisational infrastructure was presented in the conceptual framework as a series of interconnected variables. Therefore, an overlap between them was anticipated and welcomed. An example of the open coding is illustrated in Figure 4.2.

Question 3

In what way did the company's new product strategy support the development of the new product (e.g. use of specialist knowledge and teams, allocation of new resources, competitor analysis, monitoring and review) and what length of time did it take to develop the new product?

Group MD

Start in length of time, approximately 12 months. We do have a structure and a system for bringing new products to market. We have a Group Research and Development Director, a small unit within (the company) that focuses on research and development. Having identified the need in the market...they looked at this area and they did in fact recruit one specialist chemist specifically to work on this project, a guy called (Group Development Manager), who has done a very good job on bringing it to market. We also had some sponsorship from our parent company; they were quite interested in this from a global point of view...and they gave us some funding towards the project as well.

Jacqui

So, in what way did the company's new product strategy support the development in the project?

Group MD

When you say new product strategy I'm not quite sure what you mean.

Jacqui

Do you have a formal new product strategy?

Group MD

No, not really, we have a unit in house that is tasked with developing new products and bringing new products to market.

Jacqui

So, is strategy for new products built into your overall corporate strategy?

Group MD

Yes it is and its driven by the market and the market requirement so that commercial leaders of the business and in this case (Company B) will identify a need in the market and then pass it to the development team, who then either do or don't come up with a product. Sorry, just before we move on what we mean in terms of new product development, our business really is driven by responding to regulatory need...it's not just for the market. Wouldn't it be a nice idea to have a sustainable product? A lot of what we do with new product development is driven by legislative changes; stop using a certain chemical; we want to use a more environmentally-friendly material...when you talk about new product strategy a lot of our development is driven by legislative need and legislative environment, as well as our own commercial interest. We want to try and save some money.

Jacqui

And, maintain your market share?

Group MD

Yes.

Source: The Researcher

Figure 4.2: Example of Open Coding

This process was completed for each of the forty verbatim transcripts. Utilising this, the researcher was able to surface themes buried deep within the rich data (Neuman, 2014). Third, axial coding (ibid) was then used to enable the researcher to have an overview of each participant's responses against each variable, broken down by theme. This was presented in a matrix designed by the researcher, as highlighted in Table 4.5.

Table 4.5: Example of Axial Coding

Company A New Product Strategy	New product developed and launched	Factors that influenced development of product	New product strategy support	Length of time to develop the product
Participant A (51-60; over 20 yrs) Group MD <i>Senior Director-Global</i>	IGS.	Customer requirement. Market need. Environmental.	Don't really have a formal new product strategy. Built into corporate strategy.	12 months
Participant B (31-40; 3-5 yrs) Group R&D Manager <i>R&D</i>	GS.	Market demand for environmentally- friendly products.	Rolling programme of product development.	12 months to develop. 6-12 to introduce to production and market.
Participant C (41-50; over 20 yrs) Head of Group Trng <i>HR</i>	BCP product. Not really sure.	Internal demand.	Different parts of the business do their own thing.	3-5 years
Participant D (31-40; 11-20 yrs) IT Director <i>IT</i>	FS.	Demand from the market. Demand from sales people.	Do have a strategy – but more product improvement.	Not sure; not too close to that process.
Participant E (21-30; 1-2 yrs) Creative Design Coord <i>Marketing</i>	GFZ package.	To tackle the environ side of things. One supplier for architects.	Can't say; not involved in developing it – just marketing it.	Can't say.
Participant F (41-50; 11-20 yrs) Supply Chain Manager <i>Operations-Sweden</i>	EB product.	Quality. Need for blue sky development.	Wouldn't say the company has a new product strategy.	Could not say.
Participant G (31-40; 1-2 yrs) IT Help Desk Manager <i>IT</i>	Work in IT – so not aware of any new products.	Guess customer feedback. Only get involved when product testing materials don't work.	No idea. Don't know anything about it.	Don't know.
Participant H (31-40; 1-2 yrs) IT 3 rd Line Sys Eng <i>IT</i>	Nothing to do with me. Heard of FF.	Don't know.	Don't know.	Don't know.
Participant I (31-40; 11-20 yrs) IT Applications Analyst <i>IT</i>	IGS	Customer needs; new technology; architect requests.	Co has ltd resources for NPD; dev't team only 4. Other roles can detract from any quick NPD.	Could not say.
Participant J (Over 60; 11-20 yrs) HR Manager <i>HR</i>	MMA.	Based on customer demand and do better than the competition.	Does have a new product strategy.	Don't know the length of time it took.
Participant K (31-40; 1-2 yrs) IT 3 rd Line Sys Eng <i>IT</i>	Couldn't say. Although work across Company A, don't need to know about the products.	No idea.	No idea.	No idea.
Participant L (41-50; 6-10 yrs) Dev't Technologist <i>R&D</i>	DSEDS.	Problem with the previous system.	The company has a new product strategy...of sorts...product might get launched before it's finished.	Did not say.
Participant M (31-40; 1-2 yrs) Grp Finance Controller <i>Finance</i>	Wouldn't have a clue; just deal with financial side. DS; FFA.	Don't know.	Wouldn't know. Role is taken away from the actual full entity.	Wouldn't know.
Participant N (41-50; 11-20 yrs) International MD-M <i>Senior Director-Global</i>	GS range.	Environmental demand, changes in raw materials, customer feedback and competitors.	Company doesn't have a new product strategy. Hindrance to the business. Hired an NPD expert.	2 years, from start to finish, to get the idea from theory to launch.
Participant O (41-50; 6-10 yrs) International MD-U <i>Senior Director-Global</i>	FSU.	Customer feedback and demand. Feedback from the market.	I would not say the company has a new product strategy.	Did not say.
Participant P (31-40; 6-10 yrs) Grp Finance Director <i>Senior Director</i>	GS product.	Customer feedback. Product failure.	Don't think co. has a new product strategy. Built into corp. strategy; NPD is more emergent than planned.	18 months to 2 years from concept to marketplace.
Participant Q (21-30; 3-5 yrs) Creative Manager <i>Marketing</i>	GFZ.	So far removed from Technical Department; told it is customer request or competitors.	Couldn't say; Marketing is brought in at the last min; would benefit from getting involved in NPD earlier.	Did not say.
Participant R (21-30; 1-2 yrs) Group HR Coordinator <i>HR</i>	MD.	Launching new products locally or to expand market to offer what client wants.	They bring in the best they can; specialist groups and other consultants.	Wouldn't be sure about the length of time.
Participant S (Over 60; 11-20 yrs) Group R&D Director <i>Senior Director</i>	CFS products.	Improve mechanical performance of existing range and meet environmental expectations.	Employed a specialist chemist; do think the company should have a new product strategy.	Did not say.
Participant T (21-30; 1-2 yrs) Communication Coord <i>Marketing</i>	UE.	Wouldn't know; not involved in prod dev't; suggest Marketing ideas of selling it to market.	Cannot answer that; I assume we do have a new product strategy; not something aware of.	Don't know how long the product was in development.
<i>Source: The Researcher</i>				

Organising the data in this way enabled the researcher to obtain a representative picture of participants' thoughts and views against each theme (at the top of the table). This was an important stage, as the researcher could instantly see the ease or difficulty

with which each participant, by job title and functional group, expressed their opinion about whether their company had a new product strategy, based on the example presented in Table 4.5. In addition, she could also ascertain whether their closeness to, or distance from, the NPD process impacted on their specialist knowledge and how it was managed and utilised. Including the functional area and demographic data in the table prepared the researcher for the use of cross tabulation, which would also serve to identify and examine interdependence between the organisational variables and themes as they emerged (Saunders *et al.*, 2012).

Fourth, selective coding (Neuman, 2014) was utilised to glean more detailed responses from participants and facilitate a comprehensive overview of the themes from the conceptual framework and others that had emanated from the fieldwork data. It involved designing a matrix, through which comparisons of participants' responses could be made. The matrix was populated after the data collection, transcripts and open and axial coding had been completed (*ibid*). This is illustrated in Table 4.6.

Table 4.6: Example of Selective Coding

Company A	Participant A Group MD	Participant B Group Development Manager	Participant C Head of Group Training	Participant D IT Director
New Product Strategy				
Question 1 <i>New product recently developed and launched to market.</i>	IGS. Found a way of replacing ordinary Portland cement.	It was not one product but a range of products, which I developed and the range is called GS; green because they are environmentally-friendly or more environmentally-friendly than the previous range which we used to have.	We have introduced recently a new base component for a PU product, which is our standard LFHFMFMP system so we blend the actual base component formula in a different way than we did before. So, that's a new product development, I suppose.	FS. It was very much a case of opportunity driven, demand driven and by that I mean there was an opportunity for a... product that we didn't possess. I do believe and there was demand from the sales team in the UK, hence the product was developed quickly for use.
Question 2 <i>Factors that influenced the development of the new product e.g. new markets, NPD failure, new product range, customer feedback/ demand.</i>	Requirements from customers for a more environmentally sustainable product. Requests from architects for a new product with a low carbon content.	Market demand for more environmentally-friendly products. We would like to be one step in front of the other companies and also one step in front of the legislation. All my work currently is focused on the more environmentally-friendly products. It's another generation to the previous one. Main project is called GP. Mainly for replacing organic resin system with inorganic material.	Just internal demand. It's an existing product; it's been around quite a long time in the market place.	In my time in (the company), it tends to have been driven by demand more than anything else... from the market and that tends to have come through the sales people.
Question 3 <i>New product strategy support e.g. use of specialist knowledge and teams, allocation of new resources, competitor analysis, monitoring and review. Length of time to develop new product.</i>	Company does not have a formal new product strategy. Is built into overall corporate strategy. It is market driven and also driven by legislative need and environment. Product took approx. 12 months to develop.	The GS range took about 12 months to develop and another 6-12 months to introduce it to production, onto the market. Challenge was to develop more environmentally-friendly products; I found a way how to do it and we did it. We know where we are going; we know what problems we may have with existing products in the future and without waiting for the problems to occur we try to develop something new to be one step in front, if this is called development strategy, yes it is.	I would say that it was specialist knowledge within the teams because the way product development is now, there are 3, 4 or 5 key centres of technical people that are doing selling and making products every day in their market place and they then exchange information and notes and have an annual gathering and I think that has been beneficial in bringing together positive change. I would have said they have been at it 3 to 5 years probably in a true sense. Different bits of the business have been doing their own thing and to bring it to where we are now.	I'm not 100 percent sure... I'm not that close to the processes involved in that. Generally speaking, if the demand is there, the product will get developed very quickly because resources will get reallocated. There may be a longer term project in play for example that will get stalled purposely. If the demands are really there then heaven and earth will get moved to create it. They do have a strategy of developing new products but... it tends to be more product improvement, more to do with removing raw materials that aren't necessarily environmentally or people friendly.
Source: The Researcher				

Here, the analysis was more detailed and led the first iteration of the Company A findings (Chapter 5) to be written. During the selective coding stage, the researcher was able to revisit the verbatim transcripts, along with the conceptual framework, to explore further relationships or connections in the data (Altinay *et al.*, 2014), particularly amid the functional groups and their interpretations of the organisational phenomena in their work context (Altinay and Paraskevas, 2008; Yilmaz, 2013).

The final stages of the analysis engaged the researcher in comparing and contrasting the findings of Company A and B in the cross-case analysis (Chapter 7) and discussion of the findings with extant literature (Chapter 8). This involved identifying congruence and incongruity between espoused theory and theory in use (Altinay *et al.*, 2014). The conclusions from this were then graphically represented in an evaluated conceptual framework for both companies; thus fulfilling a key objective of the research study.

4.6: Ethical Considerations

The research study was bounded by ethical guidelines as it involved interaction with, and participation from, human participants (Saunders *et al.*, 2012). Approval was obtained through the University's Ethics Committee and research information, including the Participant Information Sheet, outlined the ethical guidelines through which the research study was designed and conducted.

4.7: Chapter Summary

The research process outlined in this chapter was a reflexive one, which constantly challenged the researcher and involved learning new things about herself and research study per se. The chapter highlighted the philosophical, ontological, epistemological and methodological framework of the research study and showcased the ways in engaging in thematic analysis and utilising theoretical flexibility enabled the researcher to analyse the data collected from the fieldwork stage of the study. Deep insights were gleaned from the researcher's emic, interpretive perspective. This gave her the opportunity to gain an in depth understanding of the organisational phenomena occurring in both companies.

The findings for Case Study 1 (Company A) and Case Study 2 (Company B) are presented in Chapter 5 and Chapter 6 respectively.

Chapter 5

Findings from Case Study 1: Company A

Chapter 5

Findings from Case Study 1: Company A

Research is creating new knowledge.

Neil Armstrong

5.1: Introduction

This Chapter presents the findings from the fieldwork data collection stage of the research, which was conducted in Company A. The findings will seek to determine whether the research question *‘how do organisational variables influence the management of knowledge in the new product development process?’* has been answered within the context of the espoused conceptual framework. The chapter is structured into three sections. First, it contextualises the situation within the Company and provides a brief outline of some of the issues it is currently facing. Second, the findings are presented against the organisational variables contained within the conceptual framework, and finally, the chapter concludes with a summary of the main findings from the fieldwork.

For ethical reasons and to protect the identity of participants, the Company and its intellectual property, all reference to individuals (apart from their job titles), products and the Parent Company have been anonymised.

5.2: The Context

Company A Ltd (hereinafter ‘the Company’) was incorporated in the mid-1990s, as a result of the implementation of its founding company’s growth strategy (Company B Ltd) and vision to expand the business into global markets. The Company’s incorporation coincided with the setting up of the first international division in Malaysia, which is now one of the largest and most successful manufacturing plants in the Group and in the Asia Pacific region. As reported in Chapter 1, Company A is the central innovation hub and strategic and administrative arm of the Group and is also responsible for collating and distributing information to the global business entities. It takes an overview of business policy and practice, engages in global strategy formation for the Group (although each business entity crafts its own local strategies) and liaises closely with the Parent Company. The Group is now a network of sixteen

business entities, collectively employing over 200 employees in continents such as Asia, Europe and North America.

In terms of innovation, Company A engages in new-to-market product development for the Group and thus keeps a watchful eye on competitor, market and technological developments in order to deliver first to market products that are competitively advantageous. The Company prides itself on its extensive portfolio of innovative products, which have been highly successful in the past few years due primarily to their uniqueness in terms of environmental sustainability. In the mid noughties, the group of companies was taken over by a large US conglomerate (hereinafter referred to as the Parent Company), whose worldwide net sales exceeded \$3.5bn (Parent Company Annual Report, Fiscal Year Ending 2008). Consequently, as a result of the takeover, Company A's collective Group sales have increased by almost 90% (Parent Company Annual Report, Fiscal Year Ending 2014).

As a knowledge-intensive firm, the Company employs an array of knowledge workers, who are highly qualified and experienced in their respective fields. Part of the specialist knowledge base of the Company is embedded within the small, three-man R&D Team, which is headed by the Group R&D Director. He has extensive knowledge and expertise of cement technology, with associated reaction chemistry and is ably assisted by the Group Development Manager and Development Technologist, both of who are qualified chemists, but in different disciplines. The team lead the development of new-to-market products for the Group and disseminate blueprints and chemical formulae across the business entities to be manufactured and/or modified to local climatic conditions. Some regional/localised NPD takes place for that very reason and entity Managing Directors have the autonomy to deploy and utilise regional Technical Teams, as specialist knowledge resources, accordingly with prior approval from the Group HR Department and Parent Company.

The Company has witnessed expansive growth over the past few years, due to a) an increase in the range and diversity of innovative products it has developed, b) the acquisition of, and joint ventures with, companies that complement its business activities, and c) itself being taken over by a large US conglomerate and is thus able to tap into the Parent Company's sizeable resources. Despite this, the findings have identified that it has experienced a number of issues with its infrastructure. These

relate to new product strategy, organisational culture and structure, leadership and management, specialist roles and knowledge and ICT, systems and communication and the ways in which these six organisational variables have had an enabling or disabling influence on the way in which individual and organisational (tacit and explicit) knowledge is managed and utilised within the NPD process.

The following content presents the findings of the empirical research in the order of the six organisational variables cited above. The organisational infrastructure contains a set of interrelated variables that synergise to enable firms to conduct their day to day business activities. As they are not mutually exclusive and thus do not lend themselves to separate investigation, the data analysis and findings in both Company A and Company B identified a degree of similarity between them due to their interdependent nature. Importantly, four of the six variables are contained within the cultural web (Johnson and Scholes, 1999), which emphasises their symbiotic dimension. The approach of both Companies to the management and utilisation of knowledge is embedded within their routines and rituals (a further component of the cultural web) and is impacted by culture, structure and leaders and managers. This further reinforces the interrelatedness of the variables and the cultural elements that underpin them.

5.3: New Product Strategy

From the context presented above and the interviews and observations conducted, it is evident that Company A is a very reactive, entrepreneurial business, which firmly believes that the customer is king! The Company is proud of its record of speedy development of new products, primarily on an emergent, fluid basis, in response to customer and market demand and regulatory forces for change. While this is laudable, and has helped the Company achieve global growth and an increase in sales by 90% since the Parent Company takeover, the evidence suggests it has achieved this status without a formal new product strategy. This position was confirmed by the Group Finance Director, who stated:

We don't have a written strategy. We don't have a three, five year, ten year R&D plan, like some businesses do. I don't think we do. Maybe we do in the R&D Team and it's not communicated out to myself...I think we tend to be quite reactive to the market. (Group Finance Director)

Importantly, the Group Finance Director admitted that NPD is “*built into the overall strategy*” and is, according to the Group MD, “*driven by the market and the market*

requirement.” As a consequence, commercial leaders of the business are constantly on the lookout for new opportunities that present themselves in the marketplace, which can then be exploited better and faster than their competitors. As the International MD, Malaysia (hereinafter International MD-M) recalls, a scan of the market identified a gap for a particularly rare product, which if developed would not only give the Company “*some USPs to maintain the margin,*” but also yield significant competitive advantages, particularly as “*the environmental route was a hot topic and everyone was talking about it.*” However, closer scrutiny of the proposed project determined that if the Company decided to go down that road, it would not have the specialist knowledge within the existing workforce that could see the project through from start to finish, even though, he attests, there is strong technical know-how among the “*technical R&D guys,*” particularly in the global entities. The Group Finance Director noted:

We definitely sort of looked at, from the Group R&D Director’s point of view, he looked at the team and said “actually, we have a lack of knowledge here to actually pull this forward and also a lack of sort of time...the guys are doing other projects...” So, we really kind of, you know, had a concept of what we needed and knew we were lacking a skill set in that all the skills set that we had was concentrating on other areas. (Group Finance Director)

Therefore, the Group R&D Director, along with other members of the Senior Management Team, had to make a decision: manage with the existing skills base or recruit the knowledge from outside the Company. Adopting the latter would serve two purposes. First, bring new, specialist knowledge and technical expertise into the Company that was rare, valuable, inimitable and non-substitutable and thus a strategic asset. Second, ‘future proof’ the Company’s technical knowledge and skills base for further projects of this kind, particularly as the Parent Company was “*quite interested in this from a global point of view*” (Group MD). Having decided that the best course of action was to recruit external expertise, the Group MD approached the Parent Company for sponsorship. As the Group R&D Director recalls:

We did employ a new resource...a specialist cement chemist; a very talented guy. He had more expert knowledge in the field than any of us and we also got a grant, if that is the right word, because the first year of his employment was funded by the Parent Company directly, in order to support that particular area of the business. The Company more generally has allowed (him) to travel throughout Europe and the States in order to attend seminars that enhances the learning with regard to product knowledge...you spend some money in order to contribute to the knowledge and our commercial success. (Group R&D Director)

The hiring of the Group Development Manager and “allocating him the resources he required” (International MD-M), including “a proper lab, with proper equipment and everything else” (Group MD) gave the Company the wherewithal to develop a niche range of eco-friendly products, which took “about twelve months to develop that and another six to twelve months to introduce it to production, onto the market” (Group Development Manager). The products have proven to be “quite successful” and have been “received very well in the market” (Group R&D Director).

However, although the Group Development Manager was given the tools and support to do the job, the Senior Management Team took their eye off the ball in terms of managing both him and his knowledge. Instead of focusing on the development work for which he was hired to do, he became embroiled in firefighting and crisis management in their sister company, Company B. As the Group R&D Director explained:

The Group Development Manager is supposed to work with me and we are employed by Company A, which is a distinctly different company as you are probably aware to Company B, and yet every time there's a problem in production or a crisis out there, that something doesn't work or the spec's wrong, he will be dragged into it and it doesn't matter. He will immediately stop doing his development work, which is what he is supposed to be doing, until the Company B crisis is sorted. The crisis may not be an existing product; it might be the need for a new one...That is typical. (Group R&D Director)

This led the Group MD and Group R&D Director to take drastic action to protect the Group Development Manager as a valuable knowledge resource, as he reflected:

Line Manager and Group MD tried to secure me, take me away from the day to day work...About six months ago, I was involved in every single problem within Company B. Now, they realise it and that way we will never develop new things because I do not have time because the problems in production are all the time; you solve one and there is another one; it's like firefighting and now Line Manager tried to make this barrier and save me from being involved in the work. (Group Development Manager)

The Company's lack of knowledge and human resource management of the Group Development Manager may have extended the length of time it took to develop the new product. The two-year development lead time may have been reduced had he been ‘protected’ from the outset. This was confirmed by the International MD-M, who noted:

The development chain could have been faster had that guy not been hindered by him being in a place where he was constantly interrupted or disturbed by people who thought he was a Company B resource. (International MD-M)

Moreover, his protection, along with the setting and communication of clear boundaries to key individuals, would have avoided some of the conflict that erupted between the Company A and Company B Senior Management Teams. The Group Development Manager further reflected:

They try to protect me; especially Line Manager tries to protect me from other things, and it works now. I would say within the last three or six months, he had this battle with other directors that they are not allowed to come direct to me to ask me to do something and all the jobs which they want me to do need to be approved by Line Manager. So, now after a few battles, Line Manager found that it works and they know what to do and they accept the rules; so first they come to talk to Line Manager, rather than to me. (Group Development Manager)

The findings suggest that the absence of a new product strategy is also disabling the management of specialist marketing knowledge and how it is utilised to commercialise and launch new products. Consequently, the Group MD confirmed that the Company does have “*a structure and a system for bringing new products to market,*” though this appears to be more implied rather than explicit. Reports from colleagues in the Marketing Department highlight that they have a very ‘distant’ relationship with the R&D Team, even though they have an important role to play in the NPD process. The Creative Manager, who manages the team, explained that she is “*so far removed from the Technical Department and how they formulate their products*” that she cannot say “*with any degree of certainty*” how the process works. She mooted:

In terms of the marketing side, we are brought in at the very last minute, particularly with what I do, as I work for Company A. We deal with the creative elements of marketing, so we wouldn't even get involved in market research or anything like that. (Creative Manager)

The Communications Coordinator added that although the team “*come up with the marketing ideas of how we are going to sell to the market,*” they have no involvement in the technical or “*chemical development of the product.*” In addition, the Creative Manager noted that the Marketing Team:

Don't even get involved in the naming of the product in terms of our brand portfolio, in where they will sit or in which range they will sit. That's very much determined by Technical. (Creative Manager)

Prior to the Parent Company takeover, the Company A Marketing Team was managed by the IT Director, who is based in the same building. Post takeover, the International MD-M now has overall responsibility for them, even though he and his team are over six thousand miles apart. This exacerbates their feelings of isolation, specifically as there is no one in a Group directorship capacity that has been allocated to manage the team in the UK. As a result, they report to the International MD-M *“purely because the Group MD does not have the time”* (Creative Manager) to assume responsibility for them, as he spends most of his time travelling between the business entities to monitor Group operational and financial performance.

Historically, responsibility for marketing resided in the individual operating companies and their Marketers were responsible for, among other things, enquiry generation. Although that is *“still the case,”* the International MD-M has ‘professionalised’ the function by creating a *“very good centralised Group marketing resource,”* which acts like an *“internal marketing agency”* providing *“Group support that the individual operating companies don’t do.”* He continued:

It does all the in-house design for the brochures and all the in-house copywriting, together with photography and videography. It designs the website and maintains the twitter account and blogs. What we are trying to do now is that we utilise that resource, so that when we do launch a product, we take the product to market extensively and maximise the launch. It’s fair to say we haven’t got a great track record of doing that, historically. It’s something which is fairly new to us, but it is something that I feel is very important and it’s something that we are getting better at. Albeit, I don’t think it’s perfect yet. (International MD-M)

Even though this is the case, at grass roots level, his team feel very differently about their role in the NPD process. Essentially, the services he described above are back end and prop up the work of the R&D Team in designing, prototyping and manufacturing new products. What the Creative Manager proposes is a closer working relationship and collaboration with R&D and Technical teams by virtue of a fusion of specialist technical and marketing knowledge, because of common synergies that exist between the two functions. Theory suggests that Marketing should essentially have an involvement in NPD right at the beginning of the process. They could therefore provide essential market intelligence and advise R&D and Technical teams of the best markets to penetrate, with the right type of products that will sell, and sell well, based on the appropriate market research. She reflected:

That's something I've been banging on about since I joined the Company. The Technical Department and the Marketing Department are so far removed from each other and they basically will come to us at the last moment and ask why this product is not on the website. I've never heard of it before; we've never been involved in any of the development; had not been told its coming. I know it's unrelated to product development, but it just highlights just how far removed from each other and the two departments are. (Creative Manager)

The Creative Manager further noted that the services of the Marketing Department, and the specialist knowledge they could bring to bear, would be of benefit to the business because they:

Can have packages of launch material ready, when they are ready to put it out to the market. But they don't see it from that point of view. Their task is to make sure the formula works and that's it; their job done. They don't think about the other activities that can be going on in advance to prepare for the launch because it's all very well having a new product, but if nobody knows about it, what's going to happen? (Creative Manager)

This would suggest that the specialist knowledge of the Marketing Team is not being effectively managed or utilised, especially as they are charged with the important task of commercialising and promoting new products on a global scale.

5.4: Organisational Culture

Prior to the Parent Company takeover in the mid noughties, Company A operated as an entrepreneurial business. By all accounts and from the majority of descriptions proffered by Participants, the present day culture is still viewed as “*fast moving*” (Group MD), “*innovative and creative*” (Group HR Coordinator) and fuelled by “*employee driven, self-motivated, entrepreneurial people*” (International MD-M). Undeniably, the spirit of the original founders still pervades throughout many areas of the Company. Despite this, the Company is subconsciously going through a period of culture change. Subtle vicissitudes to the business, such as a more corporatised structure, more bureaucracy and “*much more stringent*” (International MD-M) financial reporting and control has, according to the Group R&D Director, taken the shine off the Company’s “*very entrepreneurial spirit.*” He noted that the Company has become “*more PC... bureaucratic*” and risk averse than ever, which was not only disabling its ability to innovate as freely as it used to in the past, but was also stifling experimentation and risk taking within the technical teams because they are too ‘scared’ or pushed for time to try novel ways of doing things. This, in turn, was having

an impact on the opportunities they had to push the boundaries, learn new techniques and create new knowledge in the process. He reflected:

When you develop new products, no matter how carefully you develop them, there comes a point where despite the fact that the development is never precisely finished, but you've got to put a product out there and try it. With that comes a risk element. In the old entrepreneurial days, that risk did not matter because that was an accepted cost, if it went wrong; it was the cost of learning. Now it is not. There is this 'PC' attitude when new products are treated dubiously; it stifles that opportunity to try things out because nobody wants to carry the responsibility. That is the big difference now over the last two years due to corporatisation. People are too frightened to try and they are under too much pressure to get involved because of the pressure of sales. (Group R&D Director)

A more positive viewpoint on the changing culture was proffered by the International MD-M, who firmly believes that the Company has “*benefited tremendously from being part of the Parent Company over the last (few) years*” by virtue of the investment it has made in the business, particularly with sponsoring the recruitment of the Group Development Manager and the addition of his specialist cement chemistry knowledge and expertise to the Company’s knowledge worker portfolio. However, although he maintains that the takeover has been a positive one for the business, he recognises that many individuals lower down the hierarchy do not concur with his view because they see the implementation of Parent Company operational guidelines as “*more troublesome and therefore more bureaucratic than it was*” under some of the Company’s established procedures and processes, which he admitted were “*shall we say a little woolly around the edges.*” On that note, several Participants suggested that corporatisation, being “*sales led*” (Group Finance Director), the constant chase to innovate better and faster and achieving strict sales targets, has resulted in less time for individuals to meet, communicate and share tacit knowledge, which theorists espouse is vital to the NPD process.

Although the Company espouses to value the knowledge of its employees, the findings identified that poor knowledge sharing and collaboration, along with the absence of a cross-functional NPD team, are key issues of concern to many Participants, especially those in the functional departments. Importantly, the Senior Management Team recognise that these are major problems with which they have wrestled for some time and are proactively attempting to do something about, as highlighted by the Group Finance Director:

Certainly, we have some way to go on knowledge sharing...I think the nice thing is we know that and we're trying to work at fixing it. (Group Finance Director)

Part of the knowledge sharing quandary is primarily cultural and partly historic. In the early days of the Company's lifecycle, it was significantly smaller than at present. It was a "very face-to-face company" (Group Finance Director) and thus privileged tacit knowledge over explicit knowledge by managers regularly meeting with their teams, at which and through which knowledge was created and shared. Now, they are a constellation of global business entities and part of a wider Parent Company network. The Company has undergone a massive transmutation, but its knowledge sharing and management practices have not followed suit. The culture has lagged behind strategic, structural, operational and procedural changes that have taken place over the years and the Senior Management Team have not yet fully adapted and implemented support processes to underpin the way in which it manages individual and organisational knowledge.

Globalisation, along with the vast geographical distance between many of the entities, has reduced the opportunities individuals have to meet together as a community of knowledge workers and as a consequence of this, silos or pockets of knowledge have sprung up and reside in various areas of the business and are largely uncoordinated. The International MD-M outlined some of the difficulties the growth of the business has posed to the sharing and transfer of knowledge:

I would say it's difficult because people look at the Company as one business. We're trying to develop a culture of one business but the reality is that it is sixteen operating companies that are spread around the world...we've had the challenge as to how we share best practice, share knowledge for development, for application strategy, for marketing strategy as a Group. How do we share that across the sixteen businesses? Not at all and we are still getting better at it, but we have not mastered it. (International MD-M)

The Company facilitates annual technical meetings, which assemble technical/R&D teams from around the world, the objective being to enable the tacit exchange of dialogue on issues of import to NPD. However, the International MD-M highlighted that problems still occur with communication and knowledge sharing insofar as even though they come together as a collective, swap ideas and exchange knowledge of what they are developing, they "glean as much from that meeting," go back to their business entities and "do their own thing." Thus, teams have not "communicated enough" with each other, which ultimately results in a duplication of effort and

increased development costs for the Company, as the Group Finance Director explained:

We've got an R&D team working on a particular type of product because they need that for their market and we've got a different R&D team working in South Africa on basically making the same product from scratch and neither of them know that they're developing it. And, I wish I could say that it didn't happen, but it does. So, they all come together and they go 'oh, we've made this amazing product' and they go 'oh, we made this amazing product as well' and it's like, we've had two teams across the Company doing exactly the same job. It's about sharing the knowledge. And, I think that's where we've let ourselves down possibly in the past and I think we know we have. (Group Finance Director)

Even though the Group Development Manager confirmed that the Company *does* provide opportunities, such as the “*global technical meetings*” to support intra-functional collaboration and knowledge exchange, they are reportedly few and far between. The Group MD explained that they are held “*at least once a year, sometimes twice,*” which suggests that more frequent get-togethers may be prohibited by cost. The Development Technologist, who plays a key role in the R&D Team, remarked that there “*should be more regular meetings,*” both technical and general, which the IT Director reported “*have been gone for four or five years,*” but were held more frequently in the halcyon days of the previous owners.

The Creative Manager highlighted that the situation within the Company is so acute because there are no ‘official’ “*systems or processes set up*” to address the “*fragmented*” nature of knowledge sharing throughout the business. She noted:

There is nothing in place for people to talk to each other and that culture just does not exist where the technical guy in South Africa would pick up the phone and ring the technical guy in Asia and say “this is what I've done. Are you interested?” That's the reason we are trying to develop a forum to share this kind of knowledge across the business. (Creative Manager)

She further suggested that there should be a “*better communication culture*” and:

More opportunities and systems to facilitate cross-functional knowledge sharing and information and, unfortunately, a change in culture to make people more open. (Creative Manager)

The Group R&D Director commented that a major cause of poor knowledge sharing and collaboration within the Company is the changing culture, of which the findings suggest the majority of Participants are not fully conscious.

I don't think this newly developing culture, if that is the way to describe it, does aid development. I don't think it does aid knowledge sharing. I think most people are very self-protective of their knowledge and their position. I don't think they share things any more. I think they keep things to themselves because they are protecting their own interests rather than working for the better good of the company. (Group R&D Director)

This knowledge hoarding, as the Group R&D Director described, is symptomatic of some of the practices in which the technical teams in the global entities engage. As the International MD-M pointed out “*the technical guys get very emotional about the ownership of a particular formulation*” and hence get very protective of their knowledge and expertise. They therefore exercise expert and knowledge power and control over their personal knowledge base, leading to further silos of knowledge erupting. He reflected:

If you have a particular product that has a grade in Asia, a grade in Europe and a grade in America, and they're all very different because they have to be for climatic conditions, they will argue all day and all night that their formulation is better than the other two. So, when we get a particular grade of product that has been improved, “here you are, we will send it out to everyone.” That technical guy will often say “no! I'm sticking with the one I've got because I think that's better.” We find that there is almost a pig-headed doggedness about technical people not accepting other technical people's expertise. (International MD-M)

It appears that there is almost a reticence to share their formulatory expertise with other technical teams, especially as each formulation has to be tailored to regional/climatic conditions. He added:

While we're trying to get them to communicate more often...and why we want to make sure the meetings happen, is when you get them into a room, they are very good or on a blog. If you try and send them something that Joe Bloggs has developed, saying “please adopt it”, then we find it's a real challenge. They will find a way to suggest that it is not better than the one they are using or it doesn't give that many advantages or a particular raw material is not available, “so, I'll stick with the one I have got.” (International MD-M)

The evidence suggests that the changing, corporatised culture is having a disabling influence on knowledge sharing, transfer, communication and ultimately how knowledge is managed in the NPD process. With this in mind, the Senior Management Team is taking proactive steps to rectify the situation by first changing the format of the technical meetings, in order to:

Make it a more inclusive meeting. Not everybody turning up with a straight bat wanting to make sure that they defend their corner and coming to the meeting with their own agenda rather than being prepared to listen to other people. We've had to play around with the format as to who we involve, widen the meeting to some of the more management level chemists rather than the senior management level chemists. (International MD-M)

Second, by developing communication/knowledge sharing platforms, such as a technical blog, in order to “bring the teams together a little more often” because the Company is “geographically very diverse” and to enable:

The research and development chemists to talk to each other. You need a platform to share knowledge from and it needs to be as simple as it possibly can. If you make things more complicated, then people don't do it. So, I think the first thing is a simple platform for communication. (International MD-M)

The Senior Management Team hope that the implementation of these initiatives will avoid technical teams in each business entity developing and launching a new product without the other entities knowing about it, leading to, as pointed out earlier, duplication of effort and increased development costs. The International MD-M confirmed that the practice “still happens to this day and we are fighting tooth and nail to get away from it.”

The second major issue that was flagged up as an area of concern is the absence of a cross-functional NPD team. There appeared to be a degree of dissonance between the Group MD, several members of the Marketing Team and the Group Development Manager on the extent to which the cross-fertilisation of knowledge and inter-functional collaboration took place, through the medium of a cross-functional NPD team. According to the Group MD, there is a “very close contact” and an inextricable link “between the product development people, technical development and the market.” He advocated that the culture yields positives for the business because there is a:

Very close communication between the marketing staff, the sales staff and the technical staff; they are literally in each other's pockets every day. They are intimately aware of what is going on. We have not got people sat in an ivory tower doing product development; they are in labs in the factory with the sales people having tea and coffee with them and interacting; I think that's probably a big positive. (Group MD)

Yet, despite the Group MD's glowing reference, reports from colleagues in Marketing and R&D refute his espousal; at grass roots level, the situation appears to be very

different. The Creative Manager perceived that the “*fragmented*” nature of the culture, both “*within departments and across geographical locations*” has created a climate of isolationism, whereby individuals with specialist knowledge of key areas of the business, especially NPD, are not being brought together as a cross-functional NPD team in order to provide a more coordinated approach to NPD. She lamented:

Every head of department works in isolation and there is not...we don't even have a central product team. If you thought you were launching a new product, you would usually bring in a representative from Marketing, someone from Sales, someone from Technical and could tell you a little bit more; someone from the Ops department, who could get a better feel for it. They don't run those kinds of workshops. I believe they did once run a Product Council...I've never attended anything like that. (Creative Manager)

The Group Development Manager and Development Technologist also perceived the situation differently to the Group MD and bemoaned that while they have some contact with Sales teams, the position is quite different with Marketing:

Between R&D and Marketing, there is no real connection. But, there is one between R&D and Sales. I am always in touch with our Sales. (Group Development Manager)

I don't really get involved in Marketing. If a Salesman comes in with a request for a new product, we'd do the technical bit. After that, I wouldn't get involved in Marketing. (Development Technologist)

The Creative Manager further commented that the absence of a central NPD team, and the knowledge they could lend to a structured process, had led to a ‘cart before the horse’ scenario, whereby the Marketing Department were asked to supply information about a product that had already been purchased by a customer.

I usually find out with a sample on the desk or a phone call to say somebody has already bought the product, so we need to produce some information about it. So, it's very much later in the day. Yes, the culture is very fragmented; everybody works in isolation of each other in terms of their own departments. (Creative Manager)

The Creative Design Coordinator suggested that more visibility of, and involvement in, the process of developing new products would, in itself, generate opportunities to learn about different aspects of NPD and create new knowledge as a result, both from technical and sales perspectives.

I don't feel like I've been involved in the product development side of things. We maybe get technical data sheets and we are told that a product has launched, but we've had no awareness of that product until it's been launched. But, Marketing is key to that. I think we should have a lot more visibility...I think it's important for us to learn about the product and where it was born, why it was decided we need this new product...I think that is important when we are trying to market it...I think a little bit more visibility and awareness earlier on in the process would be really beneficial to my job. (Creative Design Coordinator)

She added that the culture would be less of a hindrance if the Company was able to identify “*which knowledge is important for which department*” and process and then enable the Marketing Team to have more “*visibility*,” rather than being seen as an “*afterthought*.” The Creative Manager advocated that taking an active role in the NPD process, from the front end through to the back end, would ensure “*everyone was more involved*” and enable tasks linked to commercialisation and launch to be done “*a lot quicker, more efficiently and more productively as an outcome*.” It would, she claimed, reduce their feelings of being “*blinkered*” from the process and getting the “*rough end of the stick when it comes to product development*,” especially as she and her colleagues use their specialist knowledge and skills to create the tools for the Sales Teams to promote and sell the innovative suite of products that the R&D Team design.

5.5: Organisational Structure

As mentioned in the previous section, the Company has undergone significant change; one of those changes has been structural. The implementation of its global expansion strategy resulted in the structuration of the business into a *network* of sixteen companies, all of which are headed by an MD and run as autonomous business entities within the wider Group. The evidence suggests that there “*definitely is*” (Communications Coordinator) a general confusion about the structure, particularly what Company A does within the Group on a local and global scale and how Company B fits into the equation. As the Communications Coordinator noted, “*I could not tell you how we sit alongside or below*” other companies in the Group. To add to the confusion, the majority of Participants could not decide on the *type* of structure the Company deploys.

Theory suggests that a firm's structure can positively or negatively influence how it manages and shares knowledge, so this was an area of great interest and importance to the researcher in terms of what the findings would produce. Descriptions of the structure ranged from “*definitely flat and entrepreneurial*” (Group MD),

“hierarchical” (Group Finance Director), *“bureaucratic”* (Group Development Manager) and *“effectively somewhere in between...hierarchical and flat”* (International MD-M). What is interesting to note is that no one described the structure as a network, which it appears to be, given the geographical dispersion of the entities and their linkage to HQ (Company A) in the UK and to each other by a system of technology-supported communication, such as groupware (email) and the internet.

From the collective responses, it was apparent that the Senior Management Team have not yet consciously recognised the metamorphosis of the once entrepreneurial structure into a decentralised, geographically-dispersed network. As a consequence, the Company is experiencing poor cross-functional and inter-entity knowledge sharing and communication because an adequate ICT infrastructure has not yet been fully implemented to support the exchange, sharing and transfer of a wide and diverse range of specialist knowledge and expertise. In essence, technical teams and other key knowledge workers are operating as global virtual teams and are thus not receiving the appropriate technological support they need to carry out their roles and effectively communicate with each other.

Within the Senior Management Team, several Participants agreed that cross-functional knowledge sharing within the confines of the structure is a major concern for the Company. The Group MD admitted that the geographically dispersed nature of the structure *“hinders cooperation”* among technical teams and others involved in NPD because:

All these little pieces are all in remote, different markets and it is difficult to physically get them together. So you are reliant on email; you’re reliant on the websites, on blogs and on teleconferences...we have to work hard at the communication piece. (Group MD)

Interestingly, he confessed that the Company does not *“do videoconferencing.”* This means apart from the global technical meetings, which take place once or maybe twice a year, the Company does not appear to deploy a communication strategy to compensate for the lack of face-to-face interaction between entity technical teams, as well as other key functional areas such as Marketing.

Apart from the structure enabling MDs and technical teams to keep in touch with their local market, the Group MD observed that it disables *“that learning, that communication”* and thus knowledge sharing. On that note, the Group Finance

Director also agreed that *“the knowledge sharing bit can be a problem within the structure,”* which the International MD-M confirmed creates *“a tad of a challenge”* because the Company is reliant on the global entity MDs *“feeding into their group”* and facilitating a *“regular level of communication”* with their teams in order to *“make it work from a knowledge sharing point of view.”*

As the International MD-M pointed out, the technical teams are fine as a collective and when they get together, are able to share valuable and rare tacit knowledge. However, the problem starts when they disperse and have to rely on explicit means of communication, which they don’t necessarily enjoy, want to use or know how to use. The Group MD indicated that teams are supported by blogs, email and teleconferencing, but they seem to need and enjoy face-to-face interaction with each other as a community of specialist knowledge workers. This is especially important in relation to developing the mutual trust that is vital to engendering a climate whereby they feel comfortable enough to share their knowledge freely, particularly their formulatory expertise, which the International MD-M admitted they find so difficult to do.

In addition to the issues highlighted above, the restructuring of certain corporate functions, such as IT and Marketing, along with the Parent Company takeover, created a ‘them and us’ situation between various teams, which was making cross-functional collaboration a tad problematic. As the Group Development Manager observed, the structure *“doesn’t support”* cross-functional knowledge sharing because of the perceived ‘barrier’ between Company A and Company B employees, as he explained:

I would say that it’s actually more and more difficult. What I was taught was it was much better before; nowadays, there is a stronger barrier between people working for Company A and Company B and also...IT work direct for Parent Company within the Company, but they are Parent Company people not the Company and that seems to create a barrier and people think that one of them are more important than the other and this collaboration disappears. That is the problem of this company. (Group Development Manager)

This has clearly impacted on communication and the flow of knowledge between the two companies. He noted that the problem is magnified because both companies *“are in two different buildings now and there is also a lot of new people here who we don’t know.”* This point was also reinforced by the Group HR Coordinator, who confirmed that Company A *“don’t have a lot of interaction”* with Company B *“unless they come*

to the top office.” She noted that rapport could be built, and thus knowledge shared, if *“we could get a bit more interaction with one another.”* She further advocated that knowledge sharing and communication aren’t taken seriously enough because people do not appreciate how important they are to the business. She added:

It would be a great idea if the importance of knowledge sharing across departments was raised within the business and obviously the benefits that come from that. (Group HR Coordinator)

Several Participants proposed potential solutions to some of the problems highlighted within this variable. First, the Supply Chain Manager advocated the reinstatement of the Product Council, which used to be a feature within the Company, but was “scrapped” by the Senior Management Team because it was deemed “*too bureaucratic,*” too wieldy, with “*too many people in it*” (International MD-M) and too ineffectual to achieve the objectives for which it was established. The Supply Chain Manager indicated that the Council would be a “*good step forward*” to encourage more face-to-face interaction with key colleagues “*maybe...every second month for something where you actually sit down and share...as comments are made.*” The Head of Group Training concurred with his colleague and remarked that the Product Council would enable individual “*spontaneity*” and encourage ideas to be “*fired into the forum*” to be evaluated by fellow council members, which would create new knowledge and spark further ideation.

Like the Supply Chain Manager and Head of Group Training, the International MD-USA (hereinafter International MD-U) endorsed the value of tacit, face-to-face interaction. He suggests that “*real knowledge*” can be gained from the social interaction that takes place at meetings or informal gatherings the night before, as he explained:

The...Technical Director likes to get...to meetings...a day early because he says he always learns more by sitting around in a pub at night drinking a pint with the other technical guys...he says that's where you pick up real knowledge...they open up to you with the banter and that's when you get the information. (International MD-U)

This emphasises the importance of the Senior Management Team creating opportunities for knowledge workers to meet together more often, either on a formal or informal, physical or virtual basis. Second, the Group HR Coordinator reported that the HR Department is working with the Parent Company to design and implement a

“human resource information system, which will enhance the visibility of the global workforce” and “improve communication channels” through increased interaction and collegiality.

5.6: Leadership and Management

As a Senior Management Team, the primary role the Senior Directors played in managing knowledge within the business was making sure the Company had *“got the right people in place”* (Group MD) by allocating specialist knowledge resources to a variety of NPD projects, a key appointment of which was the Group Development Manager. However, a number of Participants noted that this was done more on an ad hoc, reactive basis, rather than through undertaking short, medium and long term human resource planning for the Group. This may be reflected in the evidence that the Company does not deploy a cross-functional NPD team. On that note, the International MD-U outlined that it helps knowing where the knowledge and skills base of individuals reside in the business because he can advise his technical team to make contact with named experts with the right stock of knowledge when they need it, to enhance various aspects of the NPD process and solve problems where required. He reflected:

Our Technical Director the US may well have a special need. If I know that if there is somebody with experience, I will push him to reach out and contact that person as opposed to an environment in which people want to keep their findings closed and take the credit...I think it's generally encouraged across the Company to push the technical guys to brains trust the other operations. (International MD-U)

More ‘direct’ management of knowledge workers and their performance comes from an assessment process, which although it is *“supposed to be every half year, monitored every half year”* (Group MD) is administered annually. Within that process, individuals are:

Given an assessment, which looks at their performance for the previous year, then sets out key goals for the following twelve months...within that, they will be given four or five key things that they have to achieve. So, the technical side would be related to potentially new products and then they would be paid a lump of money as a bonus...linked to that achievement of those objectives. It's just a method of trying to manage that individual; reward and incentivise that individual. (Group MD)

A major limitation of the assessment process is the restricted access to information once the assessments have been carried out. The Group MD remarked that the

completed objective sheets are *“known to the immediate manager and to the individual; they are not widely shared within the business.”* This means that the Senior Management Team may not be able to make an accurate appraisal of which type of knowledge resides where across the business. This could potentially lead to poor decisions being made about the deployment of knowledge resources.

In terms of performance management, the International MD-M commented that the Company *“puts a huge emphasis on personal autonomy or good old fashioned initiative, as my boss used to call it.”* He added that a core strategy the Senior Management Team deploys to maintain the engagement levels of individual managers is to give them *“autonomy,”* by setting them *“clear targets and objectives”* and allowing them to evaluate what they think of the Company and its leaders; what they think of their role and how that role, along with their stock of knowledge, can make a contribution to the NPD process and the Company’s longevity and success. He claims that by adding value *“related to process and knowledge sharing,”* individuals will positively *“respond to that, come to the table and discuss their ideas,”* which *“encourages further knowledge sharing.”*

However, while this is viewed as a positive move, a number of Participants felt the Senior Management Team did not go far enough to encourage systemic and systematic knowledge creation and sharing within the Company. For example, the Company sponsors the technical conferences that are held in various global locations on an annual basis; the objective being to give individuals the opportunity to *“communicate and share knowledge”* (Creative Manager) as a collective of experts. As there are currently no established processes or procedures that monitor whether the knowledge that is exchanged, created and shared by conference participants is transferred to their jobs, the conferences lose their momentum and the Senior Management Team cannot evaluate to what extent the knowledge and ideas have been exploited in the form of new products. Furthermore, because the conferences are only held once, maybe twice a year as the Group MD reported, not enough ‘filler’ opportunities are facilitated by the Senior Management Team to get teams together, either physically or virtually, to share their tacit knowledge.

The evidence suggests that although a technical blog, email and intranet are provided by the Senior Management Team as a medium to promote knowledge sharing and

communication, primarily via explicit means, the majority of Participants would prefer some form of regular face-to-face contact with their colleagues and peers. This may serve to engender a culture of trust, whereby individuals feel more able to, and more comfortable with, sharing their tacit knowledge and expertise with others. Once again, the Supply Chain Manager advocated that the Product Council, whether it be run at a physical or virtual location, would enable members, from a cross section of the Company's experts, to actively engage with each other through dialogue that isn't email or blog based.

5.7: Specialist Roles and Knowledge

It is evident from the findings that the Company employs some very knowledgeable and talented individuals, who along with their knowledge and expertise are a central factor in its continued success. In terms of how knowledge workers influence the management of knowledge, three key issues emerged from the interviews, observations and document analysis:

- a. The ways in which they apply and utilise different types of specialist knowledge within their job roles,
- b. The ways in which their specialist knowledge is codified into explicit forms, such as laboratory reports and product brochures, and
- c. The way in which they share their specialist knowledge across functional teams.

First, the application and utilisation of specialist types of knowledge is a major feature of the NPD process within the Company. As a knowledge-intensive firm, it is heavily reliant on its knowledge workers, who came to the business with a range of qualifications, experience, knowledge and skills that has enabled the Company to build a substantial pool of talented human capital. This talent is widely drawn on by the Senior Management Team and, as confirmed by the HR Manager earlier in this Chapter, a relatively stable workforce, coupled with internal promotion, has meant that the retention of knowledge has enabled the Company to utilise its established knowledge base. Nearly half of the Participants have been with the Company for over ten years, so they have essentially grown with the business.

Importantly, as reported in the previous variable, knowledge workers are, through their annual performance assessments and job specifications, given a degree of autonomy to perform their job roles and are therefore empowered to exercise a modicum of freedom and flexibility to manage themselves and the application and utilisation of their specialist knowledge, which theory espouses is a key part of engaging in knowledge work. As the Group Development Manager confirmed:

No one ever told me what I should do; what or how we can do it. It is my creativity. I feel free to do whatever I think it is good for the Company. What they do is review my reports on a regular basis and they accept what I am doing and which way I should go. If they think that is wrong, then they corrected me. But what is great in this Company is that no one actually is telling me every day what I should do. I know that I have got their support. (Group Development Manager)

The International MD-M highlighted that the Company's recruitment and selection process builds in the identification of talented individuals, who will “*bring value and ideas to the role*” and use their initiative without the need to be micromanaged. He cited the Creative Manager as an exemplar:

As her direct boss, I will sit and discuss her objectives and KPI's. From there on in, the creative influence is entirely hers. She will come up with ideas for brochure design, product launch strategies, branding initiatives, etc. I will have an input on her ideas, but she is very much the driver of the process. (International MD-M)

Of course, the more Senior Managers, such as MD's, have a greater level of autonomy, responsibility and authority to deploy knowledge resources where necessary, unless it involves the hiring of new knowledge externally, in which case permission has to be sought from the Parent Company through the “*approval and authorisation process by specifying the job description and person profile and whether or not it's within the budget*” (Group HR Coordinator).

Given the innovative and technological nature of the products that are developed, the culture of reactivity to markets and customers and responsiveness to environmental forces for change, it was unsurprising that the types of knowledge that were applied and utilised by knowledge workers were all related to the design, prototyping, testing, commercialisation/launch and sales of new products. From the front end, this ranged from “*commercial knowledge...good knowledge of materials, suppliers and logistics...and a detailed understanding of cement chemistry*” (Group Managing Director), knowledge of and “*experience in alternative raw materials*” (International

MD-M), to develop their environmentally friendly products; knowledge of “*process engineering*” (Head of Group Training) and “*allocation of...financial resources...and budgeting...to make sure we could do what we needed to do*” (Group Finance Director).

Back end support was lent through the application and utilisation of graphic design, copywriting, web development and “*search engine optimisation*” (Creative Manager), courtesy of the Marketing Team. Importantly, the IT team gave support by ensuring that knowledge workers were able to:

Access everything on the IT infrastructure to enable them to store the information, share the information and just make sure that it all works.
(Applications Analyst)

In the absence of an ‘official’ strategy for managing knowledge, the evidence suggests that individuals manage their own knowledge within the remit of their job description and specification and take responsibility for how their specialist knowledge is applied to complete key tasks associated with the development and launch of new products.

The second key issue is knowledge worker articulation of their specialist knowledge into codified or explicit formats. Again, it is important to note that this is not in direct response to a formal knowledge management strategy of codification that the Company deploys, but a routine and inherent part of the knowledge work in which they engage on a day-to-day basis. To demonstrate this, the Group Development Manager and Development Technologist routinely complete laboratory reports for every product that is developed and tested; these are then stored as explicit knowledge for information and future reference. In addition every three to six months, the Group Development Manager prepares a development report, which is reviewed by the Group R&D Director and Group MD. If, as he explained “*they see the progress, they accept my further work on that.*” The R&D Team also produce blueprints and chemical formulae, which are disseminated to the global entities for modification/adaptation to local climatic conditions and then manufactured. This is a further demonstration that their specialist tacit knowledge is embedded in new products.

The Marketing Team articulate their knowledge, and that of the R&D Team, into product brochures, developing marketing and launch campaigns and crafting “*marketing strategies*” (Creative Design Coordinator). It also involves putting

“technical jargon and bullet points into readable prose that the market will understand, so that it is things like e-marketing communications” (Creative Manager). From an IT perspective, knowledge is articulated into the design of *“technical databases”* (IT Director) and other systems that act as ‘unofficial’ knowledge repositories and a medium for both the storage and dissemination of explicit knowledge, regardless of geographical location or time zone.

To underpin and overarch this, the Senior Management Team, whether consciously or subconsciously, codify their knowledge into strategies, budgets and a variety of plans that are disseminated and shared, both tacitly and explicitly with their MDs and teams. Such codification of knowledge generates structural capital for the business and forms a key part of the Company’s organisational knowledge and intellectual capital base, which is embedded into the new-to-market products it develops.

The third and final issue that emerged from the empirical research pertains to the way in which knowledge workers share their specialist knowledge as cross-functional teams. While they appear to have some autonomy over the management of their own knowledge, how it is applied and utilised within the context of their job role, when it comes to the cross-fertilisation of that knowledge with other functional areas, the evidence suggests that depending upon the area, they have little or no control over their input. This is compounded by the absence of a formal cross-functional NPD team, the problem of which was highlighted earlier in the Chapter.

Further evidence also suggests that for all intents and purposes, the type of product that is being developed somewhat dictates which specialist knowledge is used and when and in conjunction with other functional areas. For instance, on the eco-friendly product project, which the Group Development Manager was recruited to develop, the Group MD reported that the ideation and concept development stage was *“mainly done in a little bit of an ivory tower with the Group Development Manager locked away in his lab doing the chemistry work.”* As the development progressed and got closer to being launched to market, he outlined that there was:

Clearly a need for more of a cross functional involvement across the cross functional teams. He would then be meeting with the guys that do the application, meeting with the guys that do the manufacturing, meeting with the guys that are going to sell it, to finalise the product, to prove that the product would work and to bring it to market. So, in the early stage of the development very little; on the middle or later stages a very high degree of cross functional involvement. (Group MD)

The point about which type of specialist knowledge is used and when was emphasised by the International MD-M, who noted that cross-functional knowledge or teamwork was not possible in the early stages of developing the eco-product because “*only a limited number of people are involved in cementitious chemistry*” within the Company and therefore the type of specialist knowledge required to work on the project was restricted to one person; hence him being protected from other distractions in the business.

The absence of a formal, cross-functional NPD team suggests that specialist roles and knowledge are managed on an ad hoc, project basis, which as the evidence highlights often excludes the Marketing Department, leading to feelings of isolation and Marketing colleagues feeling like they are “*at the very end of the chain*” (Communications Coordinator). This has not gone unnoticed by several Participants, including the IT Director who noted:

I can tell you in this organisation, Marketing is a function of Sales; there is no doubt that the Marketing is the poor relation. (IT Director)

The Communications Coordinator suggested that the situation could be rectified by the Senior Management Team implementing a change in strategy and management practice by encompassing “*the sales guys under the Marketing umbrella, which traditionally it would do.*” This would not only serve to enhance the credibility of the role of Marketing within the Company but also ensure the function has “*more involvement and input into what products are being developed and how they are developed,*” which according to the evidence, the Sales Team appears to have. He added:

We are not technical guys or scientists. If the scientists say it is not going to work, then it's not going to work, but equally, if the sales guys in the marketing team say it not going to sell, then it's not going to sell. You have to have something which is going to work on something that will sell, because there is no point in selling something that is not going to work or in making something that is not going to sell. Otherwise we might as well not be here. (Communications Coordinator)

5.8: ICT, Systems and Communication

As highlighted earlier in this chapter (see Organisational Structure), the Company's global network of business entities is underpinned, interlinked and supported by its technological infrastructure, which is managed and monitored by the IT Director and his team. They report directly to the Parent Company and are also responsible for the ICT infrastructure in every company in the Parent Company group in the Europe, Middle East and Africa regions. Company A's ICT infrastructure incorporates a myriad of enterprise systems that support the NPD process through, for example, the *“MRP, manufacturing resource planning system in the factory”* (Group MD), *“Hyperion and Sage for accounting reporting”* (Group Financial Controller) and *“technical databases...that...manage the end products and...also used to formulate new products”* (IT Director). In addition, the infrastructure also provides some support via electronic communications and collaboration tools, such as *“project management systems”* (Creative Manager), *“email”* (IT Director) and the *“intranet”* (HR Manager).

The majority of these systems, in particular the communication and collaboration tools are available to every employee, regardless of location and time zone. Importantly, the bulk of these systems, such as the network drives and intranet, store codified explicit knowledge, much of which is articulated tacit knowledge from the Technical Teams, in the form of reports, product data sheets, etc.

A significant knowledge portal for all employees to tap into is the intranet. Although there was some confusion about the system; what it was called, what it could do, who had access to it and to how it influenced the management of knowledge in the NPD process, the majority of Participants concurred that it was a rich source of knowledge and information. According to the Group MD, the intranet houses all the Company's *“product information and technical details, test information, case studies on complicated projects”* and is notably:

Accessible by any of our people, anywhere in the world. So if a sales guy goes into a job with (ABC) in Australia, he could instantly find out that we have done a job with (ABC) in Malaysia or in ... the UK with that particular product and when we did it and also downloaded the technical information on the product, and testing on product as well. (Group MD)

The International MD-M added that the intranet also contains *“all the PowerPoints, reference lists ...and photographs for the Global Sales Team to build a platform to*

take to customers.” While the intention was there for the system to be used as an “intranet communication platform for technical guys” and a portal that they and other knowledge workers could use to retrieve and extract key information, he reported that the teams:

Don't use it, it is too difficult...it doesn't work is the straightforward answer. That's coming from a senior member of the Company. People have stopped using it, but that was the platform for everybody to use...which is why we're looking at building communication platforms that are simple...as it stands at the moment, we don't have a successful or a practical communication platform for putting anything on. (International MD-M)

The Creative Design Coordinator suggested that the exchange, dissemination and sharing of primarily explicit knowledge could be facilitated by making the internal intranet site “more user friendly,” to encourage engagement and buy in from “everyone in the Company” and facilitate key cross-functional knowledge and information to be disseminated to different areas of the business to guard against any gaps in knowledge. Moreover, she suggested that a greater commitment to using the intranet would enable “technical staff from across the world to go online and chat with each other,” connect both local and global specialist knowledge and expertise, build the trust that is required to share knowledge efficiently and thus contribute to the effective management and utilisation of knowledge in the NPD process.

In order to address the issues with the system and encourage a greater level of user engagement, the International MD-M reported that a new system was in the process of being constructed by the Marketing Team, which would support knowledge and information retrieval and extraction at both the front and back end of the NPD process and enable it to be used as a “knowledge repository” (Communications Coordinator) and “knowledge database” (Group R&D Director) to improve “knowledge sharing” (Group Finance Director) throughout the Company.

Although the systems described earlier in this section have the capacity to store and disseminate knowledge, the majority of Participants lamented that in general, the Company’s systems did not influence or enable the effective sharing of knowledge to take place. The Group MD acknowledged that however sophisticated the technology and systems the Company deploy are, they are “fairly restricted” in terms of how they facilitate knowledge sharing. However, the IT Director pointed out that the

primary vehicle the Company utilises for sharing knowledge is “*email*.” He observed that:

The organisation is addicted to email and basically, email is what they work from. So, if they are going to share information, you can bet your bottom dollar it will be through an email. So, during product development, that is largely how they would share information, even if they would say you've, yes sure, they save information through a network drive, but then they would email somebody to tell them where it is. So, a largely speaking, email is the only piece of technology they probably share product development information with right now. (IT Director)

The Communications Coordinator reported that there had been “*talk for some time now of a technical forum, which I think is a great idea.*” However, he noted that a bit of a ‘closed shop’ was being operated by certain technical teams, who wanted the forum to be exclusively “*for technical staff and only technical staff,*” to the exclusion of other key knowledge workers, who may find the information useful, particularly those with some task interdependence within the NPD process. He commented:

To me, that seems daft because technical knowledge of any of our products is only going to be useful to everybody. There is stuff that we need to know ... I think it's a bad idea, but that's just me. It's probably not just me either. We have marketing literature, which is available to anybody who wants it. If the technical guys want to see our customer facing brochures or campaigns, go online and you can see it all. However they are ring fencing the technical stuff. (Communications Coordinator)

Whatever the reasons are behind their thinking, it had led to a certain degree of bitterness, especially as the Senior Management Team are making strides to promote a more engaging culture of knowledge sharing. He added:

You have to think what is more beneficial; technical zone, so that only technical guys have access to it, or no technical zone at all. Logically, if they are to options and they don't want everybody to access it and that is preventing this tool being implemented, then that's even worse than not having one at all. (Communications Coordinator)

On that note, the Group HR Coordinator pointed out that the Senior Management Team is, through the HR system, driving the development of a “*central resource of information where everybody who needs that information can tap into and access it.*” It is also intended to link the global community of knowledge workers together, so they can feel more connected with each other and be encouraged to share as opposed to hoard their knowledge. She added:

We are trying to find a way that we can have a global database, which is centralised, so that each entity worldwide can tap into that information should they need it. Without it at the moment, it is very difficult to get things done because even marketing for Company A work are a lot of products and they may be promoting things in different entities worldwide. That information has to come into Company A for it to be done. (Group HR Coordinator)

According to the IT Director, a further strategy the Senior Management Team could adopt in order to engender more connectivity between the global teams and solve the conundrum of enabling tacit knowledge exchange across the structural and geographical divide, could be corporate investment in the ICT infrastructure through the implementation of business-wide videoconferencing, which the Group MD openly admitted the Company does not do. The IT Director reported that prior to the Parent Company takeover:

Videoconferencing was always seen as a luxury and they weren't prepared to buy into it. Now, now that we are owned by a big corporate, videoconferencing has to go right up the chain for sign off because of the capital involved and it will get blocked because they are working on a corporate solution for all of the businesses globally right now, but that will take years. That's where the corporate bureaucracy chain comes in. (IT Director)

Although he pointed out that there is a “little bit of on demand videoconferencing in place between the UK and the Swedish management,” the practice is not replicated throughout the business. It therefore compounds the tacit knowledge sharing and communication dilemma that is endemic within the Company.

As was highlighted earlier in this Chapter, the Company has a major issue with poor levels of communication across the business. The Group MD reported that its structure and systems “disadvantages...learning” from taking place between teams and business entities. A further issue is the lack of dialogue, knowledge sharing and information exchange between Technical Teams who, the International MD-M claims “are all very happy operating in their own little bubbles” exercising expert power and control over their own specialist knowledge. The poor communication is also compounded by a duplication of effort, particularly in the global entities when new products are developed. The Group Finance Director epitomised the state of affairs within the Company, by noting:

Corporate communication is probably one of the Company's weaker points. I think it's because it isn't hierarchical and because we are so scattered, like a bunch of little companies. It does not help communications across the Company. (Group Finance Director)

One of the major bugbears for the Marketing Team is the lack of communication within the Technical Teams and their own sparse involvement in the NPD process, even though they are a key corporate function. A closer synergy and collaboration at the front and back end would, the Creative Manager feels, enable a greater level of knowledge sharing and lead to a more collegial relationship and enhanced communication between the two core functions. She observed:

The only communication will be the end result when the product is launched. There would be an article about it in the newsletter, but as a vehicle for facilitating communication processes, it wasn't one...we are brought in at the last stage, so we have no idea what goes on before. Every appraisal I've had in the last five years has said that we need to work more closely with technical and we need to know about new products in advance, so that at least we can have a package of material prepared to launch to the market. (Creative Manager)

Hence the need for a socio-technical approach to knowledge sharing and communication, whereby the aforementioned systems underpin and support the storage and dissemination of explicit knowledge to knowledge workers when they need it, where they need it. The relaunch of the Product Council, albeit a global morph, would quench the need for knowledge workers to “*physically get together*” (Global MD) and share tacit knowledge, which the International MD-M confirmed they enjoy. The Group MD added:

I would suggest it's more about verbal communication is...to really find out what's going on...that meeting where they all get together once a year, the only general sharing of information is then they really physically get together. They maybe go out for a beer together, they have a meal together, they have a real chat; and by the way, we are working on this; well that's interesting, then things emerge from that kind of physical contact and sharing and I think even more so in our business...it has to be physical contact of some kind to stimulate that. (Group MD)

5.9: Chapter Summary

This chapter presented the findings from the empirical research conducted in Company A. Although the Company is highly successful in the markets in which it operates, the research identified a number of issues that were having a disabling effect on the ways in which knowledge is managed and utilised in the new product development process. First, Company A is historically and culturally very reactive; even though it is now part of a Parent Company Group, it still maintains an air of entrepreneurship. Its strategy of reactivity has resulted in the absence of a dedicated new product strategy, NPD process and cross-functional NPD team. This has led to a

raft of problems, including the poor allocation and utilisation of knowledge resources and lack of cross-functional knowledge sharing and collaboration.

Second, the takeover by the Parent Company has catalysed a change in culture, which has been met with some resistance. Concerns were raised that the implementation of Parent Company processes and procedures, mainly financial and sales-oriented, have begun to stifle the very entrepreneurship that made the Company a success. Further concerns were mooted about the technical teams being curtailed from experimenting and taking risks.

Third, the once entrepreneurial structure, which had been traditionally flat, has morphed into a geographically-dispersed, essentially network, structure following the restructure of the Company in the 1990s. This has led to problems with poor communication, knowledge sharing, inadequate support from the ICT infrastructure and not enough opportunities to bring individuals together to share tacit knowledge and have the physical contact the Group MD espouses is so important and necessary to enable good levels of communication. What also became evident is that technical teams and other staff in the global entities are acting as global virtual teams, but are not being given the underpinning support, such as videoconferencing, to share tacit knowledge outside the annual or biannual global technical conferences. Knowledge hoarding, as opposed to sharing, was also highlighted as an issue for the Company.

Fourth, although the Senior Management Team recognise the issues and are proactively trying to deal with them, the general feeling is they have not done enough to a) engender more inter and intra-functional knowledge sharing and collaboration, b) facilitate the establishment of a cross-functional NPD team and devise an NPD process, which would serve to ensure specialist knowledge is not only planned for but deployed appropriately when and where needed. Furthermore, the absence of a cross-functional NPD team has led to the exclusion of the Marketing Team from contributing to the bulk of NPD, which has led to feelings of isolation and tension between themselves and the R&D Team.

Fifth, although knowledge workers are given a large degree of autonomy within their job roles to manage, apply and utilise their specialist knowledge accordingly, not enough opportunities are presented by the Senior Management Team to share their knowledge tacitly and cross-functionally.

Finally, even though there are areas of good practice in terms of the ICT infrastructure, not enough support is being given to the global entities, such as videoconferencing, which the Group MD admitted the Company does not do, to facilitate good levels of communication and knowledge sharing. In addition, the Company does not deploy a knowledge management system, although the intranet is viewed and used as some form of knowledge repository to store, access and disseminate knowledge worker articulated or codified tacit knowledge and other explicit documents. The International MD-M reported that many global technical teams do not use the intranet and associated systems, which leads to further problems with communication and knowledge sharing.

The next chapter presents the findings of the empirical research conducted in Company B.

Chapter 6

Findings from Case Study 2: Company B

Chapter 6

Findings from Case Study 2: Company B

In much of society, research means to investigate something you do not know or understand.

Neil Armstrong

6.1: Introduction

This Chapter presents the findings from the fieldwork data collection stage of the research, which was conducted in Company B. The findings, which seek to answer the research question, are presented in three stages. The first stage contextualises the background to the Company; the second presents the findings against the six organisational variables and the final stage summarises the main findings that emanated from the fieldwork. As in the previous chapter, for ethical reasons, and to protect the intellectual property of the Company, all reference to its products, the Parent Company and individuals (apart from their job titles) have been anonymised.

6.2: The Context

Company B Ltd (hereinafter ‘the Company’) was founded in the early 1980s by two enthusiastic entrepreneurs, whose vision was to offer innovative flooring systems to businesses in a variety of sectors. After securing a number of high profile contracts, including NATO and winning a series of awards for innovation, the Company implemented its growth strategy in the mid-1990s and divided its operations in two; thus creating two separate legal entities. Company B continued to operate as the main manufacturing base and service the UK and European markets; Company A was tasked to be the strategic innovation hub, as outlined in the previous chapter, and coordinate the Group’s expansion into global markets.

The Company manufactures and sells products that have been designed by the Company A R&D Team, specifically for the UK and European markets. The Company engages in product development by tweaking and modifying products to suit different climatic conditions in different geographical regions. Development and modification within the Company also involves a) sourcing and adding different raw materials to create new products, specifically designed to satisfy customer and client requests, b) creating new products based on existing formulations, e.g., changing the

ratio of raw materials, and c) conducting blind as well as on site testing. As part of the wider Group, Company B has complete autonomy as a business to make deals with customers and clients. However, it is, like other entities, bound by strict monthly financial reporting requirements and sales targets, which have been imposed by the Parent Company.

As a knowledge-intensive firm, the Company is heavily dependent on gaining competitive advantage from the application of the knowledge, skills, expertise and experience of its knowledge workers, in particular those who are directly and indirectly involved in the product development and modification process. The operation is underpinned by a small development team, which is headed by the Technical Director, a highly qualified and experienced chemist, who is a member of the Senior Management Team. Other team members include colleagues in the Samples Department and the Application Development Chemist.

Labour turnover within the Company is relatively low, although it experienced a number of redundancies a few years ago, shortly after the Parent Company takeover transpired. Where possible, vacant positions are filled, and promotions made, via internal recruitment, to ensure that specialist tacit (embrained and embodied) knowledge and experience remains within the Company and part of its organisational knowledge base. This was confirmed by the HR Manager, who noted *“we would tend to use the staff that we had got working on new products because they actually know what our products are about and how they are made up.”*

As outlined in Chapter 1, even though it is a separate legal entity, Company B shares the same site and infrastructure as Company A and utilises similar systems, such as IT. Indeed, it has also experienced a number of issues with its infrastructure and aspects of the organisational variables have had an enabling and disabling influence on its capability to manage the knowledge of its knowledge workers and, ultimately, how it effectively utilises their human capital to develop and modify products. The following text presents the findings of the empirical research in the order of the six organisational variables.

6.3: New Product Strategy

By its own admission, Company B is a “*customer service oriented business and a sales and marketing focused business*” (Technical Director), which is very reactive and highly responsive to customer requirements for innovative, environmentally-friendly modified products to their exacting specifications. On that note, the Regional Sales Manager confirmed that 90% of product development within the Company is “*from what we, the Sales Team, want from R&D...because we are out there; we know what the market needs.*” Such reactivity to both its customers and new markets has been a prerequisite of the Company’s success and a key factor in corporate growth in the past few years.

Despite the Company’s sustained growth and success, the research identified that it does not have a ‘formal’ new product strategy, although this was a topic upon which several Participants could not agree. The Europe MD conceded that while he “*would like to say ‘yes’*” it does have a strategy, he admitted:

It doesn’t necessarily have a formatted plan. We often talk that we need one. And we need to have a Marketing Manager who embraces that concept of a proper launchpad, but I have to say that by the time all the I’s are dotted and the t’s crossed, the opportunity is gone. We don’t have a particular tick box of where we need to be, at any given time, literature, training, pricing. We can very quickly come up with a concept, come up with a formulation, work out its costs, and work out what we think we can sell it out and that process can take twenty four hours.
(Europe MD)

He commented that although a strategy for new products would be ideal, the emergent nature of product development within the business, which has historically always been reactive, enables the Group MD’s culture and vision of entrepreneurship and innovation to be encouraged and empowers individuals “*to get on with our own jobs and that is one of the main drivers of the success of the Company*” (Europe MD).

The European Manufacturing Director acknowledged the Company’s history of reactivity, but reported that it “*causes problems because a lot of resources can be tied up with not understanding the full potential of what it is going to be.*” He recognised that the situation could be due to the absence of a focused new product strategy, the presence of which could steer much of what the Company does in terms of developing and modifying products and ensure that projects are “*given the full allocation of resources.*”

I would like to see an opportunity where we could create a product strategy through our existing role, which we now have with our genre of products and we need to see whether they need to be modified or changed or whether we can increase sales or...we look at...types of products or other things that are offered to us by suppliers or other products that we take on board. (European Manufacturing Director)

He further acknowledged that the problem could be exacerbated because of the lack of involvement of the Marketing Department and their specialist knowledge in the process.

We never actually go to the Marketing Department and say these are the new products that we have got and these will support XYZ. What is the return going to be? Is there a life cycle? Can we have some form of cradle to cradle management process from an evolutionary point of view when that product has exhausted its life cycle we go into something else? That doesn't happen here. It's very push into the pot and we could be missing out on some potential somewhere else that nobody has really realised and that it is all about competence and people and how they deliver. (European Manufacturing Director)

Furthermore, he felt the absence of a new product strategy meant that the Company does not “*innovate enough*,” again because of the lack of resources, including specialist knowledge. This had invariably led to the Company taking “*a phenomenal amount of time to develop the product*.”

Following on from the above, the findings indicate that there is an issue with the management, allocation and utilisation of specialist knowledge resources, particularly at the front end of product development. Prior to the restructure that took place in the 1990s, as the founding enterprise, Company B engaged in its own new-to-market development and was therefore able to set its own agenda and allocate appropriate resources where available. Now that Company A is the centralised innovation hub that is responsible for “*what we know as true product development...all the stuff that you can see in all sorts of the literature that people are meant to do*” (Technical Director), if the company wishes to develop a particular range of products, such as the eco-friendly series, the Senior Management Team buy in the services of the Group Development Manager. This incurs a “*Group recharge, which is significant per year. So I'm going to maximise that as much as I can*” (UK MD). Although the UK MD views the Group Development Manager as “*very, very knowledgeable, very keen and very able in his work to produce what we want*,” because he isn't the dedicated Company B resource, there appears to be some frustration over the length of time it can take to get products to market. He noted:

I'm continually pushing and prodding because I'm impatient to have the product. So for me, it's a case of sowing the seed, getting the concept adopted and then pushing and pushing and pushing the Group Development Manager and his team to give me the product as soon as possible. (UK MD)

The UK MD also drew on the services of “another chemist on a consultancy basis when we needed to,” in order to plug the resource gap. A further issue with the management, allocation and utilisation of knowledge resources that was identified is the Technical Director. As stated earlier, he is *the* main R&D expert in the Company and heads the Technical Department. He is supported by a small team of people, including the Samples Manager. However, because he is “responsible for all the other letters of the alphabet,” as opposed to pure R&D like the Group Development Manager, he cannot devote as much time as he would prefer to product development activities because of the gamut of responsibility that he has, which he outlined could be:

To do with samples, production, the production database, formulations; it could be customer services, it could be the literature, it could be something to do with health and safety. It could be something to do with advising clients or advising customers, site support, complaints. Anything to do with live business, really. It could be that we've run out of a material so have we got an alternative. We've got this deadline to meet by the weekend or there's an opportunity to supply a product to a customer as a trial. We need 400 bags of it by next Friday. It changes every hour. (Technical Director)

Further frustration is caused by him being called away from his work, frequently at very short notice, to deal with various crises and firefight, both on and off site; resulting in delays to development projects. When the split took place between both Companies, the initial plan was to offer the Technical Director a modicum of protection from the burgeoning pushes and pulls of his job, as he recalled:

The idea was that that the R&D Department would be sheltered from the day-to-day firefighting. When I come to work, I have a number of items in mind that are urgent and need my immediate attention. But by the end of the day, I could have a list twice as long by what comes in that day. (Technical Director)

This therefore curtails both himself and the Company from fully managing, applying and utilising his specialist knowledge in the most efficient and effective way.

6.4: Organisational Culture

Company B's cultural heritage is steeped in dynamism, innovation and entrepreneurship, due primarily to the vision and dog-eared determination of its original founders. Although they are no longer with the Company, the entrepreneurial spirit that can be attributed to much of the Company's success is still pervasive and came through in many Participants' responses. It is therefore unsurprising that views of the culture ranged from *"very entrepreneurial and very dynamic"* (Europe MD), *"very business driven"* (Assistant Project Manager) to *"entrepreneurial and innovative"* (Technical Director).

Three key themes emerged from the interviews and observations: culture change, a lack of knowledge sharing and collaboration and the absence of an NPD process. First, it was evident that various changes, including the implementation of a number of Parent Company operational and financial procedures, along with the restructuring (which will be covered in the next variable), had catalysed a change in culture. This was recognised and accepted by the majority of Participants at both strategic and operational levels. One of the major changes to the culture was identified by the European Manufacturing Director. He acknowledged the *"very entrepreneurial"* roots of the Company, but affirmed the culture had transmuted into something *"very sales orientated"* and *"very, very marketing led with the brochures,"* due in part to the evolution of the business from a relatively small to a large organisation that operated under the auspices of a conglomerate Parent Company.

The Technical Director also observed that the culture is *"changing definitely"* and even though it has meant the rationalisation of a variety of processes and procedures, he accepted they were a part of the Parent Company's drive to limit the risks to the business, because:

You're not going to have control over everything and I have seen all of it. The bigger you get, the more you look for where it can go wrong and so you put a stop or a filter in where it can go wrong. It could be a procedure or technical information. It could be training, but it's an ever evolving business. The world never stops changing does it? But you've just got to change with the world and always look to improve. (Technical Director)

One area where he felt it would have a knock on effect is knowledge sharing and collaboration. He observed that the ability to communicate and share knowledge was easier in a small company, where *"you've got the whole management in one room and*

you can talk to him, him and him and everybody knows what's going on." He accepted that being 'bigger' often meant that the opportunities to exchange dialogue and share knowledge effectively was somewhat curtailed because *"busy people don't always have time to communicate,"* particularly those, like him, who are at the heart of innovation in the Company.

The UK Marketing Manager also recognised the significant change in the Company's culture. He described it as a *"merging of the old and new,"* from an *"entrepreneurial...gung ho"* way of doing things to a more sedate *"standardised...regulated corporate culture."* He acknowledged that the change had enabled more structured systems and processes and reduced a certain degree of ambiguity about various business activities. He indicated that the culture change had reduced the inclination of the Senior Management Team to make reactive changes *"almost on a whim, daily basis."* Like the Technical Director, he accepted that the changes had been for the better and had given the Company the sense of direction it needed.

The Technical Advisor had mixed views about the change and commented that the Company had become somewhat constrained by what he saw as the structure of a *"large organisation,"* which he felt had disabled the Company's ability to quickly respond to change. However, he supported the change in culture because it opened up a number of avenues for both companies and its knowledge workers by enabling them to have:

More interaction with members of the Parent Company Group, so that we can tap into resources there, in terms of raw materials...and expertise and knowledge. We're manufacturing products for other members of the Parent Company Group...so they may well give us their formulation to manufacture those materials for them. (Technical Advisor)

The second issue that was identified was poor knowledge sharing and collaboration, which the Europe MD acknowledged was *"probably an area for improvement."* He noted:

I think we have to be very careful that we get a problem in our UK business and the reasons for that problem are not disseminated to our other operating businesses and sadly we get the same problem. It's only annually when we get together with the technical boffins and discover a number of people have had the same problem last year, so there needs to be more knowledge dissemination. (Europe MD)

He confirmed that the Senior Management Team is taking proactive steps to address the situation and accepted that the solution would only work if they had the cooperation from everyone concerned:

We are trying to address that with the technical blog. But it's getting people to buy into it and add to it. It's only going to work if people take time out of their busy day with information to blog. (Europe MD)

The Europe MD further acknowledged that a major cause of poor knowledge dissemination and sharing, certainly from a strategic perspective, was the lack of board meetings that took place between the Top Management Team. Instead of being held once a month at the very minimum, he confirmed they are only held three or four times per year. He verified that the status quo is a “massive improvement on what it was two years ago” and although they meet more frequently as a board of Senior Directors, he blamed the situation on the “logistics” of the business entities being located across geographically dispersed locations. As a result of this, he outlined that the meetings could be:

In Malaysia or North America, so at least the main four senior directors are together discussing the issues. Yes I agree. It should be at least once a month, but you've got a guy in Houston, Texas; a guy based in Johannesburg; I'm sat here with the Group MD in the UK and our other colleague is in Kuala Lumpur. It's the logistics; believe me, four times a year is a massive improvement on what it was two years ago. It wasn't even annually then, so we're getting a lot better at that. Don't forget, we can communicate by e-mail and phone calls regularly, but it's been good this year to actually sit down regularly and discuss the issues. (Europe MD)

The European Manufacturing Director also agreed that a lack of Senior Management Team meetings, in particular cross-functional ones, had led to “reactive” knowledge sharing. He argued it had made two key activities a more “difficult” process: planning for financial, material and human resources and allocating the ‘right’ type of specialist knowledge to service product development. He noted:

It will be very difficult for me to remember a time when the management team have sat around a table and said, “this is the technical team, and this is the development team, this is the sales guy and what do you want to see over the next period?” ...it's difficult. From a knowledge point of view, it's more reactive. It comes from the market rather than we really understand what we are trying to get into. (European Manufacturing Director)

The Technical Director outlined that the reduction in the number of meetings is symptomatic of the ‘busyness’ of certain departments like his. Knowledge sharing and

communication are, he observed, constrained by the very small Technical Team and the juxtaposition in trying to balance the necessity to communicate and share knowledge, while at the same time respond to the reactive demands placed upon them by the business to develop products. He lamented:

It's a reasonably small team. As in all organisations, you can have better communication because with such a small resource relative to the demand, which is front-end and backend; the front end being sales, the customers, the clients, you will always have a larger demand than the resource can cope with. So you're going to have busy people. Busy people don't always have the time to communicate with each other, so the amount of demand can hinder that communication. But we do speak to each other. (Technical Director)

Although holding more regular meetings with his team are curtailed by circumstances beyond their control, the Technical Director highlighted that two of the best ways of sharing knowledge and thus recommended a lot more of are the sales conferences and Group technical meetings.

We'll have our times like a sales conference where the best bits are in the evening when you are sat around with people and you're talking and likewise when you go to a Group technical meeting, and that's when all the good stuff comes out; when you are talking to other guys from around the world and what they've seen and done. It's probably better to have more of those sort of technical get-togethers. I run the site ops team as well and we are endeavouring to have two meetings per year where we have a couple of days to go through issues we may have had to talk about causes and prevention and what we can do in the future. (Technical Director)

There were impassioned pleas for more meetings from a number of Participants in functional departments. The Samples Technician remarked that the meetings could be used as an opportunity to learn new things and become multi-skilled in different aspects of the business:

I put forward in an appraisal that we should have departmental meetings every so often because then if somebody has time on their hands and they know something that I don't, they can help me and I can help them. And if you are all learning each other's jobs, you can fill in for each other. But, I don't know if anybody reads the appraisals or not. (Samples Technician)

The final key issue that the research identified is the absence of an NPD process. This was a moot point and a rather emotive topic, especially as the Company is a highly successful innovator. According to the Technical Director, the Company *does* have a “new product introduction procedure and we have had for a number of years.” Even though this is the case, he advised that it is “never used” in his department because:

The Company is and always will be a customer service oriented business and a sales and marketing focused business, with the technical backend following along trying to support that. So, there will be some requirements that pushes through the system... demand in this line is in line with sales. If there are sales there is demand and it's like kids in a sweetie shop; 'I want that one I want that one.'
(Technical Director)

He inferred that as “*everything is wanted immediately,*” there is no time to follow a set procedure, so there are tensions between what should happen and what actually happens. He further highlighted that the Group R&D Director probably follows the procedure in his department because “*he's not involved in the day-to-day firefighting*” and therefore, arguably, has the time to engage with it.

The absence of a formal product development procedure was also noted by others, who have a direct role within the process. The Data Administrator believed that the omission of a clear and well-defined system from the Company's operations had led to a “*lack of discipline*” and generally poor collaboration between functional areas. He recommended the implementation of:

A procedure that even if it was only four bullet points that says you have got to do this, and you do it in the right sequence and I would have that for just about anything. There is a resistance to that and what they do is either not have a procedure, agree verbally and that means in twelve months' time, you slightly differ on what needs to be done and that's the biggest single problem from my point of view, that there isn't a specific procedure that says these are the check points that you need to go through, and you should do that with every product that is developed. We don't do it. (Data Administrator)

The Technical Advisor felt the situation was more acute, insofar as key individuals, like himself, who could add their specialist knowledge to enhance the process and advise where necessary, were not being consulted about various activities. This had led to a number of poor decisions being made about product development, as he explained:

I sometimes think that as Technical Advisors we probably know what the market is asking for as well and we are not asked for that information. It will very often just come from an Area Manager, a Sales Manager or something like that, who will decide that there is a market for that particular product and then the product will be made and then it sits there on the shelves and it may have been used for that one job but there is no real demand for it. I think we do have a good idea of what's required. (Technical Advisor)

Importantly, the European Manufacturing Director firmly believes that his aspirations for a greater level of specialist knowledge input and collaboration across the business

could be achieved via the implementation of what he referred to as a “*proper structure of product development.*” This would, he claims, enable the Company to “*cross ideas with other businesses*” in the Group network and thus engender a more formal and coordinated, as opposed to wholly reactive approach to product development and the cross-fertilisation of knowledge, ideas and skills.

Although the Technical Director advised that the Company already had an NPD procedure, he advocated the need for a hybrid approach to NPD and suggested that the current reactive or emergent strategy should be complemented by a more rational, planned one in order to balance the needs of the business. It would also enable the right type of specialist knowledge to be allocated to the most appropriate project. He hinted it may also identify individuals with the right mix of skills and experience, who are able to go on site and solve specific problems that emerge.

I think the concept of having a focused, isolated, separate R&D function is good because then you know that you're going to get something coming out of that box that is totally focused, totally planned and all the boxes have been ticked, but you need the other side as well. You are always going to need both of them because what you won't have from those people in that box is the ability to go to site and have that experience and that flair to make it go right, to clean it up, to turn it round. (Technical Director)

6.5: Organisational Structure

As the founding Company within the Group, Company B began its life as a flat, entrepreneurial structure that had the wherewithal to react quickly to environmental as well as other forces for change. Over the years, the reactivity has remained but the structure has changed due to significant growth, notwithstanding the Parent Company takeover, which has somewhat altered a number of business processes and procedures. The interviews raised a similar range of issues as those highlighted in the previous variable, such as poor knowledge sharing and collaboration. However, there is no doubt that the structure is having a disabling effect on the management of knowledge in a raft of areas, which the Europe MD confirmed “*could be improved.*”

It was evident that the entrepreneurial roots and culture of the founding Company were still prevalent, even though Participants' views of the structure ranged from “*hierarchical*” (Finance Manager), “*a very open structure*” (Regional Sales Manager), to “*flat*” (Cost Accountant) with an “*element of hierarchy*” (European Manufacturing Director) mixed in. The Europe MD accepted that although the

Company's structure was historically flat, it had been "*too flat...for too long.*" As a result, when he took the helm of the UK and European entity, he introduced an element of hierarchy into the business, which he believes has yielded demonstrable benefits for the Company, including the fact that the business is now:

More profitable, more focused and has more leadership because of that. Whether that is right or wrong, I don't know, but we are certainly making more profit and everyone I do believe is more motivated and knows where we're going. (Europe MD)

The Resource Manager supported the metamorphosis of the "*flat structure*" to a hierarchical, more structured one as a positive for the business, insofar as it removed some of the role ambiguity that was prevalent before the changes were inceptioned. He suggested that the change has also made it considerably easier to:

Understand people's roles within the business because for years and years, we all did several roles; we all wore several hats and I think it has got a lot more structured in the last few years now. People have got clear job roles and job specifications, although we do tend to still cross the borders. (Resource Manager)

One of the major issues that emanated from the interviews and which has significantly impacted on knowledge sharing and collaboration, as well as the utilisation of specialist knowledge, is the rift between Company A and Company B. The situation emerged as a result of the founding Company being split in two in the mid-1990s. According to the UK MD, the current organisational configuration has led to a "*stigma*" between both companies, of which the Senior Management Team are patently aware and are proactively trying to break down. He noted "*we can't afford to have that. We all work for the same brand and so we have to work together.*" Part of the problem began when the Company suffered a bout of redundancy shortly after the Parent Company takeover, which meant that a number of people, some of whom had worked for the Company for "*fifteen, eighteen, twenty years*" left the business, taking their specialist knowledge, experience and expertise with them. To inflame the situation, people were being recruited to fill positions in Company A, which he lamented:

Does not send the right message out to the people who are left. This brought this culture of well, there's people moving from Company A, but we keep employing people and putting them in Company A Marketing, Company A IT, whatever. What the hell is going on? So we had to remove this stigma. (UK MD)

The UK MD outlined that the Senior Management Team have worked hard to devise a solution to the problem, in order to build severed bridges and engender a culture where, despite the structural dichotomy between both companies, people are willing to “go the extra mile.” This, he confirmed, had been achieved through:

Our workshops, where we’ve involved the whole company, by splitting the company into sections and doing team briefs, so not only is it improving the communications to the whole of the business, the guys in the factory...how we’re doing monthly and what projects are coming up, what problems we have in the business and how we can help each other to do that. The whole thing is one, to kill the stigma of Company A and Company B, but more importantly to improve the communication in all the departments of the business. (UK MD)

He admitted that the Company faces an uphill “challenge” in moving the level of communication to where the Senior Management Team “want it to be.” In his efforts to face the issue head on, he tasked the UK Marketing Team to produce a newsletter to be disseminated to all global teams, in a bid to keep individuals notified of key developments in the Company “in between the formal quarterly meetings.” The newsletter would also, importantly, serve as an enabler to generate more feedback and knowledge sharing from teams, which could then be fed into improving the way in which products are developed and modified.

Although the Application Development Chemist works in the same lab as the Company A R&D Team and collaborates with them as key knowledge workers and experts in their field, he believes there are still barriers to closer cooperation between them. These may stem back to the tensions that exist between both companies. He recommended a simple formula to improve the standoff between them: “make Company B just Company B...take out the Company A factor.” In terms of the structure enabling knowledge worker autonomy, the Technical Director commented that knowledge workers are given their heads, in terms of encouraging them to use their own ability and initiative to apply and utilise their specialist roles and knowledge, with the blessing of the Senior Management Team. He noted “we’ve always tried to give people enough scope and flexibility to grow, make their own decisions and expand their own roles.” This is an important point, insofar as the Senior Management Team and other line managers are often too busy firefighting and managing various crises that regularly occur. As such, the autonomous knowledge workers are able manage themselves and make decisions within the scope of their jobs.

The final issue pertaining to organisational structure that was identified in the interviews and observations is the absence of a cross-functional NPD team. The European Manufacturing Director suggested that the absence of the team has resulted in knowledge, particularly about new products, not being disseminated to the right people, at the right time, principally due to the geographically dispersed nature of the entity Technical Teams. In order to remedy the situation, and enable more systemic cross-functional knowledge sharing, he advocated the implementation of a “*Product Council*,” for the UK and European business, which would ultimately lead, drive and champion product development in the Company and also manage and coordinate the way in which specialist knowledge is used for the process in a much more structured and logical way. He advocated that the Council would contain “*all the support functions*,” such as Marketing, Sales and Technical and, using their collective knowledge and expertise, could evaluate how they would “*bring...new products to market*” in the most effective way.

He also pointed out that efforts had been made by the Company to introduce a more collegial relationship-driven culture to enable the “*cross-sharing of information*” between functional areas. He noted:

The cross sharing of information I actually think is relationship driven...a technical guy... sits opposite me now and we are batting and balling things all day and every day. It's really good and he is very supportive in what I am trying to do in the factory and I'm very supportive. If he needs to take time out from manufacturing to develop a new product, or make changes, then I will give him that opportunity. That's really good. So, there is a cross-fertilisation of departments. (European Manufacturing Director)

The UK Marketing Manager lamented about the lack of collaboration between himself and the Company A R&D Team, even though he plays a key role in the commercialisation and launch products. He confirmed that it disables cross-functional knowledge sharing because there is:

No kind of cross linking between the Company A R&D guys and me, unless it specifically involves a Company B project...for example if you have one of the research guys at Company A level working on a product for the UK, from a Marketing point of view, I'm not always as aware of it as maybe one of the sales people within the UK might be. There tends to be a closer link there; Marketing tends to be a little bit removed. (UK Marketing Manager)

He further acknowledged that product launches are “*not as successful as they could be*” because of his lack of involvement in the front end process. Like the European

Manufacturing Director, he recommended the reinstatement of the *“Product Council, or something closely along those lines,”* to enable himself and other key knowledge workers to become part of a core development team within the Company. It would also ensure that the Marketing Department has *“an input earlier in the process, in order to resource it financially and plan it from a Marketing perspective.”*

6.6: Leadership and Management

The majority of the Senior Management Team subscribed to the view that their roles had made a significant contribution to product development and modification within the Company by not only championing innovation but also ensuring that the appropriate allocation and utilisation of key R&D resources and, importantly, specialist knowledge, were maximised appropriately. However, one particular area where this appears to have broken down is the way in which the Technical Director, as a specialist knowledge resource is managed. This was flagged up as an issue by the Europe MD, who admitted that it is not an ideal situation. He noted that the Technical Director does not spend much time doing his day job of developing products, or have quality time with his team because he is pulled in so many other different directions. He observed:

One of his frustrations, I would think, is a lack of time to do anything because it's all react, react, react! It's not a bad thing but he ends up firefighting day after day. And that's not good for career, health and job satisfaction. (Europe MD)

He is therefore not afforded the same ‘protection’ as the Group Development Manager in Company A, even though he performs a similar role. The Europe MD explained that the shielding of the Technical Director from outside distractions, be they from applicators applying the product on site, or attending to problems on site in the factory, may not happen because the Company is a *“fast-paced, fast-moving business and we go where the markets are”* and he is *the* substantive resource that deals with those issues. In addition, the absence of a cross-functional NPD team and NPD process may exacerbate the situation because key knowledge workers, who perhaps should have a closer involvement in the process, such as the Technical Advisors, are not actively and systemically included in many of the essential activities and decisions associated with innovation, as outlined by a number of Participants so far in this chapter.

A further lament about the absence of a formal process, in light of the Company's strategy and culture of reactivity, came from the UK Marketing Manager. He felt that the exclusion, by default, of knowledge workers from a range of functions and subject disciplines being involved earlier in product development, was disabling the process because it precluded their specialist knowledge from being effectively utilised, particularly from his perspective as a Marketer, because he could provide essential market intelligence to the development teams on the best markets in which to launch products, and ostensibly, which to avoid.

The Technical Director concurred with his colleague and suggested that the Marketing Department should be involved earlier, at the front end of the process, rather than relegated to the back end as they clearly were. He noted *"you've got to get market research. They should be looking for our opportunities where the market is changing and that also helps (product) rationalisation as well."* The UK Marketing Manager further proposed that involving people, such as himself, more systematically would imbibe a sense of *"ownership and buy in"* to the Company's innovation endeavours and enable specialist knowledge to be managed and utilised more effectively throughout the business.

One of the areas in which a number of Participants felt the Senior Management Team could improve their performance as leaders and managers is the aspect of knowledge sharing, which the Technical Director admitted *"is not as good as we could do it."* It wasn't all viewed as negative, however. Areas of good practice included encouraging knowledge creation and sharing by holding *"team briefings on a regular basis"* (UK Marketing Manager), sending *"regular email updates"* (Cost Accountant) and *"calling specialist meetings with Sales Teams"* (Regional Sales Manager). Although the UK Marketing Manager admitted that the briefings had *"kind of dropped off a bit,"* he outlined other initiatives that had been implemented by the Senior Management Team in order to boost the level of, and communication and knowledge sharing within, the business. This included *"a team bonding day,"* where colleagues from both companies spent an afternoon together at a famous local landmark, which enabled them to *"integrate with other disciplines within the business."*

In contrast, the Technical Advisor reported that *"there isn't really a lot"* of knowledge creation and sharing about product development that is encouraged by leaders and

managers within the business because formal product launches are not held, which may be as a direct result of the *perceived* absence of an NPD process. This may act as a disabler because knowledge workers may not be effectively briefed on new products that are launched or modified; therefore, the situation could affect their engagement with, and commitment to, the process.

6.7: Specialist Roles and Knowledge

The interviews, observations and document analysis highlighted that Company B employs an array of knowledge workers, who possess a wide range of knowledge, experience and expertise in their respective fields. Thus, the direct and indirect contribution their roles make to the product development process within the Company is invaluable. The evidence confirms that they have the remit, delegated autonomy and responsibility to manage themselves and the application and utilisation of their specialist knowledge and skills. The Company A HR Manager, who is also responsible for human resource management in Company B, confirmed:

Within their job description, there is a range of what decisions they can make, along with the discussions they have with their managers and following their appraisals. The actual job role is decided by the Manager. (HR Manager)

She added that their job roles, along with their span of control, are also discussed in the annual assessment exercise and everyone has the opportunity to say how they can make a positive contribution to the business.

In recognition of the calibre of the employees working in the business, the Europe MD applauded the specialist knowledge and skills of the workforce, in particular the “*very, very skilled Technical Team...and very proactive Sales Team,*” who “*knew where the opportunities were*” located in the market and collaborated, cross-functionally, to get products developed, launched and sold. Other key knowledge and skills utilised by knowledge workers include the ability to “*understand the market and...the product*” (European Manufacturing Director), “*understanding the raw materials that are used in these products and how they can be adapted from one product to another to have the desired effect*” (Application Development Chemist) and “*client and technical knowledge*” (Samples Manager), which are used extensively to build and maintain relationships with customers and clients. Indeed, the knowledge and skills of Participants spanned the gamut of product development and modification activities.

Importantly, the Technical Director believed his “*wide range of experience*,” acquired during his long and distinguished service with the Company, have been a major contributor to the completion of a number of key activities within product development, one of which is taking a systems thinking perspective and having a knowledge and understanding of how each function and department contributes to the process and ensuring that their collective contribution enables the “*end product*” to be developed, which is:

Fit enough to tick all those boxes and be robust enough and try and see where it could go wrong and try to design something in the system to prevent it either in the product or in the literature. (Technical Director)

He noted that his knowledge and experience have also enabled him to engage in “*problem solving in a simplified format*” by assimilating:

New things, new product information and...understand what they do in order for me to develop something, such as writing technical literature to enable their successful use on site and make that as robust as possible. I have a wide range of experience from site related problems and successes and laboratory experience. I also know what the market is looking for; how to put together systems to satisfy demand; raw materials production...with all that information to hand, any problem that comes in, that arsenal of information, products and knowledge and knowing what works and what products we've got to play with, its problem solving in a simplified format. (Technical Director)

The technical literature, as mentioned by the Technical Director in his quote above, is just one medium in which knowledge workers' tacit knowledge is embedded. Other media include “*manufacturing data sheets*” (European Manufacturing Director), “*simple samples requests*” (Samples Manager) and “*technical specifications and application instructions*” (Technical Advisor), which are not only retained in the business and can be disseminated to others speedily when and where required, but are also sent to customers, clients and applicators. This, in turn, helps to generate relational capital for the Company.

The major issue that emanated from the fieldwork, under this variable, is the engagement of knowledge workers, from their own volition, in cross-functional knowledge sharing and collaboration, despite the absence of a cross-functional NPD team. What was evident from talking to the majority of Participants was the general passion and enthusiasm that they injected into discussing matters of import with other teams. Significantly, this shared dialogue was also with stakeholders, such as customers and clients; thus, both social and relational capital were generated from the

tacit knowledge exchange. For example, the UK Marketing Manager reported that apart from colleagues in various departments internally, he has “*four core audiences*” with whom he communicates externally, namely “*architects, the main contractor, the product subcontractor and then the end user client,*” in order to create, share and apply knowledge about how best new or newly-modified products should be promoted and launched.

The Technical Director reported that as far as possible, he works across functions so he can acquire a flavour of the whole business, rather than just snippets. This practice not only generates new knowledge through the exchange of tacit knowledge but also enables individuals to propose ideas as to how problems can be solved; this ultimately becomes a learning process in itself.

I try to work a lot with production and I work very closely with the European Manufacturing Director and Finance Manager. So you've got the strong backend of the technical side of it to his side; procurement, business, production side and finance side. I try and work to encourage the production input and I always feel because they are making it, that they know things that you don't so I always try and say, "I'm doing this" and try and get their input directly...or I might see a better way to do something that I had thought...development is not always how all it is applied on the floor; it is how well you make it. The more information the better; the more people you speak to, the bigger the picture you can get. (Technical Director)

The Application Development Chemist espoused the value of working with the Company A R&D Team, insofar as they provide him with “*useful information*” on aspects of chemical formulations, for example. The Assistant Project Manager eloquently highlighted the truly cross-functional nature of his role and the benefits of collaborating with others to perform his job efficiently and effectively.

Basically everyone, everything that we are involved with...someone from another part of the business does have a role in what we do. If it's the European Manufacturing Director, we can see if we can try and get materials delivered to a site earlier. If it's technical, we would go straight to the Technical Director or Group Development Manager. If it's to do with actually again with the global document that we are doing for (a company), we'd go straight to the Group R&D Director...my Dad...he is actually dealing with the sales guys and finding out what their leads are doing...so basically the Company is the centre of every activity...we can get other ideas off other people in the business really. (Assistant Project Manager)

During the General Manager's discussions with a variety of heads of function, including the Technical Director, he noted that there was not enough involvement from the UK Marketing Manager in technical aspects of the business, especially as he

is tasked with commercialising and launching developed products. However, through his evaluation, he recognised that collaboration did take place between the “*Sales Team*” and the “*Technical Team*,” which enabled a “*sell it, develop it...cross-sectional link*.” To counter this, he advocated that the Company should “*link the Marketing Department to the Development Department*,” because it needs the “*right combination of effort*” to develop and market products. Although the unification was seen as a necessity for the business, the General Manager noted it was “*easier said than done*” and indicated that the attempt to fuse the two departments and create a greater level of collaboration was “*not for want of trying*.”

Occasionally, you will have somebody invited down from Marketing to come along and see what you're actually making; to see what the product actually looks like; touch it, feel it, scratch it, sniff it. Come and have a look at it because you are marketing it without knowledge of what you're actually marketing. You have a better idea and insight into it, then...they do, cos that's a revelation to them. For them, it's something that they welcome. But I don't feel that it's often encouraged. (General Manager)

In contrast, the Manufacturing Manager refuted his colleague's observation and acknowledged that “*a lot of liaising between Marketing and the Technical Team as to whether the product is suitable in the marketplace*” does actually take place. He added “*a lot of knowledge and information goes back to the Technical Team*” from the Sales Managers and the contact they have with, for example, architects. The Regional Sales Manager also contested the notion that Marketing is not involved in product development. He observed, from his perspective, that “*Technical, Marketing, Sales*” as core functional departments “*are always involved*.” He further attested that the Company does not “*talk about new products without Marketing...without Technical or without Sales being in there*.” He added:

If a Salesman, myself, comes with an idea or product need, Technical will say whether it can or can't be done and Marketing will then look at the competition and if there is no competition, how do we go to market, and it's always those three departments who are always involved in every product launch. Certainly, on this one, it had to be because Marketing need to be there to see what was out there; we wanted to be better...we needed this fast. So there is always cross-support of the different departments; it always happens here. (Regional Sales Manager)

The Resource Manager convincingly summed up the need for an ‘official’ cross-functional NPD team.

I think from a knowledge aspect, I think...we have got a lot of people with a lot of knowledge who can cross borders and understand other people's roles and I think from that perspective it works very well because we do get a team that gels well together and understands an awful lot of different topics. I know as I say from a manufacturing perspective, the European Manufacturing Director, our boss, he gets us together quite often for brainstorming sessions, "how do we do this? Put something on the table and let's have a look." He drew and scribbled on walls on boards and everything, but it is always better to get a team of people together than it is just to try and go off and do it all on your own. (Resource Manager)

6.8: ICT, Systems and Communication

As previously highlighted, Company B is one of sixteen business entities within the Group and is located on the same site as Company A. It shares the same infrastructure and systems and its ICT infrastructure is controlled by the IT Department, which is based in Company A, but directly employed by the Parent Company. The findings suggest that this scenario has led to a modicum of confusion among Participants, particularly at operational level, about what the systems are and how they enable or disable the management of knowledge within the product development process.

As Company B is a major manufacturing centre within the Group, it is capital intensive and therefore utilises a raft of systems, the bulk of which fuel its operations and production. These systems range from "*Syspro at the back end...dinosaur KMS at the front end*" (Europe MD), "*Lotus Notes*" (Technical Director) and "*the NDrive*" (Manufacturing Manager). Four major issues were identified through the fieldwork: the change in IT structure and the impact it has had on a number of knowledge worker activities; the issue of the intranet and whether it was viewed a mechanism for not only storing knowledge but also disseminating it; the extent to which the Company's systems, such as the management information system enabled knowledge sharing and the impact of poor communication on knowledge sharing.

First, the takeover by the Parent Company catalysed a number of major changes within the Company; a major one was the devolution and separation of the IT function from Company A in the UK to the Parent Company in US, although their physical base is still at headquarters in the UK. This has, according to the European Manufacturing Director, posed a number of "*massive problems*" for the Senior Management Team and is a "*huge frustration.*" The new IT structure means that if anything goes wrong with various IT software or hardware, such as printers breaking down, or if the Senior Management Team require bespoke systems to be designed, they have to "*raise a*

ticket” (European Manufacturing Director) because the IT Department services all the businesses within both the Company A Group and the Parent Company Group.

This often clashes with the Company’s culture of reactivity, not just in responding to market and customer demand for new products, but also in terms of meeting strict targets for reporting requirements to the Parent Company, such as monthly sales figures. The European Manufacturing Director explained that if he requires some “*sales analysis*,” for example, a person from IT would have to “*create an Access database*,” but he would have to “*raise a ticket...and go into a slot of all the other things he’s doing for other businesses*.” This may increase the length of time it takes to complete key operational and manufacturing tasks, while waiting for ticketed jobs to be concluded. He further noted:

I might get a guy in South Africa, who is logged onto my screen, who is looking at the fault...or software problems...and might even create the access database himself, but it will be tomorrow...someone has decided that that is the best thing for the business. Before it became a Parent Company business, they obviously trialled it and decided they could do it on a bigger platform. It’s a whole variety of reasons; better service, better control. But for me, it’s...frustrating as a small business, or one was that was very entrepreneurial, that is now part of this...complying issue of having to raise a ticket every time my printer goes down.
(European Manufacturing Director)

Second, an area where a degree of nescience and disengagement existed, with reference to how it enabled or disabled knowledge sharing, was the subject of the intranet and whether or not one existed. According to the Europe MD, the Company utilises a system called “*Companyzone, which I guess can be called an intranet*.” Although he confirmed it enables knowledge sharing, insofar as everyone has login “*access to it globally*” and can locate certain types of information, from wherever and whenever they need it, he emphasised that the support it gives to Senior Management, as a Management Information System, “*could be better*.” The Technical Director admitted that he doesn’t use the intranet because he “*doesn’t have a password*,” and doesn’t know “*how to get into it*.” He suggested that his reticence to use it stems from the fact that he had “*tried it once and it didn’t work*,” so he hasn’t “*bothered with it again*.” This may unwittingly preclude him from accessing key organisational knowledge and information that is not disseminated by more conventional means.

The majority of Participants in the functional areas cited Companyzone as the substantive intranet system, which they proffered enables knowledge sharing because

it houses “*product data*” (Cost Accountant), “*all the data sheets, the product information and things like that*” (Technical Advisor) and “*files that anyone can access*” (UK Marketing Manager). Although the system is divided into different areas for “*Sales, Marketing and Technical*” (Technical Advisor), not everyone uses it because “*it’s the best kept secret*” and the “*least used*” IT system in the Company (General Manager). One of the main reasons for its infrequent use, and “*one of its major downfalls*” is, according to the General Manager, the fact that it is “*communicated electronically,*” which entails having to “*get a password*” and then learning how to “*navigate around the site.*” He further suggested that a bit of perseverance would unearth a “*fantastic site*” that stores and can disseminate corporate data and product knowledge.

An additional reason for its infrequent or non-existent use is the perception that it is more relevant to certain sections of the workforce, such as the “*Technical, Marketing and Sales teams*” (Finance Manager), who use it as an information repository. The system called MyCompany, which is an “*internet based intranet*” that was developed in the Marketing Department “*over the last twelve months*” (UK Marketing Manager) also houses downloadable “*case studies, reference lists and pictures*” that Sales Teams find useful for putting together presentations (General Manager).

In contrast, the Regional Sales Manager and Data Administrator firmly believe that an intranet does *not* exist and insist the Senior Management Team “*keep talking about it*” (Regional Sales Manager). Importantly, the Regional Sales Manager emphasised that there is currently nothing within the Company that “*forces colleagues to communicate or input*” because “*it’s all done by email.*” It thus disables knowledge sharing, as it has the potential to “*miss out two or three people*” who “*need to know*” about new product ideas. Although knowledge and understanding about the intranet, whatever it is called, for whatever purpose it is used, appears to be somewhat confused and fragmented, the Technical Advisor views Companyzone as a pseudo knowledge management system and an enabler of knowledge sharing because “*up to date information for model specifications...health and safety data*” and other relevant snippets of material are readily available through the portal.

It is interesting to note that although the Company is a knowledge-intensive firm and employs a high concentration of knowledge workers and commoditises their

knowledge into merchantable products, it does not deploy a formal knowledge management system (other than the intranet, which the majority of Participants admitted they don't use) that has the capacity to store and disseminate articulated or codified tacit knowledge. This is a disabler as it hinders the dissemination and sharing of specialist knowledge as well as operational and product knowledge.

Third, by its own admission, the Senior Management Team agree that knowledge and information sharing is by and large problematic and is mainly *“done by normal channels of email or meetings and action notes from those meetings”* (UK MD). On that note, the UK MD advocated that *“without a doubt,”* more tacit knowledge sharing and face-to-face communication should be promoted throughout the business in the form of *“workshops,”* particularly as a good deal of the information that is disseminated is of a technical nature and is *“there and available for anyone to read if they look for it”* (Technical Director). However, because the information is inherently technical, the Technical Director often finds himself having to:

Go around and explain what some things mean as well and it's not easy to do that in a very hectic and busy working life. I found that the technical bulletins were not being read. The people were just not reading them and probably still don't. They go out to all the contractors, internal technical people, customer services, everybody. (Technical Director)

The UK MD remarked that this therefore lends credence to a change in format, such as running a *“workshop to say ‘this is what the product is like; this is what you need to know for your department’”* (UK MD). The Senior SOP Coordinator and Cost Accountant attest that the Company's systems, such as the Syspro Enterprise Resource Planning System, enable the retrieval and dissemination of knowledge because the information is *“all there for everybody...whenever they need it or the customers need it”* (Senior SOP Coordinator). In contrast, the Samples Manager observed that the systems *“didn't”* from his perspective, enable the sharing of knowledge because he is heavily reliant on his own *“personal knowledge of knowing what works,”* through many years of trial and error and experimentation. He reflected:

As you say, there is the database, if you like. It is very difficult to explain. We have things called product specifications and model specs, which are specifications for existing systems and all that sort of stuff but I don't tend to have to relate to them very often because if I come up in with the new product and it's off the back of something else, I am stating what should be used in that system. That comes from my knowledge of knowing what works and what doesn't. (Samples Manager)

Finally, the evidence suggests that communication is a major issue for the Company, particularly in terms of the ways in which knowledge is shared and also the often fractious communication between Company A and Company B, particularly in light of the “*stigma*” that was identified by the UK MD. In order to move forward and ensure knowledge and information are disseminated to the right people at the right time, the UK MD caveated that the Company must address the poor levels of communication “*from top to bottom,*” but confirmed it had “*a long way to go*” in order to do that effectively. The Technical Director felt that the physical location of both companies was a disabler and a major cause of the “*divisions*” and communication problems that had erupted between the two entities over the years. He suggested a way to tackle the situation would be to “*get everyone together in one place...the fact you’ve got two separate buildings in this place doesn’t help.*”

The Technical Advisor observed that the Company is “*quite poor at communicating.*” He noted that the problem could be combated by communicating things to people more frequently, so they are “*aware of important projects and things like that,*” rather than “*relying on people to go and find the information for themselves.*” The Data Administrator attributed the poor communication to the email system, particularly the “*circulation list*” that “*sometimes doesn’t have a particular person on it that should be notified; that’s this communication issue.*”

The UK Marketing Manager attested that the communication issue described by his colleagues is a disabler of knowledge sharing, due to a lack of dialogue, tacit knowledge exchange and collegiality. He claimed “*I don’t think (we) speak to each other enough and we aren’t collaborating enough.*” However bleak a portrait that is painted of the situation, he acknowledged that despite its problems, the Company “*somehow manages to make money, pull it together at the end of the day and be very successful.*” That success, he claims, is attributed to “*the individuals*” or the Company’s knowledge workers. The Regional Sales Manager concluded a “*global forum*” would enable people to have “*a grasp of what was needed; how we were going to go and do it.*” At the end of the day, he asserted, “*it’s all about communication.*”

6.9: Chapter Summary

This chapter presented the findings from the empirical research conducted in Company B. Although the Company enjoys success in the markets in which it operates and despite its problems “*manages to make money, pull it together and be very successful*” (UK Marketing Manager), the evidence suggests that its organisational variables have posed a number of challenges to the business. First, despite its success that has been charted throughout this chapter, the Company has felt it necessary not to craft a new product strategy, in response to its reactivity to markets and customers. Unfortunately, this has had a knock-on effect on planning for a number of key organisational activities, including human resourcing and the utilisation of specialist knowledge. The absence of the strategy has also led to the inadequate management and utilisation of the Technical Director’s knowledge and expertise. As the Company’s substantive R&D person, he is not protected from the pushes and pulls on his time, including his frequent engagement in firefighting and crisis management both on and off site. This not only curtails the amount of time he has to spend on product development activities but also the time he spends with his team. In addition, the evidence points towards the absence of an NPD process, which is contested by the Technical Director, who suggests the Company has had one for years, but doesn’t use it.

Second, although the Parent Company takeover has resulted in culture change, which has altered a number of processes and operating and financial procedures, an air of entrepreneurship still pervades. However, although there are instances of good practice, the culture does not go far enough to support knowledge sharing and collaboration by virtue of the fact that an adequate number of meetings are not held to disseminate knowledge. In addition, the absence of a cross-functional NPD team means that knowledge workers are not afforded enough opportunities to cross-fertilise their specialist knowledge.

Furthermore, the Europe MD admitted that the Top Management Team do not meet often enough as a Board, which results in a delay in key knowledge and information being disseminated down to teams. He also indicated that as knowledge sharing is reactive, it precludes the opportunity to do any ‘proper’ planning for, for example, the allocation of specialist knowledge resources to projects. Furthermore, the absence of an NPD process has resulted in specialist knowledge not being utilised appropriately.

Those with technical and market knowledge, such as the Technical Advisors and the UK Marketing Manager, are often excluded from key dialogue and developments, which have led to a tranche of poor product development decisions being made.

Third, although the Parent Company takeover has led to a number of structural and cultural changes, a major change that was implemented by the Europe MD when he took the helm of the UK and Europe business was the introduction of more hierarchy into a structure that he deemed “*too flat*” to be fully operational. The change has been a successful one and while it has reduced some of the role ambiguity that previously existed, it has flagged up a rift between Company A and Company B, which historically, were the same entity before they were separated in the mid-1990s. The “*stigma*” between the two companies, as reported by the UK MD, has led to a lack of collaboration, a breakdown in communication and poor knowledge sharing. The redundancy exercise Company B experienced post Parent Company takeover was closely followed by the recruitment of individuals to fill newly-created posts in Company A; this inflamed an already heated situation.

Fourth, although the Senior Management Team contributed to product development in a number of ways and allocated resources where needed, it was also felt that the Senior Management Team did not go far enough to not only create a cross-functional NPD team but also integrate the UK Marketing Manager into mainstream development work. This has engendered feelings of isolation from the process, particularly as he has key market intelligence to offer to the proceedings.

Fifth, importantly, knowledge workers can use delegated autonomy to manage, apply and utilise their own knowledge to perform their jobs. They also share their knowledge cross-functionally of their own volition, even though a cross-functional NPD team does not exist. The exception is the UK Marketing Manager and colleagues in the Technical Department, which the evidence suggests do not collaborate enough.

Finally, as a major manufacturing centre in the Group, the Company utilises a myriad of systems to support its operations. The restructure that took place post Parent Company takeover has resulted in the IT Department being directly responsible to the Parent Company, but sited in the UK. This has led to a number of problems and frustrations in the Senior Management Team, particularly if they require urgent IT support. There are mixed views about the intranet. Some say it doesn’t exist; some say

they don't use it; some see it as a knowledge and information repository. Importantly, some view it as a knowledge management system to store and disseminate explicit knowledge of import to the business. Whatever the system was designed to do, the general feeling is that it does not enable the kind of knowledge sharing that is required by a knowledge-intensive firm because there is an air of nescience and curiosity about it. Furthermore, communication was recognised as a major issue for the Company, mainly because not enough meetings are held, people do not engage in enough dialogue and the stigma between both companies is still evident, even though the Senior Management Team have taken proactive steps to remedy the situation.

The next chapter presents the cross-case analysis of the findings of Company A and Company B.

Chapter 7

Cross-Case Analysis of the Findings in Company A and B

Chapter 7

Cross-Case Analysis

Not everything that counts can be counted and not everything that can be counted counts.

Albert Einstein

7.1: Introduction

The previous chapter presented the findings of the fieldwork in Company B. This chapter presents a cross-case analysis of Company A and B and aims to pull together the findings in both case studies by providing a discussion of the similarities and differences between them and highlight how the organisational variables enable and disable the management of knowledge in the NPD process. The analysis of the findings in both companies is presented by organisational variable and by enablers and disablers. It is pertinent to mention that the variables are part of an interrelated infrastructural system and are thus not mutually exclusive. Therefore, some overlaps between them will be evident.

7.2: New Product Strategy

Company A and B started life in the early 1980s as one entrepreneurial business. In the mid-1990s, in order to implement its global growth strategy, the business was divided, creating two separate legal entities. Company A became the strategic innovation hub, responsible for managing and coordinating NPD within the Group and overseeing its expansion into global markets, while Company B continued to operate as the main manufacturing base, servicing the UK and European markets. Both companies were taken over by their Parent Company, a large US conglomerate, in the mid noughties.

Although they are legal entities in their own right and have a different set of strategic and operational objectives, both companies share the same site and infrastructure and utilise similar systems, such as IT. Therefore, in terms of the findings, a comparable set of issues were anticipated and identified. The findings suggest that despite neither company deploying a new product strategy, they are both highly successful, are undoubtedly entrepreneurial and have clear strategic priorities for product development on an emergent, reactive basis. As part of a wider Parent Company

group, they have strict sales targets, which have been achieved. As reported in the findings, Company A's combined Group sales have increased by 90% since the takeover. The companies are ambitious, enjoy pushing the boundaries of innovation and are keen to continue the legacy of their founders.

Although both companies operate without an overarching new product strategy, a number of enablers support how knowledge is managed, as highlighted in Table 7.1.

Table 7.1: New Product Strategy Enablers

	Company A	Company B
NEW PRODUCT STRATEGY	Recruited specialist knowledge and technical expertise to fill knowledge gap (Group Development Manager)	Hire external specialist knowledge when needed on contract basis
	Senior Management Team protection for the Group Development Manager so he can focus on blue sky NPD	Individuals empowered to do their own jobs
	Structure and system for NPD; though this is not visible	

As Table 7.1 highlights, both companies utilised external specialist knowledge in order to develop an innovative range of products to suit market demand and meet legislative requirements. From Company A's perspective, the Group Development Manager was recruited to fill a major skills gap that existed for cementitious chemistry knowledge. As he is a Company A innovation hub resource and his time therefore has to be 'purchased' via an internal recharge by Company B, the Company B Senior Management Team hire specialist knowledge on a contract basis when required to plug the knowledge and resource gap when he is not available. The hiring of external expertise also enables the company to speed up the development process and shorten the time to market.

The Group Development Manager's time and position as *the* main R&D person for Company A is now protected, following pulls on his time from Company B, which initially caused a certain degree of conflict between both Senior Management Teams. This means that his specialist knowledge can now be managed exclusively by his line manager, the Group R&D Director, by affording him the time and opportunity to apply his rare and valuable cementitious chemistry knowledge to developing blue sky, innovative products.

An important part of Company B's business operations, which is a prominent feature in other organisational variables in both companies, is knowledge worker empowerment to do their jobs, without constant supervision from their line managers. This is an important enabler as line managers such as the Technical Director and European Manufacturing Director attend global technical meetings and troubleshoot at other Group companies and can therefore be away for significant periods of time. Their teams are therefore empowered to manage themselves, their specialist roles and knowledge and get on with the job.

In Company A, it was reported by the Group MD that there is an existing structure and system for bringing products to market. Although this implies the existence of an NPD process, there was no concrete evidence of this other than the existence of the Group R&D Team. Accounts from participants suggested the contrary and there were calls for a more structured approach to NPD, to ensure the specialist knowledge of functional areas such as Marketing are embedded and utilised throughout the whole process, rather than being brought into the equation at the last minute.

Unsurprisingly, there were a number of new product strategy disablers, as presented in Table 7.2.

Table 7.2: New Product Strategy Disablers

	Company A	Company B
NEW PRODUCT STRATEGY	No written new product strategy Strategy for new products subsumed into overall corporate strategy	No formal new product strategy; emergent and reactive
	Conflict between Company A and B Senior Management Teams about the use of the Group Development Manager's time	Creation of centralised R&D hub results in buy in of the Group Development Manager's time; lengthens time to market of new products
	Marketing viewed as a back end function; specialist knowledge not utilised at the front end	NPD projects are not given full allocation of specialist knowledge resources, as well as other resources, particularly at the front end
	Distant relationship between R&D and Marketing Team	Very small Technical Team
	Ineffective utilisation of Marketing specialist knowledge	Very wide job specification of Technical Director, which includes firefighting and on and off site crisis management
	Remote management of the Marketing Team from Malaysia by the International MD-M	Technical Director not protected to focus on product development

As Table 7.2 illustrates, this variable was mainly viewed by participants in both companies as a hindrance to how knowledge is managed. As pointed out earlier, the evidence shows that neither company adopts a formal new product strategy, although the Group Finance Director reported that it is enveloped into Company A's overall corporate strategy. The absence of this strategy would appear to be congruent with both companies' philosophy of emergent, reactive and rapid NPD, in response to legislation and demands from markets and customers. Despite the absence of the strategy, both companies are highly successful in the markets in which they operate, have experienced widespread growth and have an enviable portfolio of innovative products.

However, the absence of a focused strategy for new products has resulted in a number of similar problems for both companies. A major issue has been the creation of the Company A innovation hub, which has resulted in Company B having to 'buy in' the services of the Group Development Manager. As reported earlier, conflict between the Senior Management Teams in both companies over the use of his time led to him being 'protected' from having direct contact with the Company B Senior Management Team, with the explicit understanding that if they wish to utilise his services, they must first approach his line manager, the Group R&D Director. The creation of the hub, with the 'regulated' purchase of the Group Development Manager's time, has reportedly lengthened the time to market of products in Company B.

Similar issues in both companies centre on the allocation and utilisation of specialist knowledge resources to NPD projects; this includes the Marketing Department. Evidence from the findings suggests that the function is viewed as supporting the back end of the process rather than the front end, where their specialist marketing knowledge could also be utilised, particularly in terms of steering R&D and Sales Teams towards the 'best' markets in which the products would sell and sell well. This has resulted in a rather distant relationship between R&D and the Marketing Team, which is more acute in Company A than Company B. The Company B Marketing Manager outlined that he had some contact with R&D and Technical staff, but ideally would prefer much closer collaboration, as he felt he had specialist knowledge to add to the product development process. In addition, the remote management of the Marketing Team from Malaysia by the International MD-M has caused a sense of

isolation among the Marketers, especially since there is no designated Senior Director on site in the UK to line manage them and champion their cause.

A further source of contention is the remit of the Company B Technical Director and his very small team, who service the modification of products and production of samples for customers and clients. He has a very wide job specification and spends a goodly amount of his time constantly juggling a multiplicity of roles with crisis management and firefighting, which drastically reduces the time he has to spend communicating with his team and developing and modifying products. The Europe MD openly admitted that the situation is no good for either his health or career, yet despite this, the Technical Director is not given the same protection as the Group Development Manager, even though they both hold substantive R&D positions and are key innovators in their companies.

7.3: Organisational Culture

As the findings demonstrated, organisational culture was a prominent feature within both companies. Culturally, they have experienced a similar range of issues, which is unsurprising as they started life as the same company. The majority of these issues have disabled how knowledge is managed, but there are aspects of good practice, as outlined in Table 7.3.

Table 7.3: Organisational Culture Enablers

	Company A	Company B
ORGANISATIONAL CULTURE	Innovative culture	Entrepreneurial and innovative culture
	Being part of a larger group network; access to more knowledge across the businesses and wider Parent Company network	Change in culture opens up opportunities to have more interaction with other knowledge workers in the Parent Company Group network
	Annual global technical conferences	Conferences and Group technical meetings are seen as communication and knowledge sharing opportunities
	Technical blog to encourage knowledge sharing	Reduction of ambiguity regarding business activities and implementing change

Company A and B are entrepreneurial and innovative, which is part of their historic, cultural heritage and that very much came across in the interviews and observations. The entrepreneurial spirit of the original founders is still pervasive and drives their innovative endeavours. A major change that took place was the Parent Company

takeover, which catalysed a raft of alterations to standard operating procedures and financial reporting systems to more closely align them with US operations. Noting this, the majority of participants recognise that the culture has changed. However, some of the business practices in both companies, including their communication systems and how they manage their knowledge workers, are run as if the companies were still small. Being part of a larger global corporate network gives the companies the opportunity to tap into a wider range of specialist knowledge, skills and expertise. Nonetheless, the evidence suggests this is not being fully capitalised upon by either company, particularly in terms of connecting knowledge workers with their counterparts in other countries and business entities, with whom they could share technical, product and market intelligence to enhance innovation.

Company A manages knowledge by hosting annual global technical conferences, sometimes biannually, according to the International MD-M, which Company B reported were golden opportunities to promote communication and knowledge sharing. Company A also suggested it has issues with communication and knowledge sharing, which resulted in the decision to develop a blog for the technical teams to use, to encourage them to be more forthcoming in sharing their specialist knowledge with others. This is a practice which the International MD-M reported they often find very difficult to do.

Importantly, a key difference between the two companies is the reduction in ambiguity that Company B perceived the change has wrought the business. The UK Marketing Manager felt the Parent Company takeover had been a stabilising influence, insofar as the Senior Management Team often made reactive changes on a daily basis, which had destabilised certain aspects of the business, including the way in which it developed and modified products.

Overshadowing areas of good practice are a raft of issues with which the Senior Management Team in both companies have been grappling. These disablers are presented in Table 7.4.

Table 7.4: Organisational Culture Disablers

	Company A	Company B
ORGANISATIONAL CULTURE	Subconscious culture change Fragmented culture	Culture change; difficulty to communicate and share knowledge because company is now larger
	Risk averse, corporatised culture; stifling knowledge worker experimentation, risk taking and trying novel ways of doing things	Cultural and structural change hinders company's ability to quickly respond to change
	Poor cross-functional knowledge sharing and collaboration, particularly across the global business entities	Poor knowledge sharing and collaboration
	Infrequency of meetings	Lack of board meetings; strategic knowledge is slow to filter down and be disseminated throughout the business Logistical problems precludes top management to meet more regularly face-to-face
	Chase to innovate better and faster led to less time for knowledge workers to meet, communicate and share knowledge	People don't always have the time to communicate and share knowledge; constant push for sales and innovation
	Absence of a central, cross-functional NPD team	Lack of input of knowledge workers and their specialist knowledge in aspects of NPD
	Duplication of effort with development projects due to poor knowledge sharing	Absence of visible, structured NPD process
	No 'official' knowledge sharing systems or processes	Reactive knowledge sharing impacting on planning, particularly for specialist knowledge resources
	Silos of knowledge Knowledge hoarding among technical teams	Lack of cross-functional meetings

There appear to be more similarities than differences in how the organisational culture in both companies disabled the management of knowledge. For all intents and purposes, the culture change that was catalysed by the restructuring in both companies, along with the Parent Company takeover, has been subconscious in many respects. The companies are at a different stage in their lifecycle, are much larger and in many cases, more structured. However, because of this, key modifications to systems, procedures and processes that are needed to facilitate better knowledge sharing and communication throughout the Group and support how individual and organisational knowledge are managed, particularly across the global business entities, have not been implemented.

In addition, Company A pointed out that the newly-corporatised culture had begun to stifle knowledge worker experimentation and risk taking, elements of which had originally helped the company achieve its standing in the global marketplace. In

Company B, further tensions were being felt because the cultural and structural changes, which will be highlighted in the next variable, had impacted on the rapidity with which it could respond to change. A further key issue with which the Senior Management Teams in both companies have grappled is poor knowledge sharing and collaboration. This has blighted communication in both companies but more so across the Company A global business entities, which do not receive appropriate ICT infrastructural support by way of videoconferencing for example, to enable them to share tacit knowledge with technical staff in other remote areas and the innovation hub in the UK. The Company A Group Finance Director admitted that pre-growth and expansion, the company used to be a very face-to-face oriented business and managers made the point of meeting regularly with their teams. Post restructure, the picture is very different. The Creative Manager described the culture in Company A as “*fragmented*,” which has resulted in heads of department, as well as functional areas, working in isolation from each other; thus exacerbating their communication and knowledge sharing problems.

A key similarity in Company A and B is the issue of infrequent meetings, which both Senior Management Teams and operational staff agreed there was a dearth of. As reported in Company B, the infrequency of board meetings of both the Senior Management Team and Group board resulted in strategic knowledge not being filtered down quickly enough to be operationalised. This is mainly due to logistical problems, though nothing was proffered from the Europe MD or indeed from any of the Senior Directors about the use of videoconferencing or other modern forms of technology to facilitate a knowledge sharing platform at board level and thus enable more frequent meetings and importantly, tacit, face-to-face contact with each other.

Although several participants across both companies considered that the takeover had been a positive move for the business, the entrepreneurial chase to innovate better and faster than competitors had led to the issue of ‘busyness’ and key individuals within the Group not having the time to communicate and share knowledge with their staff and colleagues. An additional area of similarity between both companies is not only the absence of a cross-functional NPD team but also the lack of opportunities knowledge workers have to apply their specialist knowledge to activities within the NPD process. This has led to a good deal of frustration across both companies, especially since the Marketing Team in Company A and Technical Advisors in

Company B have openly called for more input to the process, as they have key knowledge and skills that could be utilised to make product development and commercialisation more effective.

Following on from these points, the absence of a cross-functional team in Company A has led to a duplication of effort across the global business entities, as a direct consequence of poor communication and knowledge sharing. The Group Finance Director reported that teams in different countries can make the same product and do the same job without the other knowing about it. This invariably leads to increased development costs and longer lead times for product launch to market. In Company A, the absence of 'official' knowledge sharing systems or processes has resulted in an eruption of silos of knowledge residing in various parts of the business. In addition, knowledge hoarding, particularly among the Technical Teams, is an established practice. The International MD-M observed that they are reticent to share their formulatory expertise with others, potentially for fear of losing their expert power to others.

Similarly, in Company B, reactive as opposed to proactive knowledge sharing has impacted on the company's ability to plan for, and allocate specialist knowledge resources to, development projects. The situation has impacted on problem solving and decision making. The Europe MD pointed out that problems within some of the UK businesses only become evident annually when they discover that various people experienced the same issue the previous year but did not share it with anyone. So, communication, knowledge sharing and dissemination are major concerns across both companies.

Finally, a further disabler that was identified in both companies is the absence of a structured and visible NPD process, which the European Manufacturing Director and Data Administrator in Company B suggested was desperately needed. They felt the company would benefit from a more structured, disciplined and coordinated approach to NPD, which could involve, and as a consequence improve, the cross-fertilisation of knowledge, ideas and skills from other businesses in the Group network. However, the Technical Director confirmed that the company had been in possession of an NPD process for years. He admitted he did not use the procedure because the sales orientated demands of the business to continuously innovate, along with him being so

busy with constant crisis management and firefighting, precluded him from doing so. He did suggest that the Group R&D Director in Company A would be more likely to follow the procedure in his Department because he is not involved in firefighting on a daily basis and therefore may have more time to engage with it. Besides, he felt there was a paradox and dilemma between engaging in more structured development, which was outside the company's strategic philosophy and reactive development, which was the cultural norm.

7.4: Organisational Structure

A notable feature of both companies is the major structural change they have experienced, which has radically altered the structure of Company A. A number of participants suggested that it has also modified a number of operational activities, not necessarily for the better. In terms of organisational structure enablers, these are presented in Table 7.5.

Table 7.5: Organisational Structure Enablers

	Company A	Company B
ORGANISATIONAL STRUCTURE	Flat and entrepreneurial structure Global group network	Flat with an element of hierarchy
	MDs can keep in touch with local markets	Hierarchical structure removed some role ambiguity
	Blogs, email and teleconference to support knowledge sharing and collaboration	Knowledge workers encouraged to use autonomy, ability and initiative to make decisions and apply and utilise specialist knowledge
		Internal newsletter disseminated to all global teams in between quarterly meetings

As they were initially one and the same company and sported a flat, entrepreneurial structure before the split in the mid-1990s, it was therefore no surprise that participants in both companies described the structure as ranging from flat with an element of hierarchy (Company B) to flat and entrepreneurial (Company A). To compare and contrast the changes they have undergone, Company A's has been the most radical. It has restructured into a network of geographically-distributed, interdependent yet independent business entities. This has enabled entity MDs to keep in touch with local markets to facilitate rapid response and manage knowledge by hiring the specialist knowledge and expertise of local knowledge workers, with the

prior approval of the Parent Company. Knowledge sharing and collaboration in the global entities is further managed and supported by the use of blogs, email and teleconferencing.

In Company B, quite the opposite has happened. While Company A deconstructed and became more organic and dispersed, Company B bureaucratized and became more hierarchical, as the Europe MD reported that the structure was far too flat and was therefore causing operational difficulties. Importantly, it also enabled knowledge to be managed more effectively by removing some of the role ambiguity that a number of participants had experienced and provided more definition and clarity to their roles. A further and key enabler of the management of knowledge, as highlighted in Company B, is knowledge workers' ability to be autonomous and apply their own specialist knowledge and initiative to make decisions within the remit of their jobs. This is examined further in the Specialist Roles and Knowledge variable. To aid levels of communication within Company B, which the UK MD admitted would be a challenge, the UK Marketing Team has been tasked to produce an internal newsletter. This will enable global teams to be informed of the progress of current and future products outside scheduled meetings.

As outlined above, the restructuring of both companies resulted in a number of disablers to how knowledge is managed. These are outlined in Table 7.6.

Table 7.6: Organisational Structure Disablers

	Company A	Company B
ORGANISATIONAL STRUCTURE	Restructuring led to creation of ‘them and us’ situation with Company B, which stifles communication, collaboration and knowledge sharing Confusion about the structure No conscious recognition of network structure	Rift between Company A and B; hinders knowledge sharing, collaboration and communication
	Full ICT support, including videoconferencing, not given to global teams and entities to support knowledge sharing	Knowledge is not disseminated to the right people at the right time
	Poor cross-functional and inter-entity knowledge sharing	Absence of a cross-functional NPD team
	Lack of mutual trust between individuals and teams	Barriers to closer collaboration between the R&D teams in Company A and Company B
	Structure hinders cooperation among teams	Lack of collaboration between Marketing and R&D
	Lack of face-to-face contact with colleagues	Product launches are not as successful as they could potentially be; specialist knowledge, particularly Marketing knowledge, is not utilised
	Importance and value of knowledge to business is not recognised	

As a result of the restructuring, several participants reported a rift between the two companies, which resulted in a ‘them and us’ situation. It hindered and stifled a large degree of collaboration, knowledge sharing and communication between them, particularly as Company B suffered a spate of redundancies while employee numbers grew in Company A. The reorganisation in Company A also created some confusion about the structure, leading a number of participants to question where the Company sat in the Group and what its overall purpose was.

A major finding is that Company A is subconsciously operating as a network structure, which comprises of sixteen geographically dispersed business entities that are linked together by ICT, with the company as the innovation hub based in the UK. As the Senior Management Team do not consciously recognise it as a network structure, an appropriate technological infrastructure, including videoconferencing, has not been put in place to bolster the work of the global teams, who are in essence operating as global virtual teams. Thus, it has resulted in poor cross-functional and inter-entity knowledge sharing and communication, a lack of mutual trust between teams and a lack of recognition that knowledge is important to the business. In

contrast, in Company B, concern was expressed that knowledge is not disseminated to the right people at the right time; thus impacting on all organisational practices, including NPD. Again, this could be due to appropriate support mechanisms not being in place to enable the effective management of individual and organisational knowledge. The findings suggest that in many respects, despite fundamental change, culturally and operationally, both companies are still functioning as small, entrepreneurial businesses and that is where the crux of their problems lies.

Once again, the issue of poor cross-functional knowledge sharing and the absence of a cross-functional NPD team are prevalent in both companies. This also impacts on the relationship between R&D and Marketing; two key teams that are central to the NPD process. It is noteworthy that the majority of disablers stem from the lack of face-to-face contact individuals in both companies have with each other. This causes a ripple effect on knowledge sharing, collaboration, communication and ultimately on how knowledge resources are managed and utilised for NPD. This point resonated with a number of participants at all levels in both companies. They suggested the reinstatement of the Product Council, the unofficial community of practice, which was disbanded by Senior Management due to it being too wieldy, inoperative and not fit for purpose. The Council would serve to encourage more face-to-face, tacit interaction with colleagues, enable spontaneity, create new cross-functional knowledge and generate ideation. Importantly, it would also pull together all the support functions, such as Marketing, Technical and Sales and ensure that the Marketing Team has an input to the NPD process earlier and essentially throughout, in order to help plan and resource it appropriately.

Notably, as reported by the Group HR Coordinator in Company A, the situation could be helped by communicating the importance and value of knowledge to the business, particularly as both companies are knowledge-intensive firms and are heavily reliant on the specialist knowledge of their workforce to develop new and modify existing products.

7.5: Leadership and Management

The Senior Management Teams in both companies recognise the important contribution their knowledge workers make to the business and therefore went some way to support them and manage their knowledge, as outlined in Table 7.7.

Table 7.7: Leadership and Management Enablers

	Company A	Company B
LEADERSHIP AND MANAGEMENT	Allocating specialist knowledge resources to projects	Holding team briefings to encourage knowledge creation and sharing
	Target setting and annual performance assessment process	Holding team bonding day
	Strong emphasis on personal autonomy	Email updates
	Annual technical conferences	
	Technical blog, email and intranet to encourage knowledge sharing	

In Company A, the Senior Management Team stated that they manage knowledge by allocating specialist knowledge resources to projects, specifically in this respect via the appointment of the Group Development Manager to develop the eco-friendly range of products. A major event in the HR calendar in both companies (though not stated in the Company B enablers above) is the annual performance assessment process, which challenges individuals to set objectives and work towards the achievement of a bonus. Implicit within this process is the emphasis on personal autonomy and responsibility for their jobs. Individuals have the opportunity to say how their specialist roles can contribute to the achievement of organisational goals. As reported earlier, endowing them with autonomy enables them to make decisions within certain parameters. Importantly, in order to encourage the sharing of knowledge, Company A hosts the annual technical conferences (which several key staff from Company B attend), as an adjunct to the technical blogs, email and intranet, in order to bolster and encourage technical and other teams in the global entities to share knowledge and ideas and collaborate on development projects.

In contrast, Company B's Senior Management Team's efforts to manage knowledge centre on bringing teams together more often through team briefings. Although it was reported that these meetings had not been held as frequently as they used to be, the Senior Management Team recognised that they needed to encourage more knowledge sharing through staging the meetings and also through providing email updates as a supplement to them. The meetings would also serve to advise individuals where the company was at in terms of business and product development. In an effort to build entente cordiale and bridge the divide between both companies, a Team Bonding Day

was held at a local historical landmark. This aimed to boost the level of collegiality and communication between colleagues and help to imbibe a sense of mutual trust and collaboration.

However supportive the Senior Management Teams were, a number of practices disabled the management of knowledge, as highlighted in Figure 7.8.

Table 7.8: Leadership and Management Disablers

	Company A	Company B
LEADERSHIP AND MANAGEMENT	Absence of cross-functional NPD team	Absence of cross-functional NPD team and NPD process
	Leaders and managers did not go far enough to support knowledge creation and sharing	Senior Management Team did not do enough to enable knowledge sharing
	Senior Management Team do not have an accurate picture of which type of specialist knowledge resides where across the business Restricted access to performance assessment data	Lack of involvement of key knowledge workers from front end NPD process; precludes their specialist knowledge from being used
	Not enough opportunities facilitated for people to share face-to-face tacit knowledge	Key knowledge workers not briefed in new or modified products
	Ad hoc, reactive HR planning	Technical Director not being shielded from firefighting and crisis management to focus on product development
	No procedures or processes to monitor the transfer of knowledge from technical conferences to the job	Key knowledge workers, such as Technical Advisors and UK Marketing Manager, not included in many NPD activities
	Technical conferences held only once a year	

As Table 7.8 pointed out, a number of similarities were evident. First, neither company has a cross-functional NPD team, which not only hinders how specialist knowledge is managed, but also impacts on the effectiveness of the NPD process, however implicit. Key knowledge workers, such as Marketing and R&D, do not collaborate enough, particularly at the start of the NPD process where market intelligence could improve the development decisions that are made. A further issue in Company B is the confusion about the perceived presence or absence of an NPD process. The Technical Director confirmed that there is one, but it just isn't followed due to the reactive nature of product development and other pulls on his time.

Second, although both companies engaged in aspects of good practice, the general feeling was that the Senior Management Teams did not go far enough to support

knowledge sharing and give knowledge workers the opportunities they craved to cross-fertilise their specialist knowledge tacitly, rather than through email or technical blogs and be briefed in new or modified products (Company B). Importantly, several participants in both companies exercised the personal autonomy with which they had been endowed and collaborated with colleagues of their own volition, because they recognised the importance that the cross-fertilisation of their knowledge meant to the completion of key tasks associated with NPD, such as the commercialisation and launch of products.

In Company A, as reported by the Group MD, a major disabler of the management of knowledge is the restricted access to the annual performance assessment information, which he confirmed stays between the assessor and individual being assessed. Consequently, the Senior Management Team cannot make an accurate evaluation of which types of specialist knowledge reside where in the business. This therefore hinders any efforts to engage in meaningful human resource planning, exacerbates the silos of knowledge issue and has a knock-on effect when trying to allocate specialist knowledge resources to NPD projects.

In Company B, a lack of intel about the performance assessments is also impacting on how the Senior Management Team manage knowledge. Arguably, the exclusion of key knowledge workers from taking an active role in front end NPD activities may be as a direct result of the Senior Management Team not being aware of the specific knowledge resources the company has at its disposal. If this information were made available, it would enable the management and allocation specialist knowledge resources, such as Technical Advisers and the UK Marketing Manager to NPD projects, to be a more effective process.

Company A hosts the technical conferences once a year, sometimes twice, as reported by the International MD-M; it thus makes a conscious effort to bring together technical teams from across the business entities, including the Company B Technical Director. However, the company does not have established procedures or processes to monitor how or whether the knowledge acquired, disseminated and shared from such events are transferred to the job and to developing and modifying new products. As a result, mistakes are repeatedly made (single loop learning), the effort technical teams

expend on development projects is duplicated, knowledge is hoarded and the problem with silos of knowledge is aggravated.

Finally, a difference between Company A and B, as outlined in the New Product Strategy enablers, is the management of the Technical Director and his specialist knowledge, who is not given the same protection from the internal and external pulls on his time as the Group Development Manager. This therefore impacts on the effectiveness of product development and modification within the business.

7.6: Specialist Roles and Knowledge

As knowledge intensive firms, both companies deploy an array of enabling practices that appear to manage and utilise the specialist knowledge of their high calibre and talented knowledge workers, as illustrated in Table 7.9.

Table 7.9: Specialist Roles and Knowledge Enablers

	Company A	Company B
SPECIALIST ROLES AND KNOWLEDGE	Knowledgeable and talented individuals employed by the Company	Calibre of knowledge workers; wide range of knowledge and skills
	Knowledge worker autonomy to make decisions within boundary of jobs MDs have high level of autonomy	Delegated autonomy and responsibility to manage themselves and application and utilisation of their specialist knowledge
	Application of specialist knowledge to NPD e.g. commercial, raw materials, process engineering, budgeting, reaction chemistry	Specialist knowledge used: understand the market and product; understanding raw materials and how they can be adapted; client and technical knowledge
	Articulation of knowledge worker specialist knowledge into codified formats – as part of the job	Tacit knowledge of knowledge workers embedded in products, specifications and other codified documents
	Knowledge worker flexibility to manage themselves and apply their specialist knowledge	Engagement of knowledge workers in cross functional knowledge sharing of own volition, despite absence of cross functional NPD team
	Recruitment and selection process builds in identification of talent	Annual performance assessment exercise; knowledge workers get the chance to say how they can contribute to the business
		Technical Director works across functions; derives a systems thinking perspective of the business

There is ample evidence of good practice and the enablers outweigh the disablers by a considerable amount. A defining feature of knowledge worker management practices in both companies is the degree of autonomy and flexibility individuals are able to exercise within the scope of their specialist roles. Although the results of the annual performance assessment exercise is not widely disseminated throughout the business,

individuals do have the opportunity to say how both they and their specialist knowledge and skills can make a contribution to their companies, which the Senior Management Teams recognise is key to building employee engagement. Although the evidence pointed towards a lack of HR planning, which often resulted in the ad hoc allocation of specialist knowledge resources being made, the International MD-M confirmed that the recruitment and selection process builds in the identification of talented individuals who can join the talent pipeline. Internal promotion is privileged over external recruitment, which gives both companies the opportunity to retain key tacit knowledge within the business.

A major feature of the findings is the types of specialist knowledge that are used by knowledge workers in both companies to develop new and modify existing products, produce prototypes, undertake product testing, engage in full manufacture and then commercialise and launch them to market. Certainly, the full gamut of activities in the NPD process was represented by the types of specialist knowledge employed, which in Company A includes commercial knowledge, knowledge of raw materials, reaction chemistry, process engineering and budgeting. In Company B, it incorporates client and technical knowledge, understanding markets and products and understanding raw materials and how they can be adapted. A major difference between the two sets of knowledge used in each company is Company B has a more customer and client interface through the Sales Teams, Technical Advisers and Customer Service Team. They manufacture and modify products, train Applicators and the Technical Director troubleshoots on and off site. Therefore, the Company B knowledge workers have more hands on, practical application of specialist knowledge within the NPD process and the specialist roles they undertake.

What was also notable in both companies is the articulation of knowledge worker tacit knowledge into codified formats, such as product brochures, data sheets, technical bulletins, etc. This appears to be accomplished as part of their day-to-day specialist roles, in the absence of an 'official' codification strategy or procedure for managing organisational knowledge. However, it is evident that their specialist knowledge is also embedded in organisational artefacts and forms part of the structural capital base of both companies. Despite this, various praxes disabled how knowledge is managed, as illustrated in Table 7.10.

Table 7.10: Specialist Roles and Knowledge Disablers

	Company A	Company B
SPECIALIST ROLES AND KNOWLEDGE	Absence of formal cross-functional NPD team	Absence of formal cross-functional NPD team
	Specialist knowledge managed in ad hoc basis, often to the exclusion of the Marketing Team	Not enough link between R&D and Marketing Not enough involvement of Marketing in NPD process
	Lack of cross-functional knowledge sharing and collaboration	
	Limited number of knowledge workers in the Company with specialist cementitious chemistry knowledge	

A key disabler of how knowledge is managed, which was once again reported as an issue in both companies, is the absence of an ‘official’ cross-functional team. The inclusion of this body would give individuals valid opportunities to collaborate and share knowledge inter and intra-functionally and create new knowledge by engaging in dialogue and cross-fertilising ideas. It would also give the Marketing Teams the legitimacy and visibility they crave and safeguard their link with R&D through a formal NPD process. In practice, knowledge workers in both companies do have an issue with the Senior Management Teams not presenting them with more opportunities to share their knowledge. In the majority of cases, they want to collaborate more with each other, particularly where they perceive there is some degree of task interdependence.

Finally, there are a limited number of knowledge workers in Company A with knowledge of cementitious chemistry, hence the hiring of outside specialist knowledge. Having this type of knowledge in the talent pipeline gives the company strategic and competitive advantages, particularly in terms of innovating the suite of eco-friendly and environmentally sustainable products.

7.7: ICT, Systems and Communication

The findings highlighted that this variable is an important part of the organisational infrastructure in both companies. It has had a major impact on their business operations and while a large number of factors have disabled how they manage knowledge, certain aspects of organisational practice have acted as enablers, as illustrated in Table 7.11.

Table 7.11: ICT, Systems and Communication Enablers

	Company A	Company B
ICT, SYSTEMS AND COMMUNICATION	Infrastructural systems support for people to do their jobs	Wide range of systems used to support product development and business activities
	Intranet used as knowledge portal, albeit unofficially	Intranet enables knowledge sharing; houses codified knowledge
	Systems store codified knowledge that can be accessed	Companyzone intranet is unofficial knowledge repository; perceived as a knowledge management system
		ERP system disseminates and facilitates access to knowledge

Knowledge, NPD and general business operations are managed and supported by the technological infrastructure containing enterprise and office-based systems, such as Hyperion and Sage, project management systems and communication and collaboration tools in Company A. Company B utilise similar systems, the bulk of which fuels its operations and production, including the Syspro Enterprise Resource Planning system. Importantly, the system facilitates access to, and dissemination of, different types of knowledge that are useful to various aspects of the NPD process. Similarly, both companies have intranets, which effectively, yet unofficially, double up as knowledge portals/repositories of knowledge that store and disseminate codified knowledge. Such resources have the capacity to be relatively easily accessed, regardless of location and time zone. Interestingly, the intranet in Company B was described as a knowledge management system.

Although poor knowledge sharing has already been flagged up as an area of concern for both companies, having the intranet gives their knowledge workers the opportunity to access stored, codified knowledge. The problem lies in encouraging them to use it! Unsurprisingly, this variable was a key disabler of the management of knowledge in both companies, as highlighted in Table 7.12.

Table 7.12: ICT, Systems and Communication Disablers

	Company A	Company B
ICT, SYSTEMS AND COMMUNICATION	Structure and systems disadvantage learning and communication and do not enable effective knowledge sharing Does not invest in videoconferencing to support global teams	Devolution and separation of IT to Parent Company
	Confusion about the intranet Internal intranet site not user friendly	Confusion about the systems and how they support knowledge sharing and product development Confusion and nescience about the intranet, what it is used for and what is stored in it
	Technical Teams don't use the intranet; find it too difficult	Intranet not used regularly enough as people perceive it as more relevant to Technical, Marketing and Sales Teams Password entry to intranet acting as a barrier to use
	Technical Teams operate in own bubbles; exercise expert power and control over own specialist knowledge	Lack of tacit knowledge exchange and collegiality
	Technical staff want technical forum exclusively for Technical Teams	
	Duplication of NPD effort across global business entities and Technical Teams due to poor communication Lack of communication within Technical Teams	Does not deploy a knowledge management system; hinders sharing of specialist operational and product knowledge General lack of collaboration
	Lack of Marketing contact with R&D Teams	Stigma between companies hinders communication and knowledge sharing
	Email is used as primary knowledge sharing tool	Main communication and knowledge sharing conducted through email
	Generally poor communication across the business	Poor communication across the business

The Company A Group MD reported that the Group's structure and systems disadvantage communication and learning throughout the company and therefore disables effective knowledge sharing. In addition, the company does not deploy company-wide videoconferencing or provide a systemic ICT infrastructure to support tacit knowledge sharing in the global entities. This may therefore encourage knowledge hoarding and generate a lack of mutual trust among individuals and teams because they do not have enough sustained contact and collaboration with each other. A similar ICT infrastructural issue in Company B, which incidentally also impacts on Company A, is the devolution of the IT Department and support from Company A to the Parent Company, although the IT team is still situated on Company A's premises. The European Manufacturing Director pointed out that it can potentially elongate the

time it takes to progress jobs and get systems fixed because of the new centralised ticketing service.

In terms of the intranet, both companies experienced a certain degree of nescience and confusion about the system, including what it was called, what it was used for, what was stored in it and to what extent it could support how knowledge is managed and shared for product development and modification. This does little to imbibe confidence, motivation or employee engagement to use the system. With reference to poor system design and systems not being user friendly, this issue impacted on both companies. The International MD-M in Company A reported that the bulk of global Technical Teams do not use the intranet because they find it too difficult. In Company B, some of the non-technical staff do not use the intranet regularly enough because of the perception that it is more relevant to the teams most associated with NPD, such as Marketing, Technical and Sales. In addition, some of the IT systems require passwords, which the Technical Director reported discourages people, including himself, from using it.

As identified in Table 7.12, both companies have similar issues with a lack of knowledge exchange, but this seems to more acute in Company A, due to the distributed global Technical Teams and their apparent exercising of power and control over their own technical specialist knowledge. This invariably leads to a duplication of effort and increased development costs. The power and control exercised by Technical Teams extends to wanting their own technical forum, which is in development through the Marketing Department. The Communications Coordinator felt that giving in to their demands would be counterproductive, aggravate an already inflamed situation and lead to even further poor knowledge sharing. It would also increase the frustration of those who want to see more open forms of knowledge sharing and communication and an inclusive cross-functional NPD team being introduced. Arguably, the situation could be exacerbated by the absence of an official corporate-wide knowledge management system, which was noted in Company B.

As Table 7.12 highlights, a major disabler the management of knowledge in both companies is communication, or rather a lack of it. Overall, generally poor communication across the business has created problems within non-technical teams, Marketing, R&D and Technical Teams and has intensified the stigma between the

companies. It has also hindered collaboration and collegiality, which arguably has not been helped by the absence of the cross-functional NPD team. Importantly, it is evident that both companies are suffering from a lack of tacit knowledge exchange and because there appears to be no official communication strategy in either company to moderate the situation, the main tool used by them to communicate, as reported in the findings, is email. One participant described the use of email as an addiction. This directly impacts on mutual trust and disables the building of relationships that are key to enabling effective knowledge sharing and, ostensibly, the management of knowledge in the NPD process.

7.8: Chapter Summary

This chapter has presented a cross-case analysis of the findings in Company A and B. As the analysis has identified, the companies have experienced a raft of similar issues, some of which are more acute in Company A. Both companies deploy many aspects of good practice across all six variables in terms of how they manage knowledge in the NPD process. Various facets of their infrastructure also act as disablers. The key themes that emanated from the analysis are as follows.

Both companies manage knowledge in a number of ways by hiring specialist knowledge on a permanent and contract basis, facilitating global technical conferences as knowledge creation and sharing opportunities and giving knowledge workers their heads to get on with their own jobs. In spite of these approaches, several facets of business practice disable how knowledge is managed. Both companies are highly successful innovators, yet neither deploys a new product strategy. Instead, strategies for the development of new products are encompassed within Company A's corporate strategy, though this may also be the case in Company B. The absence of the strategy has led to a raft of major issues across both companies. First, no visible NPD process is present, although one was espoused by the Group MD and Technical Director. Second, resources including specialist knowledge are reportedly poorly allocated. Third, the specialist roles and knowledge of the Marketing Teams are underutilised. Fourth, the very wide job brief of the Company B Technical Director precludes him from devoting appropriate time to development and modification activities. Unlike the Group Development Manager, he is not a 'protected' specialist knowledge resource. Finally, a good working relationship between R&D and Marketing is not fostered, despite their specialist roles and knowledge being central to the NPD process.

In terms of organisational culture, both companies possess an innovative and entrepreneurial culture, courtesy of their enthusiastic founders. The companies manage knowledge and aspects of knowledge sharing by facilitating the annual, sometimes biannual, technical conferences that gather local and global specialist knowledge and expertise. Blogs enable a modicum of knowledge sharing and being part of a wider Parent Company network gives knowledge workers some interaction with their contemporaries. Both companies are experiencing subconscious culture change and they appear to still be operating under the entrepreneurial culture of a small company. As a result, knowledge management and communication practices are not reflective of their growth and expansion.

In addition, poor knowledge sharing, communication and collaboration are rife within both companies, but more acute in Company A, courtesy of the network of geographically dispersed business entities. The ‘fragmented’ culture, as described by a member of the Marketing Team, has led to key functional areas not being involved in aspects of NPD, episodes of knowledge hoarding, the exercising of power and control over technical knowledge and duplication of effort due to poor knowledge sharing. Both companies are suffering from a lack of tacit knowledge exchange, the absence of a cross-functional NPD team and a structured and visible NPD process.

Both companies have experienced widespread structural change. Company A’s deconstruction has been more radical and has altered the structure from an entrepreneurial configuration to a geographically distributed network. This gives entity MDs the autonomy to operate and recruit specialist knowledge in local markets. Knowledge sharing is supported via blogs but the absence of videoconferencing was noted. On the other hand, Company B bureaucratised to fix operational deficiencies that had arisen from the structure being too flat. This served to manage knowledge more effectively by reducing knowledge worker role ambiguity. The rift between the two companies has caused a number of tensions, including poor cross-functional knowledge sharing, communication and collaboration, which has worsened due to the absence of a cross-functional NPD team. Notably, there are also visible frictions between R&D and Marketing in both companies. The resurrection of the Product Council was proffered by participants in both companies as a vehicle to provide knowledge workers with more tacit contact and facilitate cross-functional input from key areas of the business.

With regard to leadership and management, despite several areas of good practice, including staging the annual performance assessment review, giving personal autonomy and hosting the Team Bonding Day to engender some collegiality and bridge the divide between the two companies, the findings show that information deriving from the review is not disseminated throughout the business. As a result, the Senior Management Teams cannot effectively evaluate what knowledge resides where in the business and the types of specialist knowledge that can be allocated to projects.

Although, as previously stated, knowledge workers have a large degree of personal autonomy, there is no cross-functional NPD team in either company, which restricts opportunities to collaborate and share specialist knowledge. Reports from participants in both companies suggest that the Senior Management Teams have not gone far enough to facilitate tacit knowledge sharing activities in which they can engage, although they have support from blogs and email. Furthermore, no established procedures exist to monitor or evaluate to what extent knowledge that is created and shared at the technical conferences hosted by Company A are transferred to the job and embedded in new or modified products. Importantly, there is an overall lack of involvement of key knowledge workers such as the Marketing Team from front end NPD activities.

In terms of specialist roles and knowledge, both companies employ high calibre, talented and knowledgeable employees and in the main have many areas of very good practice in terms of how knowledge is managed, including giving knowledge workers autonomy on how they manage, utilise and apply their own specialist knowledge of, for example, reaction chemistry, raw materials and client and technical knowledge. There were some key disablers, however. These include not giving knowledge workers a platform, specifically a cross-functional NPD team, through which they can cross-fertilise their specialist knowledge and not managing the relationship between R&D and Marketing. This impacts on the efficiency of the NPD process and does not effectively utilise market intelligence at the start of and certainly throughout the NPD process.

Finally, both companies deploy systems that enable the day-to-day functioning of the business, support the development and manufacture of products and in some ways the management of knowledge. This includes utilising the intranet as an unofficial

knowledge portal/repository/knowledge management system that enables the storage and retrieval of codified forms of knowledge. The systems disable the management of knowledge in a number of ways, such as not providing an appropriate ICT infrastructure that gives global teams adequate opportunities to share tacit knowledge, particularly in remote areas. This leads to, among other things, knowledge hoarding. Despite the intranet being used as an unofficial knowledge management system in both companies, it is not user friendly and is therefore not used by everyone. Additionally, there is no official system to manage knowledge or communication in either company. As a consequence, knowledge does not get to the right people at the right time, which consequently leads to further poor communication and collaboration across the business. This does little to heal the rift and stigma that has occurred between both companies.

The next and penultimate chapter presents a discussion of the cross-case analysis with espoused theory drawn from extant literature.

Chapter 8

Discussion

Chapter 8

Discussion

*"To raise new questions, new possibilities, to regard old problems from a new angle,
requires creative imagination and marks real advance in science."*

Albert Einstein

8.1: Introduction

The previous chapter presented the cross-case analysis of the findings in Company A and B. This penultimate chapter presents a discussion of the key enablers and disablers of the management of knowledge in the NPD process. It highlights the congruencies and incongruities between espoused theory from the critical review of extant literature, the themes presented in the conceptual framework and the theory in use that emanated from the cross-case analysis. The chapter culminates with an evaluated conceptual framework for each company and an examination of how the adoption of personalisation and codification knowledge management strategies, along with the SECI and communities of practice knowledge management models, can enhance how both companies manage knowledge more effectively in the NPD process.

8.2: The Inextricable Link between Knowledge Management and NPD

As this research study has demonstrated, knowledge management and NPD are inextricably linked (Cantner *et al.*, 2011). Described as a knowledge-creating, knowledge-intensive process (Goffin and Koners, 2011; Corallo, 2009; Goffin *et al.*, 2010; Nonaka and Takeuchi, 1995), the development of new products relies heavily on the application and utilisation of specialist knowledge (Bigliardi *et al.*, 2012; Kelly *et al.*, 2011; Yu *et al.*, 2014). As the findings have identified, how knowledge is managed is just as important as knowledge itself, which challenges firms to create conducive environments that treat and exploit knowledge as a strategic asset (Bollinger and Smith, 2001; Lee and Choi, 2003; Stonehouse and Pemberton, 1999). Advocates of the important role knowledge plays in NPD suggest that a firm's infrastructure containing its organisational variables should be configured and synergised to best support how knowledge is managed for innovation (Lee and Choi, 2003; Von Krogh, 1998; Goffin and Koners, 2011), which includes both new to market development and product modification (Cetindamar *et al.* 2010). However, as

Company A and B have experienced first-hand, infrastructural elements can enable as well as disable and constrain a firm's efforts to manage knowledge in the NPD process (Ho, 2009; Magnier-Watanabe *et al.*, 2011; Lee and Choi, 2003). A discussion now follows under each variable.

8.3: New Product Strategy

Extant literature espouses that a critical success factor that underpins NPD and distinguishes top performing companies from others is the presence of a new product strategy (Cooper and Kleinschmidt, 1986; Johne and Snelson, 1988). It enables firms to plan for, and make appropriate resources such as specialist knowledge available to, NPD projects (Cooper and Kleinschmidt, 2007; Cooper and Edgett, 2010; Castellion, 2005). Thus, managing and utilising knowledge effectively for NPD is crucial, as it enables firms to remain competitive, efficient and effective and ultimately, in business (Goffin *et al.*, 2010; Bigliardi *et al.*, 2012).

A number of practices within both companies are congruent with extant literature. The companies hire specialist knowledge and expertise on a permanent and contract basis, in order to plug knowledge gaps. The complex process of NPD requires the input of a particular level of industry-specific knowledge to facilitate the production of competitive products (Cross and Sivaloganathan, 2007). In addition, as the specialist knowledge hired in was specific to that particular product type or industry, in this case cementitious chemistry, it was not only fundamental to the development of that type of product but was a rare, inimitable and non-substitutable form of knowledge and thus valuable to both companies in terms of generating sustainable revenue (*ibid*).

The Group Development Manager in Company A is a 'protected' resource, insofar as his time is specifically focused on blue sky development for the Group. Prior to this ring fencing, he was distracted by his engagement in crisis management, firefighting and development issues in Company B, which not only caused a number of problems in terms of elongating the time to market of new products but also the eruption of a certain degree of conflict between several members of the Senior Management Teams in both companies. Theorists profess that the specialist knowledge of knowledge workers should be managed effectively because their knowledge and roles are a vital component in developing new products (Bigliardi *et al.*, 2012; Kang and Snell, 2009; Kelly *et al.*, 2011). His 'protection' as a specialist knowledge resource is thus congruent with literature.

As showcased in Company B, in undertaking their specialist roles and utilising their specialist knowledge in NPD, knowledge workers are empowered to work autonomously. This comes in handy when their line managers are away for long periods of time attending meetings or firefighting in other business entities. Extant literature subscribes to this management practice and suggests that it gives knowledge workers the opportunity to exercise their expert power, while at the same time engendering and instilling a degree of confidence and engagement with the job (Bigliardi *et al.*, 2012; Ahmed and Shepherd, 2010; Newell *et al.*, 2009).

Theorists advocate that a focused strategy for developing new products specifies and defines the goals and role of NPD within the scope of the firm's overall strategy and draws on the cross-functional knowledge of those involved in the strategy-formation process (Cooper and Kleinschmidt, 2007). Notably, the findings identified that neither company deploys a dedicated, formal and visible new product strategy. The Company A Group Finance Director did, however, report that it is enveloped within the overall corporate strategy, which may also be the case in Company B, and guides what the company does in terms of reacting to customer and market demand and environmental and legislative forces for change. Despite the theoretical assertion that the adoption of a new product strategy is essential for firms and has a strong correlation with achieving positive innovation performance (Cooper and Edgett, 2010), both companies have achieved extensive and sustained global success with their innovative range of products, have experienced widespread growth and Group sales have risen by 90% since the Parent Company takeover. This is thus an incongruity between what the literature espouses and actual business practice in Company A and B.

This success has not, however, given them total immunity from the problems they have experienced, as evidenced in the findings. One such problem is resource allocation, which the Company B European Manufacturing Director highlighted is a major issue. Extant literature suggests that the resource allocation process can be a rather daunting task for decision-makers within the firm (Klingebiel and Rammer, 2014; Hutchison-Krupat and Kavadias, 2013) because Senior Managers must decide how much funds they are prepared to allocate to development projects. Furthermore, it is an important responsibility insofar as allocating the right mix and type of specialist knowledge resources to the right strategic projects ensures that the process of developing new or modifying existing products is an effective and efficient one.

Innovation cannot take place without people (Ahmed and Shepherd, 2010), so the input of key individuals who have specific knowledge of the NPD process, such as the Group Development Manager, Group R&D Director and the Development Technologist in Company A and Technical Director, European Manufacturing Director and Application Development Chemist in Company B, is vital (Hutchison-Krupat and Kavadias, 2013).

Further to this, as newly-developed products are at a greater risk of failure than success (Klingebiel and Rammer, 2014), firms are challenged to continuously innovate in order to bolster their chances of satisfying customers and fending off threats from new competitors in the market. On this note, the European Manufacturing Director observed that Company B has, in a number of ways, been affected by not having a new product strategy. He felt the company didn't "*innovate enough*" and its efforts to develop and modify products was very "*push into the pot*" and guided more by the Group's philosophy and culture of reactive, emergent development, rather than a focused new product strategy. Due to resource constraints, the lack of a more strategic approach to product development and the situation with the Group Development Manager, the European Manufacturing Director further believed that the state of affairs had resulted in the company taking "*a phenomenal amount of time*" to develop products.

To counter this, the adoption of a product portfolio system, which mitigates against issues, such as those described by the European Manufacturing Director, from occurring and ensures that there is alignment and synergy between the firm's strategy and its product development objectives, is espoused in literature (Cooper and Edgett, 2010). This would enable the prioritisation of development projects and ensure there are adequate resources, including specialist knowledge such, as the Group Development Manager, Technical Director and Marketing Team available to support them (ibid).

Implicit within a new product strategy is an NPD process (Booz *et al.*, 1982). It is a means by which firms such as Company A and B can improve the effectiveness of their product innovation practices (Cooper and Kleinschmidt, 1991), reduce uncertainty and provide a sense of structure to developing products (Craig and Hart, 1992). Despite extant literature advocating the benefits of having such a procedure,

the findings highlighted that no visible NPD process is present in either company, although the Group MD reported that Company A does have a structure and system for developing products and committing them to market. In support of his view, the Technical Director in Company B claimed that his company also has a process and had done for years. Undoubtedly, it was evident that the presence or absence of a process for developing new products was a highly emotive issue, which resonated among numerous participants at strategic and operational levels and was raised repeatedly in several variables. The researcher noted that perceptions of the process appeared to be embedded deep within the culture of both companies. Therefore, this issue will be explored further in the next variable.

A key enabler of the management of knowledge in extant literature is the cross-fertilisation of functional, specialist knowledge, which theorists espouse is becoming more important to firms who develop new products (Hirunyawipada *et al.*, 2010). The input of multidisciplinary and cross-functional sources of knowledge is the mainstay of innovation (ibid) and key functions such as Marketing play an intrinsic and vital role in the overall NPD process (Drechsler *et al.*, 2013). Evidence suggests that practices within both companies, in terms of how they manage and utilise cross-functional knowledge, are contrary to espoused theory. For example, it was evident that the under-utilisation of core teams such as Marketing in Companies A and B and Technical Advisers in Company B, along with others who had a direct and indirect involvement in developing and modifying products, was a major issue among many participants. Again, this resonated across a number of the variables, including Specialist Roles and Knowledge. The epistemology of practice (Hislop, 2009; 2013) asserts that a critical success factor of innovation is cross-functional collaboration, which enables the gathering of collective know-how, generates social capital and new knowledge, shortens product development cycles and thus ensures that innovation actually takes place (Swan *et al.*, 1999; du Plessis, 2007; Bontis, 1998; Nonaka and Takeuchi, 1995). The issue of the under-utilisation of specialist roles and knowledge will be discussed later in the chapter.

Literature advocates the effective management of knowledge workers because they not only possess knowledge that is specialised, embedded and invested in particular knowledge domains within the firm, they also undertake specialist roles, such as R&D and Technical via the utilisation of their skills, expertise and knowledge that is rare

and strategically advantageous to their firms (Bigliardi *et al.*, 2012; Kang and Snell, 2009; Kelly *et al.*, 2011; Lakshman, 2009; Bollinger and Smith, 2001). As they are such a specialist knowledge resource and make a valuable contribution to the development and modification of new products, this poses a challenge for the Senior Management Teams in Company A and B to maximise the utilisation of their knowledge and unique skill sets by managing them appropriately (Bigliardi *et al.*, 2012).

The evidence suggests that the management of the Company B Technical Director is incongruent with extant literature (Bigliardi *et al.*, 2012; Kang and Snell, 2009; Kelly *et al.*, 2011). His burgeoning job brief and workload involves him engaging in firefighting and crisis management, both on and off-site. Indeed, the Europe MD admitted that the situation does little for his health or career. It precludes him from spending time on product development and modification activities and, importantly, exchanging dialogue and knowledge with his small team. Despite being the substantive R&D resource for his company and regardless of the pulls on his time, the Senior Management Team do not ring fence his development time and protect him as a specialist knowledge resource, unlike the Group Development Manager in Company A, who is afforded the protection by his line manager, the Group R&D Director. This potentially hinders the speed at which the company innovates and does not make appropriate utilisation of his specialist knowledge and expertise as the substantive R&D resource in his company (Bigliardi *et al.*, 2012).

The relationship between R&D and Marketing is key to NPD (Drechsler *et al.*, 2013; Sherman *et al.*, 2005). The function is responsible for identifying and assessing a firm's opportunities for developing new products (Drechsler *et al.*, 2013) and thus its involvement should be at the start as opposed to the end of the NPD process (Booz *et al.*, 1982; Cooper and Kleinschmidt, 1986). Research conducted found that Marketing should be seen and utilised as an expert resource, to ensure that relevant NPD activities are executed in a timely manner (Drechsler *et al.*, 2013). Firms who deploy a strong and visible Marketing function enjoy more successful development and launch to market of new products (ibid). On this note, praxis within both companies is incongruent with theory. R&D and Marketing suffer from a rather strikingly poor relationship, but the situation is more acute in Company A. Reports from the Marketing Team and Group Development Manager suggests a very distant connection

with each other, even though their roles are central to the process. The Creative Manager emotively observed the fact that her team are “*brought in at the very last minute*” and “*don’t even get involved in naming products*” in the brand portfolio. Such is their distance from the NPD process that the Creative Manager confirmed she cannot say “*with any degree of certainty*” how the NPD process works.

Relating back to Bigliardi *et al.*’s point about effectively managing knowledge workers and their specialist knowledge and skill sets, the Company A Marketing Team are managed remotely by the International MD-M, who is over six thousand miles away in Malaysia. Although he empowers them with the autonomy to make their own decisions (Ahmed and Shepherd, 2010), which they appear to do with aplomb, they experience feelings of isolation and are without someone in a Group director capacity on site who can champion their cause, bring them closer to the R&D Team and make their specialist roles and knowledge, as well as that of the UK Marketing Manager in Company B, an official, visible and intrinsic part of the NPD process that they so desperately crave (Bigliardi *et al.*, 2012; Drechsler *et al.*, 2013).

8.4: Organisational Culture

Organisational culture has a major impact on everything a firm is and does (Schein, 2010; Goffee and Jones, 2003; Ho, 2009; Yeh *et al.*, 2006) and also shapes how it manages and utilises knowledge for NPD (Belassi, 2013; Ho, 2009; Cooper and Kleinschmidt, 1995). In order to manage knowledge effectively, extant literature proclaims the importance of creating knowledge cultures and climates (Oliver and Kandadi, 2006; Riege, 2005), where knowledge sharing, collaboration and mutual trust are regarded as a norm (Belassi, 2013; Zuo and Panda, 2013; Hislop, 2009; Allameh *et al.*, 2011; Janz and Prasarnphanich, 2003). Both companies sport entrepreneurial and innovative cultures. This is a major aspect of their *raison d’être* and their entrepreneurial cultural heritage still has a huge impact on their philosophy and strategy of reactive, emergent and fluid NPD to meet customer and market needs and expectations.

As knowledge-intensive firms (Alvesson, 2000; Hislop, 2009), to a certain extent, both companies encourage knowledge sharing and manage knowledge in a number of ways that are congruent with espoused theory, including the provision of blogs and the intranet (Boutellier *et al.*, 2008; Nicolau, 2004; Gressgård *et al.*, 2014). These communication tools facilitate a modicum of knowledge sharing, although the Senior

Management Teams recognise that knowledge sharing is a major issue with which they have wrestled and are proactively trying to address.

Although the Parent Company takeover was met with mixed opinions by participants in both companies, overall it was seen as a positive. It not only opened new commercial opportunities but also gave knowledge workers the opportunity to share knowledge on a much wider scale with their colleagues in other Parent Company Group network businesses. This sought to not only facilitate a greater level of mutual trust and collaboration, of which several participants in both companies reported there was a dearth, and in turn, enable the creation of new knowledge (Nonaka and Takeuchi, 1995; Zuo and Panda, 2013; Belassi, 2013) for innovation purposes.

A further aspect of congruence is the technical conferences that are hosted by Company A and attended by key knowledge workers in both companies, as well as global technical staff. Importantly, these events are utilised as knowledge creating and sharing opportunities (Nonaka and Takeuchi, 1995). Interpersonal interaction and the utilisation of social networks of personal relationships are important to activities such as NPD (Wenger *et al.*, 2002; Revilla *et al.*, 2009; Goffee and Jones, 2003) because they facilitate the creation and exchange of potentially relevant technical and operational knowledge that is of import to both companies. The conferences also bring knowledge workers together and gives them the opportunity to share their own personal knowledge, as well as access key specialist knowledge from around the firm tacitly or face-to-face, in order to enhance the specialist roles they undertake in the NPD process (Nahapiet and Ghoshal, 1998; Swart and Kinnie, 2003; Ahmed and Shepherd, 2010; Newell *et al.*, 2009).

Returning to the Parent Company takeover, since the transaction occurred in the mid-noughties, both companies have experienced cultural change, though the findings would suggest that some of this transmutation has been somewhat subconscious. Despite being much larger, it would appear that they are both still operating under the guise of their original entrepreneurial culture. This has impacted on various aspects of their knowledge management practices, including the sharing of knowledge and communication. Extant literature suggests that the growth of firms can be an inhibitor to, or disabler of, the kind of specialist knowledge sharing that is required for NPD (Riege, 2005). Certain processes that were manageable as small entities may be

rendered obsolete as the firm grows and evolves over a period of time. This may then lead to inefficiency and serve to hinder knowledge flows and collaboration. Poor knowledge sharing, communication and collaboration are reportedly rife within both companies, but more so in Company A, where the situation is much more acute due to the network of business entities that are geographically dispersed. Situations such as those highlighted above, can be worsened if the existing culture, climate and infrastructure do not provide a sufficient level of underpinning and overarching support for knowledge sharing and transfer (ibid).

Various theorists suggest that what both Company A and B are experiencing is perfectly normal (Oliver and Kandadi, 2006; Pan and Scarborough, 1999; Davenport *et al.*, 1998). As knowledge intensive-firms, trying to change a culture, albeit entrepreneurial, to one that is knowledge-based can be a daunting, complex and time-consuming process. An 'easier' option is to fit knowledge management initiatives around the culture rather than trying to change the culture to fit knowledge management (Sabri, 2005; McDermott and O'Dell, 2001). In this way, strategies to manage knowledge more effectively can be moulded to fit both companies' contexts, including whether they use codification, personalisation or a hybrid of the two, to develop new or modify existing products and solve problems (Goffin and Koners, 2011; Hansen *et al.*, 1999; Nonaka and Takeuchi, 1995). In addition, to facilitate and achieve the kind of cultural sculpting that theorists advocate, the Senior Management Teams in both companies would be required to enmesh appropriate knowledge behaviours and values within the existing culture (Hislop, 2009); a feat which extant literature pessimistically claims would be difficult to achieve (McDermott and O'Dell, 2001).

Returning to the theme of the culture and unsupportive infrastructure in Company A's global network, the findings highlighted an issue with knowledge hoarding. The Group R&D Director felt strongly that the 'new' culture, catalysed by the takeover, does not aid knowledge sharing and as a consequence, individuals are very "*self-protective*" of their specialist knowledge. He claims that people keep their own counsel where their own knowledge is concerned because of parochial self-interest, rather than working towards the overall good of the company. Of course, the situation is exacerbated by the poor levels of communication, perpetuated by current issues with the technological infrastructure. As a result of this, a duplication of effort

(Ahmed and Shepherd, 2010) often takes place among the global technical teams due to, as reported by the International MD-M, their reticence to share their formulatory expertise, resulting in increased lead times and development costs. As Company A is experiencing first-hand, the exercising of power by technical teams and others who are essentially carriers of dynamic, individual, subjective, highly equivocal and idiosyncratic knowledge (Dixon, 2000; Newell *et al.*, 2009), may be as a direct result of their potentially irrational fear that they will lose their expert power if they share it with others. Such practices may lead to the stifling of creativity and ultimately hinder innovation from taking place (Newell *et al.*, 2009).

Theory espouses that culture can be labelled as a key disabler of the management of knowledge, mainly because it shapes individuals' assumptions about what knowledge is, the type of knowledge that is worth managing and who owns it, shares it and hoards it (Park *et al.*, 2004; Donnellan and Fitzgerald, 2003). As the Senior Management Team in Company A and ostensibly Company B are experiencing, culture can thus have a disabling influence on how their companies manage their specialist knowledge resources and also how their knowledge is used to develop new and modify existing products. It is evident that both companies are suffering from a lack of tacit, face-to-face interaction and knowledge exchange. Embedded within the epistemology of practice (Hislop, 2013), tacit knowledge is a crucial element of NPD within firms (Goffin *et al.*, 2010; Nonaka and Takeuchi, 1995), as much of the knowledge that is utilised in this process is tacit in nature (Goffin *et al.*, 2010). In Company A, the knowledge sharing quandary is exacerbated by a sales led culture, as evidenced by the 90% rise in Group sales since the takeover. The chase to constantly innovate in order to meet strict sales targets has resulted in less time for individuals to meet and share the kind of tacit knowledge that theorists espouse is so important to innovation (Goffin *et al.*, 2010; Nonaka and Takeuchi, 1995).

The transmutation from being a small “*face-to-face*” company (Group Finance Director) to a large one that is heavily reliant on blogs, email and teleconferencing (Group MD), precludes the kind of interaction that would generate the exchange of technical tacit knowledge, which encompasses information, expertise, skills and specialist knowledge (Gore and Gore, 1999; Sternberg, 1997). To cope with scenarios such as those present in both companies, Hansen *et al.* (1999) propose utilising a personalisation strategy, which privileges tacit over explicit knowledge, keeps

knowledge in a “*state of fluid gestation*” (Schulz and Jobe, 2001:144) and focuses on individuals as knowledge carriers. Indubitably, tacit forms of knowledge can yield significant benefits to both Company A and B (Jasimuddin *et al.*, 2005) because it cannot be easily replicated or imitated (Spender, 1995), can support a high rate of innovation (Alvesson, 2001) and a minimal investment in IT is required (Johannessen *et al.*, 2001). On the negative side, as Company A is primarily experiencing, knowledge workers can be reluctant to share their knowledge (Szulanski, 1996), tacit knowledge is often difficult to communicate and store (Ambrosini and Bowman, 2001; Connell *et al.*, 2003) and the company may suffer a loss of key knowledge due to labour turnover (Boiral, 2002). However, this last point may not be so relevant to Company A and B, as turnover is relatively low, which theoretically, goes against the trend as knowledge-intensive firms tend to experience high rates of attrition (Hislop, 2013).

Knowledge workers in both companies appear to be loyal to their employers and enjoy working for them, despite the issues that have been raised. In terms of demographics, which was highlighted during the axial coding stage of the thematic data analysis (see Chapter 4), in Company A, 40% of the workforce have been employed for over 10 years (10% over 20 years). In Company B, 35% have been employed the same length of time (20% over 20 years). Both companies have thus built up an impressive organisational knowledge base and may therefore wish to preserve that by privileging more explicit knowledge over tacit knowledge or adopting a symbiosis strategy (Jasimuddin *et al.*, 2005) or hybrid strategy (Hansen *et al.*, 1999), particularly as they are much larger than they used to be and can utilise sophisticated ICT, through their existing infrastructure to disseminate knowledge around the firm (Kuo and Myers, 2012; Hislop, 2009).

Associated with a lack of tacit knowledge exchange is the absence of a cross-functional NPD team and visible NPD process in both companies. Addressing the first point, this is incongruent with espoused theory. Extant literature identifies that cross-functional teams play an important role in NPD (Ahmed and Shepherd, 2010; Drechsler *et al.*, 2013; Gemser and Leenders, 2011). As the name suggests, individuals who have key responsibilities for executing NPD projects within specific cost, time and quality constraints, are drawn from a variety of levels and functions within the firm (Ahmed and Shepherd, 2010). While knowledge workers in Company

A and B are empowered to use their specialist roles and knowledge autonomously, the findings suggest there are no ‘official’ mechanisms to coordinate what they do, with whom they liaise on a cross-functional basis and, in the absence of an NPD process, the stages in which they are involved.

In order to work optimally, the formation of an NPD team would require various inputs from the Senior Management Teams, including providing opportunities for the team to be co-located together, at the same physical location, as it enables knowledge to be more ‘easily’ managed via frequent interaction between members of the team (Ahmed and Shepherd, 2010). This could be facilitated through the Product Council (Bresman *et al.*, 2010; Karlsson and Åhlström, 1997), for instance, which would help to build trust, improve communication and collaboration and reinforce shared values, social similarity and team expectations (Cetindamar *et al.*, 2010; Ahmed and Shepherd, 2010). Of course, problems can arise from situations in Company A, where technical and other teams are geographically dispersed. In that case, the Senior Management Team could overcome the absence of co-location by providing an appropriate ICT infrastructure, such as videoconferencing (which the Group MD admitted the company does not do) and virtual project rooms (Rahman, 2012; Ahmed and Shepherd, 2010; Roberts, 2000), to enable the social interaction knowledge workers need to share their cross-functional specialist knowledge. This is even more important in the Senior Management Team’s efforts to cross-fertilise the knowledge of two key teams in the NPD process: Marketing and R&D (Drechsler *et al.*, 2013; Sherman *et al.*, 2005).

The second point that is incongruent with extant literature is the issue of the absent NPD process. The Group MD in Company A espoused the presence of a structure and system for bringing products to market. This was mirrored by the Technical Director in Company B, who suggested that the company had been in possession of a process for years, but operationally, he was precluded from using it due to the company’s philosophy and strategy of emergent, reactive development, along with his burgeoning workload. Theorists advocate that firms can improve their innovation performance by having an explicit NPD process, which is primarily aimed at reducing uncertainty and giving a sense of structure to developing new products (Cooper and Kleinschmidt, 1991; Craig and Hart, 1992). The aim of NPD, as a knowledge-intensive process (Revilla *et al.*, 2009) is to capture specialist knowledge that can be exploited and

embody it into new products and technologies (Nonaka, 1991; Bigliardi *et al.*, 2012; Cetindamar *et al.*, 2010). Importantly, research suggests that the NPD process not only outlines sequential activities in which firms can engage to make their innovation endeavours more successful (Cooper and Edgett, 2010; Cooper and Kleinschmidt, 1986; Booz *et al.*, 1982), but also emphasises its cross-functional and multidisciplinary nature and the vital role systemic functions such as Marketing and R&D in Company A and B play in the various stages of the process (Drechsler *et al.*, 2013).

Research further proposes that knowledge workers, such as those employed by Company A and B, play a key role in progressing NPD projects from ideation to launch (Cooper and Kleinschmidt, 1986) and therefore having a formal process would optimise the management and utilisation of their specialist knowledge by the Senior Management Teams. It should be noted that the stages Company A and B go through in developing new and modifying existing products does infer the existence of some form of procedure. However, calls from the Company B Data Administrator for a disciplined, sequential procedure and from the European Manufacturing Director for a “*proper structure of product development*” suggests that if there is an existing NPD process, it has not been effectively communicated to those who are at the forefront of product development and modification and have a close and indelible relationship to it. In addition to the Senior Management Teams in both companies optimising how knowledge is managed and utilised more appropriately, allocating the right resources, including HR, money and marketing to the various stages of the NPD process, is key to improving performance (Drechsler *et al.*, 2013).

Despite not having a formal, visible process, with which the Senior Management Teams and knowledge workers can identify and utilise, both companies are highly successful innovators. However, by not having a formal NPD procedure, they are not making optimum use of the knowledge resources they have at their disposal and are potentially missing out on even more successful new product performance (Wang and Lee, 2011; Drechsler *et al.*, 2013).

Finally, a source of chagrin in both companies is the infrequency of meetings at all levels of the business. This is being felt heavily at strategic level, where theorists attest that senior managers’ roles and responsibilities for knowledge management, NPD and

the success of the business at large, are crucial (Ahmed and Shepherd, 2010). Senior Directors in both companies proffered that knowledge sharing is an issue, particularly because they do not meet together enough as a Senior Management Team. In Company B, this was reported by the Europe MD and European Manufacturing Director, both of whom said it has not only impacted on knowledge dissemination but has also led to reactive knowledge sharing and poor planning. Extant literature describes the NPD process as an iterative procedure that gathers, creates and evaluates a range of diverse information, opinions and ideas from across functional areas (Shankar *et al.*, 2013). Therefore, the Senior Management Teams should ensure there is an adequate level of coordination between themselves, knowledge workers and their specialist roles and knowledge and the overall needs of the firm, in terms of managing knowledge for NPD (*ibid.*).

Praxis within both companies, particularly in relation to infrequent meetings, (which were also an issue at operational level) and the resultant lack of contact between key strategy and decision makers and operational staff, are incongruent with the espousal of theory. There were calls for a “*better communication culture*,” along with “*more opportunities and systems to facilitate cross-functional knowledge sharing and information*” (Creative Manager), which has arisen primarily due to what she described as the ‘fragmented’ culture. This therefore suggests that in terms of organisational culture, the infrastructure is, in some ways, unsupportive, knowledge is not treated as a strategic asset and thus does not underpin the kind of systemic knowledge sharing that is required for NPD.

8.5: Organisational Structure

Extant literature proffers that organisational structure is a key influencing mechanism of knowledge management and NPD (Mahmoudsalehi *et al.*, 2012; Pertusa-Ortega *et al.*, 2010; Stonehouse and Pemberton, 1999; Lee and Choi, 2003). Among other things, structure reflects the efficient (or otherwise) distribution and utilisation of knowledge and information within the firm (Martinez-Léon and Martinez-Garcia, 2011). This configuration therefore, importantly, enables or disables the firm’s capacity to innovate and how it learns, adapts to change and generates added value for its external stakeholders (*ibid.*). Various aspects of business practice in Company A and B are both congruent and incongruent with espoused theory. First, in Company A, the restructuring of its entrepreneurial structure to a network of geographically

dispersed global business entities is, in many ways, a positive for the company, insofar as entity MDs can run their businesses on a global basis (Ahmed and Shepherd, 2010), but with local presence in the country of operation. This gives them the ability and agility to attract and recruit local specialist knowledge and be closer to their customers and clients (ibid). However, although this gives them some advantages, the evidence suggests that they have not consciously recognised the structure as a network and have thus not implemented an appropriate ICT support and technological infrastructure to enable technical and other teams to enjoy the knowledge sharing they require and crave.

On this note, the configuration adopted by Company A appears to match the integrated R&D network (Ahmed and Shepherd, 2010; Boutellier *et al.*, 2008). The Group network is a constellation of sixteen legally independent business entities that are geographically dispersed around the world. Entities are able to lead on R&D, manufacturing and marketing to meet local climatic conditions and market responsiveness and the network benefits from not only distributed specialised resources and capabilities, but also influence and power that are located in personal and organisational networks. Adoption and recognition of the network structure is contingent on a number of factors (Birkinshaw, 2002). First, the firm's commercial environment and management heritage and style. Company A's philosophy and strategy of emergent, reactive development in response to market demand and other forces for change may impact on the effectiveness of the network. Second, knowledge, communication and learning processes should be enabled via a coordinated approach between the business entities/network nodes (Boutellier *et al.*, 2008).

The findings have demonstrated that this is a long-standing issue. The International MD-M pointed out that knowledge sharing for NPD, strategy formation and implementation and marketing as a Group of companies has been poor. Indeed, he admitted they had been "*getting better at it,*" but had not "*mastered it.*" Third, theorists advise that managing this network requires the Senior Management Team to have a clear idea of what type of knowledge resources and assets are needed for NPD and then structure accordingly (Birkinshaw, 2002; Boutellier *et al.*, 2008). Again, this has been a challenge for not only Company A but also Company B, as they do not have an accurate picture of which knowledge resides where, due to information about

the annual performance assessments not being disseminated to key individuals around the business. This will be discussed further in the next variable.

Literature advocates the identification of what types of knowledge should be codified or kept tacit (Gressgård *et al.*, 2014). As highlighted in the previous variable, knowledge workers are supported by blogs, email and teleconferencing. Where it appears to be lacking is tacit contact via, for example, videoconferencing. The remoteness of the entities restricts more frequent contact or co-location (Ahmed and Shepherd, 2010), but capital investment in videoconferencing would enable more tacit and social interaction to take place (Rahman, 2012; Ahmed and Shepherd, 2010; Salomo *et al.*, 2010), which the evidence found knowledge workers in both companies want a lot more of. On that note, videoconferencing could also be used to support the introduction of a virtual Product Council or virtual community of practice (Ardichvili *et al.*, 2003), to provide badly needed knowledge sharing within the entities and avoid the eruption of knowledge hoarding (Riege, 2005) and silos of knowledge (Bartlett and Ghoshal, 1998; Goh, 2002).

In Company B, an element of hierarchy was introduced into the flat structure, in a bid to resolve operational deficiencies and reduce knowledge worker role ambiguity. Extant literature espouses that implementing a degree of formalisation and structure can not only increase a firm's performance by enhancing how it manages and utilises knowledge, but also reduce ambiguity; thus integrating different types of functional knowledge into organisational units (Chen *et al.*, 2010; Pertusa-Ortega *et al.*, 2010; Chen and Huang, 2007; Brooks, 1999). The Europe MD admitted that introducing hierarchy into a historically flat, entrepreneurial structure was a good move, insofar as the company is now *"more profitable, more focused and has more leadership because of that."* Operational staff have also recognised the changes that the addition of more structure has made to the business. The removal of role ambiguity has meant that knowledge workers can now *"understand each other's roles...we all wore several hats...people have now got clear job roles and job specifications..."* (Resource Manager). However, introducing formalisation and bureaucracy can lead to poor communication flows between functional areas, stifle knowledge sharing and promote silos of knowledge (Stonehouse and Pemberton, 1999; Goh, 2002; Donnellan and Fitzgerald, 2003). To a lesser or greater extent, both companies have experienced aspects of this over the past few years.

However beneficial the changes have been, both companies have suffered a rift between them, which, in some respects, has been catalysed by the split that took place in the 1990s. This has resulted in poor cross-functional knowledge sharing, collaboration, trust and communication between key functions such as Marketing and R&D and various members of the Senior Management Teams. Such conflict and personality clashes can stifle creativity and hinder ideation and innovation from taking place (Newell *et al.*, 2009). However, far from being a negative or a disabler, theorists counsel that the Senior Management Teams should not necessarily see conflict between the two companies as unfavourable (Lam *et al.*, 2007). Instead, it could assist them to manage knowledge by catalysing cross-functional dialogue between key knowledge workers in the NPD process and actually speed up, as opposed to hinder, the rate at which decisions are made or ideation takes place (*ibid*). This could also be supported by the inception of a cross-functional NPD team, the absence of which has caused several problems for both companies, as outlined in the previous variable.

8.6: Leadership and Management

The role of leaders and managers in managing knowledge in the NPD process is a pivotal one (Richtnér and Åhlström, 2010; Holsapple and Joshi, 2000; Cooper and Kleinschmidt, 2007). Through the utilisation of transformational (Birasnav *et al.*, 2011; Bryant, 2003) and transactional (Clegg *et al.*, 2011; Robbins, 2003; Bryant, 2003) styles of leadership, they are charged with the responsibility of managing knowledge by imbuing a knowledge culture and climate that encourages knowledge creation and sharing via both tacit and explicit knowledge (Nonaka and Takeuchi, 1995; Hanson *et al.*, 1999). In terms of actual practice in both companies, there are a number of congruencies and incongruities. First, the Senior Management Teams stage the annual performance assessment review, which gives individuals an opportunity to set and work towards the achievement of objectives as well as a bonus. Knowledge workers are also encouraged to express how their specialist knowledge can enhance their jobs and contribute to organisational performance. Extant literature suggests that this not only influences knowledge worker motivation but also their willingness and ability to create new knowledge and convert their ideas into developing new and modifying existing products (Bryant, 2003; Nonaka, 1991). Regardless of the issues that have been raised in the findings and cross-case analysis, the employees in Company A and B appear to be very motivated, engaged with their jobs and

committed to their firms. This is further reinforced by their length of service, as highlighted in the previous variable.

Second, as discussed in the performance reviews, knowledge workers are given autonomy to utilise their specialist knowledge where and when needed, within the remit of their specialist roles. This practice is welcomed by theorists, as too much direct control acts as a disabler (Richtnér and Åhlström, 2010; Riege, 2005). As reported earlier in this chapter, strategic and operational knowledge worker autonomy is a key feature of engaging in knowledge work, such as NPD (Ahmed and Shepherd, 2010; Newell *et al.*, 2009). This enables individuals such as the Group Development Manager in Company A to *“feel free to do whatever I think is good for the company.”* Third, it was reported that Company B hosted a Team Bonding Day, in order to bridge the divide and stem the conflict that had built up between both companies. Literature proposes that knowledge workers thrive in cultures and working environments that are open, supportive, harmonious and conducive to promoting knowledge worker confidence, trust, collaboration and, importantly, knowledge sharing (Bigliardi *et al.*, 2012).

Despite several good management practices, a number of incongruities were evident. Although theorists call for enabling systems to facilitate the free flow of key knowledge and information around the firm for, among other things, decision-making and resource allocation (Hlupic *et al.*, 2002; Hislop, 2009), the Senior Management Teams do not share the data from the annual performance assessment reviews with each other. This means that they, along with key functions such as HR, cannot determine what knowledge resides where across the business. This therefore does not enable managers to make optimal use of the knowledge resources they have at their disposal. In addition, there is no monitoring of knowledge sharing following the technical conferences, to evaluate whether valuable specialist knowledge has been transferred to the job and, importantly, embedded in new products. This leads to duplication of effort and an increase in development and modification costs that could have been avoided, had an appropriate system and procedure been in place (Ahmed and Shepherd, 2010).

In addition, the Senior Management Teams have a wide and critical remit in managing knowledge and NPD within their companies, particularly in terms of global innovation

in Company A (Ahmed and Shepherd, 2010). Their roles and responsibilities have far-reaching consequences for the longevity of the business. Yet, despite this and regardless of their successful innovation endeavours, there is no cross-functional NPD team (Drechsler *et al.*, 2013; Gemser and Leenders, 2011). This reduces knowledge workers' opportunities to share specialist knowledge and collaborate with each other (Cetindamar *et al.*, 2010). On that note, although Marketing, as a function, is key to NPD (Drechsler *et al.*, 2013), the evidence suggests it has very limited involvement with many of the front-end activities in either company. This is incongruent with extant literature, which advocates a close relationship between Marketing, R&D and the NPD process (ibid; Booz *et al.*, 1982; Cooper and Kleinschmidt, 1986).

Finally, it was mooted by a number of participants that the Senior Management Teams had not done enough to promote tacit knowledge sharing activities. It would not be fair to say that there is no commitment to knowledge creation and sharing because there clearly is. However, extant literature suggests that a lack of commitment to knowledge sharing and creation is a disabler (Richtnér and Åhlström, 2010; Riege, 2005). Although this was covered in previous variables, it is also worth noting here, as leaders and managers have a primary responsibility for creating and maintaining a culture and climate that is receptive to knowledge sharing (Bryant, 2003) and providing adequate opportunities for knowledge workers to share their tacit knowledge, particularly as it is a vital element of NPD within firms (Goffin *et al.*, 2010; Nonaka and Takeuchi, 1995).

8.7: Specialist Roles and Knowledge

As anticipated and welcomed, much of the content of this variable has been covered in the previous four; thus highlighting the interconnectedness and symbiosis of the variables and the need to ensure that the organisational infrastructure is thus appropriately configured to maintain synergy between them. Knowledge workers and their specialist knowledge are at the heart of the creation of organisational knowledge (Yeh *et al.*, 2006; Theriou *et al.*, 2011). The appropriate management and utilisation of their knowledge for NPD is of vital importance to firms, such as Company A and B, in order to remain competitive (Bigliardi *et al.*, 2012). The specialist roles knowledge workers undertake are also of strategic importance to firms who develop innovative products (Lakshman, 2009; Bigliardi *et al.*, 2012; Bollinger and Smith, 2001). Therefore, leaders and managers are challenged to maximise the value that the

utilisation of their expertise and skill sets can bring to the business by managing them effectively (Bigliardi *et al.*, 2012).

Overall, both companies employ a cadre of talented, high calibre knowledge workers, the majority of whom have been working for their company for over ten years. As pointed out in the findings and cross-case analysis, they adopt a number of very good, benchmarkable management practices, the bulk of which under this variable are congruent with those espoused in extant literature. These include knowledge worker autonomy (Ho *et al.*, 2014; Ahmed and Shepherd, 2010; Newell *et al.*, 2009) and the freedom to utilise their specialist knowledge, which ranges from reaction chemistry, raw materials, process engineering and commercial knowledge in Company A, to technical, client, market and product knowledge in Company B (Empson, 2001), as highlighted in the findings.

In addition, knowledge workers in both companies are encouraged and empowered to create, share and apply a tranche of skills that are allied to NPD, which serve to enhance the process (Cooper and Kleinschmidt, 2007; Song and Parry, 1997). These include NPD planning skills (Day, 1975), in which key knowledge workers such as the R&D Teams, Group R&D Director and Technical Director engage and marketing development and launch and commercialisation skills (Johne and Snelson, 1988), as utilised by the Marketing Teams. It is fair to say that both companies deploy knowledge workers to aspects of NPD that drive their innovation endeavours (Ahmed and Shepherd, 2010).

However, the absence of a cross-functional team (Drechsler *et al.*, 2013; Gemser and Leenders, 2011), as well as an NPD process (Booz *et al.*, 1982; Cooper and Kleinschmidt, 1986; Wang and Lee, 2011), both of which have been showcased in this chapter and in preceding variables, does not make the specialist roles they undertake explicit enough or utilised appropriately. The Product Council, which was disbanded by Senior Management, would have helped to serve this purpose (Fitzgerald *et al.*, 2013; Bresman *et al.*, 2010). Having a more structured approach to NPD, as asserted in the literature and suggested by several participants in both companies, would have ensured that knowledge workers had a knowledge sharing platform, specifically a cross-functional NPD team, through which they could add their creative flair and generate ideas as a collective (Edvarsson, 2008; Ruikar *et al.*, 2009). This could also

serve to assuage some of the conflict between the two companies, help build bridges and relationships between Marketing and R&D, facilitate opportunities to share knowledge with other experts in the group network and thus improve the ways in which the Senior Management Teams manage knowledge in the NPD process.

The issue of knowledge workers articulating their specialist knowledge into codified documents and artefacts will be discussed in the final variable below.

8.8: ICT, Systems and Communication

The final variable in this discussion underpins and overarches both companies' efforts to not only manage their diverse business operations on a daily basis but also intrinsically linked to that, manage the knowledge of their workforce. As an enabler of the management of knowledge and knowledge processes (Pérez-López and Allegre, 2012; Alavi and Leidner, 2001), information and communication technologies facilitate the storage, access, processing, transfer and sharing of explicit knowledge, regardless of location through coordinated and collaborative interfaces in a cost-effective manner (Van den Brink, 2003; Migdadi, 2009; Chuang *et al.*, 2013; Yeh *et al.*, 2006). This technological infrastructural support is vital to firms, such as Company A and B, because of the nature of the products they develop and modify.

In terms of congruent organisational praxis, both companies have an IT infrastructure that provides the Senior Management Teams and knowledge workers with the majority of tools they need to execute their job roles. These include communication and collaboration tools, such as email and teleconferencing and a raft of systems, which will be discussed shortly. This can be useful in situations where knowledge workers and teams are not co-located (Ahmed and Shepherd, 2010), but it can cause issues when individuals become over reliant on a particular piece of technology, rather than communicating face-to-face. The IT Director admitted that Company A is "*addicted to email*" and the bulk of NPD knowledge and information is shared through that medium. Rather than being a 'negative' thing, Revilla *et al.* (2009) suggests that technology, such as email, connects people to people and can enable improvements to be made to the way people communicate and collaborate, particularly over geographically dispersed areas (Ahmed and Shepherd, 2010; Riege, 2005), such as the global business entities.

As Company A and B are knowledge-intensive firms (Alvesson, 2000; Hislop, 2009), theorists counsel the utilisation of repositories of knowledge such as intranets (Gressgård, 2014; Boutellier *et al.*, 2008; Sanchez, 2005; Newell *et al.*, 2009), or searchable libraries (Revilla *et al.*, 2009) that facilitate the capture of the collective knowledge and expertise of knowledge workers more systematically (Blake, 1998). It also ensures that key types of knowledge, such as technical and client (Empson, 2001), are shared throughout the firm and are available when and where needed for NPD and modification. Both companies have an intranet, which is congruent with the espousal of theory (Barnes and Vidgen, 2012). However, it was evident that there was a large degree of nescience about it, in terms of whether or not an intranet existed, what it was called, what it could do and who had access to it. It is fair to say there was an element of uncertainty about the system and to what extent it was there to support knowledge sharing activities or merely to act as a virtual filing cabinet and store codified documents and files. Extant literature attests that an intranet is highly suitable for supporting NPD teams, particularly those in geographically dispersed R&D networks, such as Company A (Boutellier *et al.*, 2008). It can not only enable the development of an informal network, but also promote creativity, information exchange, support the coordination of activities and promote greater efficiency (ibid).

In reality, the International MD-M reported that technical teams almost have an aversion to using technology such as the intranet because they find it “*too difficult*” and prefer to use something more suited to their needs. Hence, the design of the blog by the Marketing Department, which is causing issues of its own, due to the request of the technical teams for their own dedicated system with restricted access to non-technical staff. The Communications Coordinator felt this would be counterproductive and disable rather than enable more transparent knowledge sharing. Basically, the company doesn’t “*have a successful or practical communication platform for putting anything on*” (International MD-M), so it is responding to an acute situation, which if not addressed could lead to even further communication, knowledge sharing and transfer problems (Riege, 2005; Snyder and Lee-Partridge, 2013).

In Company B, the use of the intranet also yielded mixed responses. It was described as the “*best kept secret*” and “*least used*” IT system in the company by the General Manager. Although that may be the case, one of the Technical Advisers views the intranet as a pseudo knowledge management system, which importantly enables

knowledge sharing, primarily because the content is readily available to knowledge workers and others who need it. On that note, extant literature espouses the utilisation of ‘official’ knowledge management and enterprise systems as information portals that are driven by IT (Alavi and Leidner, 2001; Pfaff and Hasan, 2011). These systems, they claim, enable and enhance the creation, storage, retrieval, transfer and application of knowledge throughout the firm (Pfaff and Hasan, 2011). Importantly, the primary aim of these systems is to make codified knowledge and other documents available to knowledge workers, whenever and wherever they need it (O’Brien and Marakas, 2006; Pfaff and Hasan, 2011; Khalifa *et al.*, 2008).

Although both companies utilise their intranets to store and disseminate knowledge, ostensibly as a pseudo knowledge management system, neither company ‘officially’ deploys such a system, with which everyone recognises, uses and engages. The comment made by the Company B General Manager that the intranet is the “*best kept secret*” epitomises how it is perceived by several key knowledge workers, including the Technical Director, who admitted not even he uses it. This clearly disadvantages non-users of the system, particularly as it houses product data sheets, technical data and other key information and everyone has “*access to it globally*” (Europe MD). As a management information system, the Europe MD reported that the support it gives to the Senior Management Team to facilitate knowledge sharing “*could be better.*”

In terms of NPD systems, Company B reported the use of the Syspro enterprise resource planning (ERP) system, which facilitates the access to, and dissemination of, specialist and operational knowledge that is of use and import to the NPD process. The utilisation of such systems is congruent with the espousal of theorists, who suggest that deploying enterprise systems support the conducting of knowledge work and the flow of knowledge, information and financial resources between the functional areas, including product planning and scheduling and control, purchasing, financial and HR and sales (Newell *et al.*, 2009; Chang *et al.*, 2008; Ifinedo, 2008). The objective here is to disseminate knowledge to the right people at the right time to enable timely NPD and product modification to be undertaken. However, opinion of the systems was mixed. While some participants claimed, as theory suggests, that they are “*all there for everybody...whenever they need it or customers need it*” (Senior SOP Coordinator), others, such as the Samples Manager, noted that the systems “*didn’t*” enable knowledge sharing, ultimately because he is reliant on his own

personal, tacit knowledge of “*knowing what works*,” which theorists claim is a vital and powerful tool in developing new products (Nonaka and Takeuchi, 1995; Goffin *et al.*, 2010).

This lends credence to the use of a socio-technical systems approach and symbiosis strategy (Jasimuddin *et al.*, 2005) to the management of knowledge, which combines the use of IT tools with intellectual, human and social capital (Carayanis, 1998) and takes into account the needs and expectations of its end users. This would balance the needs of the business to be supported by an ICT infrastructure, but also satisfy calls for knowledge workers in both companies to “*physically get together*” (Group MD), share their tacit knowledge and have “*physical contact of some kind*,” which the International MD-M admitted they enjoy immensely. A Product Council, either virtual or co-located (Fitzgerald *et al.*, 2013; Bresman *et al.*, 2010; Ahmed and Shepherd, 2010), supported by videoconferencing (Ahmed and Shepherd, 2010; Rahman, 2012), which the Group MD reported Company A does not do, would also provide much-needed tacit support to technical teams and other knowledge workers in the remote global entities (Boutellier *et al.*, 2008; Ahmed and Shepherd, 2010).

Theorists suggest that information overload (Zhuang *et al.*, 2011), from which neither company shows evidence of suffering, can disable effective knowledge sharing and transfer. Poor system design, such as the intranet and other ICT enabled systems that are not user-friendly (Gallivan *et al.*, 2003; Stonehouse and Pemberton, 1999) can hinder acceptance and uptake, leading to their non-use, as both Company A and B have experienced. An interesting point to note is the espousal that knowledge workers may not be willing to articulate and codify their specialist tacit knowledge to be shared with others (Gallivan *et al.*, 2003; Stonehouse and Pemberton, 1999). As highlighted earlier in this chapter, praxis within both companies confirms that this is not the case. As part of their day-to-day specialist roles, knowledge workers externalise their tacit knowledge into explicit formats (Nonaka and Takeuchi, 1995; Evans and Easterby-Smith, 2001), such as chemical formulae, intranets, laboratory reports, technical data sheets, etcetera (Hansen *et al.*, 1999; Jasimuddin *et al.*, 2005).

The point to make here is that this practice is done in both companies without an ‘official’ knowledge management codification strategy (Hansen *et al.*, 1999). One could argue that the specialist roles knowledge workers undertake, along with the

application and utilisation of their specialist knowledge, includes responsibility for preserving their tacit knowledge into explicit forms, is an implied condition within the employment relationship (Hislop, 2009). Their knowledge is not only vital for the continuation of the business and for innovation to take place but is also embedded within the structural and intellectual capital and organisational knowledge base (Rasmussen and Nielsen, 2011; Huang, 2013; Yang *et al.*, 2009) of both companies and in the innovative products they develop and modify (Goffin and Koners, 2011; Chang *et al.*, 2014; Nonaka and Takeuchi, 1995).

Finally, the NPD process is not only a knowledge-creating, and knowledge-intensive process (Goffin and Koners, 2011; Goffin *et al.*, 2010; Nonaka and Takeuchi, 1995), it is also an iterative procedure that gathers, creates and evaluates vast amounts of information from cross functional areas and multiple teams that are spread geographically (Ahmed and Shepherd, 2010; Newell *et al.* 2009; Jacobsen, 2014) for the development of modification of new products (Shankar *et al.*, 2013). Optimising communication is a daunting and challenging task, but it is also a necessary one, as inadequate communication processes can result in an extensive loss of money and time (Shankar *et al.*, 2013). In practice, both companies suffer from poor levels of communication across the business, from the strategic apex to the operating core. The Company A Group MD admitted that overall, the company has to “*work hard at the communication piece,*” primarily because the structure is represented as a cluster of global entities, which he reported hinders learning and communication across the business. The situation, as recounted earlier in this chapter, is exacerbated by the unsupportive infrastructure that does not effectively underpin and service the global communication needs of knowledge workers.

Extant literature advocates that internal corporate communication is important to firms like Company A and B because its primary focus is on ensuring communication levels are optimised and all employees are engaged with whatever systems are implemented (Welch and Jackson, 2007). On that note, the Group Finance Director admitted that “*corporate communication is probably one of the company’s weaker points,*” again due mainly to the type of structure that has been adopted. She suggested that being “*scattered like a bunch of little companies...does not help communication across the company.*” In response to this, theorists caveat that Senior Management Teams are challenged to imbibe better communication in and across business units that are

geographically dispersed (Ahmed and Shepherd, 2010). This can cause its own set of tensions though, due to issues with the absence of co-location (ibid). Support technologies to enable face-to-face contact are therefore needed to develop suitable communication flows.

In Company B, the UK MD remarked that his company faces an uphill “*challenge*” to progress communication to a level where the Senior Management Team “*want it to be.*” That includes reducing the stigma between both companies, which theorists attest can impede communication, the quality and quantity of knowledge and information exchange and ultimately, the relationship that exists between key functional areas, such as R&D and Marketing (Song *et al.*, 1996; Drechsler *et al.*, 2013). As the UK MD also reported, the company is making efforts to solve the communication quandary by developing an internal newsletter (through the Marketing Department), which will be disseminated to all global teams, in between meetings, to keep them informed of current and future product development and modification projects. Theorists welcome this move, as a strategy to engender engagement with, and a sense of belonging to, the firm (Welch and Jackson, 2007).

The Company B Regional Sales Manager concluded “*it’s all about communication.*” Thus, both companies must seek to optimise internal communication throughout the business by ensuring there is appropriate information and knowledge exchange between Senior Management Teams and their knowledge workers, in order to balance their commercial requirements to constantly innovate on an emergent, reactive basis with managing specialist roles and knowledge (Shankar *et al.*, 2013). This includes configuring the organisational variables to ensure the right internal context is provided to maximise the effectiveness of the management of knowledge in the NPD process.

8.9: Summary

As both the literature review and empirical research conclusively found, the development of new and modification of existing products is a knowledge-intensive, knowledge-creating process that is heavily reliant on the specialist roles and knowledge of a variety of knowledge workers from all levels of the firm. The findings in both companies highlighted a number of factors. First, organisational variables are symbiotic and interrelated. It was evident that a range of issues were repeatedly raised in several variables, such as the absence of an NPD process and a cross-functional NPD team, along with poor communication, collaboration and knowledge sharing.

Arguably, these are directly linked to the non-deployment of a structured procedure for developing and modifying products and the lack of input from cross-functional specialist knowledge. Second, both companies engage in a number of good, benchmarkable management practices, one of the most notable being the high level of autonomy that knowledge workers are given to apply and utilise their specialist knowledge to execute the specialist roles they undertake in a range of core and peripheral NPD activities. However, these practices, in many cases, are both congruent and incongruent with theory espoused in extant literature. These will be summarised by variable.

With reference to new product strategy, organisational practices in each company were both congruent and incongruent with espoused theory. In terms of congruencies, the hiring of external, specialist knowledge in Company A and B served to fill the identified knowledge gap and ensured that they could utilise industry-specific, specialist cementitious knowledge, which is rare, inimitable, non-substitutable and a valuable strategic asset to their innovation endeavours. The 'protection' of the Company A Group Development Manager gives the company a further layer of focused NPD using his specialist knowledge and ensures that his expertise is managed more effectively. A further area of congruence is the empowerment of knowledge workers, as showcased in Company B, with the autonomy to utilise their personal, idiosyncratic know-how and apply it to the job. Theoretically, this enables them to exercise their expert power, while at the same time engaging them with their jobs.

A number of incongruities were identified. Despite being highly successful in local and global markets with their innovative products, neither company deploys a focused new product strategy. This has led to the poor allocation and utilisation of resources, including specialist knowledge, to NPD and modification projects, which has impacted on the time to market of new products. The absence of the strategy has further resulted in the under-utilisation of key specialist knowledge resources, such as the Marketing Teams in both companies and Technical Advisers in Company B. Theory suggests that the input from these specialist roles is critical to NPD. In addition, the poor relationship between R&D and Marketing in Company A is also a hindrance to NPD, particularly as theorists espouse that there should be a close collaboration between them and Marketing should be seen and utilised as an expert resource. In addition, neither company appears to have a visible, clear and focused

NPD process, which is implicit within a new product strategy and explicit within extant literature. The Group MD (Company A) and Technical Director (Company B) both espoused the presence of the procedure. However, repeated calls for a more structured process suggest its absence. A further incongruity is the non-protection of the Company B Technical Director. This goes against extant literature, which advocates the effective management and utilisation of specialist knowledge.

The cultural heritage of both companies is inherently entrepreneurial and innovative and it clearly has a huge influence on everything they are and do as a business and as innovators. As with the previous variable, a tranche of management practices were complimentary with espoused theory, including the provision of blogs and the intranet to support knowledge sharing. The technical conferences enable the sharing of knowledge in a collegial environment and give knowledge workers the opportunity to exchange specialist technical and operational tacit knowledge for NPD. In terms of social interaction, the corporate takeover also facilitated the networking of Company A and B knowledge workers with their peers in other companies in the Parent Company Group. Theorists welcome the encouragement of knowledge sharing practices in knowledge-intensive firms. The cultural change in both companies is somewhat subconscious. Although the companies are larger, several of their management practices suggest they are still operating as an entrepreneurial culture, resulting in poor knowledge sharing, communication and collaboration across the business. Extant literature attests that both companies are experiencing a 'normal' part of culture change and are thus counselled to fit knowledge management around the existing culture, which would involve utilising appropriate knowledge management strategies that suit their individual contexts.

With regard to incongruities, evidence suggests that the culture in both companies is not fully supportive of knowledge sharing, resulting in knowledge hoarding, duplication of effort and increased development costs. Although theory propounds the importance of knowledge sharing and the use of tacit knowledge for NPD and modification, both companies suffer from a lack of face-to-face, social interaction. This includes a lack of meetings, which hinders the flow of key strategic and operational knowledge from traversing throughout the business. This is incongruent with espoused theory as developing new products is an iterative process that requires the gathering of a range of diverse knowledge and information from around the firm.

A further incongruity is the absence of a cross-functional NPD team in both companies. Theorists suggest that such teams play an essential role in innovation through the cross-fertilisation of different types of specialist knowledge. An important link to this is the rather poor relationship between R&D and Marketing, which arguably may not be the case if they were part of an 'official' NPD team and NPD process. Theory advocates that such a procedure provides a roadmap of activities and stages that guide a firm's innovation endeavours, including the allocation and utilisation of specialist knowledge resources.

In terms of organisational structure, congruent practices include the deconstruction of the Company A structure to an organic network, in which knowledge workers are supported by email, teleconferencing and blogs. The network provides Company A with a tranche of benefits, but it does not provide videoconferencing to support knowledge sharing in the absence of co-location. Not giving knowledge workers the exposure to appropriate tacit knowledge is incongruent with extant literature. In Company B, the introduction of an element of formalisation and hierarchy into the historically flat structure has reduced knowledge worker role ambiguity and generated more profit, focus and leadership. It has also enabled knowledge workers to exercise autonomy more freely, as job roles and specifications are now clearer. Additionally, theorists suggest that knowledge workers should be provided with a harmonious working environment, which is conducive to optimal knowledge sharing, communication and collaboration to fuel activities such as ideation. Conflict between both companies does dent this somewhat and it has resulted in a poor relationship between key functional areas such as R&D and Marketing.

With regard to leadership and management, congruent ways in which both companies manage knowledge include encouraging knowledge workers to set objectives through the annual performance assessment review and working towards a bonus. Both of these practices are espoused to engender knowledge work, motivation, a willingness to create new knowledge and convert ideas to new products. Akin to this is the empowerment of knowledge workers by imbuing them with personal autonomy, a practice which theory attests is a key feature of knowledge work in NPD. Company B hosted the team bonding day in a bid to heal the rift between the two companies and engender more collegiality and collaboration. According to literature, such a

management practice promotes a working environment that is conducive to knowledge worker trust, confidence, etc.

Incongruent aspects of operations in both companies include a lack of enabling systems to disseminate key information from annual performance reviews to those who need it, in order that effective resourcing decisions can be made. This also precludes the Senior Management Teams from determining whether knowledge has been transferred from the technical conferences to new products. A further incongruity is the distant relationship between R&D and Marketing, particularly in Company A, which theory asserts should be the opposite to enable both functions to freely apply their specialist knowledge to NPD activities.

Specialist roles and knowledge is one of the key enablers of the management of knowledge. There was a good deal of overlap of this variable in New Product Strategy, Organisational Culture, Organisational Structure and Leadership and Management, which highlights their symbiosis and interconnectivity. There were elements of very good practice, which are congruent with espoused theory, such as knowledge worker autonomy and their freedom to utilise and apply their specialist knowledge. This knowledge included reaction chemistry, process engineering and commercial knowledge in Company A and technical, client and market knowledge in Company B. In line with espoused theory, knowledge workers also apply a range of specialist skills to NPD, including planning, marketing and launch and commercialisation. Incongruent knowledge management praxis in both companies includes the absence of a structured NPD process and cross-functional NPD team, which has resulted in unclear specialist roles, the underutilisation of specialist knowledge such as Marketing and R&D and the nonexistence of a workable and user-friendly knowledge sharing platform.

Finally, in terms of ICT, in accordance with literature, both companies deploy an IT infrastructure, which provides support for day-to-day tasks via email, teleconferencing and other collaboration tools. Both companies have an intranet, although a large degree of nescience about it, including the perception by some knowledge workers that it is a receptacle primarily for technical staff, precludes some individuals from using it. Incidentally, as reported, technical teams find the intranet too difficult to use, which adds another barrier to knowledge dissemination and sharing. It is also seen and

used by a number of participants in Company B as an ‘unofficial’ knowledge management system or repository. Despite the utilisation of the intranet, neither company deploys a knowledge management system, which theory states is a necessary weapon to promote systemic knowledge sharing throughout the business.

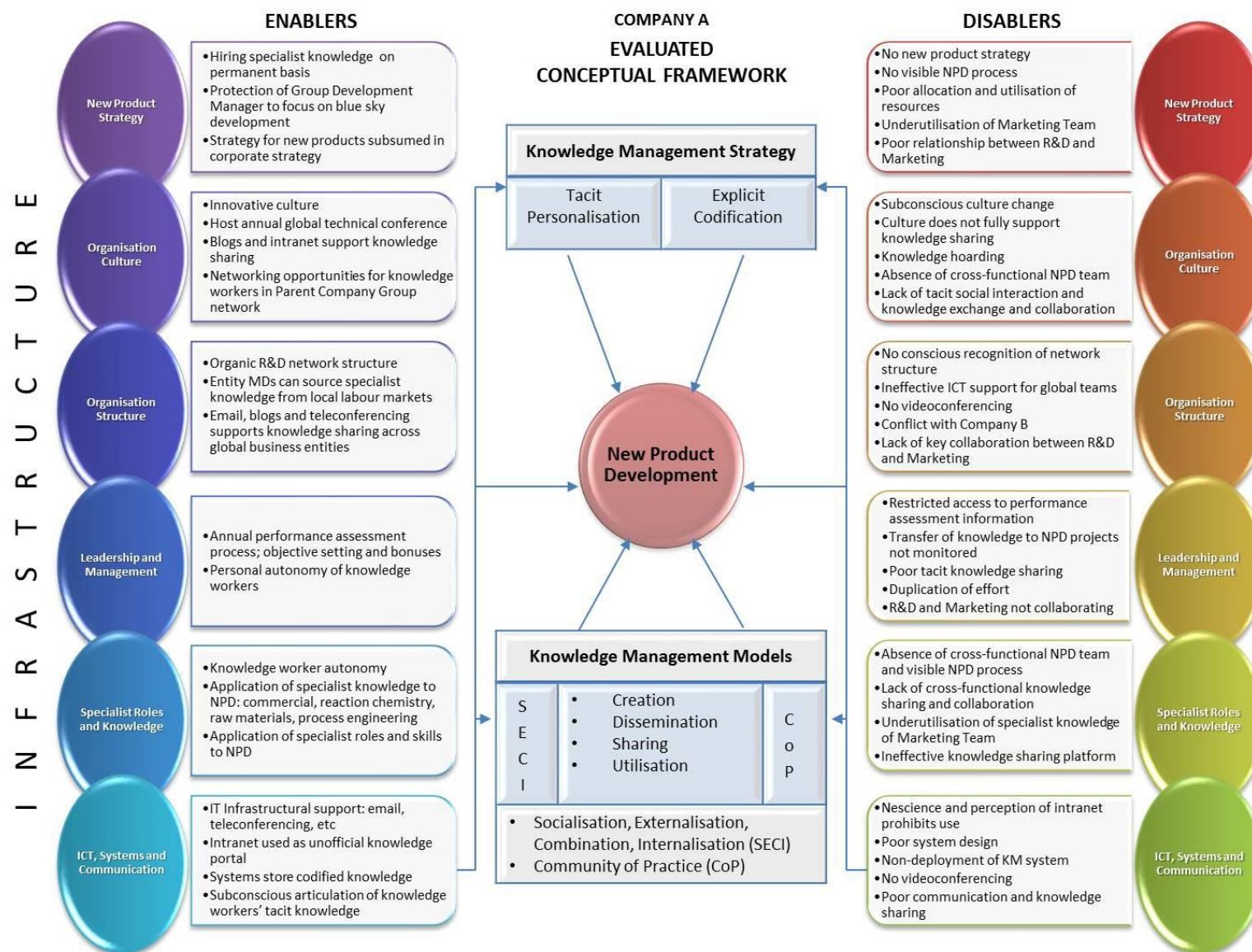
With regard to systems, congruent practices extend to the use of enterprise systems to fuel and support NPD and modification in Company B and enable the flow of knowledge and information. While the systems are primarily supportive, knowledge workers still call for more tacit contact with colleagues, which theory espouses is vital for optimal NPD performance. In both companies, knowledge workers also externalise/codify their knowledge into explicit forms as part of their day-to-day specialist roles. Incongruities include Company A not providing videoconferencing to support remote business entities in the network. In addition, poor system design, along with ICT-enabled systems that are user-unfriendly, are prohibitive to their use.

Lastly, poor communication is an issue with which both companies have struggled. Internal communication levels are not at the place where the Senior Management Teams in both companies want it to be, although the Marketing Manager in Company B has been tasked with developing an internal newsletter for dissemination to all global teams as a supplement to scheduled meetings. Theory advocates the implementation of such strategies in order to promote engagement with, and a sense of belonging to, the firm. Indeed, optimal communication is, as espoused in theory, vital to NPD and while Company A and B have taken strides to overcome poor communication, overall, their practices such as a lack of support for knowledge sharing and communication in the business entities, along with a dearth of meetings, are incongruent with extant literature. Action is therefore required to get internal corporate communication to a stage where it supports the management of knowledge and the strategic objectives of both companies to continuously develop new and modify existing products.

8.10 : The Evaluated Conceptual Frameworks

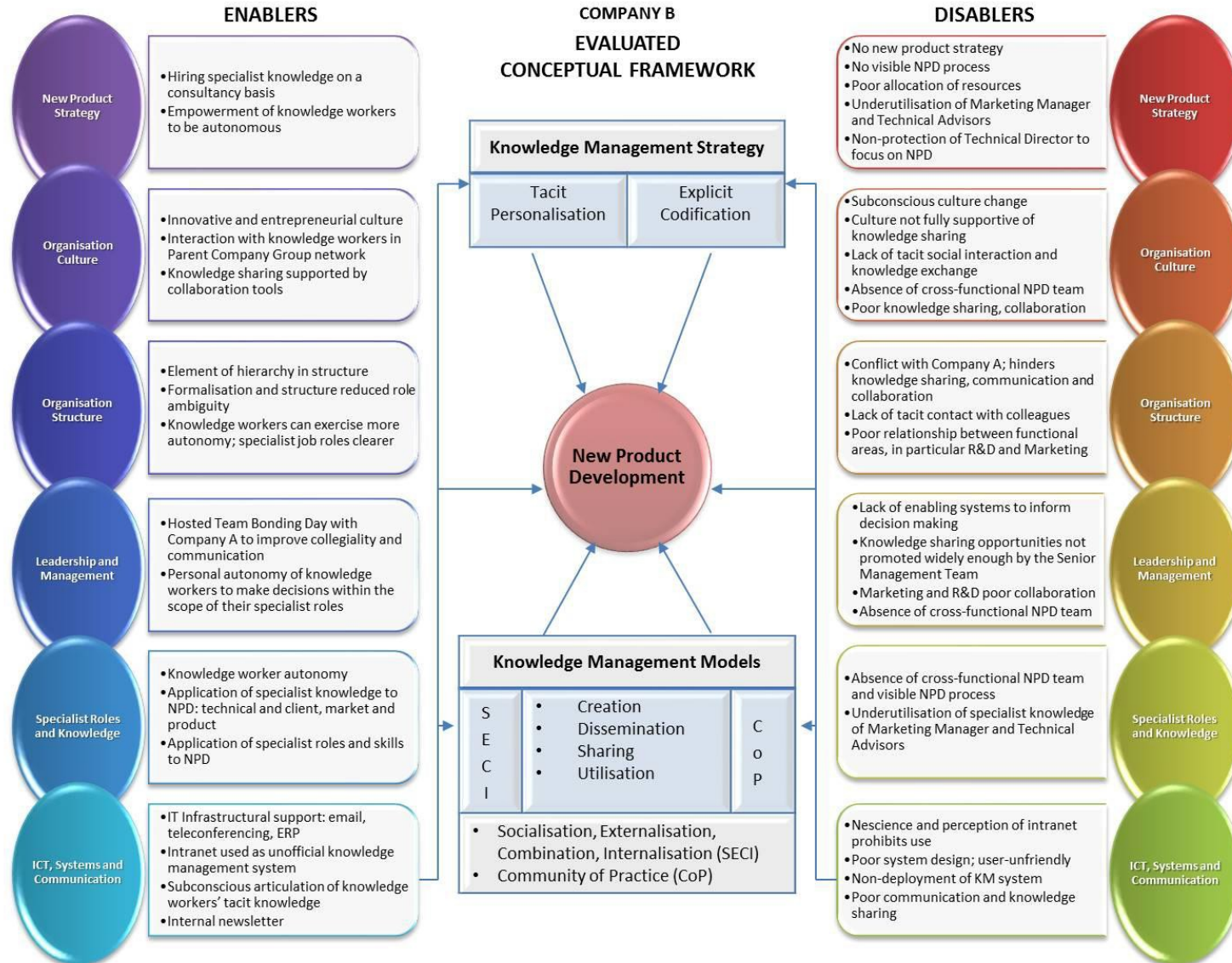
The espoused conceptual framework (see Figure 3.3: Chapter 3), which was borne from a critical and analytical review of extant literature, provided the researcher with a blueprint to evaluate the enablers and disablers of the management of knowledge in NPD. A major objective of this research was to build and evaluate a revised conceptual framework, following an in depth analysis of the fieldwork data. With this

in mind, having presented the findings and cross-case analysis and discussed the knowledge management practices that are congruent and incongruent with espoused theory, Figures 8.1 (Company A) and 8.2 (Company B) below present the evaluated enablers and disablers.



Source: The Researcher

Figure 8.1: Evaluated Conceptual Framework (Company A)



Source: The Researcher

Figure 8.2: Evaluated Conceptual Framework (Company B)

As Figures 8.1 and 8.2 demonstrate, Company A and B share similar enablers and disablers. This is unsurprising as they began their lifecycle as one company. They also share the same infrastructure, although Company A is geared towards servicing the geographically-distributed global business entities. Regardless of this, the findings have identified gaps in its provision, such as the absence of videoconferencing to support remote tacit knowledge sharing. On reflection, both companies have enabling and disabling aspects of their infrastructures. In terms of comparing them with the espoused conceptual framework, many of the enablers and disablers that emanated from extant literature do correspond in a number of ways with knowledge management practice in both companies. It is evident that Company A and B, as knowledge-intensive firms, deploy a range of benchmarkable, good practices in terms of how they manage knowledge. A glowing example of theoretical congruence is the personal autonomy with which they imbue their knowledge workers. This is rooted in literature and advocated by theorists, who profess the virtues of empowering knowledge workers to apply and utilise their specialist knowledge to developing new and modifying existing products.

A notable incongruity is the espousal that employees would not be willing to articulate their tacit knowledge. The evaluated conceptual frameworks both illustrate that knowledge workers, albeit subconsciously, externalise their personal, tacit knowledge into explicit forms, such as chemical formulae, brochures, intranets, laboratory reports, etc. This is then utilised as organisational knowledge and structural and intellectual capital. A further theme is the interconnectedness of the variables and the evidence that they are not mutually exclusive but symbiotic. One could argue that the organisational infrastructure is overarched and underpinned by three key variables: strategy, organisational culture and organisational structure, two of which (culture and structure) form part of the cultural web and can thus have a significant influence on the symbolic, behavioural and political aspects of organisational life.

The central or middle part of the conceptual framework, namely knowledge management strategy and knowledge management models, and the ways in which they can be utilised by both companies to enhance how they manage knowledge in the NPD process, will now be discussed.

8.9.1: Knowledge Management Strategies and Models

The conceptual framework espoused the adoption of knowledge management strategies to enable individual and organisational knowledge to be managed. As reported earlier in this chapter, both companies do not deploy a knowledge management strategy, which would, Hansen *et al.* (1999) suggest, formalise the way in which they manage tacit and explicit knowledge. The findings identified that participants in both companies called for more opportunities to share tacit knowledge on an intra and interfunctional basis and certainly across the business. In this respect, adopting the strategy of personalisation would enable knowledge to be shared through teamwork, communities of practice, such as the Product Council and general exchanges of dialogue, whether face-to-face or virtually via videoconferencing or Skype, for example. Adopting the personalisation strategy would enable rich, specialist tacit knowledge that cannot be easily codified and defused, to be shared on a one-to-one or collective basis (Hansen *et al.*, 1999; Jasimuddin *et al.*, 2005).

As highlighted in the literature review, Nonaka and Takeuchi (1995) espouse the value of tacit knowledge to innovating firms and suggest that firms like Company A and B create organisational knowledge via their socialisation processes, which facilitate the transfer of tacit to tacit knowledge. This explains why Technical Teams find the annual conferences so useful and stimulating. The kind of innovative thinking that these events, along with others such as team briefs and formal meetings generate, lends credence to more of these occasions to be held, in partnership with electronic support mechanisms such as web conferences and Skype, in order to assist global virtual teams in the remote entities. Indeed, as Hansen *et al.* (1999) point out, the adoption of a personalisation strategy would be beneficial to both companies, as they utilise product innovation-based strategies that privileges tacit over explicit knowledge and enables the kind of knowledge sharing that Nonaka and Takeuchi (1995) advocate knowledge-intensive firms need for innovating.

Therefore, the reintroduction of the Product Council (Bresman *et al.*, 2010; Karlsson and Åhlström, 1997) as a community of practice (Wenger *et al.*, 2002) would give both companies the opportunity to develop a cross-functional NPD team, who would then become members of the Council. In Company A, the Product Council could be virtual and enable technical teams to ‘meet’ more frequently, without the cost of the annual conference and still give them the collegial relationships they need to build

mutual trust and feel comfortable to share their specialist technical and formulatory knowledge, as opposed to hoarding it. Table 8.1 highlights the ways in which the use of specialist tacit knowledge within the Product Council community of practice can enhance the NPD process.

Table 8.1: Using Specialist Tacit Knowledge to Enhance NPD through the Product Council/CoP

	Type C Structured (Sponsored) Product Council/ Community of Practice
Objective	Provision of a forum for members to meet regularly, either face-to-face or virtually, with the objective of sharing specialist tacit knowledge. Each member would add their own personal knowledge, skills and experience to the community.
Affiliation	Criteria for the Council would be drafted by the Senior Management Teams, in conjunction with cross-functional NPD teams, to ensure the goals and objectives for both parties and the Council are taken into account. The optimum number of people in the Council would be closely monitored, to ensure that the same mistakes that forced it to be previously disbanded are not repeated.
Sponsorship, Mandate and Support	The Product Council would receive full sponsorship, a budget and endorsement by the Senior Management Teams. The Council, which would comprise of representatives from a cross-functional NPD team, including Technical, Marketing and Sales, Operations, etc., would be mandated to exchange their specialist tacit knowledge, expertise and experience, generate ideas for solving problems and new product development and modification. The mandate, along with budget allocation, would be directly linked to new product strategy, entity business plans and the NPD process.
Infrastructure	Operationalisation and monitoring of the Product Council would be enabled by a supportive culture, the Senior Management Teams and a sophisticated technological infrastructure. This would provide support for cross-functional knowledge sharing and collaboration and codify and store knowledge generated by the Council. ICT support would enable knowledge to be disseminated around the business speedily, to those who need it, when they need it. It would also enable both companies to retain and reuse specialist knowledge as social and structural capital. A global Product Council could be supported by telecommunications software such as web conferencing and Skype, to enable a greater level of tacit contact and collaboration.
Visibility	For credibility, the official Product Council would be highly visible throughout the business via a variety of targeted communication media, including internal newsletters that are supported and sponsored by the Senior Management Teams and the intranet.
<i>Source: The Researcher Adapted from Tremblay (2007:71)</i>	

In addition to the above, the other knowledge management strategy Company A and B could utilise on a more formal basis is codification. As previously reported,

knowledge workers already subconsciously articulate or externalise their specialist knowledge into a myriad of formats. Adopting a codification strategy would ensure that the articulation of tacit knowledge becomes a more conscious process, in order to capture, store, disseminate, share and utilise explicit knowledge intra and interdepartmentally (Davenport and Prusak, 1998; Nonaka and Takeuchi, 1995) and enable it to become part of the organisation's knowledge base. It would also preserve specialist knowledge, should individuals leave and take their knowledge and expertise with them.

Hansen *et al.* (1999) advocate the use of a hybrid strategy, which the conceptual framework highlights could benefit both companies in managing and utilising specialist knowledge. The framework further outlines the use of Nonaka and Takeuchi's SECI model to facilitate the generative dance between knowledge and knowing (Cook and Brown, 1999) and create new knowledge. Table 8.2 illustrates how both companies could benefit from the adoption of the model.

Table 8.2: Managing Knowledge for NPD through the SECI Model

<p style="text-align: center;">Socialisation</p> <p><i>The process by which individuals acquire tacit knowledge by sharing experiences through observation, imitation and practice; thereby creating tacit knowledge such as technical skills.</i></p>	<p style="text-align: center;">Externalisation</p> <p><i>The process of articulating tacit knowledge to explicit/codified concepts. Facilitated by dialogue among the firm's employees. Concepts or models are created to generate an understanding of what is going to be developed.</i></p>
<p>Socialisation can support the NPD process by:</p> <ul style="list-style-type: none"> ▪ Utilisation of the Product Council, team briefings, meetings and cross-functional NPD teams to share specialist knowledge, technical, market and client knowledge and other aspects of the NPD process. This would generate social capital for the business. ▪ Attendance at face-to-face and virtual meetings to exchange dialogue, share ideas and solve problems, at each stage of the NPD process, which could also be facilitated through the Product Councils. ▪ Engaging in external networking with customers, suppliers, specifiers, architects, the applicator network, universities, doctoral students, etc. This would generate relational capital and enable knowledge workers, such as Sales Teams to bring market intelligence back into the business to feed new product strategy and generate new knowledge. 	<p>Externalisation can support the NPD process by:</p> <ul style="list-style-type: none"> ▪ Codifying expertise and experience of successful and failed new product and modification projects, including laboratory reports completed by the Group Development Manager (Company A), Technical Director (Company B) and Technical Teams. ▪ Articulating ideas for new products into blueprints and formulae. ▪ Translating product concepts into prototypes to then proceed to the testing stage of the process. ▪ Transferring marketing ideas into brochures, the intranet, product launches, etc. ▪ Disseminating codified specialist knowledge around the business entities, via ICT, to facilitate speedier and more efficient NPD and modification. ▪ Articulating new product objectives and strategies, standard operating and financial procedures ready for dissemination and internalisation.
<p style="text-align: center;">Combination</p> <p><i>The process of combining different kinds of explicit knowledge. Adding, sorting and recategorising explicit knowledge to create new knowledge.</i></p>	<p style="text-align: center;">Internalisation</p> <p><i>The process of embodying explicit knowledge as tacit knowledge. It occurs as different individuals share mental models and technical know-how.</i></p>
<p>Combination can support the NPD process by:</p> <ul style="list-style-type: none"> ▪ Technical teams transferring product specifications and formulae into technical drawings, which can then be disseminated to other business entities in the global network. ▪ Facilitating cross-functional NPD teams to create new knowledge from current knowledge, such as laboratory reports, etc. ▪ Evaluating market intelligence supplied by the Marketing Teams and other pertinent documents to ensure that the development of new and modification of existing products utilise and build on corporate capabilities and the specialist knowledge of knowledge workers. 	<p>Internalisation can support the NPD process by:</p> <ul style="list-style-type: none"> ▪ Knowledge workers reading and internalising explicit knowledge in the form of documentation such as laboratory reports, technical data, technical and product brochures, strategies, etc., in order to create new knowledge, learn new things and improve the specialist roles they undertake in the NPD process. ▪ Technical Teams engaging in risk taking and experimentation. ▪ Reflecting on on-the-job experience and knowledge workers developing themselves and others.
<p style="text-align: right;"><i>Source: The Researcher</i></p> <p><i>Adapted from: Source: Ng, Goh and Eze (2011); Shankar, Acharia and Baveja (2007:137); Richtnér and Åhlström (2010:1010); Nonaka (1991:99); Schulze and Hoegl (2006:211-217)</i></p>	

As outlined in Chapter 2 (Section 2.15.1), research conducted by Ng *et al.* (2011) and Shulze and Hoegl (2006) found that socialisation, combination and internalisation have the greatest influence on the management of knowledge in the NPD process. Thus, deploying a hybrid knowledge management strategy of personalisation to keep

knowledge fluid and dynamic, as well as utilising codification as a means to store, disseminate and internalise explicit forms of knowledge, may enable both companies to manage the knowledge of their workforce in the NPD process more efficiently and effectively.

8.10: Chapter Summary

This chapter presented the discussion of the findings in Company A and B with espoused theory from extant literature. It identified a range of management practices that are both congruent and incongruent with the theories, concepts and models that were reviewed in Chapters 2 and 3. Key enablers and disablers that emanated from the discussion were added to the conceptual framework, thus facilitating a portrait to be painted of the influence that the organisational variables have on the management of knowledge in the NPD process in both companies. In addition, the personalisation and codification knowledge management strategies and SECI and community of practice models were evaluated in terms of how they can work hand in hand with the reconfigured organisational variables, to enable best practice knowledge management in both companies.

The next and final chapter presents the conclusions and implications of the findings for academic knowledge and the Senior Management Teams that have emanated from this research study.

Chapter 9

Conclusions

Chapter 9

Conclusions

No problem can be solved from the same consciousness. We must learn to see the world anew.
Albert Einstein

9.1: Introduction

The previous chapter presented the discussion of the findings in Company A and B, identified the congruencies and incongruities between espoused theory and theory in use, evaluated the conceptual framework and highlighted how the SECI and community of practice models can enhance how both companies manage knowledge more effectively in the NPD process. This final chapter reports the conclusions of the research study and is structured into seven sections. First, it evaluates how the four objectives have been achieved. Second, it briefly summarises the key findings of the study. Third, it appraises the contribution the thesis has made to academic knowledge. Fourth, it considers the implications of the findings for the Senior Management Teams in both companies and proposes recommendations for reviewing aspects of their business practices. Fifth, it outlines the limitations of the research study and examines the generalisability of the findings across similar and divergent contexts. Sixth, it contemplates aspects of the study that warrant further research and finally, it reflects on the researcher's personal journey through the various peaks and troughs of the research process.

9.2: Objectives of the Research Study

The development of new, and modification of, existing products is a knowledge-intensive, knowledge-creating process (Goffin and Koners, 2011; Chang *et al.*, 2014; Nonaka and Takeuchi, 1995). The findings of the research study have identified that innovation requires the input of specialist knowledge from a range of knowledge workers, each of which possess their own unique brand of highly tacit, idiosyncratic, dynamic and personal knowledge (Dixon, 2000; Bigliardi *et al.*, 2012) that is a source of strategic advantage to their firms. Extant literature suggests that managing such knowledge requires the implementation and maintenance of an infrastructure (Ho, 2009; Stonehouse and Pemberton, 1999) containing the organisational variables, the configuration of which can facilitate the utilisation and application of individual,

multidisciplinary and cross-functional knowledge. However, previous studies also claim that the variables can both enable and disable how knowledge is managed and used effectively in NPD. On that note, Cooper *et al.* (2001) stress the importance of paying sufficient attention to the influencing mechanisms that support and underpin both knowledge management and NPD, as ignoring them could lead to negative consequences for the firm. Thus, the aim of the research study was to identify and evaluate the organisational variables that act as enablers and disablers of knowledge management in NPD.

This exploratory research study employed four main objectives, which were achieved in a number of ways. First, the study undertook a critical and analytical review of extant literature and in doing so, contextualised and conceptualised knowledge management and NPD and showcased the close and obvious relationship that exists between them. Whilst engaging in the review, the mechanisms or organisational variables that enable and disable the management of knowledge in NPD, from an organisational infrastructure perspective, were identified and examined. In the process of doing this, the researcher noted that knowledge management, as a concept and practice, was an under-researched area, despite being espoused as a major component of the knowledge economy. This discovery also extended to the organisational infrastructure and its variables or enablers, in spite of their theoretical advocacy as an important critical success factor of knowledge management effectiveness (Stonehouse and Pemberton, 1999; Lee and Choi, 2003; Yeh *et al.*, 2006; Theriou, 2011). There was also minimal fusion of organisational infrastructure, the variables, knowledge management and NPD, which helped to make this research study more distinctive, as it justified that there is an important connection between these four elements and, significantly, an extricable link between knowledge management and NPD.

Second, the researcher developed an espoused conceptual framework from a critical and analytical review of extant literature. This was both a major intention of the research study and outcome of the review. Having identified the six organisational variables from an in depth and extensive literature search, they were then considered as a system of interrelated, influencing mechanisms in the form of the conceptual framework, which was discussed in Sections 3.10 (Chapter 3) and 8.9 (Chapter 8). In this way, she was able to make sense of their complexity, as opposed to understanding every individual aspect of that complexity (Johne and Snelson, 1988).

Third, the researcher critically evaluated the espoused conceptual framework to determine whether there were any congruencies or incongruities between how both companies manage knowledge and practices advocated in the literature. Cooper and Kleinschmidt (1995) note that the gap between what most firms do and what the literature prescribes is miles apart when it comes to the NPD process. Identifying any disparities between theory and practice would present the researcher with an opportunity to bridge the theory-practice gap by proposing recommendations to the Senior Management Teams on how elements of their knowledge management practices could be reviewed and enhanced by reconfiguring aspects of their organisational variables.

Finally, the researcher built and evaluated a revised conceptual framework for each company, following an extensive and in depth analysis of the fieldwork data, along with the cross-case analysis of the two companies and discussion of the findings against extant literature. These highlighted how the organisational variables influence the management of knowledge in the NPD process; thus facilitating the research question to be answered. The research study made a significant contribution to knowledge, details of which are discussed later in Section 9.3. The next section presents a brief summary of the findings.

9.3: Summary of the Findings

The research study conclusively found that developing new and modifying existing products is heavily reliant on knowledge workers at all levels of the firm applying and utilising their specialist roles and knowledge. The study also found that *how* such knowledge is managed is just as important as knowledge itself; thus challenging the Senior Management Teams to optimise the management of knowledge via an enabling infrastructure containing the six organisational variables. The evaluated conceptual frameworks (see Figures 8.1 and 8.2: Chapter 8) showcase the ways in which areas of good practice underpin how both companies manage knowledge. For example, Company A's infrastructure influences the management of knowledge by perpetuating an innovative culture that enables and supports knowledge sharing through the provision of blogs, teleconferencing, email and intranet and the bringing together of technical teams from around the world as a community of experts. Specialist, industry-specific knowledge is hired, protected and nurtured, in order to focus on blue sky development and maintain the company's competitive edge through the

innovation of ground-breaking new products. Knowledge workers are managed by the Senior Management Team giving them a high level of autonomy, particularly the MDs, who operate in the global, R&D network of business entities. This allows them to think globally and recruit locally by sourcing specialist, indigenous knowledge for focused, regional development.

Its knowledge management practices are disabled by a number of factors. First, by not deploying a new product strategy, the inclusion of which would serve to provide structured development by way of a formal and visible NPD process and the cross-fertilisation of knowledge via a cross-functional NPD team. Second, by not providing videoconferencing, which would compensate for the absence of co-location and support tacit knowledge sharing in global teams.

As it shares the same infrastructure as its sister company, Company B also manages knowledge in similar ways. Its innovative and entrepreneurial culture ensures that the specialist knowledge of its knowledge workers is managed by imbuing them with a large degree of autonomy to apply and utilise their knowledge as they know best, with a minimal amount of supervision from their line managers. Knowledge sharing is managed by the provision of collaboration tools and the intranet, which some participants viewed as a knowledge management system, albeit an unofficial, informal one. Mirroring the practices in Company A, the management of knowledge is disabled by the absence of an NPD process and cross-functional NPD team, the presence of which would provide a sense of formality, collaboration, communication and structure that many participants reported was needed.

In view of the evaluated conceptual frameworks of Company A and B, the research study concludes that aspects of:

- New Product Strategy disables more than enables,
- Organisational Culture disables more than enables,
- Organisational Structure disables more than enables,
- Leadership and Management disables more than enables,
- Specialist Roles and Knowledge enables more than disables, and
- ICT, Systems and Communication disables more than enables.

Thus, Specialist Roles and Knowledge has the most significant influence on how both companies manage their knowledge resources. This is underpinned by not only the organisational culture in both companies, which is open, innovative and entrepreneurial but also the organisational structure and leadership styles of the Senior Management Teams. It also outlines the importance of tacit and explicit knowledge to the NPD process. As knowledge-intensive firms in theory and practice, Company A and B place a good deal of emphasis on their knowledge workers and the specialist knowledge they utilise and apply to develop new and modify existing products. Both companies have a relatively stable workforce and a low rate of turnover ensures that specialist knowledge remains in the business. In addition, where possible, internal recruitment is privileged over external methods, in order that the corporate memory and stock of organisational knowledge that has built up over the companies' long and illustrious history can be utilised.

It is important that the disabling factors, which were pointed out above, are not seen as a negative. On the contrary, both companies have good knowledge management and business practices that are worthy of being benchmarked by other firms in the same or contrasting industries. It should be pointed out that despite the absence of a formal new product strategy, both companies have enjoyed sustained growth and success in the local and global markets in which they operate. The disablers that are highlighted in Figures 8.1 at 8.2 can be enabled by reconfiguring various aspects of their infrastructure, as noted in the recommendations for best practice that are proposed in Section 9.4. Indeed, Tables 8.1 and 8.2, as discussed in Chapter 8, outline how both companies can utilise the SECI and community of practice models to proactively manage tacit and explicit knowledge.

The researcher is confident that the distinctiveness of the conceptual framework and findings can be used as a guideline or blueprint through which innovating companies, and certainly those operating in the services industry, can build a supporting infrastructure and configure the interdependent variables to ensure the most efficient and effective management and utilisation of specialist knowledge in NPD or indeed any other organisational process.

9.4: Contribution to Academic Knowledge

The aim of this research study was to identify and evaluate the organisational variables that act as enablers and disablers of knowledge management in the NPD process. As the cross-case analysis and discussion chapters have illustrated, this aim, along with an identification of *how* the variables influence the ways in which both companies manage their specialist knowledge resources for innovation, has been achieved. As well as the above, a major objective of the study was addressing the literature gaps that were identified in Chapter 1. This section reflects on the contribution the research study has made to academic knowledge.

A number of major contributions to academic knowledge have emanated from this research study. First, a small amount of research has previously been conducted linking knowledge management and NPD, particularly in relation to organisational infrastructure and the enablers (e.g. Lee and Choi, 2003; Migdadi, 2009). Previous research investigating aspects of NPD fell short of evaluating how different types of knowledge are identified and utilised in the process of developing and modifying new products. This study has, however, identified different types of knowledge that are used by Company A and B, such as cementitious knowledge and reaction chemistry, as well as technical, client and market knowledge. It can therefore be concluded that developing new and modifying existing products is heavily dependent upon the application, utilisation and exploitation of industry-specific knowledge, such as those cited above, as well as general tacit and explicit knowledge. This makes the configuration of the organisational infrastructure and variables, to enable the effective management of knowledge, all the more important.

Second, this research study exhibited its qualitative, interpretive and exploratory nature. Many studies identified in the literature search, such as Lee and Choi (2003), utilised large scale, positivistic methodologies and engaged in highly complex statistical analyses, which did little to facilitate an understanding of the complexities of organisational life, as seen from a multiplicity of participants' perspectives. This research study is different, as the researcher interacted with the dynamic, personal, idiosyncratic, fluid and specialist and operational knowledge of a range of knowledge workers, who are involved in the gamut of NPD activities. The exploratory, inductive, multiple case study design, along with the utilisation of triangulation, enabled the researcher to gather rich, in depth data that offered new and varied insights into how

variables, such as organisational culture, influence the management of knowledge in NPD. The researcher can therefore conclude that research of this kind requires qualitative rather than quantitative approaches, in order to experience and appreciate the behavioural, political and symbolic aspects of organisational life and observe how the variables interact in the real life context of organisational actors.

Third, despite burgeoning extant literature that espouses the NPD process as a knowledge-creating, knowledge-intensive process (Goffin and Koners, 2011; Goffin *et al.*, 2010; Nonaka and Takeuchi, 1995), the systemic connection between knowledge management and NPD was not explicitly identified. This research study can conclude that the relationship between them *is* close and obvious and the process of developing and modifying products is not only knowledge-intensive and creating but also explorative and exploitative (Edvarsson, 2008). It is explorative in the sense that it focuses on ‘knowing’ (epistemology of practice; Cook and Brown, 1999) or the tacitness of knowledge and the processes involved in the dissemination and sharing of personal insights, expertise and learning that cannot be completely codified, due to its highly tacit nature. On the other hand, it is exploitative insofar as it increases the innovative capacity of both companies by focusing on ‘knowledge’ (epistemology of possession; Cook and Brown, 1999) or the explicitness of knowledge and the procedure involved in capturing, storing, disseminating and sharing codified, tacit knowledge, to enable its use and reuse when and where needed, regardless of time zones and geographical location. Again, that makes this research distinctive.

Fourth, the conceptual framework was a major achievement and provided a blueprint through which the enablers and disablers of knowledge management in NPD could be identified, evaluated and generalised across real life corporate contexts. The six variables within the framework were considered as interrelated and symbiotic; thus answering pleas from Gupta and Govindarajan (2000) for them to be treated as a holistic system. The framework also highlighted that the variables are a key part of a firm’s culture and climate. Indeed, four of the six variables namely organisational culture, organisational structure, leadership and management (power structures) and systems form part of the cultural web (Johnson and Scholes, 1999) and are therefore a powerful, influential force on the symbolic, political and behavioural aspects of organisational life (Johnson *et al.*, 2008; Sun, 2008). Importantly, this provides a platform for further research to be undertaken, which will be discussed in Section 9.7.

The conceptual framework generated empirical awareness of the collective effect of the variables and remedied some of the problems associated with previous studies, such as focusing on a single variable and not treating them as interconnected and synergistic (e.g. Revilla *et al.*, 2009). In addition, the research identified how the knowledge management strategies (personalisation and codification: Hansen *et al.* 1999) and models (SECI: Nonaka and Takeuchi, 1995; communities of practice: Wenger *et al.* 2002) that were embedded within the framework can enable knowledge to be managed more effectively within the NPD process and, indeed, other corporate contexts.

The following contributions to academic knowledge emanated from the evaluation of the conceptual framework.

- Developing a formal and focused new product strategy is an important aspect of innovation, as it guides and monitors a firm's innovation endeavours and ensures appropriate specialist knowledge and human, material and financial resources are allocated to projects, when and where necessary, to avoid delaying the commercialisation and launch of new products and to make NPD a more effective process (Cooper and Kleinschmidt, 2007).
- The absence of a clear, formal, visible and communicated NPD process has a major impact on innovation and on levels of knowledge sharing, collaboration and communication. The NPD process is inextricably linked to new product strategy and organisational culture and should therefore be developed in sync, to ensure the best possible outcomes for product development and modification within the firm are realised (Ahmed and Shepherd, 2010).
- Organisational culture change can have a major impact on established business practices, particularly in a corporate takeover (Clegg *et al.*, 2011). It can also enable and disable how knowledge workers experiment, take risks and share their formulatory expertise with others. Subconscious culture change can have an influence how the firm views knowledge; whether it is important to the business and consequently, the support that is given by leaders and managers to knowledge workers to share their specialist knowledge with others.

- Organisational structure is an important factor in the management and dissemination of knowledge. Too flat a structure can cause problems with role ambiguity. Too tall a structure can exacerbate problems in disseminating knowledge speedily around the firm. Consciously adopting the right structure, such as the integrated R&D network, can manage knowledge workers and their specialist knowledge in geographically dispersed businesses and thus implement the most appropriate support mechanisms, such as videoconferencing, to encourage tacit knowledge sharing (Ahmed and Shepherd, 2010).
- Effective tacit knowledge sharing and dissemination requires some form of co-location and socialisation, whether it is via a formal cross-functional NPD team, a product council or a simple meeting. Global teams also require appropriate opportunities to socialise with colleagues, either face-to-face or via mediating technologies, such as videoconferencing. It is interesting to note that a good deal of tacit knowledge sharing and exchange took place at the annual technical conferences, where Technical Teams espoused the virtues of sharing knowledge and experiences with like-minded colleagues, some of which was done while having a meal or a pint of beer! Such exposure to knowledge networks may avoid sticky knowledge (Bartlett and Ghoshal, 1998) or silos from occurring in various parts of the firm.
- A close working relationship between R&D and Marketing is imperative, in order to improve the outcomes of NPD (Drechsler *et al.*, 2013) and the ways in which specialist knowledge is managed. Moreover, the necessity for a more explicit role for the Marketing function at the beginning and indeed throughout the NPD and modification process is key. A formal cross-functional NPD team is a prerequisite, in order to not only cross-fertilise the expertise of knowledge workers such as Technical Advisors, but also enable the kind of specialist knowledge sharing that can shorten product development cycles and maintain industry and market competitive advantages.
- Specialist Roles and Knowledge is a major enabler of the management of knowledge. It thus reinforces the important role knowledge workers, along with their specialist knowledge and skills, play in developing new and

modifying existing products and the conditions they need to not only incubate that knowledge but also utilise and apply it by exercising personal autonomy and accountability (Ahmed and Shepherd, 2010). Leaders and managers play a key role in creating a culture that is conducive to valuing and rewarding knowledge workers and the technical, client and market knowledge they bring to innovation.

- Knowledge-intensive firms such as Company A and B require knowledge management systems to enable explicit knowledge to be managed more effectively and as a result disseminated around the firm to those who need it, when they need it (Pfaff and Hasan, 2011). User-friendly intranets, which do not exclude key knowledge workers from using it as a knowledge portal, are an important part of a firm's knowledge and communication systems.

Finally, this research study has responded to the plea of Biemans (2003) for best practice recommendations to be made to senior executives, to bridge the theory-practice gap, that are translatable, implementable and capable of being monitored and evaluated. This is dissimilar to many authors in the literature search, who provided little insight as their studies were primarily quantitative and statistical. What little qualitative research was conducted did not go far enough to offer executives practical ways in which the research findings could be applied to improve a firm's organisational context and knowledge management practices. This study is therefore distinctive, as it makes best practice recommendations with regard to how the Senior Management Teams in both companies can critically review aspects of their business practices and configure the variables to ensure the right specialist and cross-functional knowledge is disseminated to the right knowledge workers at the right time, to enable the development of new and modification of existing products.

9.5: Implications of the Findings for Senior Management

As seen from the summary of the findings, both companies engage in many areas of good practice. Various parts of their infrastructures are, however, disabling how they manage and utilise specialist knowledge in the NPD process. In view of this, it is recommended that the Senior Management Teams use the conceptual framework as a business tool to critically review aspects of their business practices. This may be achieved by:

- R 1: Introducing a new product strategy, which clearly defines the goals and role of NPD within the business and how it fits with other corporate and business strategies. Furthermore, the strategy should incorporate both planned and emergent NPD and modification and utilise a product portfolio management system, to ensure that adequate human, material, financial and other necessary resources that are crucial to NPD are allocated appropriately. The adoption of the strategic bucket system would support resource deployment and ensure that resource allocation is effectively monitored.
- R 2: Introducing a visible NPD process, which is guided by the strategic aims and objectives of the new product strategy and corporate and business strategies. The NPD process would provide a more structured approach to product innovation and enable each stage to be monitored and evaluated in terms of the allocation and performance of human, material and financial resources against clear targets and timescales. The process should spell out the series of interrelated activities and build in the utilisation of specialist, cross-functional knowledge and expertise at all stages.
- R 3: Creating a cross-functional NPD team, which will enable a closer, more systemic link between the new product strategy, the NPD process and ensure that the utilisation of cross-functional knowledge is being managed and monitored. The NPD team, which could be virtual or co-located, would engender a greater level of cross-functional collaboration, communication and integration of specialist knowledge, roles and ideas across key functional areas, including R&D, Marketing and Technical and Sales Teams. The cross-functional NPD team would enable the fusion of technical, industry-specific and generic operational expertise, in order to bring together knowledge workers, whose specialist roles, knowledge and skills complement each other. This would serve to create, share and utilise tacit knowledge and may also reduce the 'divide' and tensions between both companies.
- R 4: Reallocating some of the duties and responsibilities of the Technical Director in Company B to appropriately qualified and experienced individuals, to enable his engagement in more development and modification activities and

less firefighting and crisis management. This will enable him to engage in more knowledge creation and sharing activities with his team.

- R 5: Reinstating the cross-functional Product Council, which could operate as a Type C community of practice. To avoid the previous situation from recurring, the Council should include members of the cross-functional NPD team and operate within a clear mandate, which would be supported by and agreed with the Senior Management Teams.
- R 6: Holding more regular meetings at both strategic and operational levels. This will enable more systemic departmental and cross-functional communication, collaboration and knowledge sharing. It will also give individuals the opportunity to discuss the changing culture and its implications for them and the business. Global MDs and their teams should be supported by telecommunications application software, such as web and videoconferencing and Skype.
- R 7: Developing a knowledge management strategy for the business. This will enable both companies to utilise personalisation and codification strategies and processes to capture and disseminate tacit and explicit specialist and functional knowledge before, during and after NPD projects. It would also ensure the transfer of knowledge within and across the business entities and reduce the risk of a duplication of effort and increased development costs. Implementation of the strategy would further monitor and evaluate tacit knowledge exchange through the Product Council. It would also ensure that the information from the annual performance assessment exercise is coordinated by the HR Manager and disseminated to the appropriate individuals, to enable a portrait to be painted of where specialist knowledge and skills reside in the business.
- R 8: Adopting the integrated R&D network structure, as it is representative and supportive of the way in which the geographically dispersed business entities manage knowledge and commercial operations. This would catalyse the implementation of an appropriate technological infrastructure, including videoconferencing, to support global teams in their pursuit to collaborate and

engage in more tacit exchange of specialist knowledge and technical expertise with other knowledge workers in the network.

R 9: Modifying the corporate intranet, enterprise resource planning and information management systems to be more user friendly and recognised as knowledge repositories/knowledge management systems. This will enable key specialist knowledge to be inputted, retrieved, disseminated and shared, regardless of geographical location and time zone.

R 10: Creating a corporate 'Yellow Pages' where users, including Senior Management Teams, could locate experts with particular types of specialist knowledge and enable them to be contacted using the appropriate media. This would further identify and classify where specialist knowledge is located across the business.

R 11: Developing and implementing an employee communications strategy, with the HR Manager, aimed at improving levels of communication across the business. The strategy will enable a more coordinated and systemic approach to communication, particularly across the global business entities where there is a propensity to duplicate NPD effort due to poor information and knowledge sharing. It will also identify appropriate communication channels and media that are tailored to meet the needs of end users, such as the blog for technical teams. The utilisation of internal social media, through enterprise social networks, would provide a contemporary way to engage individuals, who are seasoned social media users. This would also offer a socio-technical aspect to the communication system and satiate knowledge workers' requests for more social interaction with colleagues.

9.6: Corporate Benefits of Participating in the Research

From the outset, Company A and B have been very supportive of the research study and enabled the researcher to 'access all areas' of the business, both pre-and post-data collection. It is anticipated that the findings from the research will enable them to gain a number of benefits, including:

- Utilising the evaluated conceptual framework to benchmark best practice knowledge management in the NPD process, particularly as developing or

modifying products is a knowledge-intensive process and requires the input of a range of specialist knowledge.

- Working with the researcher to operationalise the findings and recommendations.
- Enhancing their problem-solving and decision-making processes pertaining to managing knowledge in NPD, particularly with regard to utilising knowledge management strategies, such as codification, to disseminate knowledge around the local and global business entities and personalisation to facilitate tacit knowledge sharing.
- Enhancing the way in which individual and organisational knowledge is managed and exploited as a strategic asset, to innovate new and modify existing products.
- Deploying mechanisms to transform disablers into enablers and reinforce areas of good practice in the business.
- Improving the speed at which they create and modify products through knowledge sharing and networking; thus contributing to gaining and sustaining competitive advantage over their rivals.

9.7: Limitations of the Study

As previously reported, the aim of this research study was to identify and evaluate the organisational variables that act as enablers and disablers of knowledge management in NPD and facilitate the researcher gaining a more in depth understanding of the mechanisms that influence how knowledge is managed, utilised and ultimately exploited for NPD. This was always going to be a challenge, as theorists such as Drucker (1993) and Dixon (2000) claim that knowledge is highly tacit, idiosyncratic to each individual and thus incapable of being managed in that sense.

Access was given to all areas of the business, including chemical formulae, product samples and prototypes and the observations included products being made and rigorously tested in real time. However, conducting the fieldwork was elongated by the non-availability of the Senior Management Teams, who often had to go on site at short notice or fly off to one of the global entities to attend budgeting or technical meetings. All participants were very open about the situation in their organisational contexts as they perceived it and the researcher often found it difficult, particularly

when writing the findings, to present a balanced view of corporate life, while at the same time protecting their confidentiality. A key limitation was the researcher's initial perceptions of the companies involved. Both are highly successful in the markets in which they operate and she saw this as an indication that all was well. However, once the interviews and other data had been collected and analysed, it was evident that they had issues with a number of their knowledge management practices, as highlighted in previous chapters.

Despite the benefits that conducting qualitative case study research can yield, various theorists have reported a number of rather contentious issues in using the strategy (Onwuegbuzie and Leech, 2010). First is the issue of generalisability. Representing the views of a number of qualitative researchers, Onwuegbuzie and Leech (2010) proffer that the ultimate goal of interpretivist researchers is not to make statistical generalisations but to aim for studying phenomena in their natural context and engaging in case to case transfer, through generalising from one case to another, as encompassed in this research study. Although multiple case studies are considered to be more robust than single strategies, Amaratunga and Baldry (2001) claim that the aim of engaging in case study research is not to generalise but to understand and convey patterns and linkages that are of theoretical importance.

Regardless of the small number of cases that were deployed and both participant companies being part of the same corporate group, the researcher is confident that the findings are capable of being generalised across other innovative contexts. The conceptual framework has been evaluated in the context of the research study and is thus robust, yet general enough to be applied in non-innovation situations. As McNiff and Whitehead (2009) assert, the aim of research is not to predict but to understand and liberate rather than control. Therefore, it is neither desirable nor possible to aim for generalisation or replication. On that note, Altinay and Paraskevas (2008:235) suggest *"if you have achieved something close to these ideas, then you have achieved a lot."* Based on this thinking, the researcher can say with confidence that the research findings can enable both companies, along with others who wish to utilise the conceptual framework as a business tool, to understand the ways in which the organisational variables influence the management of knowledge.

A further limitation is the issue of reliability. The utilisation of a researcher's subjective judgement, along with axiological values and emic interpretation (Hennink *et al.*, 2011), can impact on the reliability and validity of the data (Bromley, 1986). Thus, Bryman and Bell (2011) advocate that case study researchers should focus on the unique nature of the case under study and develop an in depth understanding and appreciation of its complexity.

Due to the personal and idiosyncratic nature of knowledge, as pointed out earlier, the researcher contends that this type of research is essentially behavioural and does not lend itself easily to positivist or objectivist approaches to research. In addition, the organisational variables that were identified through the literature and incorporated into the conceptual framework are not mutually exclusive and as such are inextricably linked, interdependent and symbiotic in nature. Four of the variables are contained in the cultural web (Johnson and Scholes, 1999) and are thus representative of an organisation's culture and climate. Therefore, the researcher would argue that it may be difficult to examine each of the variables as discrete objects because of the large degree of overlap that exists between them.

9.8: Further Research

A major objective of this thesis was to build and evaluate a conceptual framework and disseminate the findings and conclusions across the academic and business/practitioner communities. The researcher is confident that the research is rich and robust and thus able to be generalised across different contexts (Gummesson, 2014). Moreover, the innovative design of the conceptual framework has the capability to be used by firms as a practical and pragmatic business tool to cope with the challenges and complexities involved in managing knowledge and idiosyncratic NPD processes. In doing so, they can enhance both individual and organisational performance.

Notably, the organisational variables contained within the conceptual framework were researched as an interconnected, symbiotic system as part of the organisational infrastructure. However, for the purposes of conducting further research as a continuation of this study, there is scope for each variable to be investigated in its own right or in combination with another.

It is important that the researcher considers her publication strategy, in order to achieve impact and the widest possible dissemination of academic and practitioner

knowledge as comprehensively and speedily as possible. This includes a consideration of the type of audience, the likely research topic and the potential outlet, in terms of academic or professional journal, for instance. In terms of academic dissemination, the researcher intends to focus on writing both conceptual and empirical academic journal articles (short to medium term), writing books (medium to long term) and attending international conferences for face-to-face peer review of the research (short to medium term). Business/practitioner dissemination will target writing articles for professional journals (short term), such as *Director*, which has a wide readership of members who are Directors of FTSE 100 companies. This will ensure that the research receives the engagement of business leaders and managers, who have the authority and influence to champion and effect change within their companies.

In view of the above, the following outlines the proposed further research by variable.

1. New Product Strategy

The importance of firms having a new product strategy was evidenced in extant literature and also the research findings. Neither company deployed an explicit, formal strategy for delivering new and modified products to market and ensuring appropriate resources are allocated. Further research in this area may examine:

- The impact that the absence of a new product strategy has on the business, the allocation of specialist knowledge resources and time to market of products.
- The juxtaposition between planned and emergent NPD, as both companies appeared to struggle with the cultural and historic requirements to engage in emergent, reactive NPD and the need to adopt more planned approaches.
- The distant relationship and poor communication between the R&D and Marketing functions and lack of specialist knowledge sharing between them. Marketing is viewed as the 'poor relation' in the NPD process. Their specialist knowledge and the market intelligence they gather is not fully utilised and applied; thus resulting in several products in the portfolio selling once before becoming redundant stock.

- The impact of an absent new product strategy on the utilisation and application of specialist Marketing knowledge.

2. **Organisational Culture**

Both companies experienced major organisational, cultural and structural change, much of which appeared to be subconscious. This impacted on both knowledge management and NPD. More widespread research could investigate:

- The influence of conscious and subconscious change on knowledge management and NPD.
- The impact of corporate takeovers and imposition of parent company procedures and processes on knowledge management and NPD.
- How knowledge workers are affected by corporate takeovers and culture change and whether it impacts on their propensity to engage in experimentation and risk taking, particularly when generating ideas.
- The influence of organisational culture and culture change on the value of knowledge and knowledge sharing within the firm.
- How firms approach the implementation of knowledge management initiatives: do they fit it around the culture or change the culture to fit knowledge management?

The absence of a clear, visible and communicated NPD process and cross-functional NPD team affected both companies. Further research could examine:

- The ways in which an absent NPD process increases the time to market of new and modified products and how it impacts on the utilisation of specialist knowledge, such as Marketing and Technical.
- The influence that the utilisation of cross-functional NPD teams have on levels of collegiality, knowledge sharing and communication.
- The strategies and practices firms adopt to deal with 'sticky' knowledge or the eruption of silos of knowledge.

3. **Organisational Structure**

Subconscious culture change, coupled with the non-adoption of the most appropriate structure to suit its business context caused a number of issues for Company A. Further research could investigate:

- How the adoption of the integrated R&D network can enable and support optimal knowledge sharing in the absence of co-location, in geographically-dispersed teams.
- The type of support mechanisms firms can utilise to facilitate a greater level of socialisation and tacit knowledge sharing in knowledge networks.
- The ways in which firms can manage expert or specialist knowledge in R&D and knowledge networks and avoid Technical Teams engaging in knowledge hoarding and exercising expert power.

4. **Leadership and Management**

Although leaders and managers played a key role in creating a conducive culture for managing innovation and knowledge, participants felt they could have done more to support knowledge workers in sharing knowledge. Further research could identify:

- The role leaders and managers play in developing knowledge cultures and promoting knowledge sharing and communication.
- Whether incentivising knowledge workers through reward systems increases their levels of engagement and commitment to the firm.

5. **Specialist Roles and Knowledge**

As a major enabler of knowledge management in NPD, this variable showcased the importance of knowledge workers and their specialist knowledge and skills to both companies. Further research could evaluate:

- The input of knowledge worker specialist knowledge and skills at key stages of the NPD process. It could also evaluate whether a greater level of specialist knowledge and skills are needed at the start or end of the process.

- The importance of knowledge workers being given the autonomy and accountability to apply their specialist knowledge to their roles, particularly in the absence of the co-location of their line managers, as in the case of the Marketing Team and the International MD-M.

6. ICT, Systems and Communication

Despite being knowledge-intensive firms, Company A and B do not deploy a formal knowledge management system, but instead rely on the intranet to store and disseminate explicit knowledge. Further research could explore:

- The extent to which firms use knowledge management systems, or other knowledge portals, to manage, disseminate and share knowledge.
- The influence of mediating technologies on the dissemination and sharing of knowledge, particularly across geographically-distributed business entities.
- The factors that preclude or discourage specialist knowledge workers from using systems such as the intranet and the likely impact this has on knowledge dissemination and sharing.

In addition to the above variables, further research could also be undertaken that is focused on the knowledge management strategies of personalisation and codification. Hansen et al (1999) proffered their research at the end of the twentieth century. So, a contemporary, twenty-first century picture of a firm's use of such strategies could be ascertained in a range of different industries, especially in light of the growth of the knowledge economy and widespread globalisation and internationalisation.

In terms of communities of practice, further research could be conducted into intra and interorganisational networks, knowledge sharing, the generation of social and relational capital and the contribution they make to knowledge management and the NPD process within firms. Furthermore, research into the importance of socialisation and tacit knowledge sharing to knowledge networks, whether face-to-face or remotely via videoconferencing, could be undertaken.

The research study identified that knowledge management and NPD collectively is an under researched area. Using the strategies outlined in this section, this research, along

with the proposed further research, have the capacity to build a significant body of knowledge in these fields.

9.9: Reflections on the Research Process

The research journey has been both an enjoyable and eventful one. It has also been rewarding, insofar as the research study has made several contributions to knowledge, in the form of papers and conferences. First, an empirical paper was written with a number of colleagues and was published in a prestigious Four Star Journal in 2013. Second, a work in progress empirical paper was written for, and presented at, an international conference in Cyprus, also in 2013. Third, the researcher has presented her research at a number of international conferences and seminars, details of which can be found in Chapter 1 (Section 1.6 et seq).

After many years of undertaking this research study, it is hard to believe that the journey is almost at an end. The most difficult part of the process was juggling life as a full time senior academic and all its associated roles and responsibilities with consistent study. In the majority of cases, the job and students had to come first. Study often became something that was done in the wee small hours of the morning or late into the evening.

The experience was made all the more rewarding by the unwavering and unequivocal support the researcher received from the case study companies and a number of participants, to whom the researcher will be eternally grateful. These include the Group MD, International MD-M, Group R&D Director and Group Development Manager in Company A and Europe MD, European Manufacturing Director and Technical Director in Company B. Last but not least, the researcher's named contact, the Group HR Manager, who was always on hand to advise and assist. Indeed, Saunders *et al.* (2012) caveat that gaining the right type of corporate access is fundamental to conducting research in an efficient and effective manner. On this note, the research was an iterative process (*ibid*), insofar as the researcher conducted the first stage (semi-structured interviews) then returned on a number of separate occasions to complete the three observations and document analysis. Thus, she considers herself very fortunate to have been given that level of unbridled support. The courtesy she was accorded by everyone concerned made the data collection process an interesting and memorable one. It was also useful to engage in research

using a multiple case study approach, as it facilitated meaningful comparisons to be made between both companies.

A more challenging experience was trying to maintain an air of objectivity while at the same time immersing herself in the data. The researcher has lectured in knowledge management at undergraduate and postgraduate levels for over fifteen years and studied Innovation Management as part of her Master's degree, so there was a natural fusion and synergy between her subject specialisms and the objects of the research study. Therefore, from her perspective, the two could not be separated. Engaging in reflexivity throughout the research process was an important and necessary part of the journey and experience. As Finlay (2002:212) states *"research is co-constituted, a joint product of the participants, researcher and their relationship."* By engaging in an *"explicit, self-aware, meta-analysis"* (p209) of the research process, the researcher was challenged to acknowledge the fact that researcher bias does exist and embrace the subjective nature of interpretivist research and the influence of axiological values on the outcomes of the research.

Is there anything the researcher would have done differently? If she had to make a decision, the answer would probably be not reading the PhD on a part time basis. However, working while studying and lecturing in the subjects at the heart of the research study gave the research a completely different dimension and enhanced the researcher-researched experience. As the researcher approaches the end of her research journey, she can say with confidence that life will never be the same again.

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Appendix 1

Research Instruments

Appendix 1: Research Instruments

Invitation Letter

The Business School, Oxford Brookes University, Headington Campus,
Gipsy Lane, Headington, Oxford, OX3 0BP
Tel: 07 • 01865 483858

16th July 2012

Dear

My name is Jacqueline McLean and I am a part-time Doctoral Student, in the Business School at Oxford Brookes University. In order to fulfil the requirements of the Degree of Doctor of Philosophy, I am conducting a research study entitled 'The Influence of Organisational Variables on Knowledge Management in New Product Development' and would like to invite you to participate.

The aim of the study is to identify the extent to which a firm's organisational variables (new product strategy, organisation culture, organisation structure, leadership and management, specialist roles and knowledge and ICT, systems and communication) enable or disable the management of knowledge in the new product development process. In order that the research can be conducted, Company A Ltd has given its consent for the company to be used as a case study and for some of its employees to be selected as participants.

You are being invited to participate in the research because you have been identified by the researcher (via purposive sampling) as a key individual who has specific knowledge and expertise of, or has had some influence on, the knowledge management and/or new product development process within the company. You should not feel obligated to take part in the research or disclose any information. However, it would be extremely helpful to the research if you felt you were able to participate.

If you do give consent to participate, you will be asked to sign an Interview Consent Form. The interview stage of the research study will comprise a one-to-one semi-structured interview with the researcher, which will be digitally audio recorded with your agreement. Audio recording the interview gives the researcher the opportunity to transcribe, analyse and reflect on the responses you give. Your interview will last approximately forty-five minutes to one hour, during which you will be asked a series of semi-structured questions. The interview will take place during your normal working hours and on company premises.

As you have been identified as someone who plays a key role in the new product development process within your company, **anonymity of the responses you give in the interview will be guaranteed and will be treated in strict confidence.** To reiterate, it would be extremely helpful to the research if you felt you were able to participate.

You will find full details of the research study in the attached Participant Information Sheet. Please read this carefully. If you would like to discuss its contents, or would like further information before you reach a decision, please do not hesitate to contact me.

With kind regards

Jacqueline McLean
MSc Mgt (Dist) MIoD Chartered MCIPD FInstAM PgDipPM CertEd
PhD Researcher

enc

Participant Information Sheet: Company A

The Influence of Organisational Variables on Knowledge Management in New Product Development

Jacqueline McLean, PhD Researcher/Senior Lecturer (HRM)

The Business School, Oxford Brookes University, Headington Campus,

Gipsy Lane, Headington, Oxford, OX3 0BP

Tel: 07 · 01865 483858

Invitation to Participate in this Study

You are cordially invited to participate in this PhD research study. Before you decide whether or not to take part, it is important for you to understand why the research is being conducted and what it will involve. Please take a few minutes to read the following information carefully.

Purpose of the Study

The purpose of this study is to identify and evaluate the extent to which a firm's organisational variables (new product strategy, organisation culture, organisation structure, leadership and management, specialist roles and knowledge and ICT, systems and communication) enable or disable the management of knowledge in the new product development process. New product development has been described as a knowledge-intensive process and is thus heavily reliant upon the right conditions being created within the firm to support the generation, sharing and utilisation of knowledge. Such conditions include the implementation of an infrastructure, in which the variables work together to facilitate the development and launch to market of new product development initiatives within the firm.

Research Design

In order that the research can be conducted, Company A Ltd is being used as a case study. Data will be collected using semi-structured interviews, observations/shadowing, analysis of archival documents and attendance at management meetings. The data collection stage will take approximately three to four months, during which time you will be asked to participate in an interview. The interview will be digitally recorded, with your consent.

Participation in the Research

You have been asked to participate in the research study, because you were purposively selected by the researcher as a key individual who has specific knowledge and expertise of, or had some influence on, knowledge management and/or the new product development process within your company. Approximately twenty people the Company will be asked to participate in the research. Your participation in the research is entirely voluntary. If you do decide to take part, you will be given this Information Sheet to keep and be asked to sign an Interview Consent Form. If you give consent, you will be free to withdraw at any time and without giving a reason.

If you give consent, you will be asked to participate in a one-to-one interview with the researcher. You will be asked a series of semi-structured questions, primarily based on the new product development process within the Company. Your interview will last approximately forty-five minutes to one hour. **The anonymity of your responses is guaranteed and will be treated in strict confidence.** The interviews will be conducted during working hours only and there will be no costs to you personally.

The Company has not influenced your selection to take part in the research study in any way. Although you have been purposively selected by the researcher to participate, you should not feel obligated to take part because of the role you play in the company. However, it would be extremely helpful to the research if you felt you were able to participate.

Potential Benefits

There are no direct benefits to you for participating in the research, other than it may enable you to understand the important contribution you make to the new product development process within your company. In terms of corporate benefits, the research findings may enhance your company's problem solving and decision making processes that pertain to knowledge management and new product development and improve the speed at which it creates new products and services through knowledge sharing and networking activities.

Confidentiality

All information collected about you will be kept strictly confidential (subject to legal limitations). Confidentiality, privacy and anonymity will be ensured in the collection, storage and publication of research material at all times. The data generated in the course of the research must be kept securely in paper or electronic form for a period of ten years after the completion of a research project, in accordance with Oxford Brookes University's Policy on Academic Integrity.

In compliance with the Data Protection Act in the UK, all fieldwork data will be securely stored on a security encrypted laptop computer, desktop computer and memory stick at the researcher's home.

Opt In to the Research

If you wish to opt in to the research, please sign the Interview Consent Form and hand it to the nominated research contact in your Company. You will then be offered a convenient day and time to take part in the research. Remember, you can opt out of the research at any time, without giving a reason.

Results of the Study

On completion of the study, the results will be incorporated into the PhD thesis and presented to the Group Managing Director and the Senior Management Team. As a Participant, you will receive a copy of the results.

Organisation of the Research

I am conducting this research as a part-time Doctoral Student, in the Business School at Oxford Brookes University. The research study will be conducted under the guidance and supervision of:

1. Professor Levent Altinay (Director of Studies): The Business School, Oxford Brookes University, Gipsy Lane, Headington, Oxford, OX3 0BP, Tel: 01865 483832 laltinay@brookes.ac.uk
2. Dr Sola Adesola (Supervisor), The Business School, Oxford Brookes University, Wheatley Campus, Wheatley, Oxford, OX33 1HX, Tel: 01865 485764 sadesola@brookes.ac.uk
3. Professor Phil James (Supervisor), The Business School, Oxford Brookes University, Wheatley Campus, Wheatley, Oxford, OX33 1HX, Tel: 01865 485912 pjames@brookes.ac.uk

Approval of the Research

The research has been approved by the Oxford Brookes University Research Ethics Committee (UREC). If you have any concerns regarding the way in which the study has been conducted, please contact the Chair of the Oxford Brookes University Research Ethics Committee on ethics@brookes.ac.uk.

Contact Details

My contact details can be found at the top of this Information Sheet. Please feel free to contact me, on my mobile, during the course of the research study.

Thank You

Thank you for taking the time to read this Information Sheet. If you have any questions, please contact me and I will be happy to answer them.

Jacqueline McLean

July 2012

Consent Form: Interview



The Influence of Organisational Variables on
Knowledge Management in New Product Development

Jacqueline McLean, PhD Researcher
The Business School, Oxford Brookes University, Gipsy Lane, Headington, Oxford, OX3 0BP
Mobile: 07 • Tel: 01865 483858

Please initial box

1. I confirm that I have read and understand the Participant Information Sheet for the above study and have had the opportunity to ask questions.
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason.
3. I agree to take part in the above study by being interviewed.

☐☐☐

Please tick box

4. I agree to the interview being audio recorded.
5. I agree to the use of anonymised quotes in publications.

Yes

No

☐☐☐☐

Name of Participant

Date

Signature

Name of Researcher

Date

Signature

Appendix 2

Interview Questions Context

Appendix 2

Interview Questions Context

Variable 1: Specialist Roles and Knowledge

Question 1

Could you please tell me about a new product that was recently developed in your firm and launched to market.

Context

Huang, Soutar and Brown (2001) profess that new product development is a crucial business activity in a firm's quest to create and sustain its competitive advantage over rivals. In order to maintain this competitiveness, firms have been spurred to innovate, develop new products and launch them to market better and faster than their competitors (Sabri, 2005; Lin, Chen and Tsai, 2005). Thus, new product development success has become a critical management issue for modern firms, particularly those who operate in technology-driven industries (Zirger and Maidique, 1990).

Responses Intend to Get

This question aims to identify the details of a product that was developed and launched to market within the firm. The researcher anticipates that responses may identify whether the product was a success or otherwise and also ascertain the impact it had on current and future product development initiatives.

Aspects of the Literature Covered

The question covers aspects of new product development within the literature and factors that contribute to NPD success.

Part of Conceptual Framework it Covers

The question plays a pivotal role in the conceptual framework, as new product development is one of the key themes in and objectives of the research.

Question 2

What was your role in developing this new product (e.g. project planning, project management, product testing, etc)?

Context

According to Nonaka and Takeuchi (1995), individuals play a key role in innovation. They espouse that tacit knowledge, which resides in individuals' heads, is the driving force behind Japanese firms' success as innovators and manufacturers of innovative products. They profess that organisational innovation is not based on the rather automatus processing of objective knowledge, but is borne from individuals' highly personal, subjective insights. Thus, Cooper and Kleinschmidt (1995) attest that knowledge workers are a key linchpin in the new product development process, as they are a major source of creativity and can submit new product ideas based on, for example, past experiences and mistakes made. Furthermore, as knowledge "*is always embodied in a person, carried by a person, taught and passed on by a person, used or misused by a person*" (Drucker, 1993:10), the researcher would argue that a knowledge worker's contribution to new product development success is an important one.

Responses Intend to Get

This question aims to identify the role individuals, in different positions, played in the new product development process. This role may be primarily front-ended, i.e., the provision of appropriate systems or procedures to enable new product development success or developing product development strategy; or it may be back-ended via activities such as marketing the product (Olson, Walker and Ruekert, 1995). The researcher anticipates that the responses will identify to what extent the individual was involved in the research and development process, whether the product was developed predominantly by him/her or by, for example, product development teams.

Aspects of the Literature Covered

The question covers aspects of knowledge management and the new product development process. It also leads into the role individual knowledge and human capital play in the exploitation of knowledge and intellectual capital.

Part of Conceptual Framework it Covers

The question plays a pivotal role in the conceptual framework, as individuals are a key linchpin in the new product development process. Moreover, it is linked to whether individual knowledge is explored or exploited in the new product development process.

Question 3

What skills (e.g. planning, research and development, marketing, commercialisation, etc) contributed to the development of the new product?

Context

Johne and Snelson (1988) attest that several factors influence the success of new product endeavours. Such factors include the firm's attributes, its operating and market environments and its skilled employees who are involved in product development work. On this note, Cooper and Kleinschmidt (1988) and Song and Parry (1997) attest that a firm's skills base directly impacts on the effectiveness of the new product development process. As this process is so uncertain, the utilisation of these skills becomes all the more important. Examples of the skills required for NPD are cited below.

- a. New product development planning: planning activities include considering whether a strategy of internal growth or growth by acquisition should be pursued and deciding whether innovation or imitation is the best course of action to follow (Day 1975).
- b. Technical development: these skills are key to the identification of a technically sound and reliable product (Maidique and Zirger, 1984; Rothwell, 1977).
- c. Marketing development: generating, evaluating and testing marketing options, based on product testing and market forecasting (Johne and Snelson, 1988).
- d. Launch/commercialisation: research has found that managers cite the poor execution of a new product's launch as the main reason for its ultimate failure; thus, these skills are a vital part of the process (Johne and Snelson, 1988).

Responses Intend to Get

The question aims to identify the role that the application of specialist skills (human capital; Bontis, 1998), such as those cited above, played in the development and launch of the new product. It may also identify other skills, such as prior new product development experience, that may have influenced new product development within the firm. In addition, Thomke and Fujimoto (2000) profess that new product development is an iterative, complex, problem solving process in which individual and collective experience play a pivotal role. The application and utilisation of knowledge and skills may create new knowledge, which may then feedback into the new product development process (Nonaka and Takeuchi, 1995).

Aspects of the Literature Covered

The question covers aspects of the new product development process and the exploration and exploitation of human capital.

Part of Conceptual Framework it Covers

The question plays a pivotal role, as individuals' knowledge, skills and experience are important success factors within the new product development process.

Question 4

What types of knowledge (e.g. tacit knowledge: face-to-face via NPD teams or explicit knowledge: via blueprints, manuals, technical information) were used during the development of the new product?

Context

According to Goffin et al (2010), new product development is a knowledge-intensive process, which requires individuals and teams to draw on both tacit (know-how) and explicit (know-that) knowledge. Goffin et al argue that tacit and explicit knowledge are interwoven in the context of new product development. The characteristics and physical dimensions of a product, manifested in explicit knowledge, can be conveyed to individuals and teams via blueprints and engineering drawings. However, the correct interpretation of the drawing may require the application of tacit knowledge. Johnes and Snelson (1988) caveat that a codification strategy may facilitate the articulation, capture and sharing of certain aspects of tacit knowledge, but there is no substitution for direct interaction with others, either through new product development teams or communities of practice (Wenger, 1991).

Responses Intend to Get

This question aims to identify the extent to which tacit and explicit knowledge were used during the development of the new product and in what concentration, i.e., was tacit knowledge used more than explicit knowledge or in equal proportions (hybrid strategy; Hanson et al, 1998). It may further identify the importance of knowledge sharing in the new product development process.

Aspects of the Literature Covered

The question covers aspects of knowledge management, knowledge creation and sharing, the new product development process and codification and personalisation strategies.

Part of Conceptual Framework it Covers

The question overarches and underpins the conceptual framework, as new product development is seen as a knowledge-intensive process.

Variable 2: New Product Strategy**Question 5**

What factors influenced the development of the new product (e.g. new markets, NPD failure, new product range, customer feedback/demand)?

Context

McAdam (2000) posits that the constant pressure from globalised markets and increased competition has forced firms to innovate and differentiate their products from competitors. The drivers that influence a firm's propensity to innovate include the need to develop and penetrate new markets and satisfy the needs of increasingly demanding customers (ibid).

Responses Intend to Get

This question aims to identify the reasons why the new product was developed and launched to market within the firm. It further aims to determine whether the decision to innovate was a strategic, emergent or reactive one.

Aspects of the Literature Covered

The question covers aspects of new product development and new product development strategy within the literature.

Part of Conceptual Framework it Covers

The question plays a pivotal role in the conceptual framework, as new product development is one of the key themes in, and objectives of, the research.

Question 6

In what way did the firm's new product development strategy support the development of the new product (e.g. allocation of new resources, competitor analysis, monitoring and review)?

Context

Dwyer (1990) and Johne and Snelson (1988) profess that a firm's new product development strategy defines the role of NPD within its overall corporate strategy. It stipulates products and markets as areas of focus, proposes the necessary organisation structures to facilitate implementation and defines new product and corporate goals (Hegarty and Hoffman, 1990; Bobrow, 1991) Gupta and Wilemon (1990) suggest that a firm's explicit new product development strategy enables management to plan for, and make adequate resources available to, specific product development projects. Cooper (1986) and Dwyer (1990) attest that having an explicit new product development strategy can increase a firm's chances of enjoying NPD success.

Responses Intend to Get

This question aims to ascertain the extent to which the firm's strategy supported the development of the new product through planning, allocation of resources, etc. Through in-depth discussion, for example at a focus group, the researcher may further identify the type of knowledge that was used to craft the strategy.

Aspects of the Literature Covered

The question covers aspects of strategic management, new product development, new product development strategy and knowledge as a strategic asset within the literature.

Part of Conceptual Framework it Covers

The question plays a pivotal role in the conceptual framework, as, following an in-depth and critical review of the literature, strategy was identified as a key organisational variable. As such, it is one of the key themes in, and objectives of, the research.

Question 7

What length of time did it take to develop the new product?

Context

According to Menon and Lukas (2004) and Sun, Zhao and Yau (2009), the speed with which firms develop new products is a key element of their competitive strategy. Rapid and ubiquitous changes in the business environment can render efficient products obsolete, unless firms expeditiously replace or improve them (Menon and Lukas, 2004). Thus, a firm's new product development strategy may incorporate the facility to manage the speed with which its new products are developed and launched to market ahead of competitors.

Responses Intend to Get

This question aims to identify how quickly the new product was developed and committed to market. It may also ascertain whether the aspect of 'speed' was built into the firm's new product development strategy.

Aspects of the Literature Covered

The question covers aspects of new product development.

Part of Conceptual Framework it Covers

The question plays a role in the conceptual framework, as the speed with which new products are developed and launched to market is a strategic issue. The literature review identified strategy as a key organisational variable and, as such, is one of the key themes in, and objectives of, the research.

Variable 3: Organisation Structure**Question 8**

What factors (e.g. organisation structure, organisation culture, the support of managers, etc) influenced the speed with which the product was developed and launched to market?

Context

According to Johnes and Snelson (1988) and Cooper and Kleinschmidt (1995), the provision of an organisational infrastructure that supports new product development activities is of increasing importance to managers and academics. Two infrastructural elements or variables that Menon and Lukas (2004) espouse drive the speed with which new products are developed and launched to market are organisation structure and culture. Kessler and Chakrabarti (1996) advocate that a firm's structure has a direct influence on its new product development cycles. They suggest that a firm can improve its customer responsiveness by choosing optimal, de-bureaucratised structures that facilitate the speedy development of new products and enable the rapid dissemination and utilisation of information (Wheelwright and Clarke, 1992; Meyer, 1993) and, the researcher would argue, knowledge.

Lam (2004) suggests that the choice of organisational form, such as an operating adhocracy or J-Form organisation, can enable firms to use the 'right' type of knowledge to suit their context and thus influence their propensity to innovate and develop new products. Donnellan and Fitzgerald (2003) caveat that organisation structure can be seen as both an enabler and disabler of knowledge management and the new product development process because harsh bureaucratic structures and formal communication channels may stifle creativity and innovation. Therefore, a firm's structure should be compatible with the chosen new product development process and all its various stages (Soldatos and Hardy, 2004). This may entail adopting flatter, networked structures (Stonehouse and Pemberton, 1999).

Chatman and Jehn (1994) and Hammer and Champy (1993) suggest that the cultural climate in a firm may influence the time it takes to develop new products. Deshpandé et al (1993) profess that an adhocratic culture may engender a positive impact on the speed of new product development, insofar as it encourages risk taking, adaptation and entrepreneurial behaviours.

Responses Intend to Get

This question aims to identify the extent to which the firm's structure and culture supported or hindered the speed at which the product was developed and launched to market. It may also enable the researcher to analyse espouse theory versus theory-in-use (Argyris and Schön, 1978). For example, Soldatos and Hardy (2004) espouse that hierarchical structures can stifle creativity and innovation. Actual practice may suggest otherwise. Moreover, organic structures may not necessarily speed up idea generation, for example, and the traverse of information and knowledge throughout the firm due to, for example, bounded rationality (Simon, 1991).

Aspects of the Literature Covered

The question covers aspects of organisation structure, organisational forms, knowledge management and new product development.

Part of Conceptual Framework it Covers

The question plays a pivotal role in the conceptual framework, as structure and culture are two of the organisational variables and are thus key themes in, and objectives of, the research.

Variable 4: Organisation Culture

Question 9

Describe the culture within the firm (e.g. entrepreneurial culture, innovative culture, learning culture) and explain how it supported or hindered the development of the new product.

Context

According to Belassi, Kondra and Tukul (2007), organisational culture affects how a firm does things, influences its strategy and processes and, as a consequence, the outcome of new product development endeavours. Park, Ribère and Schulte Jnr (2004) profess that organisational culture is the main enabler and barrier in the successful implementation of knowledge management because it shapes the assumptions about what knowledge is, which knowledge is worth managing and who owns it, shares it and hoards it (Donnellan and Fitzgerald, 2003). As a result, it can have a positive and negative effect on the outcomes of new product development (de Brentani and Kleinschmidt, 2004). Belassi et al (2004) concur and caveat that as innovation and new product development are critical factors to a firm's success, if its culture does not support new product development, it may not occur – to the firm's detriment. Stonehouse and Pemberton, (1999) suggest that a way of overcoming this is to create a learning culture that enhances the competencies of the firm and supports the new product development process.

Responses Intend to Get

This question aims to identify the important influence (or otherwise) that organisational culture had on the new product development process within the firm and whether culture change was required to drive new product development forward.

Aspects of the Literature Covered

The question covers aspects of organisational culture, knowledge management and new product development. It also leads into the role that culture plays in enabling or hindering new product development initiatives.

Part of Conceptual Framework it Covers

The question plays a pivotal role in the conceptual framework, as culture is an organisational variable and thus plays a major role in knowledge management and new product development. It is also one of the key themes in, and objectives of, the research.

Variable 5: Management and Leadership

Question 10

What role did managers (e.g. research and development, strategic management, project management) play in the development of the new product?

Context

According to Johnes and Snelson (1988), top management support is a crucial factor in the successful launch to market of newly-developed products. Top management involvement incorporates the adoption of imaginative, open and creative management styles that actively encourage middle managers to play an effective role in new product development (Booz, Allen and Hamilton, 1982). Top management's role in the innovation/development of new products should envision, energise and enable the innovation/new product development project (Tushman and Nadler, 1986).

Responses Intend to Get

This question aims to identify whether senior and middle managers supported the development of the new product via, for example, facilitating an innovative culture, providing requisite funds and resources via the new product development strategy, encouraging risk taking, getting involved in the development of the new product hands on, etc.

Aspects of the Literature Covered

The question covers aspects of management and leadership theory and new product development.

Part of Conceptual Framework it Covers

The question plays a pivotal role in the conceptual framework, as leadership/ management is one of the organisational variables and is thus one of the key themes in, and objectives of, the research.

Question 11

How did leadership within the firm support the development of the new product?

Context

According to Stonehouse and Pemberton (1999), leadership can be seen as a major lever in building and maintaining a learning culture and implementing knowledge management. McDonough and Barczak (2001) and Skyrme (2000), suggest that employing the 'right' style of leadership can enable the speedy development and delivery of new products and the effective implementation of knowledge management. However, Abdullah and Othman (2007) counsel that unless leaders are supportive of knowledge management initiatives, the cultural change that is necessary to imbibe a knowledge culture throughout the firm will not be possible. Skyrme (2000) professes that an 'ideal' style is 'knowledge leadership', as it involves the constant development and innovation of knowledge and individual skills; ideal traits to help 'feed' the new product development process (Nonaka and Takeuchi, 1995).

Responses Intend to Get

This question aims to identify the role leadership played in the development of new products within the firm and the way knowledge was used to contribute to new product development success. Further, it aims to ascertain whether the leadership style adopted enabled or hindered new product development initiatives.

Aspects of the Literature Covered

The question covers aspects of knowledge management, leadership and new product development. It also leads into the role that knowledge leadership plays in both knowledge management and new product development.

Part of Conceptual Framework it Covers

The question plays a pivotal role in the conceptual framework, as leadership is one of the organisational variables and thus a key theme in, and objective of, the research.

Variable 6: Specialist Roles

Question 12

What role did product development/cross-functional teams play in the development of the new product?

Context

Bonner, Ruekart and Walker Jnr (2002) attest that a key factor in the successful development of new products is cross-functional/product development teams. They suggest that bringing together individuals from multiple, functional specialist areas yields a greater diversity of views, knowledge, enables better decision making, facilitates the creation of more innovative designs and builds the cross-functional commitment that is necessary for effective product development (Johne and Snelson, 1988). Takeuchi and Nonaka (1986) profess that firms who have found success as innovators reassign individuals who have acted as change agents in previous new product development projects.

Responses Intend to Get

This questions aims to ascertain the type of expertise that was used to develop the new product, such as research and development, scientists, project planners, project managers, production staff, marketers, etc. In addition, the researcher anticipates that it will identify whether (and how) tacit knowledge was shared between the team – as Nonaka and Takeuchi (1995) espouse that tacit knowledge is the most useful when developing new products.

Aspects of the Literature Covered

The question covers aspects of multidisciplinary teams, knowledge management and new product development.

Part of Conceptual Framework it Covers

The question plays a pivotal role in the conceptual framework, as the application of knowledge worker skills, the use of tacit knowledge and the creation and sharing of knowledge creation are key aspects of the research and are endemic within extant literature on knowledge management and new product development.

Question 13

What techniques (e.g. brainstorming) were used to generate ideas?

Context

McAdam and McClelland (2002) advocate that idea generation is one of the most fundamental stages of the new product development process. It is intrinsically linked with creativity, which Titus (2000), cited in McAdam and McClelland (2002:87) defines as “*the birth of imaginative new ideas*.” Idea generation has been considered to be a learning process, which generates knowledge creation (Morris, 1999) and there are a number of techniques that can be adopted during this stage of the new product development process, including brainstorming (Osborn, 1963), reversing negatives into positives (Evans and Lindsay, 1999) and suggestion boxes (Kelly and Storey, 1998). In their research, Kelly and Storey identified that meetings were an effective idea generation tool; this potentially allows cognitive and social constructionist approaches to be utilised for the creation of new knowledge (McAdam and McClelland, 2002).

Responses Intend to Get

This question aims to determine to what extent idea generation techniques, as espoused in the literature, were used to develop the new product. Further, it aims to identify whether the techniques were within the cognitive or social constructionist schools – or both.

Aspects of the Literature Covered

The question covers aspects of knowledge management, epistemology and new product development.

Part of Conceptual Framework it Covers

The question plays a key role in the conceptual framework, as idea generation is, according to Booz et al (1982), the second stage of the new product development process and, arguably, one of the most knowledge-intensive. The researcher would argue that idea generation utilises both the exploration and exploitation of human capital.

Question 14

Describe the support that the team received from managers during the development of the new product.

Context

As previously identified in Question 9, managers play a key role in both facilitating and supporting the new product development process through the crafting of new product development strategy, allocating resources, imbuing a culture of entrepreneurship and knowledge and providing time for creativity and idea generation to take place.

Responses Intend to Get

This question is aimed at determining whether espoused theory is contrary to theory-in-use and identifying the actual support that was given by managers. It may identify other support that is not espoused in the literature.

Aspects of the Literature Covered

The question covers aspects of management and leadership theory and new product development.

Part of Conceptual Framework it Covers

The question plays a pivotal role in the conceptual framework, as leadership/ management is one of the organisational variables and thus one of the key themes in, and objectives of, the research.

Variable 7: Systems**Question 15**

Describe the stages involved in the process of developing the new product.

Context

According to Johnes and Snelson (1988), a crucial feature of the complex product development process is the distinct and separate activities that need to be performed by firms. Booz, Allen and Hamilton (1982) prescribe a model, which outlines the stages of new product development:

- a. New product strategy
- b. Idea generation
- c. Idea screening
- d. Concept development
- e. Business analysis
- f. Product development
- g. Test marketing
- h. Commercialisation

Takeuchi and Nonaka (1986) argue that in the development of certain high technology products, it can be to the firm's advantage to undertake these stages in parallel order, to enable the products to be committed to market ahead of competitors.

Responses Intend to Get

This question aims to identify the emphasis that firms place on key stages of the new product development process; whether particular stages of the new product development process were more conducive than others and whether they enabled or hindered product success. Furthermore, it aims to ascertain whether firms used an espoused model or followed their own tried and tested formulae.

Aspects of the Literature Covered

The question covers aspects of the new product development process.

Part of Conceptual Framework it Covers

The question plays a pivotal role in the conceptual framework, as new product development is one of the key themes in and objectives of the research.

Question 16

Describe the systems (e.g. knowledge management systems; MIS, project management) that supported the development of the new product.

Mathi (2004) advocates that through the co-ordination of a multiplicity of processes, systems can enable the sharing, leveraging and dissemination of knowledge to support new product development. Alavi and Leidner (2001) attest that codification and personalisation strategies can influence the type of systems that are used, i.e. whether knowledge is stored in repositories of knowledge, such as a database (explicit) or whether systems supported more tacit exchanges of knowledge that enabled the creation and sharing of knowledge, such as communities of practice (Wenger, 1991). However, Barnes (2002) caveats that systems can become a disabler, if they are inappropriately designed and incorrectly implemented.

Responses Intend to Get

This question aims to identify the systems that overarched, underpinned and facilitated the development of the new product. It also aims to determine to what extent the firm utilised knowledge management and management information systems and the role they played in the development of the new product.

Aspects of the Literature Covered

The question covers aspects of knowledge management, the new product development process, knowledge management systems and management information systems.

Part of Conceptual Framework it Covers

The question plays a pivotal role in the conceptual framework, as systems is one of the organisational variables and is thus one of the key themes in, and objectives of, the research.

Appendix 3

Semi-Structured Interview Guide

Appendix 3

Semi-Structured Interview Guide

Variable 1: New Product Strategy

Question 1

Could you please tell me about a new product that was recently developed in the Company and launched to market?

Question 2

What factors influenced the development of the new product (e.g. new markets, NPD failure, new product range, customer feedback/demand)?

Question 3

In what way did the Company's new product strategy support the development of the new product (e.g. use of specialist knowledge and teams, allocation of new resources, competitor analysis, monitoring and review) and what length of time did it take to develop the new product?

Variable 2: Organisational Culture

Question 4

Describe the organisational culture within the Company (e.g. entrepreneurial culture, innovative culture, learning culture) and explain how it supported or hindered the development of the new product.

Question 5

How does the culture support knowledge sharing, collaboration and innovation within the Company?

Variable 3: Organisational Structure

Question 6

Describe the organisational structure within the Company (e.g. hierarchical, bureaucratic, flat) and explain how it supported or hindered the development of the new product.

Question 7

How does the structure support cross-functional knowledge sharing, autonomy and spontaneity?

Variable 4: Leadership and Management

Question 8

Describe the role leaders and managers played (e.g. supporting teams, research and development, strategic management, project management) in the development of the new product.

Question 9

How do leaders and managers encourage knowledge creation and sharing in the development of new products?

Variable 5: Specialist Roles and Knowledge

Question 10

Explain the role you played in the development of the new product (e.g. strategic planning, project planning, project management, product testing, etc)?

Question 11

Describe the specialist knowledge and skills (such as technical and client knowledge) that contributed to the development of the new product.

Question 12

Describe how you created, shared and applied your knowledge in developing the new product.

Question 13

What role did cross-functional teams play in the development of the new product?

Variable 6: ICT, Systems and Communication

Question 14

Describe the systems (e.g. knowledge management systems; management information systems, project management) that supported the development of the new product.

Question 15

How did the systems (you describe) enable the sharing of knowledge in the development of the new product?