

**A THEORY OF INNOVATION IN SMALL
KNOWLEDGE-INTENSIVE PROFESSIONAL
SERVICE FIRMS**

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Dedication

I dedicate this piece of research to my parents. Without their unconditional love and faith in me, this opportunity would not have been possible.

Declaration

I declare that this thesis was the result of my own work. No portion of the work covered in the thesis has been submitted in support of any application for another degree or qualification at this or any other university or institution of higher learning.

List of Abbreviations

Calderpeel	Calder Peel Partnership Ltd
CKIPSFs	Construction Knowledge-Intensive Professional Service Firms
CoP	Community of Practice
HC	Human Capital
HCM	Human Commitment Management
HRM	Human Resource Management
ICT	Information and Communication Technology
IiP	Investors in People
IOI	Individual-Organisational-Individual
ISO	International Organization for Standardization
IT	Information Technology
K Ba	Knowledge Ba
KC	Knowledge Capital
KIPSFs	Knowledge-Intensive Professional Service Firms
PDP	Personal Development Plan
PSFs	Professional Service Firms
RC	Relationship Capital
R&D	Research and Development
SC	Structure Capital
SCKIPSFs	Small Construction Knowledge-Intensive Professional Service Firms
SMEs	Small and Medium-sized Enterprises
SKIPSFs	Small Knowledge-Intensive Professional Service Firms
QA	Quality Assurance
UK	United Kingdom

Abstract

Performance improvement in the construction industry is significantly influenced by the innovation performance of small construction knowledge-intensive professional service firms (SCKIPSFs). There is thus an urgent need to better understand the nature and process of innovation in such firms. The prevailing innovation literature is generally not appropriate for SCKIPSFs, as it tends to focus on large, manufacturing-based firms operating in 'non-project based' environments; rather than small, service-based firms operating in multiple, fluid 'project based' environments. A knowledge-based innovation model was developed from a review and synthesis of the relevant literature. This model is presented as a holistic, system-orientated framework to better investigate how SCKIPSFs create, manage and exploit innovation. The five variables in the conceptual model are: interaction environment; relationship capital; structure capital; human capital; and, knowledge capital.

The conceptual model formed a gap analysis framework to interrogate the meta hypothesis and six sub-hypotheses. The model was investigated and developed through a longitudinal twenty-two month case study which consisted of an exploratory phase and an action research phase. Semi-structured interviews, company documentation and company workshop data collection techniques, and content analysis and cognitive mapping data analysis techniques, were used.

The unit of analysis for this research was taken as the 'innovation activity.' In the exploratory phase of the case study, seven innovations were investigated, and key variables for successful and unsuccessful innovation identified. In the action research phase of the case study, an interim project review process innovation was developed and, in so doing, the interactions between the key variables identified in the exploratory phase were investigated.

The empirical testing of hypotheses revealed two principal factors that stimulate

successful knowledge-based innovation in SCKIPSFs: client requirements (synonymous with the market-based view of innovation) and the competences of knowledge workers (synonymous with the resource-based view of innovation). In developing and testing the conceptual model, the research contributed to innovation theory by: affirming that the prevailing innovation theory is not appropriate for SCKIPSFs; and, conceptualising and empirically validating two forms of knowledge-based innovation: exploitative innovation and explorative innovation, along with their generic variables and their distinctive variables to success and failure, within a SCKIPSF context.

The results emphasised the need, in practice, for appropriate: senior management education and training in innovation management; and, mechanisms for knowledge sharing between staff which are not solely driven by immediate project needs.

1.0 Introduction

1.1 Background to the research

The 'knowledge economy' has grown from its origins in the late 1980's to a degree where it is now significantly changing the structure of industry and the key determinants of competition. The knowledge economy is defined, for example, as (DTI, 1998:1)¹:

"....one in which the generation and the exploitation of knowledge has come to play the predominant part in the creation of wealth. It is not simply about pushing back the frontiers of knowledge; it is also about the more effective use and exploitation of all types of knowledge in all manner of economy activity."

There is significant consensus that the knowledge economy is fundamentally based on the 'knowledge' capabilities of people (for example, see Dougherty, 1999²; Drucker, 1997³). It is argued that the knowledge possessed by 'staff' represent a key source of sustainable competitive advantage for individual organisations (for example, see Raich, 2002⁴), countries (for example, see DTI, 2003⁵; Porter, 1990⁶), and trading blocs (for example, see EC, 2004⁷).

The transition to knowledge economies is, to varying degrees, affecting, and being affected by, many organisations, sectors and industries. For example, evidence shows that knowledge-based services account for a significant and growing proportion of economic activity in modern industrial economies (OECD, 2003)⁸.

¹ DTI: Department of Trade and Industry (1998), **Our Competitive Future: Building the Knowledge Driven Economy**, December, DTI: London.

² Dougherty, V. (1999), "Knowledge is about People, not Databases", **Industrial and Commercial Training**, 51/7, pp. 262-266.

³ Drucker, P. (1997), "The Future has already Happened. In Looking Ahead: Implications of the Present", **Harvard Business Review**, September/October, pp. 20-24.

⁴ Raich, M. (2002), "HRM in the Knowledge-based Economy: Is there an Afterlife?", **Journal of European Industrial Training**, 26/6, pp. 269-273.

⁵ DTI: Department of Trade and Industry (2003), **Competitive in the Global Economy: The Innovation Challenge**, HMSO: London.

⁶ Porter, M. (1990), **The Competitive Advantage of Nations**, The Free Press: New York.

⁷ EC: European Communities (2004), **Facing the Challenge: The Lisbon Strategy for Growth and Employment**, EC: Luxemburg.

⁸ OECD: Organisation for Economic Co-operation and Development (2003), **Review of Indices of Service Production for OECD Member Countries**, OECD: Paris.

This is evident in the United Kingdom (UK). The share of knowledge-based services, for instance, in the total economy in the UK has risen from 5% in 1968 to 30% in 1997 (EC, 2000)⁹ and 54% of businesses sector value added in 1998 (DTI, 2002a:78)¹⁰. This shift toward a knowledge economy is also evident in the UK construction industry with, for example, the number of construction professional service firms rising from 19,000 in 1996 to 23,500 in 2003 (CIC and DTI, 2003:9)¹¹. Further evidence of this trend is the rise in the gross turnover of consulting engineering firms (in current prices) from £1,241m in 1990 to £1,834m in 1999 (DETR, 2000)¹². During the same period, the construction industry's share of economic activity continued its long-term decline. This is shown, for example, by the construction industry's share of all industries' Gross Value Added from 6.1% in 1991 to 5.4 % in 2001 (Office for National Statistics, 2002)¹³. (Gross Value Added is a Gross Domestic Product less taxes on products, mainly Value Added Tax.)

The services offered by these professional service firms are characterised by being highly knowledge intensive in nature (Løwendahl, 2000)¹⁴. Indeed, a number of authors contend that professional service firms should be considered synonymous with knowledge-intensive professional service firms (KIPSFs) (for example, see Løwendahl, 2000¹⁵). The 'knowledge dynamic' to these firms is increasingly essential to sustain client satisfaction and corporate performance. There is significant agreement that the principal means by which this growing body of KIPSFs create value is through the successful creation and management of knowledge. Robertson *et al.* (2001:334)¹⁶, for example, stress:

⁹ EC: European Communities (2000), **European Competitive Report 2000**, EC: Belgium.

¹⁰ DTI: Department of Trade and Industry (2002a), **UK Competitiveness Indicators: Second Edition**, October, DTI: London. Available from <http://217.154.27.195/competitiveness/index.htm> [Accessed on 10th August 2004]

¹¹ CIC and DTI: Construction Industry Council and Department of Trade and Industry (2003), **Survey of UK Construction Professional Services 2001/2002**, January, CIC/DTI: London.

¹² DETR: Department of the Environment, Transport and Regions (2000), **Construction Statistics Annual: 2000 Edition**, DETR: London.

¹³ Office for National Statistics (2002), **United Kingdom National Accounts 2002**, Stationary Office: London.

¹⁴ Løwendahl, B.R. (2000), **Strategic Management of Professional Service Firms**, 2nd ed., Handeshøjsskolens Forlag: Denmark.

¹⁵ See Løwendahl (2000), *op. cit.*

¹⁶ Robertson, M., Sørensen, C. and Swan, J. (2001), "Survival of the Leanest: Intensive Knowledge Work and Groupware Adaptation", **Information Technology & People**, 14/4, pp. 334-352.

“Managing knowledge is a value-creating process in most organisations and is particularly important in knowledge-intensive firms.”

The ‘value-creating’ performance of the construction industry, however, has often been questioned by its clients. The common perception of the construction industry is that of an industry which delivers products and services which are often of inappropriate quality, and which fail to meet client demands for price certainty and guaranteed delivery. The ‘Egan’ report on the UK construction industry, for example, laments that “too many of the industry’s clients are dissatisfied with its overall performance” (DETR, 1998:1 emphasis added)¹⁷; while the Department of Trade and Industry in the UK has identified the need for significant performance improvement as an urgent issue (DTI, 2002b)¹⁸.

Innovation has been described as being the principal means to bring about this improvement in the UK construction industry performance (for example, see DETR, 1998¹⁹; DTI, 2002b²⁰; Egan, 1998²¹; Sexton and Barrett, 2003a²² & 2003b²³). The ‘Egan’ report recognised, for example, “the necessary service/product improvement and company profitability can be realised through *innovations* to enhance leadership, customer focus, integrated processes and teams, quality and commitment to people” (DETR, 1998: Paragraph 17 emphasis added)²⁴. Indeed, it has been argued that “[in construction and civil engineering] innovation brings benefits of improved efficiency, effectiveness, quality of life, productivity and competitiveness” (CERF, 1998:43)²⁵.

¹⁷ DETR: Department of the Environment, Transport and Regions (1998), **Construction Statistics Annual: 1998 Edition**, DETR: London.

¹⁸ DTI: Department of Trade and Industry (2002b), **Rethinking Construction Industry Innovation and Research**, February, DTI/DTLR: London.

¹⁹ See DETR (1998), *op. cit.*

²⁰ See DTI (2002b), *op. cit.*

²¹ Egan, J. (1998), **Rethinking Construction: Report of the Construction Task Force on the Scope for Improving the Quality and Efficiency of UK Construction**, DETR: London.

²² Sexton, M.G. and Barrett, P.S. (2003a), “A Literature Synthesis of Innovation in Small Construction Firms: Insights, Ambiguities and Questions”, **Construction Management and Economics: Special Issue on Innovation in Construction**, 21, September, pp. 613-622.

²³ Sexton, M.G. and Barrett, P.S. (2003b), “Appropriate Innovation in Small Construction Firms”, **Construction Management and Economics: Special Issue on Innovation in Construction**, 21, September, pp. 623-633.

²⁴ See DETR (1998), *op. cit.*

²⁵ CERF: Civil Engineering Research Foundation (1998), **Commercialising Infrastructure Technologies - A Handbook for Innovators**, CERF: Washington, DC.

Successful innovation in this research is understood to be (see Section 2.5.5 and 8.3.1):

“The effective generation and implementation of a new idea which enhances overall organisational performance, through appropriate exploitative and explorative knowledge capital which develops and integrates, relationship capital, structure capital and human capital.”

Small construction firms play an important part in improving the overall innovation performance of the construction industry. The growing role of small construction firms within the UK is evidenced by ninety-nine point two percent of UK construction firms having one to fifty-nine staff (DTI, 2002c:47 Table 3.1)²⁶, delivering some fifty-three point five percent of the industry’s workload (DTI, 2002a:50 Table 3.3)²⁷, and by ninety-seven percent of construction KIPSFs employ less than fifty people (CIC and DTI, 2003:10 Table 3.1)²⁸. In addition, construction projects typically draw together a significant number of diverse small and large construction firms with varying collaborations. It is acknowledged that large firms’ performance is significantly impacted by their small supply chain partners’ performance (for example, see Egan, 1998²⁹; Latham, 1994³⁰). Therefore, any performance improvement of large construction firms is significantly influenced by the performance of small construction KIPSFs (SCKIPSFs).

1.2 Research problem

The previous section has indicated that managing knowledge is a particularly crucial issue for knowledge-intensive firms (for example, see Robertson *et al.*, 2001³¹), and recognises that innovation is a key part in improving construction performance. There is strong consensus that managing knowledge is critical for successful innovation in SKIPSFs. It is argued that highly qualified knowledge workers are the core catalyst for managing knowledge within knowledge-intensive firms (for

²⁶ DTI: Department of Trade and Industry (2002c), **Construction Statistics Annual: 2002 Edition**, August, DTI: London.

²⁷ See DTI (2002c), *op. cit.*

²⁸ See CIC and DTI (2003), *op. cit.*

²⁹ See Egan (1998), *op. cit.*

³⁰ Latham, M. (1994), **Constructing the Team**, HMSO: London.

³¹ See Robertson, Sørensen and Swan (2001), *op. cit.*

example, see Alvesson, 1999³²). Alvesson (1999) goes on to say that knowledge workers are engaged primarily in work of an intellectual nature. To reiterate the argument set out in Section 1.1, there is a recognition that the human capability within construction firms to successfully innovate is vital to achieving performance improvement in the construction industry (for example, see Girmscheid and Hartmann, 2002³³; Seaden *et al.*, 2000³⁴; Slaughter, 1998³⁵). Within this context, the capability to innovate in SKIPSFs is strongly linked to the motivation and ability of the knowledge worker.

There have been a number of reports which provide guidelines to help practitioners to improve their business performance through innovation (for example, see Barrett *et al.*, 2001³⁶; M⁴I, 1998³⁷). They have provided recommendations for practices and procedures to be adopted by the construction industry and its main stakeholders to realise step improvements in both large and small construction firms. Innovation initiatives to deliver the improvements suggested in these industry guidelines, however, inadequately address project-based, service-enhanced forms of construction enterprises (for example, see Gann and Salter, 2000³⁸). Indeed, the relevance and accessibility of many of these initiatives for small construction firms is still debatable (for example, see Miozzo and Ivory, 1998³⁹; Sexton and Barrett, 2003a⁴⁰ & 2003b⁴¹; Wharton, 2004⁴²). Egbu *et al.* (1998:605)⁴³ further emphasise

³² Alvesson, M. (1999), "Social Identity and the Problem of Loyalty in Knowledge-intensive Companies", in F. Blackler, D. Courpasson and B. Flkjaer (Eds.), **Knowledge Work, Organisations and Expertise: European Perspectives**, Routledge: London.

³³ Girmscheid, G. and Hartmann, A. (2002), "Innovation in Construction - The View of Client" in B.O. Uwakweh and I.A. Minkarah (Eds.), **Construction Innovation and Global Competitiveness**, 10th International Symposium, The Organization and Management of Construction, pp. 29-43.

³⁴ Seaden, G., Gouolla, M., Doutriaux, J. and Nash, J. (2000), **Analysis of the Survey on Innovation, Advanced Technologies and Practices in the Construction and Related Industry 1999**, Science, Innovation and Electronic Information Division, Statistics Canada.

³⁵ Slaughter, S.E. (1998), "Models of Construction Innovation", **Journal of Construction Engineering and Management**, 124/3, pp. 226-231.

³⁶ Barrett, P., Sexton, M.G., Miozzo, M., Wharton, A. and Leho, E. (2001), **Base Report: Innovation in Small Construction Firms**, University of Salford/UMIST: Salford.

³⁷ M⁴I: Movement for Innovation (1998), **Mission Statement**, Movement for Innovation: London.

³⁸ Gann, D.M. and Salter, A.J. (2000), "Innovation in Project-based, Service-enhanced Firms: The Construction of Complex Productions and Systems", **Research Policy**, 29/7-8, pp. 955-972.

³⁹ Miozzo, M. and Ivory, C. (1998), **Innovation in Construction: A Case Study of Small and Medium-sized Construction Firms in the North West of England**, Manchester School of Management, UMIST: Manchester, UK.

⁴⁰ See Sexton and Barrett (2003a), *op. cit.*

⁴¹ See Sexton and Barrett (2003b), *op. cit.*

that “there still remains a great deal to be investigated and learned about organizational innovations within a construction environment. This is more so within the management domain of innovation where there is still a meagre amount of empirical studies that have given attention to the innovations in construction enterprises.”

There are three potential problems of this lack of explicit research into innovation in construction KIPSFs. First, innovation theory tends to be based on manufacturing-based firms; rather than service-based firms in general, and on construction KIPSFs in particular (for example, see Sexton and Barrett, 2003a⁴⁴). Innovation in manufacturing has been argued to be significantly different from innovation in services (for example, see Miles, 2000⁴⁵). For example, innovations in the manufacturing sector often emphasise research and development (R&D) work leading to ‘technological’ novelties (for example, see Freeman, 1982⁴⁶; Rothwell and Zegfeld, 1982⁴⁷); whilst service sectors are often based on social networks leading to ‘non-technical’ innovations (for example, see Kandampully, 2002⁴⁸; Sundbo, 1999⁴⁹). It is this social network perspective which results in the service production process, and the final service, being more integrated, in both time and function, than in manufacturing (Sundbo, 1997)⁵⁰, with individual innovation often consisting of process, organisation, market and product dimensions (Bilderbeek *et al.*, 1994)⁵¹.

⁴² Wharton, A. (2004), **Constrinonnet Final Report: Innovative Issues, Successful Practice & Improvements**, European Commission: Brussels.

⁴³ Egbu, C.O., Henry, J., Kaye, G.R., Quintas, P., Schumacher, T.R. and Young, B.A. (1998), “Managing Organisational Innovations in Construction”, **Proceedings of the Association of Researchers in Construction Management Fourteenth Annual Conference**, University of Reading: September 9th-11th.

⁴⁴ See Sexton and Barrett (2003a), *op. cit.*

⁴⁵ Miles, I. (2000), “Special Issue on Innovation in Services”, **International Journal of Innovation Management**, December.

⁴⁶ Freeman, C. (1982), **The Economics of Industrial Innovation**, Penguin, Harmondsworth: London.

⁴⁷ Rothwell, R. and Zegfeld, W. (1982), **Innovation and the Small and Medium Sized Firm**, Frances Printer: London.

⁴⁸ Kandampully, F. (2002), “Innovation as the Core Competency of Service Organisation: The Role of Technology, Knowledge and Networks”, **European Journal of Innovation Management**, 5/1, pp. 18-26.

⁴⁹ Sundbo, J. (1999), “Balancing Empowerment”, **Technovation**, 16/8, pp. 397-409.

⁵⁰ Sundbo, J. (1997), “Management of Innovation in Services”, **The Service Industries Journal**, 17/3, pp. 432-455.

⁵¹ Bilderbeek, R., Den Hertog, P., Huntink, W., Bouman, M., Kastrinos, N. and Flanagan, K. (1994), **Case Studies in Innovation and Knowledge-intensive Business Services**, Prest: Apeldoorn.

Second, innovation research tends to focus on non-project based firms in relatively stable supply chains; rather than project-based firms in relatively unstable supply chains in general, and on construction KIPSFs in particular. Project-based firms are defined as those which operate on the basis of projects as their products and services need to be significantly customised to meet the particular requirements of individual clients. Projects within such firms are “singled out as basic units, so that managerial responsibilities, resources allocation.....and accounting data are directly or indirectly defined in terms of projects or aggregation of projects” (Warglien, 2000:3)⁵². Innovation in non-project based firms has been argued to be significantly different from innovation in project based firms (for example, see Gann, 2000⁵³; Gann and Salter, 2000⁵⁴). Non-project based firms are better able, through functional hierarchy, to own and maintain innovation compared to project-based firms. These firms engage in loose coupled horizontal transactions between project participants and which result in project teams having fragile contexts in which to commit to, and reap reward from, innovation activity (for example, see Turner and Keegan, 1999⁵⁵). Indeed, Gann and Salter (2000)⁵⁶ argue that in project-based organisation, innovation activity often relies upon resources from other companies. As a consequence of their weak appropriation of economic rent, innovation in project-based firms is seen as useful, but primarily as costly and dangerous (for example, see Keegan and Turner, 2002⁵⁷, Sexton and Barrett, 2005⁵⁸).

Finally, innovation research tends to focus on large firms; rather than small firms in general, and on construction KIPSFs in particular (for example, see Page *et al.*,

⁵² Warglien, M. (2000), **The Education of Competencies in a Population of Projects: A Case Study**, University of Venice Publication: Venice, Italy.

⁵³ Gann, D. (2000), **Building Innovation: Complex Construction in a Changing World**, Thomas Telford Ltd: London.

⁵⁴ See Gann and Salter (2000), *op. cit.*

⁵⁵ Turner, R.J. and Keegan, A. (1999), “The Versatile Project-based Organisation: Governance and Operational Control”, **The European Management Journal**, 17/3, pp. 296-309.

⁵⁶ See Gann and Salter (2000), *op. cit.*

⁵⁷ Keegan, A. and Turner, J.K. (2002), “The Management of Innovation in Project-based Firms”, **Long Range Planning**, 35, pp. 367-388.

⁵⁸ Sexton, M.G. and Barrett, P. (2005), “Performance-based Building and Innovation: Balancing Client and Industry Needs”, **Building Research and Information**, 33/2, pp. 142-148.

1999⁵⁹). Innovations in large firms have been indicated to be significantly different from small firms (for example, see Sexton and Barrett, 2003a⁶⁰ & 2003b⁶¹). For example, innovation capability and outcomes of large firms tend to be more mechanistic; whilst small firms are organic in nature making them more agile and responsive (for example, see Nooteboom, 1994⁶²; Rothwell, 1989⁶³; Rothwell and Dodgson, 1994⁶⁴). However, small firms' innovation potential is constrained by intrinsic problems which large firms do not have. Rothwell and Zegfeld (1982)⁶⁵ identify four challenges unique to small manufacturing firms. First, limited staff capacity and capability restrict their ability to undertake appropriate research and development. Second, small firms have scarce time and resources to allocate to external interaction. This limits the flow and amount of information on which to have discussions. Third, small firms are often affected by the excessive influence of senior management. Often small firms are vulnerable to domination by a single owner or small team who may use inappropriate strategies and skills. Fourth, small firms can have difficulty in raising finance and maintaining adequate cash flow which can result in limited scope for capital or ongoing investment in innovation activity.

In conclusion, small knowledge intensive professional service firms (SKIPSFs) are becoming increasingly important agents of innovation in construction. The innovation literature, however, tends to focus on manufacturing-based, large sized and/or non-project based organisations. This paucity of explicit research on innovation in SKIPSFs ushers in real risks to policy makers, academics and industrialists of developing innovation prescriptions based on an inappropriate foundation, and thereby producing solutions for the wrong problems.

⁵⁹ Page, M., Limeneh, M., Pearson, S. and Pryke, S. (1999), "Understanding Innovation in Construction Professional Service Firms: A Study of Quantity Surveying Firms", **Proceedings of the RICS Construction and Building Research Conference (COBRA): The Challenge of Change: Construction and Building for the New Millennium**, University of Salford: 1st – 2nd September, 1, pp. 122–130.

⁶⁰ See Sexton and Barrett (2003a), *op. cit.*

⁶¹ See Sexton and Barrett (2003b), *op. cit.*

⁶² Nooteboom, B. (1994), "Innovation and Diffusion in Small Firms: Theory and Evidence", **Small Business Economic**, 6, pp. 327-347.

⁶³ Rothwell, R. (1989), "Small Firms, Innovation and Industrial Change", **Small Business Economic**, 1, pp. 51-64.

⁶⁴ Rothwell, R. and Dodgson, M. (1994), "Innovation and Firm Size" in M. Dodgson and R. Rothwell (Eds.), **The Handbook of Industrial Innovation**, Edward Elgar: Aldershot Hants.

⁶⁵ See Rothwell and Zegfeld (1982), *op. cit.*

1.3 Research methodology

This research adopts the 'nested approach' (Kagioglou *et al*, 1998)⁶⁶ as shown in Figure 1.1.

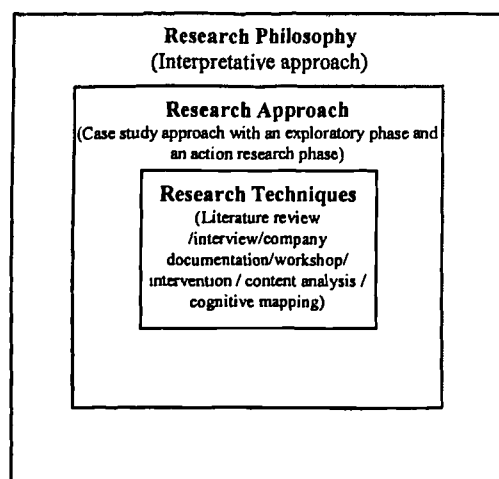


Figure 1.1 The nested research methodology approach

An interpretative philosophy has been adopted. Within this context, a single case study approach was used with an exploratory phase and an action research phase. The case study was characterised by deep collaboration and lasted twenty-two months. The research techniques included literature review, interview, company documentation and workshop data collection, and content analysis and cognitive mapping data analysis tools.

1.4 Synopsis of this thesis

This thesis is structured into eight chapters. Each of the chapters are summarised below.

⁶⁶ Kagioglou, M., Cooper, R., Aouad, G., Hinks, J., Sexton, M.G. and Sheath, D.M. (1998), *A Generic Guide to the Design and Construction Process Protocol*, University of Salford: Salford.

- **Chapter 1: Introduction**

Chapter 1 introduces the research background, the core research problem, a summary of the research methodology used and a synopsis of each chapter.

- **Chapter 2: Literature review**

Chapter 2 presents a literature and synthesis which develops the research problem and resultant research questions. First, the characteristics of SKIPSFs are given. Second, a review of the relevant innovation literature is presented. Third, knowledge-based innovation is proposed as the principal means of achieving sustainable competitive advantage in SKIPSFs. Finally, two research questions are stated.

- **Chapter 3: The concept of knowledge-based innovation model**

Chapter 3 presents the concept of knowledge-based innovation model. The model is put forward as a holistic, system-orientated framework to better investigate how SCKIPSFs create, manage and exploit innovation. Within the context of the concept model, the research questions and hypotheses are set out.

- **Chapter 4: Methodology**

Chapter 4 discusses and justifies the choice of methodology used in this research. An interpretative philosophy is adopted. A single case study was developed within this context, using qualitative data collection and analysis techniques.

- **Chapter 5: Research findings: case study - exploratory phase**

This chapter presents key research findings from the exploratory phase of the case study. The background to the case study firm is given. Seven innovations are described and discussed using the concept of knowledge-based innovation model as

an analytical framework. Key characteristics of successful and unsuccessful innovations are set out.

- **Chapter 6: Research findings: case study - action research phase**

This chapter contains key research findings from the action research phase of the case study. The findings are structured around explicit action research phases. Within each phase a 'practice' section is given detailing what happened within the case study firm, and a second section which describes the action researchers' reflection on that practice.

- **Chapter 7: Testing of research hypotheses**

This chapter presents the key findings from the exploratory phase (Chapter 5) and the action research phase (Chapter 6) within the context of the meta hypothesis and six sub-hypotheses set out in Chapter 3.

- **Chapter 8: Conclusions**

The final chapter presents a summary of the research findings and their contribution to innovation theory. From this discussion, comments are made on the initial research problem (Chapter 1) and research question (Chapter 2). Limitations of the research are given, along with suggested areas for future research.

1.5 Summary and link

This section has set out the background and principal focus for this research. The next section will contextualise the outlined research issues within the relevant general and construction-specific innovation and knowledge literature.

2.0 Literature review

2.1 Introduction

This chapter reviews the relevant literature which will identify and support the focal questions investigated in this research. This chapter is organised as follows:

- (1) The unique characteristics of small knowledge-intensive professional service firms (SKIPSFs) are discussed (section 2.2).
- (2) The definitional debate on innovation within SKIPSFs is presented (section 2.3).
- (3) The market-based and resource-based views of innovation are described (section 2.4).
- (4) The concept of knowledge-based innovation is introduced as the principal means of achieving sustainable competitive advantage in SKIPSFs is explored (section 2.5).
- (5) The principal managerial challenges in managing knowledge capital in SKIPSFs are articulated (section 2.6).
- (6) The two main questions for this research are set out (section 2.7).

2.2 Conceptualisation of small knowledge-intensive professional service firms

The knowledge-intensive professional service firm (KIPSF) is the focus of a significant and growing body of relevant literature. An important starting point in this literature is the ‘service’ dimension of knowledge-intensive professional service firms. ‘A service’ has been usefully described as (Grönroos, 2000:46)⁶⁷:

“a process consisting of a series of more or less intangible activities that normally, but not necessarily always, take place in interactions between the customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problem.”

⁶⁷ Grönroos, C. (2000), *Service Management and Marketing: A Customer Relationship Management Approach*, 2nd ed., Wiley: Chichester.

The core of the definition above is that the generation of successful services demands a high degree of interaction and co-production of the service provision between the client and the service provider (Hansson, 2002)⁶⁸. Extending the service concept to professional services, Hill and Neely (1988)⁶⁹ characterise a 'professional service' as one where the client is significantly dependent on the provider to define the problem and give appropriate advice. As a consequence, professional services are associated with confidentiality, intangibility and interdependency (Glückler and Armbrüster, 2003)⁷⁰. Such a view underlines the following remarks by Wilson (1972:XVi)⁷¹ that professional services are:

“designed to improve the purchasing organization’s performance or well-being and to reduce uncertainty by the application of skills derived from a formal and recognised body of knowledge, which may be interdisciplinary, and which provides criteria for the assessment of the results of the application of the service.”

The literature then moves on to argue that the principal 'provider' of these services is the professional (for example, see Løwendahl, 2000⁷²; Maister, 1993⁷³) or knowledge worker (for example, see Despres and Hiltrop, 1995⁷⁴). Indeed, it has been argued that the distinction between professional services and other services can be made by whether the service is done by 'professionals' or 'non-professionals' (for example, see Kotler, 1980a⁷⁵; Løwendahl, 2000⁷⁶; Thomas, 1975⁷⁷). There is strong consensus that professional services are services based on the knowledge and

⁶⁸ Hansson, J. (2002), "Management of Knowledge Transfer in Knowledge Service Firms", **Paper for EURAM 2002: Innovative Research in Management**, 9th –11th May, Stockholm: Sweden.

⁶⁹ Hill, C.J. and Neely, S.E. (1988), "Differences in the Consumer Decision Process for Professional vs. Generic Services", **Journal of Service Marketing**, 2/1, pp. 17-23.

⁷⁰ Glückler, J. and Armbrüster, T. (2003), "Bridging Uncertainty in Management Consulting: The Mechanisms of Trust and Networked Reputation", **Organization Studies**, 24, pp. 269-297.

⁷¹ Wilson, A. (1972), **The Marketing of Professional Services**, McGraw-Hill Book Company: London.

⁷² See Løwendahl (2000), *op. cit.*

⁷³ Maister, D.H. (1993), **Management the Professional Service Firm**, Simon and Schuster: New York, N.Y.

⁷⁴ Despres, C. and Hiltrop, J. (1995), "Human Resource Management in the Knowledge Age: Current Practice and Perspectives on the Future", **Journal of Employee Relations**, 17/1, pp. 9-23.

⁷⁵ Kotler, P. (1980a), **Principles of Marketing**, Prentice-Hall International: Englewood Cliffs, NJ.

⁷⁶ See Løwendahl (2000), *op. cit.*

⁷⁷ Thomas, D.R.E. (1975), "Strategy is Different in Service Business", **Harvard Business Review**, 53/4, July-August, pp. 158-165.

expertise of a 'professional' (Ojasalo, 1999)⁷⁸. A 'professional' is considered as "someone who can act independently while bringing a body of special knowledge to bear in a work situation" (Shaper, 1985:21)⁷⁹. It is argued that professionals are highly-qualified and are engaged primarily in work of an intellectual nature (Alvesson, 1999)⁸⁰ and that professionals have a specific area of specialisation (Maister, 1993⁸¹; Wheatley, 1983⁸²).

Returning back to the services concept, services undertaken by professionals have been referred to as knowledge based services (Wood, 2001)⁸³. The grouping together of professionals to provide services to clients is known as a professional service firm (Maister, 1993)⁸⁴; a knowledge based organisation (Winch and Schneider, 1993)⁸⁵; and, a knowledge-intensive organisation (Alvesson, 1999)⁸⁶. The label of knowledge-intensive professional service firms (KIPSFs) is adopted for this thesis (for example, see Løwendahl, 2000⁸⁷) as it communicates the knowledge-intensive nature of professional services and professional service firms.

To reiterate, it has been recognised that small construction firms play an important part in the UK construction industry (see Section 1.1). The SBS (2000)⁸⁸, for example, has identified that there are around 122,132 construction firms are micro and small size in 2001 (see Section 4.6.2). Of these, 22, 811 firms were small construction knowledge-intensive professional service firms (SCKIPSFs) (see Table 2.1) (CIC and DTI, 2003:10)⁸⁹. SCKIPSFs are thus a significant proportion of KIPSFs in the UK construction industry.

⁷⁸ Ojasalo, J. (1999), "Quality Dynamics in Professional Services", 76, Publications of the Swedish School of Economics and Business Administration: Helsinki.

⁷⁹ Shaper, A. (1985), **Managing Professional People: Understanding Creative Performance**, The Free Press: New York.

⁸⁰ See Alvesson (1999), *op. cit.*

⁸¹ See Maister (1993), *op. cit.*

⁸² Wheatley, E.W. (1983), **Marketing Professional Services**, Prentice-Hall: Englewood Cliffs, N.J.

⁸³ Wood, P. (2001), **Regional Innovation and Business Service**, Scott Policy Seminar, May, NIERC: Belfast.

⁸⁴ See Maister (1993), *op. cit.*

⁸⁵ Winch, G. and Schneider, E. (1993), "Managing the Knowledge-based Organisation: The Case of Architectural Practice", **Journal of Management Studies**, 30/6, pp. 923-937.

⁸⁶ See Alvesson (1999), *op. cit.*

⁸⁷ See Løwendahl (2000), *op. cit.*

⁸⁸ SBS: Small Business Service (2000), Available from
<<http://www.sbs.gov.uk/press/news44.pdf>> [Accessed on 14th May 2003]

⁸⁹ See CIC and DTI (2003), *op. cit.*

Table 2.1 Estimated number of construction KIPSFs by main type and number of employees

Discipline	Size of Firm (number of employees)					Total no.
	1	2-10	11-25	26-50	Over 50	
Architects	2915	5033	651	199	85	8882
Civil and structural engineers	971	3389	1000	563	387	6309
Building services engineers	335	1124	274	83	59	1875
Quantity surveyors	397	1163	207	71	33	1871
Other surveyors	409	973	116	36	25	1559
Project managers	122	454	84	39	23	722
Others (including planners)	475	1313	293	124	86	2292
Total no.	5635	13436	2625	1115	699	23510

Source: CIC and DTI (2003:10 Table 3.1)

In summary, professional services have four principal characteristics:

- (1) professional services are knowledge-intensive in nature;
- (2) professional services are delivered by professionals/knowledge workers; but,
- (3) professional services are nonetheless co-produced between the knowledge worker and the client; and,
- (4) the majority of construction professional services are provided by small firms.

SCKIPSFs thus have unique characteristics (when compared to other types of firms), and these characteristics have a significant impact on the focus and nature of innovation activity. The next section will thus focus on innovation within this context.

2.3 Definitional debate on innovation

There is a diverse range of definitions of innovation in the literature. Innovation is often defined as developing and implementing a new idea in an applied setting, both in the general literature (for example, see van de Ven *et al.*, 1999⁹⁰) and in the

⁹⁰ van de Ven A.H., Polley, D., Garud, R. and Venkataraman, S. (1999), *The Innovation Journey*, Oxford University Press: New York.

construction literature (for example, see Barrett and Sexton, 1998⁹¹). The ‘new idea’ component embraces a range of domains. Rogers (1983:11 emphasis added)⁹², for example, defines innovation as: “a product or service that is perceived as *new* by the members of the social system,” and that “it matters little whether the idea is ‘objectively’ new as measured by the lapse of time since its first use or discovery. The perceived newness of the idea for the individual determines his or her reaction to it. If the idea seems new to the individual, it is an innovation.”

Innovation is commonly analytically separated into ‘product innovation’ and ‘process innovation.’ ‘Product innovation’ refers to the development and introduction of new or improved products and/or services which create or meet a new demand and which are successful in the market (for example, see Mansfield, 1991⁹³); whilst ‘process innovation’ involves the adoption of new or improved methods of manufacture, distribution or delivery of service which “lower the real cost of producing outputs, although they may also give rise to changes in their nature” (Clarke, 1993:143)⁹⁴. The ‘product’ versus ‘process’ view of innovation has evolved towards a more systemic view. Athey and Schmutzler (1995)⁹⁵ assert that process innovation (cost-reducing) and product innovation (demand enhancing) are complementary. Indeed, Imai (1992:226)⁹⁶ speculates that “process improvement and product differentiation are now being fused.” This fusion is promoting a more holistic view of innovation. The EC (1995:1 emphasis added)⁹⁷, for example, defines innovation as:

“the renewal and enlargement of the range of products and services and the associated markets; the establishment of new methods of production, supply and distribution; and the introduction of changes in management, work organisation, and the working conditions and skills of the workforce.”

⁹¹ Barrett, P.S. and Sexton, M.G. (1998), *Integrating to Innovate: Report for the Construction Industry Council*, University of Salford: Salford

⁹² Rogers, E.M. (1983), *Diffusion of Innovations*, 3rd ed., The Free Press: New York, NY.

⁹³ Mansfield, E. (1991), *Microeconomics*, Norton: New York.

⁹⁴ Clarke, R. (1993), *Industrial Innovation*, Blackwell: Oxford.

⁹⁵ Athey, S.E. and Schmutzler, A. (1995), “Product and Process Flexibility in an Innovative Environment”, *Rand Journal of Economics*, 26, pp. 557-574.

⁹⁶ Imai, K. (1992), “The Japanese Pattern of Innovation and Its Evaluation” in N. Rosenberg, R. Handau and D. Mowery (Eds.), *Technology & The Wealth of Nations*, Standford Press: Standford.

⁹⁷ EC: European Commission (1995), *Green Paper on Innovation*, December, EC: DG XIII.

This more inclusive definition is captured by the term ‘organisational innovation’ which is the result in the more effective use of human and physical resources; in other words, is concerned with improving internal capabilities (Bates and Flynn, 1995)⁹⁸.

The construction literature is generally consistent with the general literature. Sexton and Barrett (2003b:626)⁹⁹, for example, define successful innovation as “the effective generation and implementation of a new idea, which enhances overall organisational performance.” Similarly, CERF (2000:3)¹⁰⁰, for instance, defines innovation as “the act of introducing and using new ideas, technologies, products and/or processes aimed at solving problems, viewing things differently, improving efficiency and effectiveness, or enhancing standards of living” (focusing specifically on construction KIPSFs). Page *et al.* (1999)¹⁰¹ conclude that innovation activity tends to gravitate around product innovation, process innovation, market innovation, organisational innovation and resource innovation.

The key common theme across the definitional debate in the literature is that ‘new ideas’ are taken to be the starting point for innovation. The central question which will now be addressed is what is the stimulus for these ‘new ideas?’ It is the investigation of this question which distinguishes the unique characteristics and challenges of innovation in SKIPSFs, and is the focus of the next section.

2.4 Market- and resource-based view of innovation

There are two main schools of thought on the principal stimulus for innovation: the market-based view and the resource-based view. Each perspective will be discussed in turn.

⁹⁸ Bates, K.B. and Flynn, E.J. (1995), “Innovation History and Competitive Advantage: A Resource-based View”, **Proceedings of Academy of Management Conference: Analysis of Manufacturing Technology Innovations**, pp 235-239.

⁹⁹ See Sexton and Barrett (2003b), *op. cit.*

¹⁰⁰ CERF: Civil Engineering Research Foundation (2000), “Guidelines for Moving Innovations into Practice”, **Working Draft Guidelines for the CERF International Symposium and Innovative Technology Tradeshow 2000**, 14th-17th August, CERF: Washington, DC.

¹⁰¹ See Page, Limeneh, Pearson and Pryke (1999), *op. cit.*

1. Market-based view of innovation

The market-based view of innovation emphasises the role of market factors in stimulating innovation within companies. From this perspective, industry structure and the competitive environment are seen as the principal drivers of innovation (for example, see Porter, 1980¹⁰² & 1985¹⁰³). In the general literature, a number of market-based innovation theorists have investigated market or environmental influences on innovation for large firms. For example, the influences have been articulated as customer-supplier relations (von Hippel, 1989)¹⁰⁴, network studies (Håkanson, 1989)¹⁰⁵, market conditions (Ames and Hlavacek, 1988)¹⁰⁶, and external knowledge infrastructures (Nelson, 1993)¹⁰⁷. The market-based innovation viewpoint emphasis is that firms adapt or orientate themselves through innovation to optimally exploit changing market conditions.

The literature on market-based view of innovation for small firms, however, is rather unclear. Small firms are commonly considered down sized versions of large firms. This implies that their market-orientated innovation is based upon the market(s) they serve, and the competitive forces within that market (Porter, 1985)¹⁰⁸. Storey (1994)¹⁰⁹, however, finds that small manufacturing-based firms are content to survive within stable markets, often supplying one or two key customers in their local geographic market only. Their innovation strategy, therefore, is to continue with their current suppliers and customers regardless of changes in the broader market or environmental situation.

This is consistent with the view in the literature that the SKIPSF's market is made up of a network of close relationships between the client and the knowledge worker.

¹⁰² Porter, M.E. (1980), **Competitive Strategy: Techniques for Analyzing Industries and Competitors**, The Free Press: New York, NY.

¹⁰³ Porter, M.E. (1985), **Competitive Advantage: Creating and Sustaining Superior Performance**, The Free Press: New York, NY.

¹⁰⁴ von Hippel, E. (1989), **Sources of Innovation**, Oxford: London.

¹⁰⁵ Håkanson, H. (1989), **Corporate Technological Behaviour: Corporation and Networks**, Printer: London.

¹⁰⁶ Ames, B.C. and Hlavacek, J.D. (1988), **Market Driven Management: Prescription for Survival in a Turbulent World**, Irwin: Homewood, IL.

¹⁰⁷ Nelson, P.R. (Eds.) (1993), **National Innovation Systems**, Oxford University Press: Oxford.

¹⁰⁸ See Porter (1985), *op. cit.*

¹⁰⁹ Storey, D.J. (1994), **Understanding the Small Business Sector**, Routledge: London.

Maister (1993:54 emphasis added)¹¹⁰, for example, asserts that “*relationships*, to remain strong, must be nurtured, and future business must be earned.” Similarly, Løwendahl (2000:93 emphasis added)¹¹¹ stresses that “given the high degree of independent professional judgment required in *client relations*, and the adaptation to client needs, operational authority has to be delegated to the professionals who are in direct interaction with the clients.” The principal stimulus for new ideas and thus innovation in SKIPSFs, it is argued, is consistent with the customer-supplier relations position advocated by von Hippel (1989)¹¹². von Hippel (1989) demonstrates that manufactures are not the sole source of innovation; rather, suppliers and customers provide a critical role. Afuah (1998:72)¹¹³ summaries the customer as a source of innovation in the observation that “customers who require special features in a product they use add their features to the product. If there are features that other customers can use, the manufacturer can incorporate them into its products.” The SKIPSF position, however, can be distinguished from the manufacturing perspective (where the supplier treats the clients as ‘an anonymous market’ to a certain extent), in that they have personalised relationships with customers who have ‘a name and a face.’

The environment where this client interaction occurs is defined as ‘the task environment’ (Kotler, 1980b)¹¹⁴; whilst the environment where other firms which compete with the firm customer and scarce resources is defined as ‘the competitive environment’ (Kotler, 1980)¹¹⁵. Together the task environment and competitive environment has been defined as ‘the interaction environment’ (Barrett *et al.*, 2001:52)¹¹⁶. In summary, the interaction environment is a significant market-based stimulus to innovation within SKIPSFs.

¹¹⁰ See Maister (1993), *op. cit.*

¹¹¹ See Løwendahl (2000), *op. cit.*

¹¹² See von Hippel (1989), *op. cit.*

¹¹³ Afuah, A. (1998), **Innovation Management: Strategies, Implementation, and Profit**, Oxford University Press: New York.

¹¹⁴ Kotler, P. (1980b), **Marketing Management: Analysis Planning and Control**, Prentice-Hall: Englewood Cliffs.

¹¹⁵ See Kotler (1980), *op. cit.*

¹¹⁶ See Barrett, Sexton, Miozzo, Wharton and Leho (2001), *op. cit.*

2. Resource-based view of innovation

In contrast, the resource-based view of innovation emphasis is that resources available to the firm, rather than on the market conditions (market-based view), are the principal stimulus for innovation (for example, see Barney, 1991¹¹⁷; Grant, 1995¹¹⁸; Itami, 1987¹¹⁹; Penrose, 1959¹²⁰).

The resource-based view of innovation emphasis is that firms attempt to identify and nurture resources that enable firms to generate innovation to 'shape' market conditions; rather than the market-based view within advocates that market conditions 'shape' the resources which firms develop and exploit to response to opportunities and threats.

Research into small manufacturing-based firms, for example, reports that the "accumulation and development of *resources* and *capabilities* are the relatively most important influential factors for innovativeness. Managerial skills and capabilities, internal technological resources.....and capabilities explain to a considerable extent the differences in innovation behaviour of small firms" (Hadjimanolis, 2000:278 emphasis added)¹²¹. The resource-based view of innovation is evident in Wilson's (1972)¹²² argument that successful professional service firms are seen as those having the most appropriate stocks of resources for their selected innovation activities. Such a view underlines the argument by Kotler and Bloom (1984)¹²³ and Løwendahl (2000)¹²⁴ who depict distinctive competencies of KIPSFs as the 'resources' and 'abilities' that a particular organisation is especially strong in relative to their competitor.

Resources in themselves are not seen as productive. Dynamic environments

¹¹⁷ Barney, J.B. (1991), "Firm Resources and Sustained Competitive Advantage", *Journal of Management*, 17/1, pp. 99-120.

¹¹⁸ Grant, R.M. (1995), *Contemporary Strategy Analysis*, 2nd ed., Blackwell: Oxford.

¹¹⁹ Itami, H. (1987), *Mobilizing Invisible Assets*, Harvard University Press: Cambridge, MA.

¹²⁰ Penrose, E.T. (1959), *The Theory of the Growth of the Firm*, Wiley: New York.

¹²¹ Hadjimanolis, A. (2000), "A Resource-based View of Innovativeness in Small Firms", *Technology Analysis and Strategic Management*, 12/2, pp. 263-281.

¹²² See Wilson (1972), *op. cit.*

¹²³ Kotler, P. and Bloom, P.N. (1984), *Marketing Professional Services*, Prentice-Hall: USA.

¹²⁴ See Løwendahl (2000), *op. cit.*

ceaselessly call for a new generation of resources as the context constantly shifts (Chaharbaghi and Lynch, 1999)¹²⁵. The challenge for firms to create sustainable competitive advantage in rapidly changing and competitive environments is for resources to be integrated, co-ordinated and deployed as 'distinctive capabilities' (for example, see Teece *et al.*, 1997¹²⁶). This requires dynamic capabilities. Amit and Schoemaker (1993:35)¹²⁷ note that capabilities "refer to firm's ability to deploy resources, usually in combination, using organizational processes, to affect a desired end. They are information-based, tangible or intangible processes that are firm specific, and are developed over time through complex interactions among the firm's resources." Such a view underlines the following remarks by Nanda (1996:97)¹²⁸: "while resource is a fixed asset, capability is the potential input from the resource stock to the production function." There is agreement that capability is associated with the ability of the firm and its resources (Grant, 1996a¹²⁹; Stalk *et al.*, 1992¹³⁰).

In this research, the constant development of 'distinctive capabilities' in a dynamic environment is labelled as 'dynamic capability' (Teece *et al.*, 1997)¹³¹. Collis's (1994)¹³² definition of 'organisational capability' seems to have much common with Teece's *et al.* (1997)¹³³ concept of 'dynamic capabilities' in that they both refer to the ability to develop and apply resources and skills. Collis (1994:145)¹³⁴ defines 'organisational capabilities' as "socially complex routines that determine the efficiency with which firms physically transform inputs into outputs." The capability of organisations to adopt, adapt and transform existing technological applications and know-how from other environments into relevant and appropriate

¹²⁵ Chaharbaghi, K. and Lynch, R. (1999), "Sustainable Competitive Advantage: Towards a Dynamic Resource-based Strategy", *Management Decision*, 37/1, pp. 45-50.

¹²⁶ Teece, D.J., Pisano, G. and Shuen, A. (1997), "Dynamic Capabilities and Strategic Management", in N.J. Foss (Eds.), *Resources, Firms and Strategies*, Oxford University Press: New York. pp. 268-287.

¹²⁷ Amit, R. and Schoemaker, P.J.H. (1993), "Strategic Assets and Organizational Rent", *Strategic Management Journal*, 14, pp. 33-46.

¹²⁸ Nanda, A. (1996), *Resources, Capabilities & Competences*, Sage Publications: London.

¹²⁹ Grant, R.M. (1996a), "Prospering in Dynamically – Competitive Environments: Organizational Capability as Knowledge Integration", *Organizational Science*, 20, pp. 375-387.

¹³⁰ Stalk, G., Evans, P. and Shulman, L.E. (1992), "Competing on Capabilities, The New Rules of Corporate Strategy", *Harvard Business Review*, 70, pp. 57-69.

¹³¹ See Teece, Pisano and Shuen (1997), *op. cit.*

¹³² Collis, D.J. (1994), "Research Note: How Valuable are Organisational Capabilities?", *Strategic Management Journal*, 15, pp. 143-152.

¹³³ See Teece, Pisano and Shuen (1997), *op. cit.*

¹³⁴ See Collis (1994), *op. cit.*

solutions, organisational processes and technological products/services to match the socio-cultural context of construction industry sector is crucial in bringing about innovation (Sexton and Barrett, 2003a¹³⁵, 2003b¹³⁶ & 2004¹³⁷). The organisational capability to innovate is discussed further in Section 2.5.5.

The principal resource for KIPFSs, as noted in Section 2.2, is the knowledge worker. This proposition is developed further in Section 2.5.4. In summary, it is proposed that the market- and resource-based view of innovation can be gainfully linked, by extending the argument that there is mutually adjustment between companies 'reacting to' market opportunities and threats and 'proactively' identifying, developing and exploiting resources and capabilities to secure a foundation for innovation in dynamic environments. As shown in Figure 2.1 the principal stimulus for innovation from the market-based view comes from knowledge workers' relationships with their clients, and the principal resource from the resource-based view of innovation is the knowledge worker. It is the proposition of this thesis that the development of the optimal dynamic capabilities which bring these two resources together to co-produce innovation which creates sustainable competitive advantage. This view is very much an extension of similar discussions focusing on the appropriate balance between market-based and resource-based view of innovation capabilities needed in small construction firms (Sexton and Barrett, 2003a)¹³⁸.

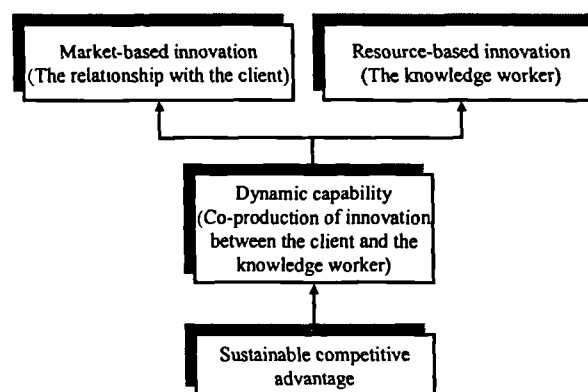


Figure 2.1 Principal sources of sustainable competitive advantage for SKIPFSs

¹³⁵ See Sexton and Barrett (2003a), *op. cit.*

¹³⁶ See Sexton and Barrett (2003b), *op. cit.*

¹³⁷ Sexton, M. and Barrett, P. (2004), "The Role of Technology Transfer in Innovation within Small Construction Firms", *Engineering, Construction & Architecture Management*, 11/5, pp. 342-348.

¹³⁸ See Sexton and Barrett (2003a), *op. cit.*

This section has presented the key innovation challenge facing Skips as the generation of an appropriate balance between market- and resource-based views. The knowledge-based view of innovation described below is presented as a way of conceptualising this balance.

2.5 Knowledge-based view of innovation

2.5.1 Introduction

The previous section has proposed and justified the importance of ‘dynamic capability’ as the driver of successful innovation and sustainable competitive advantage within Skips. This section further develops the concept of ‘dynamic capability’ in SKIPSFs. This section is organised as follows. First, the concept of knowledge-based view of innovation is introduced. Second, the nature of knowledge within the SKIPSFs is described. Third, the principal types of knowledge-based resources are identified. Finally, the main types of organisational capabilities for innovation are explored.

2.5.2 Knowledge-based view of innovation

It has been argued that knowledge and the capacity, ability, and motivation to create and utilise knowledge is the most important source of a firm’s sustainable competitive advantage (for example, see Drucker, 1993¹³⁹; Grant, 1996b¹⁴⁰; Quinn, 1992¹⁴¹; Seviby, 1997¹⁴²). Leonard-Barton (1992:113 emphasis added)¹⁴³, for instance, defines a core capability as “*the knowledge set that distinguishes and provides a competitive advantage..... A core capability is an interrelated, interdependent knowledge system.*” Similarly, Peters (1994:10)¹⁴⁴ emphasises that

¹³⁹ Drucker, P.F. (1993), **Post-capitalistic Society**, Butterworth Heinemann: New York.

¹⁴⁰ Grant, R.M. (1996b), “Toward a Knowledge-based Theory of the Firm”, **Strategic Management Journal**, 17, pp. 109-122.

¹⁴¹ Quinn, J.B. (1992), **Intelligent Enterprise: A Knowledge and Service Based Paradigm for Industry**, Free Press: New York.

¹⁴² Seviby, K.E. (1997), **The New Organisation Wealth: Managing and Measuring Knowledge-based Assets**, Barrett Koehler: San Francisco.

¹⁴³ Leonard-Barton, D. (1992), “Core Capability and Core Rigidities: A Paradox in Managing New Product Development”, **Strategic Management Journal**, 13, pp. 111-125.

¹⁴⁴ Peters, T. (1994), **Crazy Times Call for Crazy Organisations: Tom Peters Seminar**, Macmillan: London.

“the key source of sustainable competitive advantage is knowledge, and specifically the capacity of organisations to acquire knowledge that translates into ongoing organisational innovations.” This argument is also found within the project-based firm literature. Prenciple and Tell (2001)¹⁴⁵, for example, suggest that the ability of project-based firms to successfully innovate is determined by the knowledge they possess. Further, the theme of knowledge as a source of innovation is found within the construction literature. There is general acceptance, for example, that the management of knowledge is vital for innovation in the construction industry (for example, see Carillo, 2004¹⁴⁶; Egbu, 1999¹⁴⁷; Egbu *et al.*, 2000¹⁴⁸).

To reiterate the argument set out in Section 2.2, it has been recognised that the knowledge-intensive nature of services is the primary way to distinguish KIPSFs from non-KIPSFs, and that knowledge-based services are principally the outcome of a co-production between the knowledge worker and the client. Further, it has been emphasised that ‘new ideas’ are the starting point for successful innovation in SKIPSFs (see Section 2.3). The pertinent issue for SKIPSFs is that the ‘new ideas’ are intrinsically ‘knowledge-laden’ and that they are stimulated either directly through co-production with the client, or are driven by contextual market needs (see Section 2.4). Muller (2001:16)¹⁴⁹, for example, asserts innovation is “a process of knowledge creation” and that new knowledge from the process is translated into the creation of new products and services (Knapp, 1998)¹⁵⁰.

The thesis here is that innovation for SKIPSFs should be considered synonymous with a ‘knowledge-based’ view of innovation. Before turning to a closer examination of the ‘knowledge-based view of innovation’, the nature of knowledge

¹⁴⁵ Prenciple, A. and Tell, F. (2001), **Internal-Project Learning: Processes and Outcomes of Knowledge Codification in Project-based Firms**, CoPS Innovation Centre: England.

¹⁴⁶ Carrillo, P. (2004), “Managing Knowledge: Lessons from the Oil and Gas Sector,” **Construction Management and Economics**, 22, pp. 631-642.

¹⁴⁷ Egbu, C.O. (1999), “The Role of Knowledge Management and Innovation in Improving Construction Competitiveness,” **Building Technology and Management Journal**, 25, pp. 1-10.

¹⁴⁸ Egbu, C.O., Sturges, J. and Gorse, C. (2000), “Communication of Knowledge for Innovation within Projects and Across Organisational Boundaries,” **Congress 2000, 15 World Congress on Project Management**, 22nd - 25th May, Royal Lancaster Hotel, London, UK.

¹⁴⁹ Muller, E. (2001), **Innovation Interaction between Knowledge-intensive Business Services and Small and Medium-Size Enterprises: An Analysis in Terms of Evolution, Knowledge and Territories**, Physica-Verlag Heidelberg: Germany.

¹⁵⁰ Knapp, E.M. (1998), “Knowledge Management,” **Business and Economic Review**, 44/4, pp. 3-6.

within SKIPSFs must be addressed. This is the focus of the next section.

2.5.3 The nature of knowledge within SKIPSFs

Knowledge has been traditionally grouped into two types: tacit and explicit (Polanyi, 1962¹⁵¹ & 1966¹⁵²). ‘Tacit knowledge’ is specific to, and resides in, individuals, and refers to knowledge that cannot be easily expressed, represented or communicated. In contrast, ‘explicit knowledge’ refers to knowledge which has been codified and expressed in formal language, which can be stored in the databases, organisational charts, process manuals, routines and documents. The tacit and explicit distinction has evolved into knowledge as a ‘noun’, i.e. an ‘asset’ which can be neutrally articulated, stored, and traded (explicit knowledge); and, knowledge as a ‘verb’, i.e. the context specific ‘process’ of knowledge creation and use (tacit knowledge). The asset and process views of knowledge, and their relevance to SKIPSFs, are discussed below.

1. An asset orientated view of knowledge

The asset view conceptualises knowledge as ‘self-contained’ truths (Galliers and Newell, 2000)¹⁵³ which can be codified and stored in knowledge repositories, and which can be shared, built upon and retained regardless of employee turnover (Washo and Faraj, 2000)¹⁵⁴. Indeed, some commentators argue that knowledge as an ‘asset’ forms a market, where knowledge can be traded (Davenport and Prusak, 1998)¹⁵⁵. The asset view has been prevalent in the general knowledge management area (for example, see Cohen, 1998¹⁵⁶; Knock and McQueen, 1998¹⁵⁷); and in the

¹⁵¹ Polanyi, M. (1962), **Personal Knowledge: Towards a Post Critical Philosophy**, Routledge: London.

¹⁵² Polanyi, M. (1966), **The Tacit Dimension**, Routledge & Kegan Paul: London.

¹⁵³ Galliers, R.D. and Newell, S. (2000), “Back to the Future: From Knowledge Management to Data Management”, **Information Systems Department: Working Paper No.92**, London School of Economics: London, UK.

¹⁵⁴ Washo, M. and Faraj, S. (2000), “It’s What One Does: Why People Participate & Help Other in Electronic Communities of Practice”, **Journal of Strategic Information Systems**, 9/23, pp. 155-173.

¹⁵⁵ Davenport, T.H. and Prusak, L. (1998), **Working Knowledge: How Organisations Manage What They Know**, Harvard University Press: Boston, MA.

¹⁵⁶ Cohen, D. (1998), “Toward a Knowledge Context: Report on the First Annual UC Berkeley Forum on Knowledge and the Firm”, **California Management Review**, 40/3, pp. 22-39.

construction disciplines (for example, see Egbu, 1999¹⁵⁸, Kululanga and McCaffer, 2001¹⁵⁹).

A growing body of commentators are critical of the asset view (for example, see Blackler *et al.*, 1997¹⁶⁰), arguing that knowledge should be viewed as being relative, processual and primarily context-bound (for example, see Barley, 1996¹⁶¹; Orr, 1990¹⁶²). The 'process' view is the focus on the next section.

2. A process orientated view of knowledge

In contrast with the asset view of knowledge, the process view of knowledge stresses the dynamic, human-centred creation and use of knowledge which is specific to a particular context and a particular time. Knowledge, from this perspective, for example, is defined as "a dynamic human process of justifying personal belief toward the truth. Knowledge is created by the flow of information, anchored in the beliefs and commitment of its holder" (Nonaka and Takeuchi, 1995:58)¹⁶³. It follows that knowledge is "dynamic, personal and distinctly different from data and information" (Sveiby, 1997: 345)¹⁶⁴; and is "information combined with experience, context, interpretation, and reflection.....it is high value information that is ready to apply to decisions and actions" (Davenport *et al.*, 1998:43)¹⁶⁵. There is further evidence to suggest that knowledge is a product of human reflection and experience

¹⁵⁷ Knock, N. and McQueen, R. (1998), "Knowledge and Information Communication within Organization: An Analysis of Core, Support and Improvement Process", **Knowledge & Process Management**, 5/1, pp. 29-40.

¹⁵⁸ See Egbu (1999), *op. cit.*

¹⁵⁹ Kululanga, G.K. and McCaffer, R. (2001), "Measuring Knowledge for Construction Organizations", **Engineering, Construction and Architectural Management**, 8, 5/6, pp. 346-354.

¹⁶⁰ Blackler, F., Crump, N. and McDonald, S. (1997), "Knowledge, Organisation and Competition" in G. Krogh, J. Roos and D. Kleine (Eds.), **Knowing in Firms: Understanding, Managing and Measuring Organisational Knowledge**, Sage Publications: London.

¹⁶¹ Barley, S. (1996), "Technician in the Workplace: Ethnographic Evidence for Bringing Work into Organization Studies", **Administration Science Quarterly**, 41/1, pp. 146-162.

¹⁶² Orr, J.E. (1990), "Sharing Knowledge Celebrating Identity: Community Memory in a Service Culture" in D. Middleton and D. Edwards (Eds.), **Collective Remembering**, Sage Publications: Newburg Park, pp. 169-189.

¹⁶³ Nonaka, I. and Takeuchi, H. (1995), **The Knowledge-creating Company**, Oxford University press: New York.

¹⁶⁴ Sveiby, K.E. (1997), **The New Organizational Wealth: Managing and Measuring Knowledge-based Assets**, Berrett-Koehler: San Francisco, CA.

¹⁶⁵ Davenport, T.H., De Long, D.W. and Beers, M.C. (1998), "Successful Knowledge Management projects", **Sloan Management Review**, Winter, pp. 43-57.

(De Long and Fahey, 2000)¹⁶⁶ and involves emotion, values and hunches (Takeuchi, 2001)¹⁶⁷, and that knowledge is defined as “a stock of expertise, not a flow of information” (Starbuck, 1992:716)¹⁶⁸. The common theme throughout in the advocate of the process view of knowledge is that knowledge is dynamic, humanistic and relative (Nonaka *et al.*, 2001)¹⁶⁹.

The socialisation, externalisation, internalisation, and combination (SECI) model provides us with an understanding on how knowledge creation from a process view takes place between individuals, groups and organisations (see Figure. 2.2). These four separate, but interlinked, activities which are described as follows.

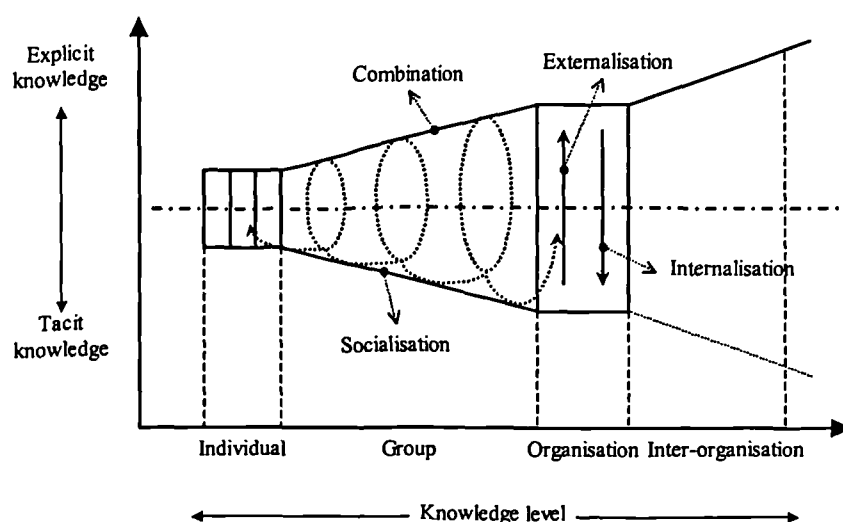


Figure 2.2 Spiral of organisational knowledge creation (Nonaka and Takeuchi, 1995:73)¹⁷⁰

¹⁶⁶ De Long, D.W. and Fahey, L. (2000), “Diagnosing Cultural Barriers to Knowledge Management”, *Academy of Management Executive*, 14/4, pp. 113-127.

¹⁶⁷ Takeuchi, H. (2001), “Towards a Universal Management of the Concept of Knowledge” in K. Nonaka and D.J. Teece (Eds.), *Managing Industrial Knowledge: Creation, Transfer and Utilization*, Sage Publications: London, pp. 315-329.

¹⁶⁸ Starbuck, W.H. (1992), “Learning by Knowledge-intensive Firms”, *Journal of Management Studies*, 29/6, pp. 713-740.

¹⁶⁹ See Nonaka, Toyama and Konno (2001), *op. cit.*

¹⁷⁰ See Nonaka and Takeuchi (1995), *op. cit.*

First, knowledge creation starts with 'socialisation.' The 'socialisation' mode is a process of creating knowledge by converting tacit knowledge from one entity (individual, group, or organisation) to another entity. This interaction facilitates the sharing of individuals' experiences and perspectives. Second, the 'externalisation' mode is a process of creating knowledge by converting tacit knowledge into explicit knowledge. Through this process, entities articulate their formerly tacit knowledge to each other. Third, the 'combination' mode is a process of creating new explicit knowledge from existing explicit knowledge. Through this process, knowledge increasingly takes a concrete form. Finally, the 'internalisation' mode is a process of creating new knowledge by converting explicit knowledge into tacit knowledge. Through 'learning by doing', 'new' tacit knowledge is created, and then renews the knowledge conversion spiral. New knowledge is thus created by these four conversion processes, and through transferral of tacit/explicit knowledge from individual to group/organisational levels (Nonaka and Takeuchi, 1995)¹⁷¹.

A complementary argument is that knowledge can be categorised into individual and collective knowledge (Simon, 1957)¹⁷². 'Individual knowledge' is that part of the organisation's knowledge that resides in the brain and bodily skills of individual. 'Collective knowledge' refers to the ways in which knowledge is distributed and shared among members of an organisation. Walsh and Ungson (1991)¹⁷³ extend this argument by arguing that collective knowledge guides the behaviour, problem-solving activities and pattern of interaction among organisational members.

These two dimensions have been usefully combined to give rise to four categories of knowledge: 'embrained' (individual-explicit) knowledge depends on conceptual skills and cognitive abilities; 'embodied' (tacit-individual) knowledge is action-orientated and rooted in specific physical context; 'encoded' (collective-tacit) knowledge resides in organisational routines, practices and shared norms; and 'embedded' (collective-explicit) knowledge is information conveyed by signs and

¹⁷¹ See Nonaka and Takeuchi (1995), *op. cit.*

¹⁷² See Simon (1957), *op. cit.*

¹⁷³ Walsh, J.P. and Ungson, G.R. (1991), "Organizational Memory", *Academy of Management Review*, 16, pp. 57-91.

symbols (Collins, 1993)¹⁷⁴. Following Collins (1993), Blackler (1995)¹⁷⁵ adds encultured knowledge which is the process for achieving shared understandings (beliefs).

De Long and Fahey (2000)¹⁷⁶ provide a fruitful synthesis by bringing knowledge as an 'asset' and knowledge as a 'process' dimensions together, and identify three distinct, but interactive, types of knowledge:

- (1) **Human knowledge** constitutes what individuals know or know how to do, and is manifested in experience, knowledge and skills. Human knowledge is tacit knowledge.
- (2) **Relationship/Social knowledge** exists in relationships among individuals and groups which add value to activities. Relationship knowledge is largely tacit, composed of cultural norms that exist as a result of working together. Relationship knowledge is reflected by an ability to collaborate effectively.
- (3) **Structure/Structural knowledge** is embedded in organisational systems, processes, tools, rules and routines. Structure knowledge is largely explicit and rule based and can exist independently of staff.

These three types of knowledge are proposed as being critical to understanding innovation in SKIPSFs. The argument here is that the appropriate generation of, and conversion between, human knowledge, relationship knowledge, and structure knowledge is essential to successful knowledge creation and thus (particularly in SKIPSFs) successful innovation. Justification for this argument is given below.

¹⁷⁴ Collins, H.M. (1993), "The Structure of Knowledge", *Social Research*, 60/1, pp. 95-116.

¹⁷⁵ Blackler, F. (1995), "Knowledge, Knowledge Work and Organizations: An Overview and Interpretation", *Organization Studies*, 16/6, pp. 1021-1046.

¹⁷⁶ See De Long and Fahey (2000), *op. cit.*

2.5.4 Knowledge-based resources for innovation

To reiterate, it is proposed that there are three types of knowledge-based resources which are critical for knowledge capital: human capital, relationship capital and structure capital. Whilst discussing these categories separately it is important to note that there are links and synergies between each of these categories that contribute to what is being coined in this research as ‘knowledge capital’ (KC). The knowledge capital is defined as ‘the dynamic synthesis of both the context and process of knowledge creation and conversion between Individual-Organisational-Individual knowledge ba spiral, and the content of relationship capital, structure capital and human capital’ and is more fully discussed in Section 2.6.

Dimension 1: Human capital (HC)

The human capital of a company is defined as “the sum of competence, compliance and commitment” (Rabey, 2000:23)¹⁷⁷; and, as “the composition of human knowledge, skills and attitude that may serve productive purposes in organizations” (Nordhaug, 1993:50)¹⁷⁸. These two definitions are similar in stressing that human capital represents staff motivation and ability to undertake directed and productive work (Cohen and Prusak, 2001)¹⁷⁹. The need to create a ‘high commitment’ culture of staff, in this case knowledge workers, to progressing business performance is recognised in the human resource management (HRM) literature (for example, see MacDuffie, 1995¹⁸⁰; SBAC, 2002¹⁸¹; Wood and de Menezes, 1998¹⁸²).

The development and use of human capital is particularly important for SKIPSFs.

¹⁷⁷ Rabey, G. (2000), “Whither HR? Don’t People Matter Anymore”, *Industry and Commercial Training*, 32/1, pp. 19-23.

¹⁷⁸ Nordhaug, B. (1993), *Human Capital in Organization*, Scandinavian University Press: Oslo.

¹⁷⁹ Cohen, D. and Prusak, L. (2001), *In Good Company*, Harvard Business School Press: Boston, MA.

¹⁸⁰ MacDuffie, J.P. (1995), “Human Resource Bundles and Manufacturing Performance: Organizational Logic and Flexible Production Systems in the World Auto Industry”, *Industrial and Labor Relations Review*, 48/2, January, pp. 197-221.

¹⁸¹ SBAC: The Society of British Aerospace Companies (2002), *High Performance Work Organization in UK Aerospace – The SBAC Human Capital Audit 2002*, SBAC: London.

¹⁸² Wood, S. and de Menezes, L. (1998), “High Commitment Management in the UK: Evidence from the Workplace Industrial Relations Survey and Employers’ Manpower and Skills Practices Survey”, *Human Relations*, 51/4, pp. 485-515.

First, knowledge workers are central to the performance of SKIPSFs. Maister (1993)¹⁸³, for example, indicates that knowledge workers' expertise and skills, and their ability to influence the client and perform their knowledge-intensive tasks, depends on their personal qualities (see Section 2.2). The generation of 'new ideas' (see Section 2.3) requires the motivation and in-depth knowledge and experience of knowledge workers (Baumard, 2002)¹⁸⁴, thus the capability to successfully innovate within SKIPSFs is significantly located within human capital.

Second, human capital is an important prerequisite condition for the 'absorption' or 'capture' of the value of knowledge into organisational structure (see structure capital below). This view is particularly important for small firms, as often a significant proportion of their knowledge about clients (relationship capital) and work activities (structure capital) are embodied in a small number of knowledge workers. The concentration of knowledge in a few staff renders small firms especially vulnerable to key members of staff leaving the firm. As a consequence, losing key knowledge workers is potentially detrimental to SKIPSFs performance (for example, see Barrett, 1993¹⁸⁵; Løwendahl, 2000¹⁸⁶; Maister, 1993¹⁸⁷). Barrett and Ostergren (1991)¹⁸⁸, for instance, identify a number of adverse implications of the loss of critical staff for professional service firms, such as leaving staff taking clients with them and eroding the goodwill of the firm (see relationship capital below). In summary, this thesis adopts the argument that knowledge workers are a crucial resource in the innovation process (Kanter, 1983)¹⁸⁹.

Dimension 2: Relationship capital (RC)

The relationship capital has been described as social capital (for example, see Landry

¹⁸³ See Maister (1993), *op. cit.*

¹⁸⁴ Baumard, P. (2002), "Tacit Knowledge in Professional Firms: The Teachings of Firms in very Puzzling Situations", *Journal of knowledge Management*, 6/2, pp. 135-151.

¹⁸⁵ Barrett, P. (1993), *Profitable Practice Management - For the Construction Professional*, E & FN Spon Publisher: London.

¹⁸⁶ See Løwendahl (2000), *op. cit.*

¹⁸⁷ See Maister (1993), *op. cit.*

¹⁸⁸ Barrett, P.S. and Ostergren, K. (1991), "The Value of Keypersons in Professional Firms" in P.S. Barrett and R. Males (Eds.), *Practice Management: New Perspectives for the Construction Professionals*, E & FN Spon Publisher: London, pp. 321-414.

¹⁸⁹ Kanter, R.M. (1983), "Supporting Innovation and Venture Development in Established Companies", *Journal of Business Venturing*, 1, pp. 47-60.

et al., 2002¹⁹⁰), external structural capital (for example, see Sveiby, 1997¹⁹¹), customer capital (for example, see Stewart, 1997¹⁹²), or relational capital (for example, see Synder and Pierce, 2002¹⁹³). The relationship capital is defined as “customer and supplier relationships, knowledge of market channels and an understanding of the impact of governmental or industry association” (Bontis, 2002:24)¹⁹⁴; and, “the value derived from connections outside the organization; it includes reliable suppliers and loyal customers” (Synder and Pierce, 2002:478)¹⁹⁵. These two definitions point that “[relationship] capital resides in the relationship among [human capital]” (Cohen and Prusak, 2001:3)¹⁹⁶. Furthermore, Cohen and Prusak (2001:4) assert that “[relationship] capital consists of the stock of active connections among people: the trust, mutual understanding and shared values and behaviours that bind the members of human networks and communities and make cooperative action possible.” Social networks are thus as a primary source of relationship capital (for example, see Coleman, 1988¹⁹⁷). This interaction develops and leverages individual’s skills and knowledge (Cohen and Prusak, 2001)¹⁹⁸.

The development and use of relationship capital is critical for SKIPSFs. In the general management literature, it has been identified that relationship capital plays a particularly important role in innovation (for example, see Ibarra, 1993¹⁹⁹; Yli-Renko *et al.*, 2001²⁰⁰; Young *et al.*, 2001²⁰¹). For example, clients and their networks as

¹⁹⁰ Landry, R., Amara, N. and Lamari, M. (2002), “Does Social Capital Determine Innovation? To What Extent?”, *Technological Forecasting and Social Change*, September, 69/7, pp. 681-701.

¹⁹¹ See Sveiby (1997), *op. cit.*

¹⁹² Stewart, T.A. (1997), *Intellectual Capital: The New Wealth of Organisations*, Doubleday/Currency: New York, USA.

¹⁹³ Synder, H. and Pierce, J. (2002), “Intellectual Capital” in B. Cronin (Eds.), *Annual Review of Information Science and Technology*, 36, Information Today: Medford, NJ.

¹⁹⁴ Bontis, N. (2002), “Managing Organizational Knowledge by Diagnosing Intellectual Capital: Framing and Advancing the State of the Field” in N. Bontis and W.C. Choo (Eds.), *The Strategic Management of Intellectual Capital and Organisational Knowledge*, Oxford University Press: New York, pp. 621-642.

¹⁹⁵ See Synder and Pierce (2002), *op. cit.*

¹⁹⁶ See Cohen and Prusak (2001), *op. cit.*

¹⁹⁷ Coleman, J.S. (1988), “Social Capital in the Creation of Human Capital”, *American Journal of Sociology*, 94: S95 - S120.

¹⁹⁸ See Cohen and Prusak (2001), *op. cit.*

¹⁹⁹ Ibarra, H. (1993), “Network Centrality, Power, and Innovation Involvement: Determinants of Technical and Administrative Roles”, *Academy of Management Journal*, 36, pp. 471-501.

²⁰⁰ Yli-Renko, H., Autio, E. and Sapienza, H.J. (2001), “Social Capital, Knowledge Acquisition, and Knowledge Exploitation in Young Technology-based Firms”, *Strategic Management Journal*, 22, pp. 587-613.

well as the networks of the professionals are important resources for KIPSFs (Løwendahl, 2000)²⁰². Communities of practice (CoP), for example, have been identified as being important to the flow of knowledge within knowledge-based organisations (for example, see Hildreth and Kimble, 2004²⁰³). For instance, the choice of clients influences the development of the knowledge worker (human capital), which in turn influences organisational structure (structure capital) (Scott, 1998)²⁰⁴. The importance of CoP has been identified in the project-based learning literature, with Ayas and Zeniuk (2001)²⁰⁵, note that innovation is supported by reflective practitioners who share sense of purpose, a learning infrastructure and exposure to mutual role models.

Dimension 3: Structure capital (SC)

The structure capital has been described as internal structural capital (for example, see Seviby, 1997²⁰⁶) or organisation capital (for example, see Stewart, 1997²⁰⁷).

The structure capital has been defined as the systems for codifying, storing, transmitting and sharing knowledge (Stewart, 1997)²⁰⁸; and, “knowledge embedded in the non-human storehouses and routines of organization.....[and] consists of mechanisms and structures of the organization that can help support employees in their quest for optimum performance” (Bontis, 2002:24)²⁰⁹. Seviby (1997:10)²¹⁰ asserts that structure capital includes “patents, concepts, models, computer and administrative systems as well as organisational culture.”

The structure capital has been described as an important resource for SKIPSFs. A

²⁰¹ Young, G.L., Charns, M.P. and Shortell, S.M. (2001), “Top Manager and Network Effects on the Adoption of Innovative Management Practices: A Study of TQM in a Public Hospital System”, *Strategic Management Journal*, 22, pp. 935-951.

²⁰² See Løwendahl (2000), *op. cit.*

²⁰³ Hildreth, P. and Kimble, C. (2004), *Knowledge Networks: Innovation through Communities of Practice*, Idea Group Publishing: Hershey, PA, USA.

²⁰⁴ Scott, M.C. (1998), *The Intellect Industry: Profiting and Learning from Professional Service Firms*, John Wiley: Chichester.

²⁰⁵ Ayas, K. and Zeniuk, N. (2001), “Project-based Learning: Building Communities of Reflective practitioner”, *Management Learning*, 32/1, pp. 61-76.

²⁰⁶ See Seviby (1997), *op. cit.*

²⁰⁷ See Stewart (1997), *op. cit.*

²⁰⁸ See Stewart (1997), *op. cit.*

²⁰⁹ See Bontis (2002), *op. cit.*

²¹⁰ See Seviby (1997), *op. cit.*

key aspect of the management of knowledge in organisations is the development of an organisational structure to perform knowledge-based work. Shaper (1985:57)²¹¹, for instance, states that:

“Organisation structures and processes are concerned with configuring, channelling and affecting the ways people in the organisation relate to each other in carrying out their work.”

Where knowledge is formalised and embedded in structure capital, it becomes easier (from an asset perspective) to store and to distribute to the organisation (such as by developing standardised processes, best practices, methods, or organisational manuals). Information technology (IT) or information and communication technology (ICT), for example, has been recognised as an efficiency tool to improve construction industry performance (for example, see Barthorpe *et al.*, 2003²¹²). Standardisation of work (such as ISO 9000 Quality management system), for instance, has been described by, is one way of accumulating best practices in an organisation (Thompson, 1967)²¹³. As a consequence, it is believed that construction organisations should have ‘a system’ or ‘a structure’ which can support knowledge sharing interactions (Yamazaki and Ueda, 2003)²¹⁴.

Summary

The relationship capital is the starting point for SKIPSFs to produce targeted services; appropriate human capital is the essential factor to bundle different resources and capabilities to form knowledge capital to bring about appropriate innovation in services and service deliveries; and, structure capital is the principal means by which outcomes of individuals’ interactions can be captured, amplified and shared across different projects and across the organisation.

²¹¹ See Shaper (1985), *op. cit.*

²¹² Barthorpe, S., Chien, H.-J. and Shih, J.K.C. (2003), “The Current State of IT or ICT Usage by UK Construction Companies”, *International Journal of Electronic Business*, 1/4, October-December (Special Issue: E-procurement: myths and realities).

²¹³ Thompson, J.D. (1967), *Organizations in Action*, McGraw-Hill: New York.

²¹⁴ Yamazaki, Y. and Ueda, Y. (2003), “Technology and Knowledge Fusions toward Construction Innovation”, *Proceedings of the Joint International Symposium of CIB Working Commissions*, volume 1, National University of Singapore, Singapore: 22nd-24th October, pp. 40-53.

The key argument of this section is that knowledge capital is made up of relationship capital, structure capital and human capital. The rationale for the capabilities required by SKIPSFs to produce knowledge capital is explored in the next section.

2.5.5 Organisational capabilities for innovation

As was noted previously, innovation is produced by knowledge-based resources and capabilities (see Section 2.5.2) which form knowledge capital (see Section 2.6).

There is a need to understand what kinds of capabilities are required to create, manage and exploit relationship capital, structure capital and human capital to form 'knowledge capital' within SKIPSFs.

The organisational capability for innovation is defined, for example, as "the comprehensive set of characteristics of an organization that facilitate and support innovation strategies" (Burgelman *et al.*, 1996:8)²¹⁵. It has been argued that the acquisition of 'organisational capability' may occur through the processes of 'organisational learning' (Chaston *et al.*, 1999)²¹⁶ and that 'organisational learning' may lead to innovation (Argyris and Schön, 1996)²¹⁷. Chaston *et al.* (1999)²¹⁸, for example, posit organisational learning as a necessary antecedent to building stronger core competences in organisations, particularly in small and medium sized enterprises (SMEs). Indeed, Chaston *et al.* (2002)²¹⁹ further indicate that the role of organisational learning in knowledge acquisition for competitive advantage is required to support the effective marketing of knowledge-based services. These viewpoints indicate the need for 'organisation learning' as a key mechanism by which firms successfully innovate.

Organisational learning can be defined, for example, as "the process of improving

²¹⁵ Burgelman, R., Maidique, M. and Wheelwright, S. (1996), **Strategic Management of Technology and Innovation**, Irwin: Homewood.

²¹⁶ Chaston, I., Badger, B. and Sadler-Smith, E. (1999), "Organisational Learning: Research Issues and Application in SME Sector Firms", **International Journal of Entrepreneurial Behaviour & Research**, 5/4, pp. 191-203.

²¹⁷ See Argyris and Schön (1996), *op. cit.*

²¹⁸ See Chaston, Badger and Sadler-Smith (1999), *op. cit.*

²¹⁹ Chaston, I., Badger, B., Mangles, T. and Sadler-Smith, E. (2002), "Knowledge-based Services and the Internet: An Investigation of Small UK Accountancy Practices", **Journal of Small Business and Enterprise Development**, 9/1, pp. 49-60

actions through better knowledge and understanding” (Fiol and Lyles, 1985:803)²²⁰, and is the “continuous process of creating, acquiring, and transferring knowledge accompanied by a modification of behaviour to reflect new knowledge and insight, and produce a higher level assets” (Neilson, 1997:2)²²¹. Organisational learning is thus a process rather than an outcome (March, 1991)²²² and results in changes in what the organisation knows and how it acts (Forss *et al.*, 1994)²²³. A key challenge for companies is when to change and when not to change. The work of March (1991)²²⁴ provides theoretical guidance to addressing this challenge through the distinction between exploitative and explorative routines. March (1991:85)²²⁵ states that: “essence of exploitation is the refinement and extension of existing competencies, technologies and paradigms . . . [the] essence of exploration is experimentation with new alternatives.”

The term ‘exploitative routines’ has been described in terms of ‘competitive advantage’ that allows an organisation to outperform its resources in the same industry or product market. Cohen (1991:136)²²⁶, for example, indicates that “improving the speed of routines and changing their detailed contents, along with the accurate switching among existing routines, are major sources of competitive advantage or other forms of organisational success.” Incremental new knowledge is thus added to the existing routines which are expected to have the end result of improving it. In other words, no attempt is made to change the paradigm, only make improvements within the context of the prevailing paradigm. In contrast, ‘explorative routines’ are required to generate sustainable competitive advantage. Explorative routines consider the protection of the value of resources over time to enable the organisation to maintain its competitiveness.

²²⁰ Fiol, M. and Lyles, M. (1985), “Organisational Learning”, *Academy of Management Review*, 4/2, pp. 17-33.

²²¹ See Neilson (1997), *op. cit.*

²²² March, J.G. (1991), “Exploration and Exploitation in Organisational Learning”, *Organisation Science*, 2, February, pp. 119-126.

²²³ Fross, K., Cracknell, B. and Samset, K. (1994), “Can Evaluation Help an Organisation to Learn?”, *Evaluation Review*, 18/5, pp. 591-594.

²²⁴ See March (1991), *op. cit.*

²²⁵ See March (1991), *op. cit.*

²²⁶ Cohen, M.D. (1991), “Individual Learning and Organisational Routine: Emerging Connections”, *Organization Science*, 2, February, pp. 135-139.

It has been suggested that organisations should divide their attention and other resources between exploitation and exploration (for example, see Holmgvist, 2003²²⁷; Knott, 2002²²⁸; March and Levinthal, 1999²²⁹). This view is supported by Ghemawat and Costa (1993)²³⁰ who argue that ‘dynamic capabilities’ are anchored in a firm’s ability to both exploit and explore. In other words, the firm ability to compete over time may lie in its ability both to integrate and build upon its current competencies, whilst simultaneously developing fundamentally new capabilities (Teece *et al.*, 1997)²³¹.

The argument here is that there are two distinct, but interactive, types of capabilities are required for successful innovation:

- (1) **Exploitative capability** to utilise organisational resources to improve organisational efficiency to generate **short term** competitive advantage.
- (2) **Explorative capability** to create and use new resources and capabilities to improve organisational effectiveness to generate **sustainable** competitive advantage.

The key proposition of this section is that the concepts of exploitative and explorative capabilities are an appropriate way of understanding, connecting and managing knowledge-based resources. This proposition leads to the concept of successful knowledge-based innovation as being:

“The effective generation and implementation of a new idea which enhances overall organisational performance, through appropriate exploitative and explorative knowledge capital which develops and integrates, relationship capital, structure capital and human capital.”

²²⁷ Holmgvist, M. (2003), “A Dynamic Model of Intra-and-Interorganizational Learning”, *Organization Studies*, 24, pp. 95-123.

²²⁸ Knott, A.M. (2002), “Exploration and Exploitation as Complements” in C.W. Choo and N. Bontis (Eds.), *The Strategic Management of Intellectual Capital and Organizational Knowledge*, Oxford University Press: New York, pp. 299-358.

²²⁹ March, J.G. and Levinthal, D.A. (1999), “The Myopia of Learning” in J.G. March (Eds.) *The Pursuit of Organisational Intelligence*, Blackwell Publishers: Oxford, UK, pp. 191-222.

²³⁰ Ghemawat, P. and Costa, J. (1993), “The Organizational Tension between Static and Dynamic Efficiency”, *Strategic Management Journal*, 14, pp. 59-73.

²³¹ See Teece, Pisano and Shuen (1997), *op. cit.*

2.5.6 Summary and link

This section presents ‘knowledge capital’ as the ‘dynamic innovation capability’ which generates innovation and sustainable competitive advantage within SKIPSFs. The literature reports that the appropriate development and use of knowledge-based resources and capabilities are critical to successful innovation, but it does not adequately address how knowledge-based resources and capabilities are developed and used in SKIPSFs’ innovation activities. This challenge is taken up in the next section.

2.6 Key managerial challenges for innovation

The co-production of professional services demands a high degree of interaction between knowledge workers and clients (see Section 2.2). Knowledge sharing and creation is thus significantly based on the human capital held by knowledge workers and others at work. Adopting De Long and Fahey’s (2000)²³² categorisation, this knowledge can be viewed as ‘relationship knowledge.’ Sverlinger (2000:236 emphasis added)²³³, for example, argues that in knowledge-intensive professional service firms that:

“knowledge about *market* and knowledge about *customers* [are] stored mostly in the *heads of people*.”

There is strong consensus that much of the knowledge in KIPSFs is stored in ‘the heads of knowledge workers.’ Knowledge located within the knowledge worker can be viewed as ‘human knowledge’ (see Section 2.5.3). The implication of this is that relationship and human knowledge are often not effectively ‘structurally’ embedded within the firm; rather, they are located within the knowledge worker. This is compounded by knowledge workers tending to exhibit unique behavioural characteristics when compared to non-professionals (Maister, 1993)²³⁴; in particular, they are intrinsically motivated to seek challenging projects and develop new, valuable skills for themselves, i.e. their individual ‘relationship knowledge’ and

²³² See De Long and Fahey (2000), *op. cit.*

²³³ Sverlinger, P.M. (2000), **Managing Knowledge in Professional Service Organisation: Technical Consultants Serving the Construction Industry**, Department of Service Management, Chalmers University of Technology, Göteborg: Sweden.

²³⁴ See Maister (1993), *op. cit.*

‘human knowledge.’ This individual motivation might not always be appropriately aligned to the needs of the organisation. Maister (1993)²³⁵, for example, states that ‘brain’ type professional service organisations concentrate on complex problems which require new solutions; ‘grey hair’ type professional service organisations tend to concentrate on the firms’ past experience in dealing with similar problems; and, ‘procedure’ type professional service organisations usually use standard solutions to solve familiar problems. Adopting this typology, it can be argued that for the procedural type professional service organisation, knowledge workers who seek challenging, novel projects outside of the firm’s strategic positioning can be disruptive. Similarly, for the brain type professional service organisation, knowledge workers who focus on using ‘standard solutions’ will be in conflict with the firm’s strategic goal.

Knowledge workers’ knowledge about customers tends to be personal and anecdotal, situationally prescribed and, according to Clippinger (1995:28)²³⁶, “typically neither created nor shared through traditional channels, but rather emerging and evolving from the bottom up in somewhat helter-skelter patterns.” This ‘person specific’ knowledge held by knowledge workers can be labelled as ‘individual knowledge’ (Simon, 1957)²³⁷. The accrued or cumulative learning and knowledge of individuals has been referred as ‘individual knowledge capital’ (Neilson, 1997:1)²³⁸.

The challenge within SKIPSFs is to combine various individual knowledge domains to form dynamic ‘organisational knowledge’ in new configurations with feed back to, and enrich, individual knowledge. Bhatt (2002)²³⁹ stresses that the difficulty of this challenge by stating that ‘organisational knowledge’ is not simply the sum of staff’s ‘individual knowledge.’ The generation of organisational knowledge is the product of appropriate ‘interaction’ between individual knowledge bases (Bhatt, 2002)²⁴⁰. Organisations therefore need to develop mechanisms for tapping into the collective

²³⁵ See Maister (1993), *op. cit.*

²³⁶ Clippinger, J.H. (1995), “Visualisation of Knowledge: Building and Using Intangible Assets Digitally”, *Planning Review*, 23/6, pp. 28-31.

²³⁷ See Simon (1957), *op. cit.*

²³⁸ See Neilson (1997), *op. cit.*

²³⁹ Bhatt, G.D. (2002), “Management Strategies for Individual Knowledge and Organisational Knowledge”, *Journal of Knowledge Management*, 6/1, pp. 31-39.

²⁴⁰ See Bhatt (2002), *op. cit.*

intelligence and skills of knowledge workers in order to create a greater 'knowledge base' (Bollinger and Smith, 2001)²⁴¹.

The proposition made here is that organisational knowledge capital within SKIPSFs arises from a dynamic spiralling process wherein relationship capital, structure capital and human capital are converted into relationship knowledge, structure knowledge and human knowledge through their exploitative and explorative capabilities. Hence, these constant interaction activities form an individual-organisational-individual (I-O-I) knowledge capital spiral. Through this spiral, individual knowledge capital is converted into fresh organisational knowledge capital and allows other individuals to access the organisational knowledge capital base.

As a consequence, knowledge capital is dynamic (exploration capability), but must be capable of being accessed and used at any given time (exploitation capability). It is therefore necessary to be able to concentrate knowledge creation and conversion at a certain space and time in order to render it useful - the shared context (Nonaka and Konno, 1998)²⁴². It has been argued that these 'interaction activities' take place in the 'ba' which is a place, space or facility where individuals interact to exchange ideas, share knowledge, conceptualise and create new knowledge (Nonaka *et al.*, 2001)²⁴³. Nonaka *et al.* (2001) differentiate four kinds of ba: (1) originating ba, (2) dialoguing ba, (3) systemising ba, and (4) exercising ba (see Figure 2.3). Each ba corresponds to, and supports, a particular stage of the knowledge creation and conversion spiral.

²⁴¹ Bollinger, A.S. and Smith, R.D. (2001), "Managing Organisational Knowledge as a Strategic Asset", *Journal of Knowledge Management*, 5/1, pp. 8-18.

²⁴² Nonaka, I. and Konno, N. (1998), "The Concept of 'ba': Building a Foundation for Knowledge Creation", *California Management Review*, 40/3, pp. 40-54.

²⁴³ See Nonaka, Toyama and Konno (2001), *op. cit.*

		Type of interaction	
		Individual	Collective
Media	Face-to-face	Originating Ba (Socialisation)	Dialoguing Ba (Externalisation)
	Virtual	Exercising Ba (Internalisation)	Systemising Ba (Combination)

Figure 2.3 *Ba, the shared space for interaction (Nonaka et al. 2001:25)*²⁴⁴

First, ‘originating ba’ offers a context for the socialisation phase (see Section 2.5.3 for description of the socialisation phase). It involves sharing experiences, feelings, emotions, and mental models via thought. Second, ‘dialoguing ba’ offers a context for the externalisation phase (see Section 2.5.3 for description of the externalisation phase). In this context, tacit knowledge becomes explicit through dialogue, reflection and the sharing mental models and skills. Third, ‘systemising ba’ offers a context for the combination phase (see Section 2.5.3 for description of the combination phase). Systemising ba offers a virtual collaborative environment for systemising explicit knowledge throughout the organisational structure such as databases and documentation. Finally, ‘exercising ba’ offers a context for the internalisation phase (see Section 2.5.3 for description of the internalisation phase). Through exercising ba, individual continuously synthesis as ‘self-refinement’ that comes in action.

It has been argued that ‘ba’ may be the physical, virtual or mental ba (Nonaka *et al.*, 2001)²⁴⁵. Adopting this typology, it can be argued that ‘physical ba’ can be, for example, the office; ‘virtual ba’ could emerge from the virtual office, e-mail, teleconferencing, telecommuting or other electronic devices; and ‘mental ba’ driver from shared experiences, ideas or ideals. ‘Ba’ provides a platform for continuously converting tacit knowledge into explicit knowledge and then back again into tacit knowledge, hence advancing collective knowledge. The various ba’s provide

²⁴⁴ See Nonaka, Toyama and Konno (2001), *op. cit.*

²⁴⁵ See Nonaka, Toyama and Konno (2001), *op. cit.*

platforms for knowledge creation and conversion to take place. The argument being made here is that the 'ba' should be focused on the 'knowledge' environment (Davenport and Prusak, 1998:137)²⁴⁶. 'Ba' is thus labelled as 'knowledge ba.' For SKIPSFs, the 'knowledge ba' is significantly located within the interaction between individual knowledge workers and their clients. This individual level of the 'ba' can be viewed as '**individual knowledge ba.**'

It has been proposed that there is a need for the shared context for knowledge creation and conversion from the 'individual level' to 'organisational level', and then back to 'individual level' (for example, see Nonaka and Takeuchi, 1995²⁴⁷). The organisational level of the shared context can be viewed as '**organisational knowledge ba.**' Organisational knowledge ba connects knowledge workers to create, share and utilise knowledge within the organisation. Knowledge within the organisational level forms organisational knowledge capital.

To reiterate, individual knowledge capital within the SKIPSF is mobilised and shared in the 'individual knowledge ba', where knowledge capital is held by individuals and their clients, and not necessarily held by an organisation. In contrast, organisational knowledge capital within the SKIPSF is mobilised and shared in the 'organisational knowledge ba', where knowledge is held by individuals and their clients, as well as an organisation.

Organisational knowledge ba thus presents an influential factor facilitating the individual-organisational-individual (I-O-I) knowledge creation and conversion spiral within SKIPSFs. This spiral, which continuously nurtures the interaction and development of individual and organisational knowledge ba, is taken to be the core dynamic innovation capability for SKIPSFs. The argument here is that knowledge capital is the dynamic synthesis of both the 'context' and 'process' of knowledge creation and conversion within 'knowledge ba', and the 'content' of relationship capital, structure capital and human capital at both individual and organisational level.

²⁴⁶ See Davenport and Prusak (1998), *op. cit.*

²⁴⁷ See Nonaka and Takeuchi (1995), *op. cit.*

The hypothesised 'ideal' position is thus shown on the right hand side of Figure 2.4. The left hand side of diagram depicts a SKIPSF when knowledge workers have very weak ties, in terms of knowledge conversion and innovation, to the 'organisational knowledge ba.' In contrast, on the right hand side of diagram, a stylised picture is presented of closer, more productive, alignment of individual knowledge ba and organisational knowledge ba which provides the necessary dynamic organisational knowledge capital base for successful innovation at both individual and organisational levels.

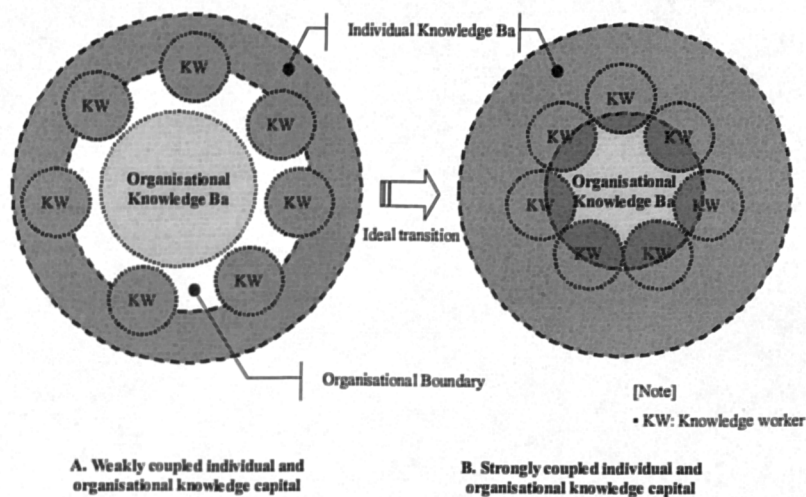


Figure 2.4 Barriers between individual and organisational knowledge capital

This research starts from the adaptation of the knowledge spiral model (see Figure 2.5) presented by Nonaka and Takeuchi (1995)²⁴⁸. Figure 2.5 presents 'dynamic interactions' within the SKIPSF. The different level of interactions between a SKIPSF and its client are discussed below.

²⁴⁸ See Nonaka and Takeuchi (1995), *op. cit.*

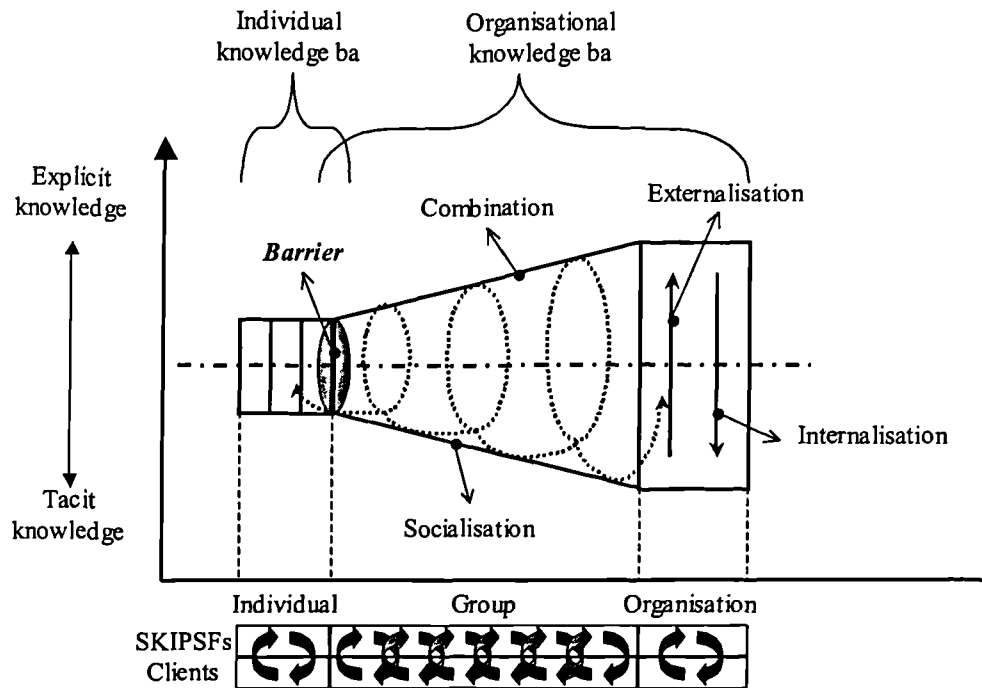


Figure 2.5 Spiral of organisational knowledge capital creation

First, knowledge interactions (see Section 2.5.3 for description of four types of interaction: the socialisation, externalisation, combination and internalisation phase) start from the individual level. The interactions in a SKIPSF are acquired through experience and are possessed by individual knowledge worker working with the client. This is shown in Figure 2.5 in the bottom rectangle. Knowledge interactions in the individual level occur in the individual knowledge ba.

Second, knowledge interactions expand outside the individual. At this stage, the collaborative interaction of individuals share their diverse interests and issues within a team context. As the knowledge work tends to be project-based (see Section 2.2), individuals are being re-grouped in new teams. One strategy is the development of communities of practice (CoP) where groups of people deepen their knowledge through interaction on an on-going basis (for example, see Brown and Duguid,

1991²⁴⁹). CoP have potential to link individual and organisational knowledge ba's together. Knowledge interactions thus occur in the individual and organisational knowledge ba.

Finally, knowledge interactions expand outside of the immediate team context. This implies a view of organisations as multiple communities-of-practice. At this stage, knowledge interactions occur in the organisational knowledge ba.

Figure 2.5 shows different phases of knowledge interactions between clients and the SKIPSFs, including individual, group and organisational interaction. It is argued that there is a paucity of research on understanding the necessary interactions between individual-organisational-individual (I-O-I) knowledge ba spiral to overcome the barrier between I-O-I knowledge creation and conversion spiral within SKIPSFs. This observation may indicate that the barrier between individual knowledge ba and organisational knowledge ba is seen as the key factor which constrains the knowledge flow across individual, group and organisational levels.

The argument to this point identifies two key managerial challenges for successful innovation in SKIPSFs. First, SKIPSFs need to develop a context in which knowledge conversion takes place not only at the individual level (the knowledge worker and the client), but also at the organisational level (the knowledge worker and its organisation). Second, for this to happen, SKIPSFs need to motivate their knowledge workers to create and engage in this context. These challenges are articulated as research questions in the next section and form the focus of this thesis.

2.7 Research questions

The following interconnected questions are formulated:

- (1) How do SCKIPSFs appropriately develop and manage knowledge interaction activities between individual-organisational-individual (I-O-I) knowledge ba

²⁴⁹ Brown, J.S. and Duguid, P. (1991), "Organizational Learning and Communities of Practice: Toward a Unifying View of Working, Learning and Innovation" in M.D. Cohen and L.S. Spruoll (Eds.), **Organizational Learning**, Sage Publications: London, pp. 59-82.

- spiral, and how do these arrangements affect innovation performance?
- (2) How do SCKIPSFs appropriately manage and motivate their knowledge workers to create and engage in this development of, and alignment between, individual-organisational-individual (I-O-I) knowledge ba spiral?

2.8 Summary and link

This chapter has provided a review and synthesis of the relevant literature pertinent to innovation in SCKIPSFs. The central thesis here is that knowledge-based innovation is critical for sustainable competitive advantage. It is proposed that relationship capital, structure capital and human capital knowledge-based resources and exploitative and explorative capabilities must be appropriately combined. This has led to the articulation of two research questions.

The next chapter will set out a concept of knowledge-based innovation model which will guide the investigation of these questions.

3.0 The concept of knowledge-based innovation model

3.1 Introduction

The aim of this chapter is to set out a concept model and hypotheses for this research based on the literature synthesis set out in chapter 2. This chapter is organised as follows. First, a concept model of knowledge-based innovation is proposed. Second, the operationalisation of the model is developed by viewing the model as a gap analysis framework. Finally, the meta hypothesis and six sub-hypotheses are presented.

3.2 Description of knowledge-based innovation model

The proposed definition of knowledge-based innovation (see Section 2.5.5) forms the basis for the knowledge-based innovation concept model shown in Figure 3.1. The variables which make up the model are defined as follows:

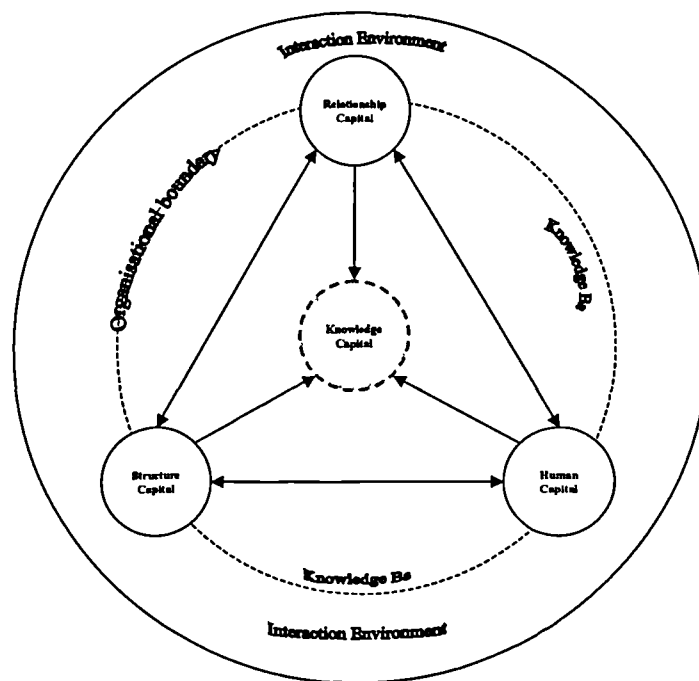


Figure 3.1 Knowledge-based innovation concept model for SCKIPSFs

- (1) **Interaction Environment** is that part of the business environment which firms can interact with, and influence, including the ‘task environment’ (the environment where this client interaction occurs) and the ‘competitive environment’ (the environment where firms compete for customers and scarce resources) (see Section 2.4).
- (2) **Relationship capital (RC)** is the network resources of a firm. It is the resulting from interactions between individual, organisation, and external supplier chain partners, including reputation or image. Relationship capital is the means to leverage human capital (see Section 2.5.4).
- (3) **Human capital (HC)** is defined as the capabilities and motivation of individuals within the SCKIPSF, client systems and external supply chain partners to perform productive, professional work in a wide variety of situations (see Section 2.5.4).
- (4) **Structure capital (SC)** is made up of systems and processes (such as company strategies, machines, tools, work routines, and administrative systems) for codifying and storing knowledge from individual, organisation, and external supply chain partners (see Section 2.5.4).
- (5) **Knowledge capital (KC)** is the dynamic synthesis of both the ‘context’ and ‘process’ of knowledge creation and conversion between Individual-Organisational-Individual knowledge ba spiral, and the ‘content’ of relationship capital, structure capital and human capital (see Section 2.6).

The model proposes that interaction environment, RC, SC, HC and KC, are the key variables in understanding and improving innovation performance in SCKIPSFs. The variables, RC, SC and HC, are interrelated with, as indicated by the double-headed arrows. The variables, RC, SC and HC are contributed to KC, as indicated by the one-way arrow. All these variables need to be effectively linked for successful innovation to occur.

This conceptual knowledge-based innovation model proposes when these variables are created and managed appropriately, they will automatically contribute to knowledge capital, and then successful innovation and sustainable competitive advantage will flow from this knowledge capital.

The concept model highlights the growing recognition placed by firms on the need to build, connect, and energise appropriate knowledge-based resources and capabilities by providing a spatially, temporally, physiologically and sociologically stimulating and supportive 'space' to generate knowledge capital from where successful innovation will spring.

3.3 Gap analysis

The operationalisation of the knowledge-based innovation model is investigated through viewing the model as a gap analysis framework (see Figure 3.2), and forms the basis for a number of indicative research questions given in Table 3.1.

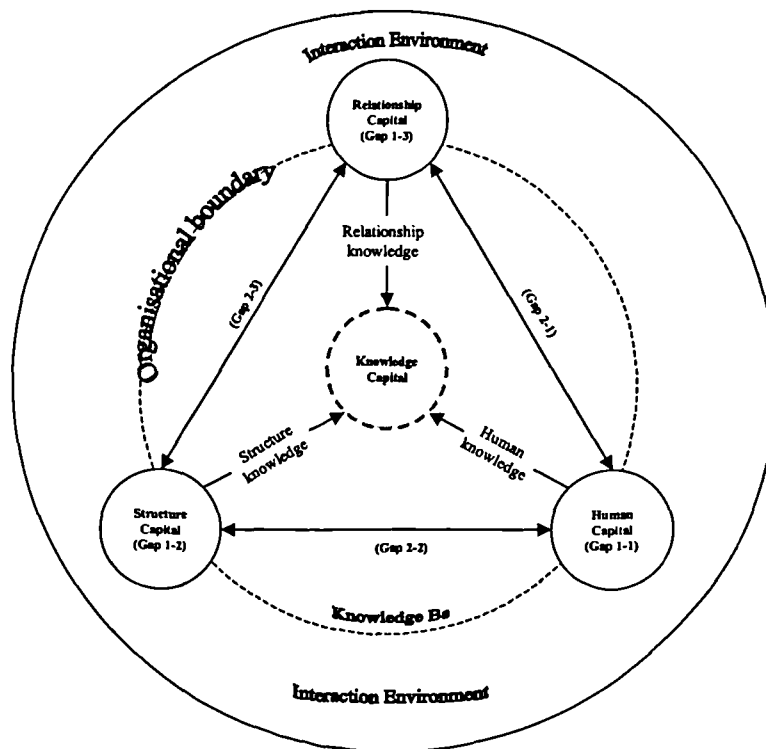


Figure 3.2 Gap analysis framework

Table 3.1 Gaps in knowledge and understanding and their implications

Gap		Lack of knowledge about...	Generic questions raised
Knowledge-based resources	1-1	Human capital	What is the human capital required for SCKIPSFs for successful innovation?
	1-2	Structure capital	What is the structure capital required for SCKIPSFs for successful innovation?
	1-3	Relationship capital	What is the relationship capital required for SCKIPSFs for successful innovation?
Capabilities	2-1	The link between the human capital and relationship capital	How are exploitative and explorative capabilities developed and used in the interaction between human capital and relationship capital?
	2-2	The link between the structure capital and human capital	How are exploitative and explorative capabilities developed and used in the interaction between structure capital and human capital?
	2-3	The link between the relationship capital and structure capital	How are exploitative and explorative capabilities developed and used in the interaction between relationship capital and structure capital?

This gap analysis framework produces a number of hypotheses to test the research questions set out in Section 2.7. The next section will present these hypotheses.

3.4 Research hypotheses

To address the two research questions identified in Section 2.7, a meta hypothesis and six sub-hypotheses are presented (see Figure 3.3).

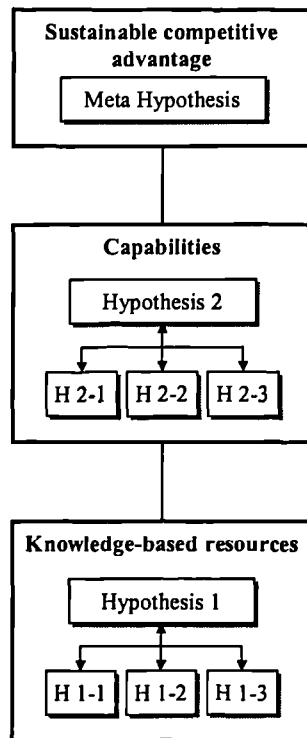


Figure 3.3 Hypotheses structure for this research

The general argument here is that for enduring successful innovation in SCKIPSFs to take place, all hypotheses outcomes must be positive.

Meta hypothesis: *A small construction knowledge-intensive professional service firm which generates and integrates relationship capital, structure capital, and human capital through exploitative and explorative capabilities will create knowledge capital for successful innovation and sustainable competitive advantage.*

Knowledge-based resources

Hypothesis 1: *A small construction knowledge-intensive professional service firm which develops integrated individual, organisational and client human capital, structure capital, and relationship capital will generate a more appropriate stock of resources for successful innovation.*

Hypothesis 1-1: *A small construction knowledge-intensive professional service firm which develops integrated individual, organisational and client human capital will generate a more appropriate stock of human capital resources which will contribute to successful innovation.*

Hypothesis 1-2: *A small construction knowledge-intensive professional*

service firm which develops integrated individual, organisational and client structure capital will generate a more appropriate stock of structure capital resources which will contribute to successful innovation.

***Hypothesis 1-3:** A small construction knowledge-intensive professional service firm which develops integrated individual, organisational and client relationship capital will generate a more appropriate stock of relationship capital resources which will contribute to successful innovation.*

Capabilities

***Hypothesis 2:** A small construction knowledge-intensive professional service firm which generates and integrates exploitative and explorative capabilities through appropriate interaction between human capital, structure capital, and relationship capital will generate appropriate knowledge capital to stimulate and support successful innovation.*

***Hypothesis 2-1:** A small construction knowledge-intensive professional service firm which generates and integrates exploitative and explorative capabilities through appropriate interaction between relationship capital and human capital will make a positive contribution to knowledge capital.*

***Hypothesis 2-2:** A small construction knowledge-intensive professional service firm which generates and integrates exploitative and explorative capabilities through appropriate interaction between structure capital and human capital will make a positive contribution to knowledge capital.*

***Hypothesis 2-3:** A small construction knowledge-intensive professional service firm which generates and integrates exploitative and explorative capabilities through appropriate interaction between relationship capital and structure capital will make a positive contribution to knowledge capital.*

3.5 Summary and link

This chapter has set out the knowledge-based innovation model which is presented as a holistic, system-orientated framework to better investigate how the SCKIPSFs create, manage and exploit innovation. One main hypothesis and six sub-hypotheses have been articulated. The next chapter will present the research methodology used to test these hypotheses.

4.0 Methodology

4.1 Introduction

Chapter 3 set out the conceptual model and hypotheses to test the research questions detailed in Section 2.7. This chapter concentrates on the design and operation of the research methodology used in this research. The structure of this chapter is as follows.

- (1) The need for a ‘nested’ research methodology approach, which integrates research philosophy, research approach and research technique, is argued (section 4.2).
- (2) The overall research process within the nested research methodology is introduced (section 4.3).
- (3) The interpretative research philosophy underpinning the research is substantiated (section 4.4).
- (4) A justification for the choice of a single case study with an exploratory phase and an action research phase is explored (section 4.5).
- (5) The case study design for this research is discussed (section 4.6).
- (6) The qualitative data collection research techniques used in this research are discussed (section 4.7).
- (7) The qualitative data analysis research techniques used in this research are presented (section 4.8).
- (8) The generalisability, representativeness, validity and reliability aspects of the research are set out (section 4.9).

4.2 Research methodology: nested approach

It is important that any given piece of the research adopts a methodology which is appropriate to the research area (McNeill, 1990)²⁵⁰; in other words, the methodology needs to be designed to be sympathetic to ‘the phenomena’ being investigated: in effect to “....suit the method to the problem, and not the problem to the method”

²⁵⁰ McNeill, P. (1990), **Research Methods**, Routledge: London.

(Linstone, 1978:275)²⁵¹. Towards this aim, this research adopts a ‘nested approach’ (Kagioglou *et al.*, 1998)²⁵² in order to bring about an appropriate holistic and systemic methodology, as shown in Figure 1.1.

This approach integrates research philosophy, research approach and research technique. The outer rectangle represents the unifying research philosophy which guides and energises the inner research approach and research technique. The middle rectangle consists of the dominant research methodology for theory generation and testing method; whilst the inner rectangle comprises the research techniques used for data collection and data analysis.

The nesting of the model’s elements generates a framework which provides this research with a research approach and research technique which benefits from appropriate philosophical direction and cohesion. Each of the elements of this model will be discussed below within the context of this research.

4.3 Overall research process used in this research

The overall research process used in this research is given in Figure 4.1 (based on Sexton and Barrett, 2003b:624)²⁵³.

²⁵¹ Linstone, H.A. (1978), “The Delphi Technique” in J. Fowles (Eds.), **Handbook of Futures Research**, Greenwood Press: London. pp. 273-300.

²⁵² See Kagioglou, Cooper, Aouad, Hinks, Sexton and Sheath (1998), *op. cit.*

²⁵³ See Sexton and Barrett (2003b), *op. cit.*

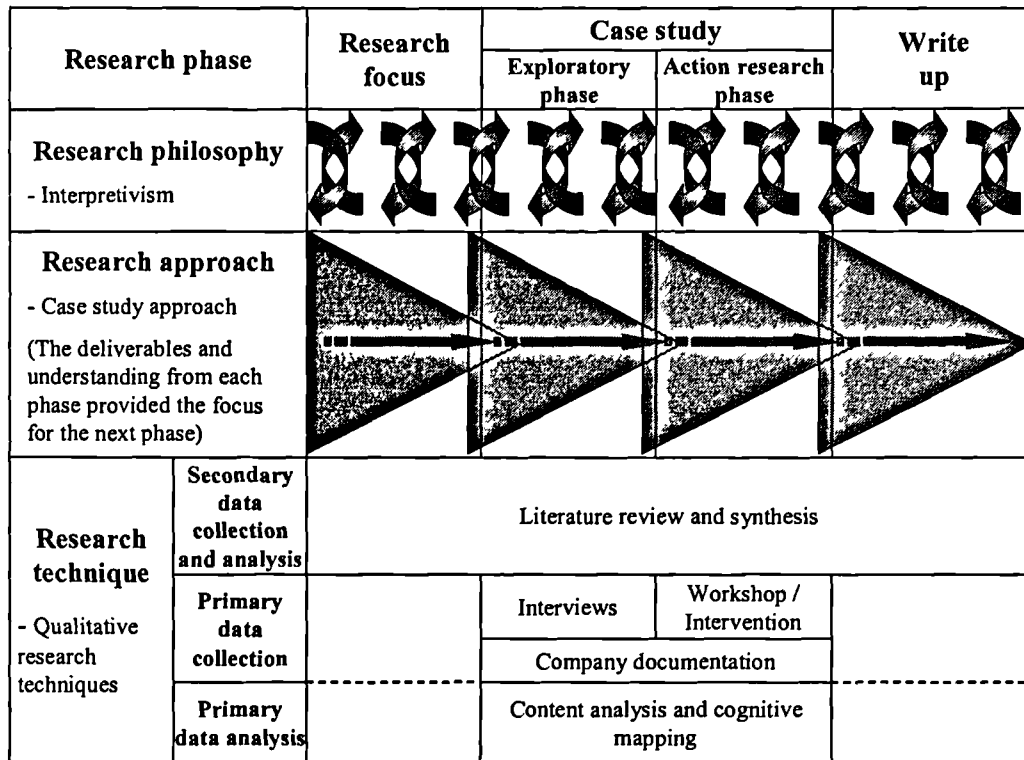


Figure 4.1 Overall research process within the nested research approach

The aim of this research is to investigate the key interconnected challenges identified in Section 2.7, namely:

- (1) How do SCKIPSFs appropriately develop and manage knowledge interaction activities between individual-organisational-individual (I-O-I) knowledge ba spiral, and how do these arrangements affect innovation performance?
- (2) How do SCKIPSFs appropriately manage and motivate their knowledge workers to create and engage in this development of, and alignment between, individual-organisational-individual (I-O-I) knowledge ba spiral?

These aims were pursued through four main research phases: research focus, case study (comprising an exploratory phase and an action research phase), and write up. Each phase provided progressive focus for the next. First, the research focus phase was carried out to develop a concept model of key variables for successful innovation identified within the literature: interaction environment, relationship capital, human capital, structure capital, and knowledge capital (see Section 3.2).

Second, the exploratory phase of the case study was carried out to test these variables by investigating successful/unsuccessful innovation within the case study company. Third, in the action research phase, the key findings from the exploratory phase were fed into a company workshop. The results of the exploratory phase were reviewed in the workshop by senior management of the case study company, and a high priority business improvement need identified. This need formed the basis of the intervention in the action research phase. This action research phase further tested the concept model. Finally, the completed results were written up.

4.4 Research philosophy: interpretative approach

The research approach and research technique should not operate in a philosophical vacuum, as this would render the methodology and the technique devoid of any philosophical context; indeed, “.....a methodology is more than merely a collection of these things. It is usually based on some philosophical view, otherwise it is merely a method, like a recipe” (Avison and Fitzgerald, 1994:64)²⁵⁴.

It has been argued that all research methodology is based on underlying presuppositions adopted by the researcher about the nature of knowledge (Berger and Luckman, 1996)²⁵⁵. Girod-Séville and Perret (2001:13)²⁵⁶, for example, state “recognizing that [researchers] have these presuppositions allows researchers to control their research, to increase the validity of the knowledge produced and to make this knowledge cumulative.” There is thus a need for the researcher to articulate his or her philosophical view in order to provide direction for the appropriate design of the research study.

A number of research philosophies can be considered along several dimensions

²⁵⁴ Avison, K. and Fitzgerald, L. (1994), **Methodological Concepts and Approaches**, Free Press: New York.

²⁵⁵ Berger, P.L. and Luckman, T. (1996), **The Social Construction of Reality**, New York.

²⁵⁶ Girod-Séville, M. and Perret, V. (2001), “Epistemological Foundations” in R.A. Thiétart *et al.*, (Eds.) **Doing Management Research: A Comprehensive Guide**, Sage Publications: Paris, pp. 11-30.

(Sexton, 2003)²⁵⁷ as shown in Figure 4.2. Each approach captures different combinations of ontological, epistemological and axiological assumptions.

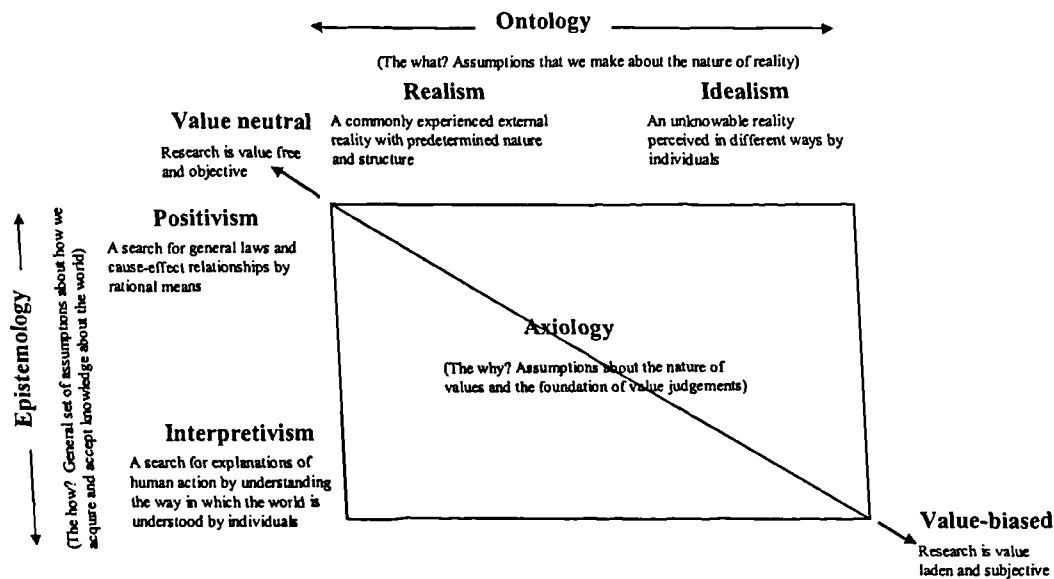


Figure 4.2 Dimensions of research philosophy

The assumptions made by the researcher for this research are as follows.

The researcher's axiological position is in between 'value neutral' and 'value biased'; namely, that reality is not totally independent of the observer and that in order to interpret and understand the external world than has to be, by necessity, value judgement. The value judgement of reality, however, does not negate the belief that there is a 'foundation' of independent reality which individuals interpret in different ways. In this research, therefore, it is believed that the researcher has brought her own values which condition the way the researcher has interpreted information and behaviour within the research; however, checks and balances in the research design has produced results which can be, to a degree, understood and replicated by other researchers (see Section 4.9).

²⁵⁷ Sexton, M.G. (2003), "A Supple Approach to Exposing and Challenging Assumptions and Path Dependencies in Research", **Keynote Speech of the 3rd International Postgraduate Research Conference**, Lisbon, April 2003 – www.scpm.salford.ac.uk/bf2003/sexton_keynote.pdf

Moving on from this articulated axiological position, this research adopts an ontological position towards the idealism end of the continuum. The focus and interaction between people in an organisational setting is believed to be a social construction which creates multiple realities from different actor perspectives. The multiple realities are taken, however, to be dependent on each actor, to a degree, and a core of ‘consensually’ agreed and understood reality exists, e.g. employees of a company agree and understand that they work in the same company!

Finally, the epistemological position taken by the researcher places the work in an interpretive epistemology. The research recognises that innovation in SCKIPSFs cannot be reduced to rational cause and effect relationships; rather, it is a product of idiosyncratic social constructions. To argue otherwise would be to accept that all firms could follow a ‘recipe book’ approach to achieve innovation success! Further, the motivation of the knowledge worker requires individual interpretations of the consequence of specific behaviour and therefore cannot be brought together in unconditional causal generalisations that enable the researcher to predict and control individual human actions (Rosenberg, 1994)²⁵⁸. Therefore, the interpretative approach is considered the most appropriate for this research as it acknowledges the intersubjective, extremely close-knit nature of knowledge workers within a small firm setting.

4.5 Research approach: case study with an exploratory phase and action research phase

There are a variety of research approaches available to the researcher. There are four key research approaches in human and social research (Sexton, 2003)²⁵⁹: experiment, case study, action research and ethnography approaches shown in Figure 4.3. Each approach is briefly defined below and its applicability for this research discussed.

²⁵⁸ Rosenberg, A. (1994), “What is the Cognitive Status of Economic Theory” in R.E. Backhouse (Eds.), *New Directions in Economic Methodology*, Routledge & Kegan Paul: London, pp. 216-235.

²⁵⁹ See Sexton (2003), *op. cit.*

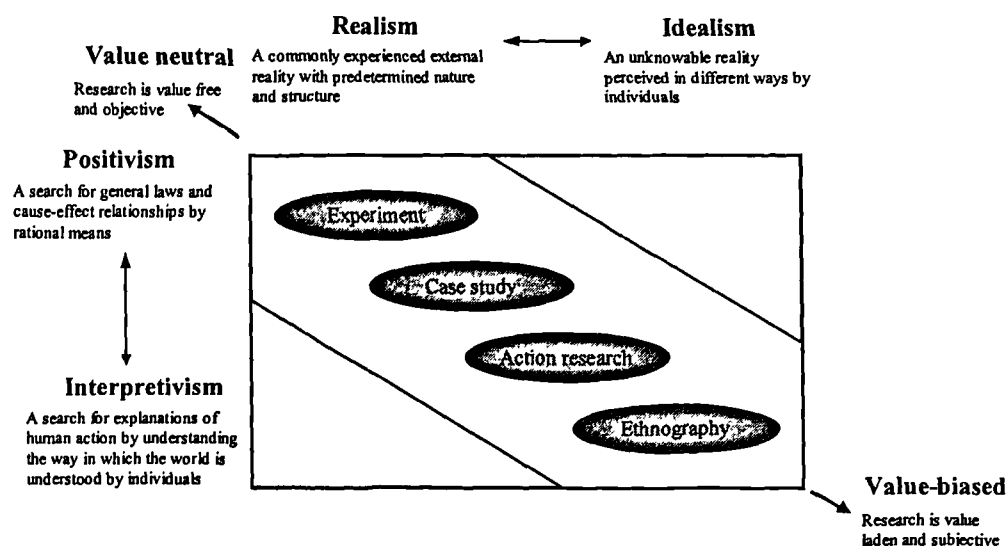


Figure 4.3 Dimensions of research approaches

First, an experiment approach requires one or several independent variables to be identified, and to measure the effect of changes in these variables on selected dependent variables, whilst intervening variables are kept constant (for example, see Babbie, 1990²⁶⁰). This research aims to develop an understanding of the multiple variables which interact to either stimulate or constrain successful knowledge-based innovation in a real world organisational setting. It is therefore impractical in a SCKIPSF to ‘fix’ a variable to understand its impact on other variables; for example, it would be impossible and unethical to reduce salaries in a company to understand at what decreased level of salaries staff will leave! Thus, the experiment research approach is considered inappropriate for this research.

Second, an ethnography approach is the direct observation of the activity of members of a particular social group, and the description and evaluation of such activity (for example, see Rosen, 1991²⁶¹). It is particularly well-suited for the detailed examination of face-to-face interaction within a complex social situation. It preserves the natural qualities of the situation being studied, and captures the richness of the context within which the interaction occurred. For this research the

²⁶⁰ Babbie, E. (1990), *Survey Research Methods*, 2nd ed., Wadsworth: Belmont, CA.

²⁶¹ Rosen, M. (1991), “Coming to Terms with the Field: Understanding and Doing Organisational Ethnography”, *Journal of Management Studies*, 28/1, January, pp. 1-24.

ethnographic approach is not considered appropriate for two reasons. First, successful innovation in SCKIPSFs is not solely dependent on social interaction, but with the interaction between RC, SC, and HC (see Section 2.5.4). An ethnographic approach would not, therefore, given appropriate understanding of innovation phenomena. Second, on a pragmatic level, the resource implication of constantly observing participants in the case study for twenty-two months (see Section 4.6.4) is considered unrealistic for a doctoral study.

Third, this research is fundamentally concerned with the underlying interaction within and between individuals in their 'real-life' context in SCKIPSFs. This means there is a need to explore, to a degree, the motivational and capability aspects of knowledge workers, rather than treat people as a 'black box' in the innovation process. This is in contrast to 'large firm' research which often approaches innovation from a more generic 'human resource' level. The case study approach is useful in the research of human affairs (Yin, 1994)²⁶². Eisenhardt (1989)²⁶³ further explains that the case study is appropriate for allowing a particular issue to be studied in detail and in the context of its relationship with the real world. This research aims to evaluate and validate the knowledge-based innovation concept model; therefore, an in-depth case study was adopted.

Finally, an action research approach is concerned with introducing and deeply understanding change in real-world organisations, and deems the role of the researcher as an active participant in the change process under investigation (for example, see Argyris *et al.*, 1985²⁶⁴; Checkland, 1993²⁶⁵). Kemmis and McTaggart (1990:5)²⁶⁶, for example, define that action research is "a form of collective self-reflective inquiry undertaken by participants in social situations in order to improve the rationality and justice of their own social or educational practices, as well as their understanding of these practices and the situations in which these practices are

²⁶² Yin, R.K. (1994), **Case Study Research: Design and Methods**, Applied Social Research Methods Series, 2nd ed., Sage Publications: Newbury Park, CA.

²⁶³ Eisenhardt, K.M. (1989), "Building Theories from Case Study Research", **Academy of Management Review**, 14/4, pp. 532-540.

²⁶⁴ Argyris, C., Putnam, R. and Smith, D. (1985), **Action Science: Concepts, Methods and Skills for Research and Intervention**, Jossey-Bass: San Francisco, CA.

²⁶⁵ Checkland, P. (1993), **Systems Thinking, System Practice**, John Wiley & Sons: New York, NY.

²⁶⁶ Kemmis, S. and McTaggart, R. (1990), **The Action Research Planner**, Deakin University Press: Geelong.

carried out.” An action research approach was considered appropriate for this research. In this research, investigating successful innovation activities in SCKIPSFs implies the researcher needs to understand the ‘meaning’ and ‘process’ of ‘people’ interaction activities. Therefore, the researcher requires a level of participation within the study. For example, the researcher looked for patterns of behaviour of knowledge workers, and then interpreted the interrelationships between them. A potential limitation of the action research approach is that, when the researcher intervenes, the researcher becomes part of the study and therefore the results are biased. Some commentators have thus concluded that action research approach is ‘unscientific’ (for example, see Whyte, 1991²⁶⁷). Such arguments, however, presuppose a positivist view of knowledge creation and validation. This research adopts an interpretative approach which renders these criticisms void.

This research adopted a single case study which composed of an exploratory phase and an action research phase (see Section 4.6.4). This case study design is the focus of the next section.

4.6 Case Study design

This section examines the case study design used in this research, and describes and justifies the following elements: the unit of analysis; the sampling strategy for case study firm selection; the sampling strategy for interviewee selection; and, data collection techniques.

4.6.1 Unit of analysis

The definition of ‘the unit of analysis’ is a “phenomenon of some sort of occurring in a bounded context” (Miles and Huberman, 1994:25 emphasis added)²⁶⁸ and should be “related to the way the initial research questions have been defined” (Yin, 1994:22)²⁶⁹. An appropriate unit of analysis is critical, as it influences the subsequent lines of inquiry within a case study.

²⁶⁷ Whyte, W.F. (1991), *Participatory Action Research*, Sage Publications: London.

²⁶⁸ Miles, M.B. and Huberman, A.M. (1994), *Qualitative Data Analysis: A Sourcebook*, Sage publications: Thousand Oaks, CA.

²⁶⁹ See Yin (1994), *op. cit.*

The unit of analysis for this research is taken as the ‘innovation activity’ (see Figure 4.4); i.e. the generation and implementation of an innovation is investigated through the ‘interpretative’ prism of the organisational model of innovation (see Section 3.2). In the exploratory phase, seven innovations were identified for investigation (see Section 5.4); whilst in the action research phase, the unit of analysis was the interim project review process innovation (see Section 6.2.1). The individual innovation activity from the exploratory phase and the action research phase helped the researcher to gather a synthesised understanding of organisational innovation activity. This synthetic understanding from the exploratory phase and the action research phase were used to test the research questions (see Section 2.7) and hypotheses (see Section 3.4).

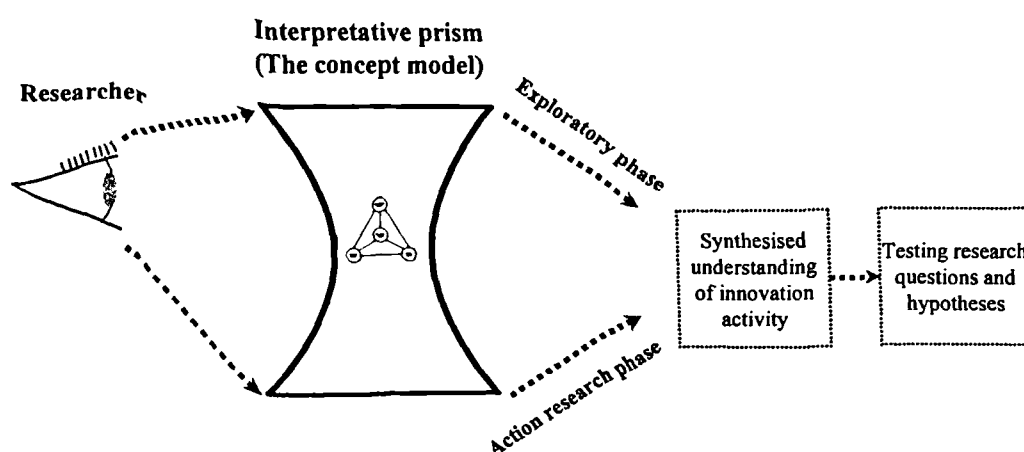


Figure 4.4 The unit of analysis within this research

4.6.2 Sampling strategy for sampling design

‘A sample’ has been defined as “a model of the population for a subset of the population that is used to gain information about the entire population” (Henry, 1998:102)²⁷⁰; and, “the set of elements from which data is collected” (Royer and

²⁷⁰ Henry, G.T. (1998), “Practical Sampling” in L. Bickman and D.J. Rog (Eds.), **Handbook of Applied Social Research Methods**, Sage Publications: London.

Zarlowski, 2001:147)²⁷¹. Yin (1994)²⁷² argues that successful case study research is significantly influenced by the sample size (number of cases) and sample representativeness (case selection). Each of the characteristics will be discussed in turn.

▪ Sample size

There are many different views on what constitutes a 'correct' sample size, but a generic theme throughout the debate is that sample size should be appropriate to the articulated research questions. Royer and Zarlowski (2001:157)²⁷³, for example, state that "determining the size of a sample really comes down to estimating the minimum size needed to obtain results with an acceptable degree of confidence." Yin (1994)²⁷⁴ consolidates this argument for case study research by stressing the need to select 'information-rich cases' which will illuminate the questions under study. Similarly, Patton (1990)²⁷⁵ considers that as there are no set rules for sample size in qualitative research and that each scenario needs to be considered in its unique context.

A longitudinal single case study of twenty-two months was the basis for this research. A single case has been described as the opportunity to study several contexts within the case; a number of different cases in the single firm; or, the number of cases studied can be different from the number of firms (Mukherjee *et al.*, 2000)²⁷⁶. There are three rationales for conducting a single-case study (Yin, 1994:38-40)²⁷⁷.

- (1) The case presents a critical setting for testing an existing theory, whether the goal is to confirm, challenge or extend it;
- (2) The case has unique or extreme characteristics; or,

²⁷¹ Royer, I. and Zarlowski, P. (2001), "Sampling" in R.A. Thiétart *et al.*, (Eds.) **Doing Management Research: A Comprehensive Guide**, Sage Publications: Paris, pp. 147-171.

²⁷² See Yin (1994), *op. cit.*

²⁷³ See Royer and Zarlowski (2001), *op. cit.*

²⁷⁴ See Yin (1994), *op. cit.*

²⁷⁵ Patton, M. (1990), **Qualitative Evaluation and Research Methods**, Sage Publications: London.

²⁷⁶ Mukherjee, A., Mitchell, W. and Talbot, F.B. (2000), "The Impact of New Manufacturing Technologies and Strategically Flexible Production", **Journal of Operations Management**, 18, pp. 139-169.

²⁷⁷ See Yin (1994), *op. cit.*

- (3) The case study exists in a situation whereby an investigator has opportunity to observe and analyse a phenomenon previously inaccessible to scientific investigation.

The single case study adopted in this research is principally stimulated by the first and third rationales above. It is believed that the single case study is best suited to dealing in an in-depth way with the multitude of fragmented perspectives and complexity of organisational life within SCKIPSFs (rationale 3 above) that have been identified as important issues in Chapter 2 (rationale 2 above). Effort has been made to select a representative SCKIPSF (see below), therefore rationale 1 above is being explicitly rejected.

The single case approach, however, has a number of limitations. The first limitation is the degree of generalisability of the conclusions, models or theory development from one case study. Second, the results from a single case study can be inappropriately integrated. Leonard-Barton (1990)²⁷⁸, for example, argues that these include the risks of misjudging the relevance and impact of a single event, and of exaggerating easily available data. This research adopts the position set out by Yin (2003:39)²⁷⁹ in that the results are generalised to theory (which is analogous to the way in which scientists generalise from experiments to theory) rather than to the wider population of SCKIPSFs.

These risks to the generalisation to theory have been reduced in this research by focusing on a longitudinal, twenty-two month case study which offers a richer 'dynamic' picture than offered by the, arguably, that 'snap shot' insight gained from a number of short case studies (see Section 4.9). Further, triangulation method was employed to ensure robustness of data collection and analysis (see Section 4.7 and 4.8). This view is supported by Stake (1994:242)²⁸⁰, who states:

“generalization from differences between any two cases are much less to be trusted than generalizations from one.”

²⁷⁸ Leonard-Barton, D. (1990), "A Dual Methodology for Case Studies: Synergistic Use of a Longitudinal Single Site with Replicated Multiple Sites", *Organisation Science*, 1/1, pp. 248-266.

²⁷⁹ See Yin (2003), *op. cit.*

²⁸⁰ Stake, R. (1994), *Case Studies, Handbook of Qualitative Research*, Sage Publications: London.

▪ **Sample representativeness (Selection criteria)**

Selection criteria for the single case study company were made on the basis of the size and type of organisation. Each criterion is discussed below.

1. Size of organisations

The research focuses on small firms (see Section 1.2). There is significant consensus from international and national bodies that ‘a small company’ is defined as having between 11 and 49 staff. The EC (1996)²⁸¹, for example, defines micro companies as having between one and ten staff; small as between eleven and forty-nine staff; medium as between 50 and 250 staff; and, large as having more than 250 staff. Similarly, the SBS (2000)²⁸² defines small construction firms as having between 11 and 49 staff (see Table 4.1).

Table 4.1 Number of enterprises, employment and turnover in the private sector summary by size of enterprises of construction industry section in UK (2000)

Size band		A	B	C	D	Total
Size definition		Micro	Small	Medium	Large	
Number of employees	None ^[1]	1-10	11-49	50-250	251+	
Enterprises	81.8	18.0		0.2	0.0 ^[2]	678,515
Employment	37.5	38.5		8.4	15.5	1,576,000
Turnover (£million)	17.9	41.1		13.9	27.1	127,033

Source: Small Business Service (2000)

[1] Sole proprietorships and partnerships comprising only the self-employed owner-manager(s) and companies comprising only and employee director.

[2] Numbers are rounded to the nearest 5 to avoid disclosure. Counts of less than 3 appear as zero.

Calderpeel, the single case study firm (see Section 5.2), meets this criterion by having 40 staff.

²⁸¹ EC: European Commission (1996), “SMEs: Recommendation of the Commission”, **Official Journal of the European Communities**, L107/6, pp. 1-2.

²⁸² See Small Business Service (2000), *op. cit.*

2. Classification of organisations

The research focuses on construction knowledge-intensive professional service firms (CKIPSFs). Adopting the definition of a CKIPSF (see Section 2.2), it can be argued that consultancy firms (such as consulting engineering firms, cost consulting), architecture, building service, building survey, quantity survey and higher education institutes and research institutes, can be regarded as CKIPSFs (for example, see CIC and DTI, 2003: 6-7²⁸³). The case study firm was an architectural practice. There are two reasons for this choice. First, there is evidence that ‘the architectural service’ is the ‘archetype’ of a PSF, being almost entirely reliant on the knowledge and expertise of individual organisational members (for example, see Boström, 1995²⁸⁴; Day and Barksdale, 1992²⁸⁵; Wislon, 1997²⁸⁶). Second, the important role of architects within UK construction KIPSFs is evidenced by the CIC and DTI report (2003)²⁸⁷ which shows that small architecture firms (11-50 staff) make up 22.7% of UK CKIPSFs (see Table 4.2).

Table 4.2 Number of construction SKIPSFs

Discipline	Small size of firm (number of employees)		Total	
	11-25	26-50	no.	%
Architects	651	199	850	22.7
Civil and structural engineers	1000	563	1563	41.8
Building services engineers	274	83	357	9.5
Quantity surveyors	207	71	278	7.4
Other surveyors	116	36	152	4.1
Project managers	84	39	123	3.3
Others (including planners)	293	124	417	11.1
Total no.	2625	1115	3740	100

Source: CIC and DTI (2003:10 Table 3.1)

²⁸³ See CIC and DTI (2003), *op. cit.*

²⁸⁴ Boström, E-O. (1995), “Successful Cooperation in Professional Services: What Characteristics should the Customer Have?”, *Industrial Marketing Management*, 24, pp.156-165.

²⁸⁵ Day, E. and Barksdale, Jr.H.C. (1992), “How Firms Select Professional Services”, *Industrial Marketing Management*, 21, pp.85-91.

²⁸⁶ Wislon, T.L. (1997), “Segment Profitability of the US Business Services Sector: Some Reflections on Theory and Practice”, *International Journal of Services Industry Management*, 8/5, pp. 398-413.

²⁸⁷ See CIC and DTI (2003), *op. cit.*

Calderpeel is an architectural practice (see Section 5.2) and therefore meets this criterion.

4.6.3 Sampling strategy for interviews

Before conducting interviews, the appropriate size and composition of interviewees needs to be determined. This view is in alignment with Leedy (1988:158)²⁸⁸ who argues that “no matter how good the gathering of data is ... the survey cannot be accurate if the people in the sample are improperly selected.”

KIPSFs usually structure their employees in three levels: juniors, managers, and seniors (Maister, 1993:4)²⁸⁹. The different level of staff is determined by the experience and skill requirements of its work. Senior-level professionals and middle-level professionals (managers) are highly experienced and skilled. It is argued that senior management are engaged, to a significant extent, in organisational management activities; whilst managers focus on project management activities. Managers are usually project management professionals (Maister, 1993:5)²⁹⁰. Junior-level professionals are primarily engaged in undertaking project tasks under the direction of project management. Figure 4.5 shows the structure of Calderpeel using this classification. The sample of five interviews in the exploratory phase represents all three levels. This reduced the risk of the results being biased to a particular professional level within the firm.

²⁸⁸ Leedy, P.D. (1988), *Practical Research - Planning and Design*, Macmillan: New York.

²⁸⁹ See Maister (1993), *op. cit.*

²⁹⁰ See Maister (1993), *op. cit.*

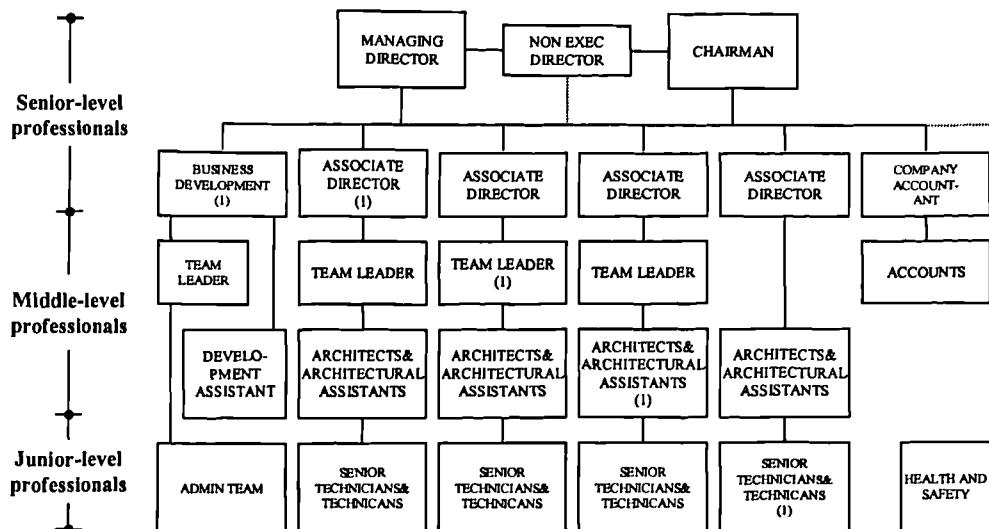


Figure 4.5 Classification of professionals within Calderpeel

Table 4.3 summarises key features of the five respondents which participated in the exploratory phase in this research.

Table 4.3 Profile of respondents in interviews

Respondent	Classification	Age	Formal qualification (Graduate & Fully qualified members of professional institutions)	No. of years with this company & Role/activity	Pervious employer			
					Firm & number of years with it	Main products/services	Type	Size
A	Senior	34	<ul style="list-style-type: none"> Architecture Diploma Royal Institute of British Architects (RIBA) 	2/Associate director	3/Architect	Architectural practice	Private	Medium
					4 Architect	Architectural practice	Private	Micro
					2/Architect	Architectural practice	Private	Small
B	Junior	26	<ul style="list-style-type: none"> Trained to HNC (Higher National Certificate) or HND (Higher National Diploma) in Architecture 	2/Architectural technician	5.5/ Technical drawing	Architectural practice: Design scheme for the building, achieve partnering information, and help the team building	Private	Micro
C	Manager	28	<ul style="list-style-type: none"> Architecture Diploma RIBA 	3.5/Architect	5/Managing contracts on site	Building company	Private	Small
					2/Architect	Architectural practice	Private	Small
D	Manager	31	<ul style="list-style-type: none"> Architecture Diploma RIBA 	3/ Project architect and team leader	3/Training architects	Architectural practice	Private	Medium
E	Senior	26	<ul style="list-style-type: none"> Architecture Diploma MBA in the marketing 	5/ Development manager and architectural assistant	5/Estate agent	Selling house	Private	Small
					1/Copy Typist	Preparing documents for Court	Public	Large
					5/Selling shoes	Shoe shop: Children shoes	Private	Large

It can be seen that: the average age of the respondents is fairly young (29 years); respondents have explicit architect education and qualification; and, that four out of five respondents come from small to medium sized, private, architectural or building firms.

4.6.4 Case study data collection design

The overall activity in the twenty-two month case study is given in Figure 4.6. The case study started in April 2003, and ended in January 2005. There were two main phases in this study: the exploratory phase and the action research phase. Each phase is discussed below.

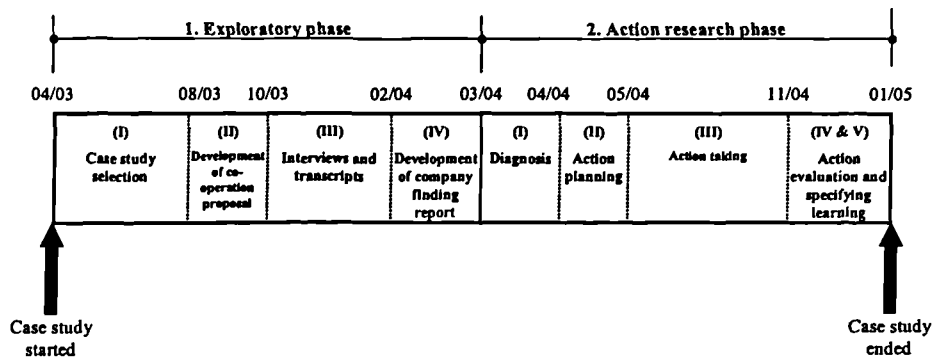


Figure 4.6 Case study phases and activities

1. Exploratory phase

The exploratory phase was twelve months in duration. The main activities within the exploratory phase are listed in the Table 4.4 (see Chapter 5 for the description of the exploratory phase).

Table 4.4 Exploratory phase activities (April 2003 to May 2004)

Phase		Duration	Case study research activity	Outcome
I	Case study selection	April to July 2003	<ul style="list-style-type: none"> • Emailed and telephoned around 300 SCKIPSFs with research proposal (see Appendix A) 	<ul style="list-style-type: none"> • Calderpeel selected (comment: an indication problem with collaboration research with small construction firms is that they do not have either the motivation and/or 'surplus' resource to engage in research)
II	Development of co-operation proposal	August to September 2003	<ul style="list-style-type: none"> • Developed co-operation proposal with Calderpeel senior management • Access to company documents (see Appendix B) 	<ul style="list-style-type: none"> • A confirmation e-mail from senior management • An agreed detailed company co-operation proposal (see Appendix C) • An agreed revised detailed company co-operation proposal (see Appendix D)
III	Interviews and transcripts	October 2003 to January 2004	<ul style="list-style-type: none"> • Arranged the interview schedule with Calderpeel senior management 	<ul style="list-style-type: none"> • A confirmation e-mail from senior management
			<ul style="list-style-type: none"> • Emailed interview co-operation proposal (see Appendix E) and interview protocol to each respondent (see Appendix F) 	<ul style="list-style-type: none"> • A confirmation e-mail from each respondent
			<ul style="list-style-type: none"> • Face to face interviews with each respondent • Each interview was appropriately 1.5 hours duration 	<ul style="list-style-type: none"> • Delivered transcripts/the word-processed documents to each respondent (see Appendix G for an example transcript)
			<ul style="list-style-type: none"> • Check transcription accuracy with each respondent 	<ul style="list-style-type: none"> • A confirmed transcription accuracy e-mail from each respondent
IV	Development of company finding report	February to March 2004	<ul style="list-style-type: none"> • Developed company finding report with Calderpeel senior management 	<ul style="list-style-type: none"> • A general company finding report (see Appendix H)

2. Action research phase

This research adopted an action research methodology (see Section 4.5), adopting the five-step process of diagnosis, action planning, action taking, action evaluation and specifying learning (Susman, 1983)²⁹¹ (see Figure 4.7). The focus of each phase was tailored to meet the specific nature of this study, and is set out below:

²⁹¹ Susman, G.I. (1983), "Action Research: A Sociotechnical Systems Perspective" in G. Morgan (Eds), *Beyond Method: Strategies for Social Science Research*, Sage Publications: London, pp. 95-113.

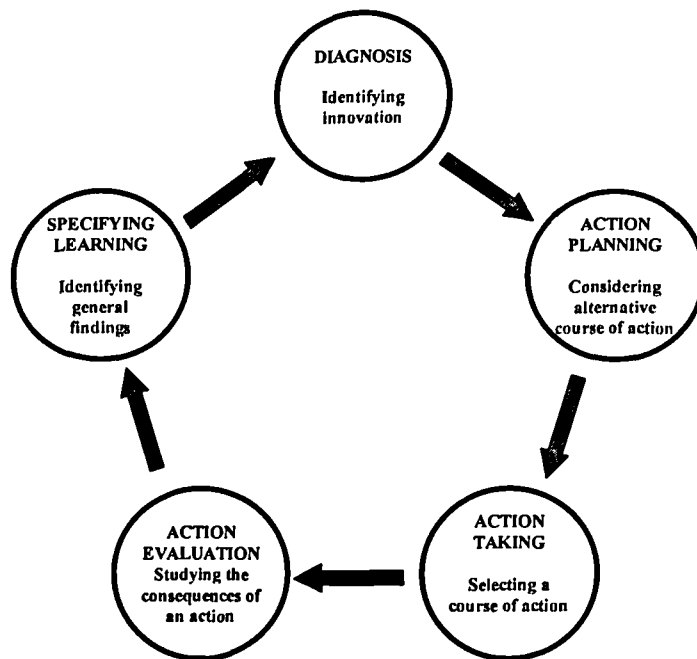


Figure 4.7 The process of action research

1. Diagnosis phase

The diagnosis phase generally corresponds to the identification of the issue (be it an opportunity or problem). In this research, the ‘issue’ is innovation activity, and the diagnosis phase concentrated on collecting and analysing relevant information to develop a clear understanding of relevant factors.

2. Action planning

The action planning activity specifies organisational actions to progress the intervention. An action plan is made for some form of intervention strategy; for example, the performance outcomes of the intended intervention.

3. Action taking

Action taking is to implement the action plan. The intervention within this research was carried out in six activities.

4. Action evaluation

After the actions are completed, the action evaluation activity takes place to determine that the implemented innovation has been a success or a failure.

5. Specifying learning

Specifying learning is to reflect the knowledge gained in the action research whether the innovation has been successful or not. The results direct future innovation research.

The five phases within overall action research process do not take place in five, sequential phases; rather, mini cycles, from diagnosis through to specifying learning, took place through out the action research process (see Figure 4.8). The important characteristic of each cycle is that diagnosis before action planning, action planning before action taking, action taking before action evaluation, and reflects on specifying learning. The specifying learning at the end of each cycle feeds into the diagnosis for the next cycle.

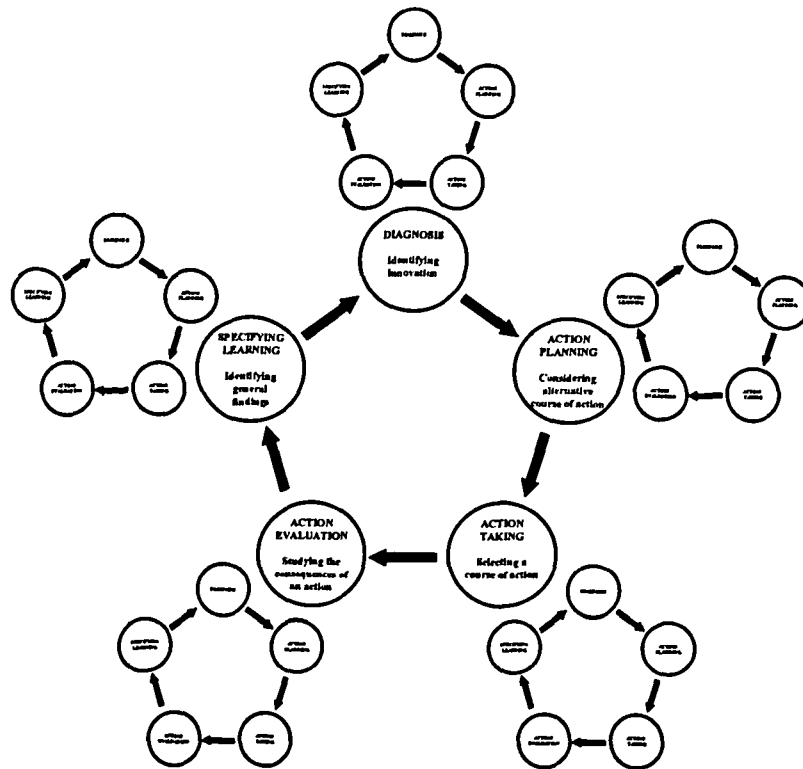


Figure 4.8 The action research cycle (Sexton and Barrett, 2003b:631)²⁹²

The action research phase was ten months in duration. The main activities within the action research phase are listed in the Table 4.5 (see Chapter 6 for the description of the action research phase).

²⁹² See Sexton and Barrett (2003b), *op. cit.*

Table 4.5 Action research phase activities (April 2004 to January 2005)

Phase		Duration	Action research activity	Outcome
I	Diagnosis	April 2004	<ul style="list-style-type: none"> Presented the key findings from the exploratory phase in the company workshop 	<ul style="list-style-type: none"> Discussed and validated the analysis and results
			<ul style="list-style-type: none"> Possible interventions identified and discussed 	<ul style="list-style-type: none"> Interim project review process innovation identified
			<ul style="list-style-type: none"> Emailed company workshop minutes to Calderpeel senior management (see Table 6.1) 	<ul style="list-style-type: none"> A confirmation e-mail from senior management
II	Action planning	May 2004	<ul style="list-style-type: none"> Developed an action plan (see Table 6.2) 	<ul style="list-style-type: none"> A confirmation e-mail from senior management
III	Action taking	May to November 2004	<ul style="list-style-type: none"> Developed first draft of the interim project review policy, guidelines and checklists 	<ul style="list-style-type: none"> The first draft of the interim project review process (see Appendix K)
			<ul style="list-style-type: none"> Reviewed relevant company documents (see Appendix B) 	
			<ul style="list-style-type: none"> Emailed the first draft of the interim project review process to Calderpeel's quality representative Meeting with Calderpeel's quality representative 	<ul style="list-style-type: none"> The third version of the interim project review process
			<ul style="list-style-type: none"> Emailed the third version of the interim project review process to Calderpeel's quality representative Interim project review handbook reviewed by Calderpeel management board 	<ul style="list-style-type: none"> Calderpeel's senior management comments on the third version of the interim project review process
			<ul style="list-style-type: none"> Emailed the revised interim project review handbook to Calderpeel's quality representative Meeting with Calderpeel senior management 	<ul style="list-style-type: none"> QW01 Calderpeel guidelines for interim project review (see Appendix L)
			<ul style="list-style-type: none"> Interim project review procedure reviewed by Calderpeel's external ISO consultant Meeting with Calderpeel senior management 	<ul style="list-style-type: none"> QW1 interim project review handbook (Revision A) (see Appendix M)
			<ul style="list-style-type: none"> Emailed the revised QW1 interim project review handbook to Calderpeel's quality representative Meeting with Calderpeel's quality representative 	<ul style="list-style-type: none"> QW1 interim project review handbook (Revision B) (see Appendix N)
IV & V	Action evaluation & Specifying learning	December 2004 to January 2005	<ul style="list-style-type: none"> Tested the interim project review process 	<ul style="list-style-type: none"> By the end of December 2004, the interim project review process had not been implemented as a result

4.7 Research techniques: qualitative data collection techniques

The data collection techniques for this research consisted of reviewing relevant literature and company documentation, carrying out interviews, and setting up and attending workshops and meetings. Each tool is discussed below.

4.7.1 Literature review

It is believed that prior theory in the area of research interest in the case study research should be identified through a literature review (for example, see Miles and Huberman, 1994²⁹³; Yin, 2003²⁹⁴). The literature review embraced two main areas, with a particular focus on SCKIPSFs: the management of knowledge, and the management of innovation.

This research adopted the hermeneutic-based philosophy of interpretation of pre-understanding/understanding (for example, see Baleicher, 1980²⁹⁵). Figure 4.9 shows the process of literature review and synthesis used in this research. Three generic strands ran through this process. The pre-understanding of the researcher represented the researcher's initial priori knowledge, insights and experience which the researcher drew upon to interpret a piece of general management literature. The understanding gained provided an appropriate focus for a piece of construction specific literature. This shaped the next phase of pre-understanding used to interpret a second piece of general management literature, and so on. The ongoing review and synthesis of the relevant literature resulted, initially, in the formulation of the research questions, and then supported the data collection and analysis activity.

²⁹³ See Miles and Huberman (1994), *op. cit.*

²⁹⁴ Yin, R.K. (2003), **Case Study Research: Design and Methods**, Applied Social Research Methods Series, 3rd ed., Sage Publications: London.

²⁹⁵ Baleicher, J. (1980), **Contemporary Hermeneutics: Hermeneutics as Method, Philosophy and Critique**, Routledge: London.

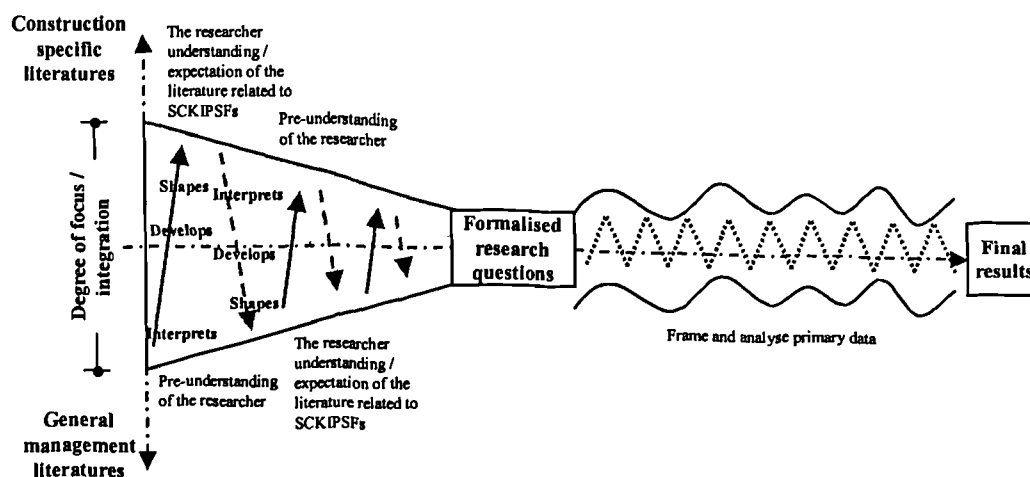


Figure 4.9 Literature review and synthesis process

4.7.2 Interviews

The interview technique is a flexible and commonly used research tool (Breakwell, 1995)²⁹⁶ and particularly appropriate if sensitive or complex questions need to be asked (Hussey and Hussey, 1997)²⁹⁷. The interview technique used in this research aimed to gain an insight into the “below the surface activities” (Oppenheim, 1992)²⁹⁸ in terms of obtaining an overall picture of the case study company and its innovation activities.

Traditionally, there are three broad types of interview: structured, unstructured and semi-structured (for example, see Fontana and Frey, 2000²⁹⁹). A structured interview is where a fixed schedule of questions is followed with each respondent. An unstructured interview is where the process can be shaped to the individual situation and context. There are no fixed questions, although there is often a ‘checklist’ of issues to be explored. The interview is conducted in an open-ended

²⁹⁶ Breakwell, G.M. (1995), “Interviewing” in G.M. Breakwell, S. Hammond and C. Fife-Shaw (Eds.), **Research Methods in Psychology**, Sage Publications: London.

²⁹⁷ Hussey, J. and Hussey, R. (1997), **Business Research: A Practical Guide for Undergraduate and Postgraduate Students**, Macmillan Press: London.

²⁹⁸ Oppenheim, A.N. (1992), **Questionnaire Design, Interviewing and Attitude Measurement**, printer: London.

²⁹⁹ Fontana, A. and Frey, J.H. (2000), “Interviewing: The Art of Science” in N.K. Denzin and Y.S. Lincoln (Eds.), **Handbook of Qualitative Research**, Sage Publications: Thousand Oaks: London, pp. 361-376.

way to allow the discussion to evolve in an organic fashion. A semi-structured interview is where guidance is given in an informal setting and where a broad formalised questions are asked. The key distinction between an unstructured interview and a semi-structured interview is the interventions made by the researcher (for example, see Royer and Zarlowski, 2001:147-148³⁰⁰). In an unstructured interview, the researcher makes no intervention to direct the subject's remarks. This research is investigating the case study company's innovation activity, with respect to a particular set of propositions set out in the concept model, research questions and hypotheses. A level of intervention by the researcher is thus required to ensure that these prepositions were investigated. An unstructured interview, therefore, is not appropriate for this research. In summary, this study used a semi-structured interview during the exploratory phase.

Before starting the interviews, a semi-structured interview protocol was prepared and pretested (see Appendix F). First, the focus and content of the interviews were co-developed with a senior member of the firm - the securing of buy-in and shared ownership of the interview process by the owners of the firm were essential to the freeing up of staff to undertake the interviews. The questions within this protocol were designed to investigate the definition of knowledge and innovation (see Section 2.5.5) and the knowledge-based innovation conceptual model (see Section 3.2). The semi-structured interview protocol (see Appendix F) was structured into four main sections: introduction, background, knowledge-based innovation details and additional information. Each section is described below.

The **introduction** section was designed to introduce this research and the researcher to the respondents.

The **background** section was designed to understand the background information of the respondent, the case study company and the company's principal clients. It helped the researcher to understand the company's business environment, its major clients and the qualifications and backgrounds of its staff.

³⁰⁰ See Royer and Zarlowski (2001), *op. cit.*

The **knowledge-based innovation details** section was designed to understand the nature of innovation activities in Calderpeel and to identify the type of resources and capabilities used. The questions in this section investigate the six variables of the knowledge-based innovation conceptual model (see Section 3.2): interaction environment, K ba, RC, SC, HC and KC. There are four sub-sections under this section.

The first subsection had two opening questions which were designed to understand what respondents understood by the terms knowledge and innovation. The second subsection focused on developing questions to understand the interaction environment of the company, including company business strategy, innovation strategy, and the company supporting innovation activities (RC, SC, HC, KC and K ba). The third and fourth subsections investigated successful and unsuccessful firm-specific innovation generated over the last two years. The identified innovations were explored by understanding how the company generated the new idea, implemented the new idea, and supported the new idea (RC, SC, HC, KC and K ba), and identifying innovation performance measurement/indicators.

The **additional information** section was designed to capture issues considered relevant by the respondents which were not raised in the interview.

A Director identified key respondents at senior, middle and junior levels within the firm. When agreement to cooperate was received, the semi-structured interview protocol was sent to these respondents prior to the interview. This was to allow them to know the type of issues that were going to be discussed.

Each interview was between one and two hours in length, and was carried out face-to-face. The interview data was captured by note-taking and recording, with the recorder placed openly in the middle of the table. Prior arrangement to record the interview was secured from the respondents. Note-taking was kept to a minimum to avoid unnecessary disruption. The combination of using an audio recorder and making notes has been recommended in conducting the interview (for example, see

Hussey and Hussey, 1997³⁰¹). The interview recordings were transcribed verbatim (see Appendix G for an example transcript). The transcripts were sent to each participant to check for accuracy before being analysed.

4.7.3 Company documentation

In addition to the interviews, further data were obtained through the analysis of company documents in order to reach a deeper understanding of the company. However, it was found that there was little company documentation. This indicates the very informal nature of codification in small firms; but, from a research methodology perspective, reduces the scope to triangulate participant accounts against company documentation (for example, see Guran and Blackburn, 2001³⁰²; Lu and Sexton, 2004³⁰³). Appendix B gives a list of the company documentation examined.

4.7.4 Company workshop

The workshop was undertaken in April 2004 at the start of the action research phase of the case study. The workshop began with a presentation of the key findings from the exploratory phase (see Appendix J). The remainder of the workshop was structured around a number of main questions, which were informed in the company finding report (see Appendix H), namely: what is the current position? what are the potential problems? why manage knowledge? what are potential improvement areas to sustain current growth? and, what are the immediate innovations which the firm should progress? The company report was co-authored by the researcher and Calderpeel's senior management. This helped to ensure the report was appropriate in focus and style, and assisted in creating shared ownership of the report, and the subsequent action research phase.

³⁰¹ See Hussey and Hussey (1997), *op. cit.*

³⁰² Guran, J. and Blackburn, R.A. (2001), **Researching the Small Enterprise**, 1st ed., Sage publications: London.

³⁰³ Lu, S. and Sexton, M.G. (2004), "Appropriate Research Design for Investigating Innovation in Small Knowledge-intensive Professional Service Firms", **Proceedings of ARCOM 20th Annual Conference and Annual General Meeting**, Heriot Watt University, Edinburgh, UK: 1st – 3rd September, pp. 733-739.

The workshop debated the immediate potential innovations identified in the company general finding report - beginning with exit interview process and post-project review process - followed by a discussion of how these two themes could be developed. The senior manager identified that the development and implementation of that interim project review process was needed and should be the focus of the action research phase.

The workshop was videotaped for subsequent analysis. In addition, in order to maximise consensus and the commitment of the participant, the minutes of the workshop were sent to the firm for confirmation that the discussion had been interpreted correctly (see Table 6.1).

4.8 Research techniques: qualitative data analysis techniques

The primary data collected in this research was qualitative in nature (see Section 4.7). Content analysis and cognitive mapping data analysis techniques were used. The justification for using these techniques is twofold.

First, the content analysis technique enabled the identification of key issues from the large volume of interview transcripts (for example, see Weber, 1985³⁰⁴). Second, in order to help the researcher to see the relationships between different ideas and perspectives emerging from the content analysis, the cognitive mapping technique was used. It is argued that the cognitive mapping technique allows the key concepts and relationships articulated by the researcher to be externalised and synthesised in a clear layout that facilitates critical enquiry and reflection (for example, see Eden, 1992³⁰⁵). The combination of content analysis and cognitive mapping is supported by Allard-Poesi *et al.* (2001)³⁰⁶ who stress that the content analysis and cognitive mapping are commonly and appropriately used in the management research.

³⁰⁴ Weber, R.P. (1985), **Basic Content Analysis**, Sage Publications: London.

³⁰⁵ Eden, C. (1992), "On the Nature of Cognitive Maps", *Journal of Management Studies*, 29, pp. 261-265.

³⁰⁶ Allard-Poesi, F., Drucker-Godard, C. and Ehlinger, S. (2001), "Analyzing Representations and Discourse" in R.A. Thiétart *et al.* (Eds.) **Doing Management Research: A Comprehensive Guide**, Sage Publications: Paris, pp. 351-372.

The data analysis used two software packages – ‘QSR NUD*IST Vivo’ (NVivo) (content analysis tool) and ‘Decision Explorer’ (cognitive mapping tool). In the exploratory phase, the data for each identified innovation (see Section 5.4) was analysed using content analysis to develop the key notes (or variables) (the presence of certain words or concepts within texts or sets of texts). These notes are in short phrases (see Section 4.8.1). These notes then were fed into the cognitive mapping.

Figure 4.10 shows the journey that being made by the researcher in conducting the primary data analysis.

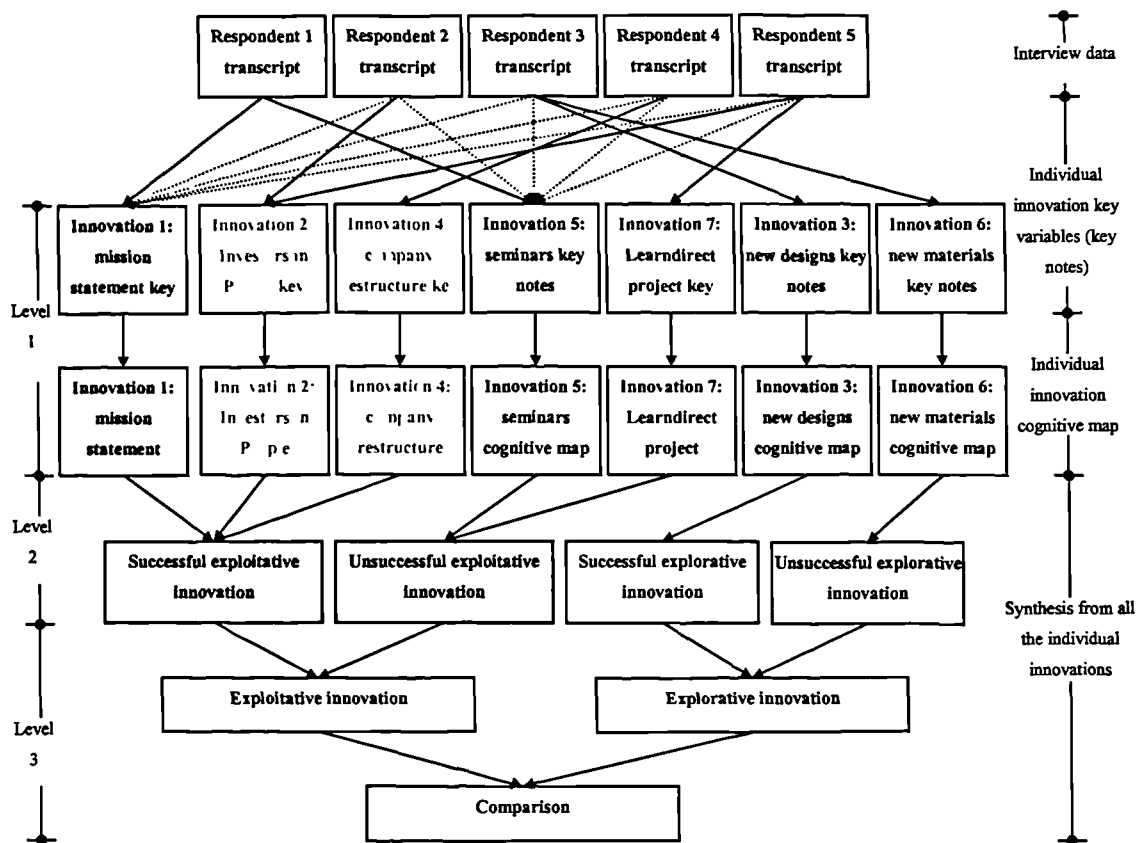


Figure 4.10 Primary data analysis structure

Primary data from the five respondent transcripts were imported into NVivo’s database. Three levels of analysis were articulated to identify patterns within the data. The first level consisted of the analysis of the individual innovations. First,

appropriate variables (notes) were identified by the researcher's interpretation using NVivo. Second, the interrelationships between these variables were identified by the researcher's interpretation using Decision Explorer.

The second level consisted of a cross-innovation analysis and then the grouping of innovations with similar patterns. First, seven innovations were grouped into the matrix of successful/unsuccessful and explorative/exploitative innovations in order to focused insight from the data (see Section 5.4). Four types of innovations – successful explorative innovation, unsuccessful explorative innovation, successful exploitative innovation and unsuccessful exploitative innovation - were identified. Second, the interrelationships between variables of these four types of innovations were identified by the researcher's interpretation using Decision Explorer.

The third level was a summation of all the innovations within the knowledge-based innovation concept model. First, four types of innovations were grouped into two types of innovation: explorative innovation and exploitative innovation. Second, the comparison between them was made.

A noted system used in this research comprised 'Free Nodes', 'Tree Nodes', and 'Sets.' The note in 'Free notes' presented as unorganised or not belonged in hierarchies of categories and subcategories. The notes in 'Tree notes' was presented in hierarchies of categories and subcategories. A 'Set' is a grouping of nodes for purpose of working with them together. Figure 4.11 shows the structures of the note system used in this research.

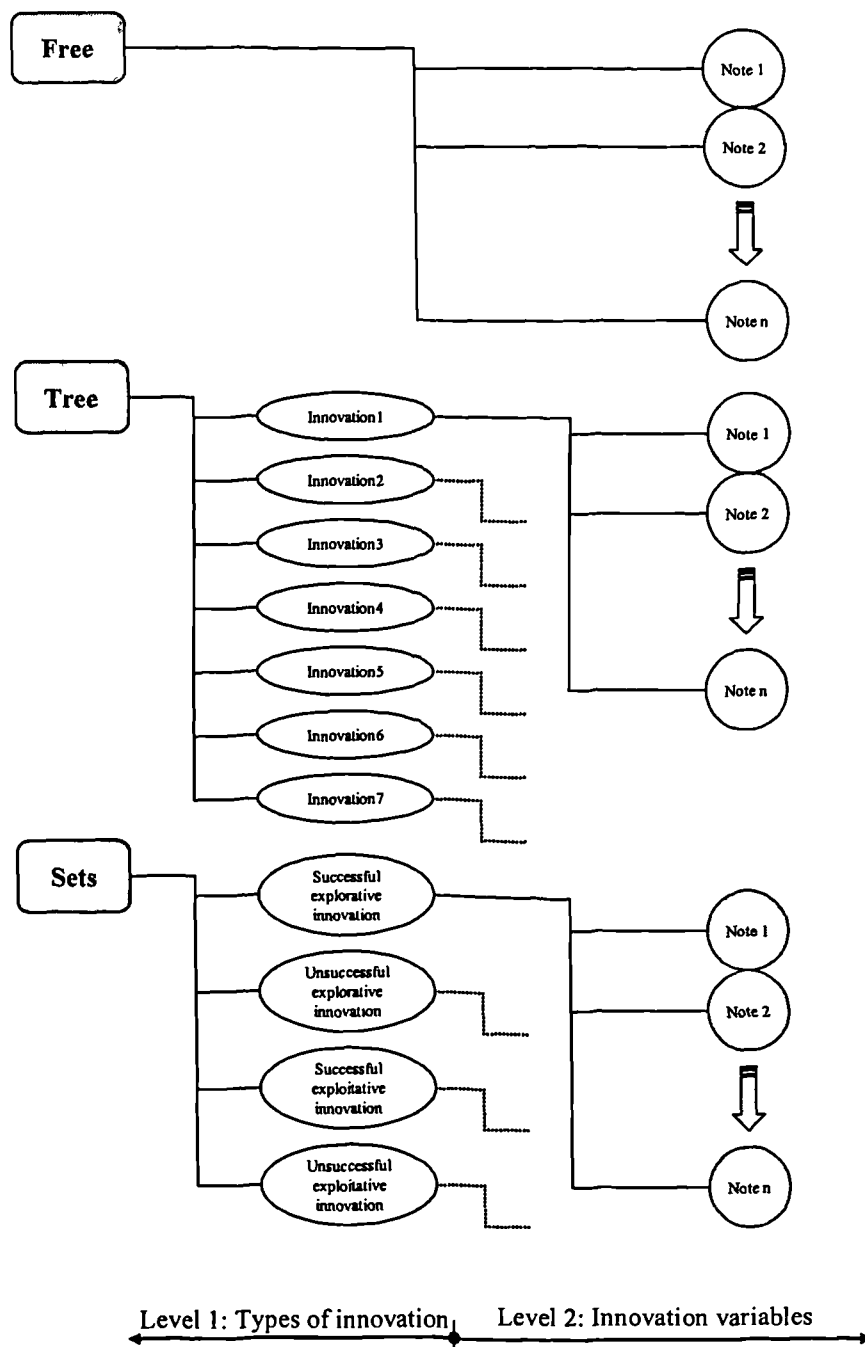


Figure 4.11 Different levels of notes used in this research

The first level categories of 'Tree Notes' used in this research were: why mission statement successful (innovation 1); why IiP successful (innovation 2); why new designs successful (innovation 3); why company restructure successful (innovation

4); why seminars failed (innovation 5); why new materials failed (innovation 6); and, why Learndirect project failed (innovation 7) (see Section 5.4). The second level subcategories of 'Tree Notes' were critical variables for the identified innovation.

For further analysis, the nodes were also managed in Sets. The first level categories of 'Sets' used in this research were: successful explorative innovation (innovation 3); unsuccessful explorative innovation (innovation 6); successful exploitative innovation (the combination of innovation 1, 2 and 4); and, unsuccessful exploitative innovation (the combination of innovation 5 and 7) (see Section 5.4 for the description of company innovations). The second level subcategories of 'Sets' identified the critical variables for each innovation.

The process developed is illustrated using innovation 1 (the Calderpeel mission statement) as an example (see Figure 4.12).

The screenshot shows the NVivo Node Explorer interface for 'Innovation in Calderpeel 10'. The left pane shows a tree structure with 'Nodes' and 'Sets'. The 'Nodes' section includes 'Recently Used' (Free (0), Trees (172)), 'Cases (0)', and 'Sets (4)'. The 'Sets' section includes 'Unsuccessful explorative innovation', 'Successful explorative innovation', 'Successful exploitative innovation', and 'Unsuccessful exploitative innovation'. The right pane shows a table of all nodes.

Title	No.	Passages	Created	Modified
Why mission statement successful	1	0	17/08/20...	17/08/20...
Why IP successful	2	0	29/07/20...	17/08/20...
Why new designs successful	3	0	06/08/20...	26/11/20...
Why company restructure succ...	4	0	16/08/20...	10/12/20...
Why seminars failed	5	0	17/08/20...	17/08/20...
Why new materials failed	6	0	06/08/20...	17/08/20...
Why Learndirect project failed	7	0	17/08/20...	29/11/20...

Figure 4.12 Different levels of notes produced in NVivo

4.8.1 Content analysis

Transcripts from the five respondents were transferred into a text file in order to import it to the NVivo system. The researcher then 'interpreted' the text into 'notes' (or variables). To identify and bring together the data passages that seem to belong at a category is called coding (Richards, 1999:55)³⁰⁷. Each note was coded under subcategories of 'why mission statement successful' (innovation 1). Take number 2 note: 'chair man driven' as an example, Figure 4.13 shows the context of passages coded under this category. Similar notes were combined and structured into new categories. When subcategories grew too big, they were broken down into new subcategories. The ongoing process resulted in the formulation of appropriate notes.

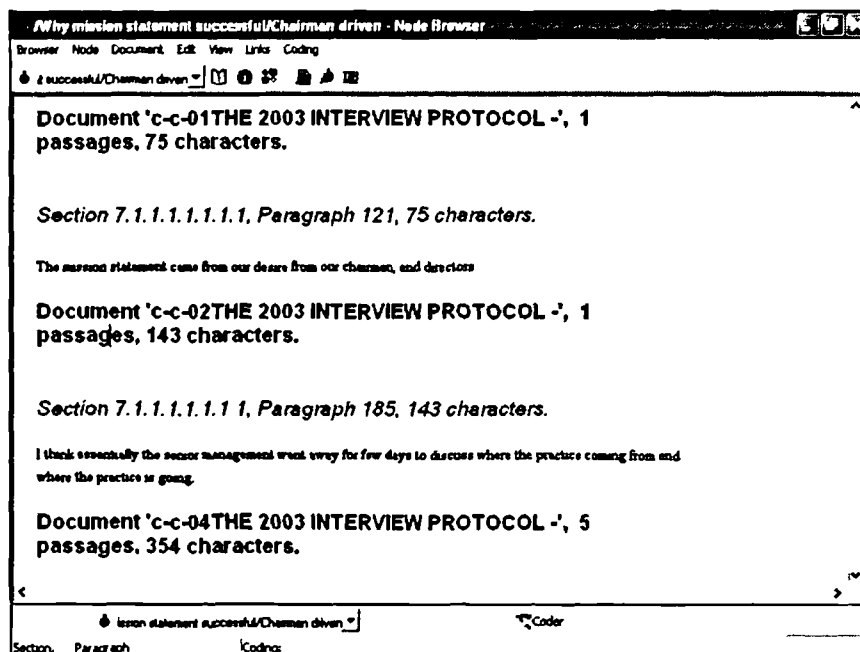


Figure 4.13 Context coded in number 2 node: chairman driven

The research results indicate that there are twenty-eight notes (variables) within innovation 1: mission statement (see Figure 4.14 and 4.15). It shows that 'informal presentation/workshop (number 19 note) (see Figure 4.15) was the key element in enabling this innovation success which was referred to 17 times within the transcripts. The second highest criteria to enable this innovation success were

³⁰⁷ Richards, L. (1999), *Using NVivo in Qualitative Research*, Sage Publications: London.

‘informal discussion in the office’ (number 4 note) (see Figure 4.14) and ‘no specific way to measure the performance’ (number 21 note) (see Figure 4.15). They both were referred to 13 times.

The screenshot shows the NVivo Node Explorer interface. On the left, a tree view shows the hierarchy: 'Free (0)' and 'Trees (172)'. Under 'Trees (172)', there is a node 'Why mission statement successful' which is expanded to show a list of 15 sub-nodes. On the right, a table lists these nodes with columns: Title, No., Passages, Created, and Modified. The nodes are numbered 1 through 15. Below the table, it says 'No coding. Children: 28' and '(no description)'. At the bottom left, it says 'Tree Node - (1) / Why mission statement successful'.

Title	No.	Passages	Created	Modified
Senior management implementation	1	11	08/07/20...	10/12/20...
Chairman driven	2	7	24/05/20...	08/11/20...
Senior management talking to people	3	4	07/09/20...	07/09/20...
Informal discussion in the office	4	13	07/09/20...	12/11/20...
Raised employee awareness	5	5	08/07/20...	03/11/20...
Not all employees bought into	6	2	11/06/20...	10/12/20...
MS information documented	7	7	07/09/20...	03/11/20...
E-mails	8	1	07/09/20...	15/12/20...
Company was directionless	9	3	11/06/20...	29/11/20...
Good relationships with colleagues a	10	7	07/09/20...	29/11/20...
Company website	11	4	14/06/20...	12/11/20...
Staff understood the firm more	12	10	07/09/20...	15/12/20...
Company had identity	13	7	08/07/20...	03/11/20...
Company had structure	14	5	07/09/20...	03/11/20...
Company had future direction	15	3	07/09/20...	03/11/20...

Figure 4.14 An example of key notes produced in NVivo (1/2)

The screenshot shows the NVivo software interface. On the left, a 'Node Explorer' pane displays a tree structure under the node 'Why mission statement successful'. The tree includes sub-nodes like 'Senior management implerr', 'Chairman driven', 'Senior management talking', 'Informal discussion in the ol', 'Raised employee awareness', 'Not all employees bought in', 'MS information documenter', 'E-mails', 'Company was directionless', 'Good relationships with colle', 'Company website', 'Staff understood the firm m', 'Company had identity', 'Company had structure', 'Company had future directi', 'Social activity', 'Office', and 'Informal meeting'. The main pane on the right displays a table of key notes.

Title	No.	Passages	Created	Modified
Company had structure	14	5	07/09/20...	03/11/20...
Company had future direction	15	3	07/09/20...	03/11/20...
Social activity	16	8	07/09/20...	29/11/20...
Office	17	4	07/09/20...	07/09/20...
Informal meeting	18	6	07/09/20...	07/09/20...
Informal presentation-workshop	19	17	10/05/20...	10/11/20...
Used in the marketing	20	12	24/05/20...	29/11/20...
No specific way to measure the perf	21	13	24/05/20...	07/09/20...
Training	22	11	24/05/20...	12/11/20...
Quarterly office meeting	23	5	24/05/20...	04/11/20...
Recruited new staff	24	2	24/05/20...	29/11/20...
Motivated staff	25	5	26/05/20...	29/11/20...
Management meeting	26	4	07/09/20...	04/11/20...
Business adviser vision	27	3	07/09/20...	10/12/20...
Open family culture	28	2	07/09/20...	15/12/20...

Below the table, it states: 'No coding. Children: 28' and '[no description]'. At the bottom left, it says 'Tree Node - (1) / Why mission statement successful'.

Figure 4.15 An example of key notes produced in NVivo (2/2)

The next section will discuss how the key variables identified in NVivo were imported into Decision Explorer's database and how interrelationships between these variables were identified.

4.8.2 Cognitive mapping

In order to analyse the interrelationships between the 28 key notes, the cognitive mapping technique was used. Two processes were conducted in order to transfer the file in NVivo's database into Decision Explorer's database. First, the key notes coded in innovation 1 mission statement were exported as a 'NUT*IST' type of file (see Figure 4.16). Second, this file was imported into Decision Explorer's database (see Figure 4.17).

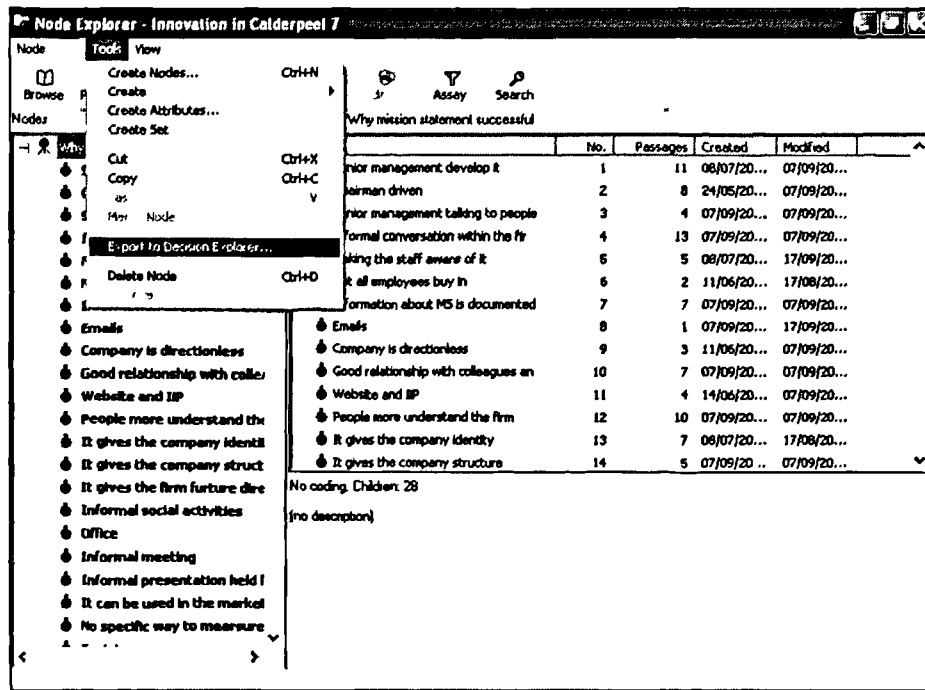


Figure 4.16 An example of exporting innovation 1 key notes

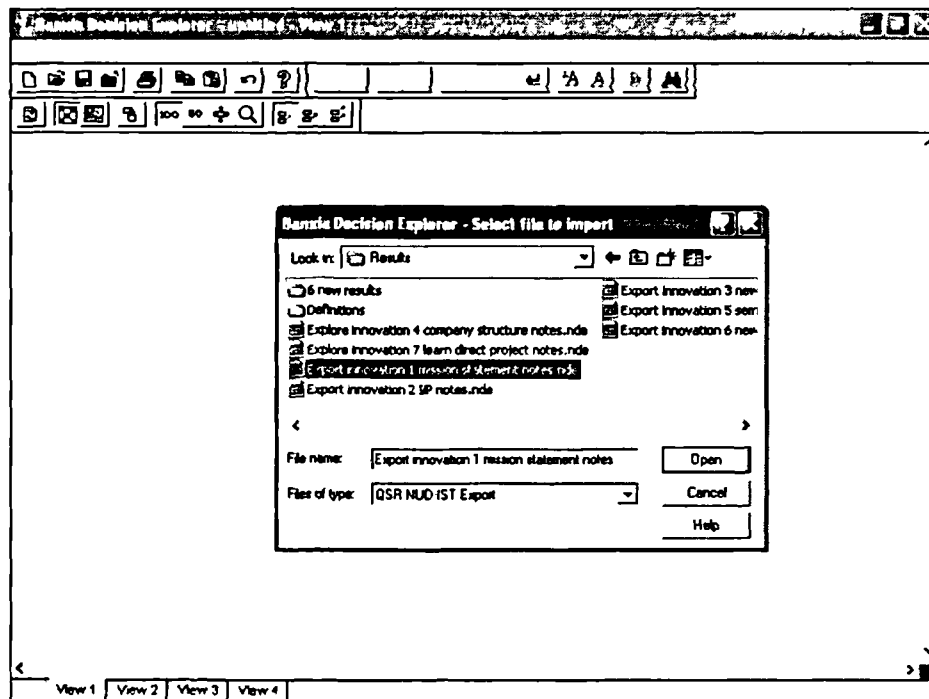


Figure 4.17 An example of importing innovation 1 key notes produced in NVivo's database into Decision Explorer's database

Through this process, the '28 notes' under innovation 1 category and 'one' innovation 1 category coded in NVivo became '29 concepts' in the Decision Explorer system (number 1 to number 29 concepts) and produced a basic map (see Figure 4.18).

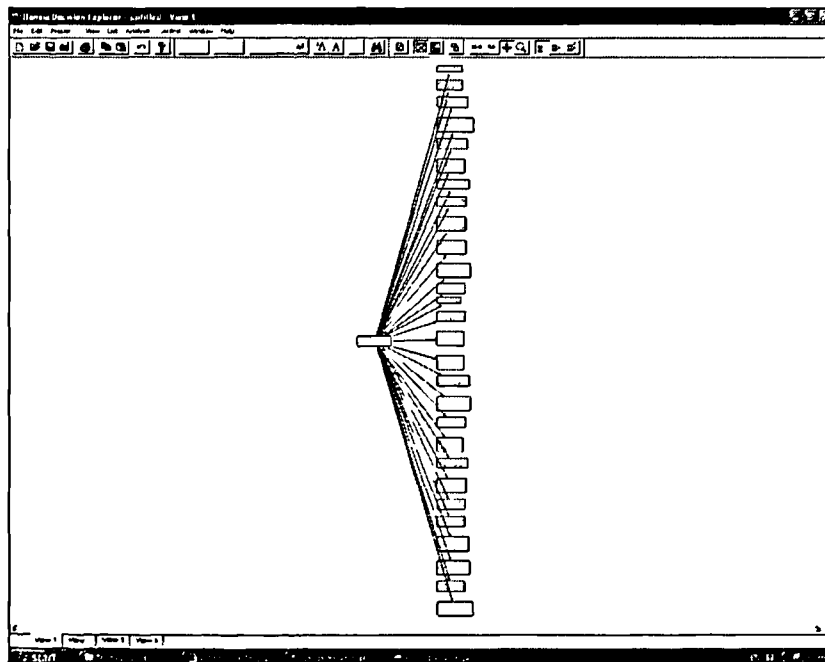
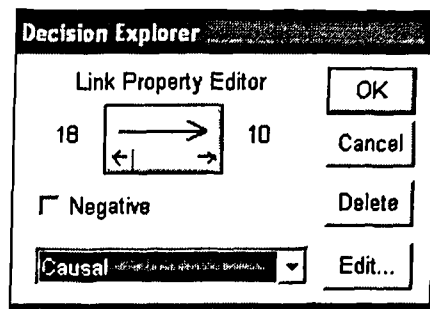


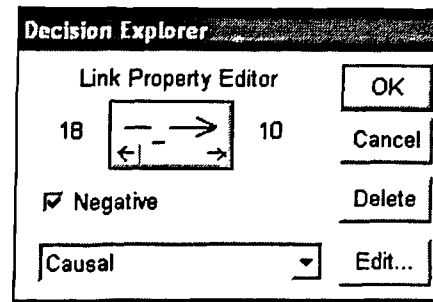
Figure 4.18 An example of a basic cognitive map

In order to more easily interpret and identify the interrelationships between the 29 concepts, the four variables identified in the knowledge-based concept model were used to form subcategories: human capital, structure capital, relationship capital and knowledge ba (see Section 3.2). In addition, in order to understand the outcome of innovation 1, one subcategory – impacts from it – was added. The total number of concepts, therefore, increased from 29 to 34.

Links were used to identify the meaning between variables. A link is represented as an arrow. In this research, an arrow represented the phrase 'leads to' or 'cause.' For example, Figure 4.19 (a) shows that number 18 has a positive effect on number 10; whilst Figure 4.19 (b) shows that number 18 has a negative effect on number 10.



(a) Represent positive relationship



(b) Represent negative relationship

Figure 4.19 An example of choosing the relationship between two concepts

Taking number 16, 18 and 10 concepts as an example (see Figure 4.20), number 16 (1 16) 'social activity' and number 18 (1 18) 'informal meeting' have implications for, or lead to number 10 (1 10) 'good relationships with colleagues and suppliers.'

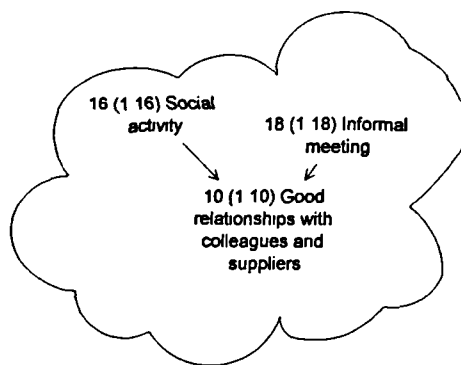
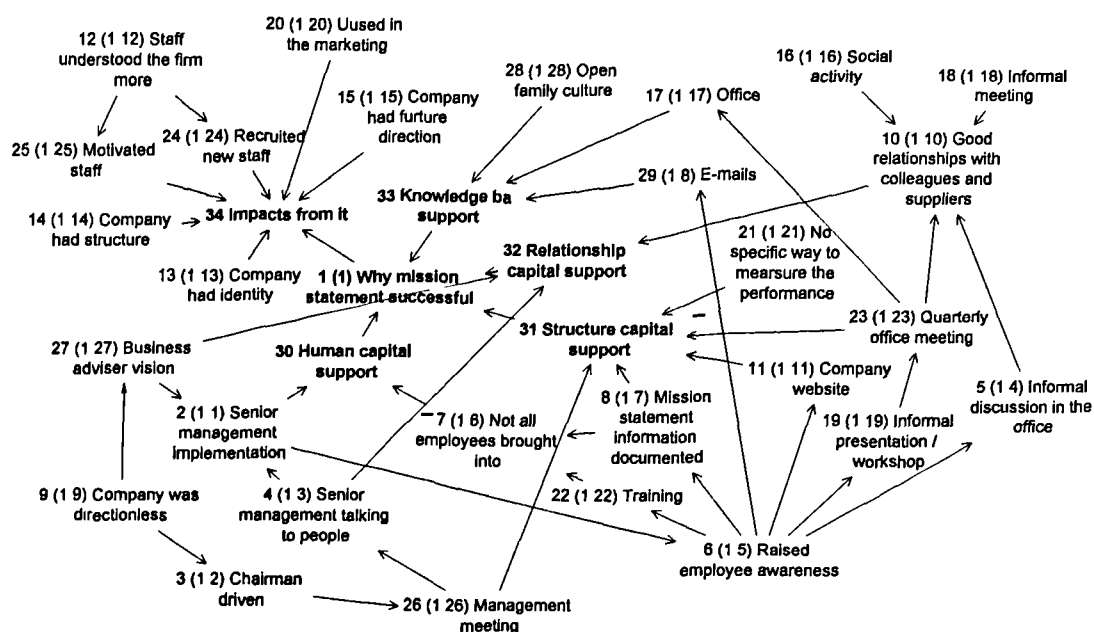


Figure 4.20 An example of linking concepts

Figure 4.21 shows a cognitive map of innovation 1 why mission statement successful created in Decision Explorer.



The data analysis rationales and procedures have been identified and discussed. The following section will discuss the procedures followed to ensure the validation of the research methodology.

4.9 Validation – triangulation strategy

This section examines the validation of the results from the Calderpeel case study. Different research approaches and techniques have different strength and weakness. The implication is that no single method is always best for all situations. Given an awareness of this dilemma, this research has adopted the use of triangulation strategy (for example, see Jick, 1979³⁰⁸). Triangulation argues for the need to appropriately combine different methodologies to study a given phenomenon (Denzin, 1978)³⁰⁹. The concept of triangulation is based on the assumption that any bias inherent in particular data sources and research methods would be reduced or neutralised when used in conjunction with other data sources and research methods

³⁰⁸ Jick, T.D. (1979), "Mixing Qualitative and Quantitative Methods: Triangulation in Action", *Administrative Science Quarterly*, December, 24, pp. 602-611.

³⁰⁹ Denzin, N.K. (1978), *The Research Act: A Theoretical Introduction to Sociological Methods*, 2nd ed., McGraw-Hill: London.

(Jick, 1979)³¹⁰. Through triangulation, different methods are used to corroborate the same facts thus improving accuracy and providing the researcher with more confidence of the results (Das, 1983)³¹¹.

Before presenting the triangulation strategy adopted to ensure the validity of this research within the context of the nested approach used in this research (see Section 4.2), key terms will be described.

▪ Validity

‘Validity’ is concerned with the extent to which the research findings present a true picture of what is being studied and what is really happening in the situation (Cunningham, 1988³¹²; Hussey and Hussey, 1997³¹³). Among the different types of validity, those most often used are construct validity, external validity and internal validity (for example, see Yin, 1994³¹⁴). Construct validity refers to “the establishment of correct operational measures for the concepts being studied” (Yin, 1994:33³¹⁵); external validity refers to “the possibility of extrapolating the results obtained from a sample to other element, under different conditions of time and place” (Royer and Zarlowski 2001:147)³¹⁶; and, internal validity “consists in ensuring the relevance and internal coherence of the results in line with the researcher’s stated objectives” (Royer and Zarlowski, 2001:147-148)³¹⁷.

A single case study approach was used to conduct this research (see Section 4.6.2). Two criteria - validity and reliability - are most often used in evaluating the quality of the case study research (for example, see Yin, 1994³¹⁸). The important emphasis here is that the quality evaluation of this research is that the researcher takes

³¹⁰ See Jick (1979), *op. cit.*

³¹¹ Das, T. (1983), “Qualitative Research in Organisational Behaviour”, *Journal of Management Studies*, 20/3, pp. 301-314.

³¹² Cunningham, I. (1988), “Interactive Holistic Research: Researching Self-Managed Learning” in P. Reason (Eds.), *Human Inquiry in Action – Developments in New Paradigm Research*, Sage publications: London. pp. 163-181.

³¹³ See Hussey and Hussey (1997), *op. cit.*

³¹⁴ See Yin (1994), *op. cit.*

³¹⁵ See Yin (1994), *op. cit.*

³¹⁶ See Royer and Zarlowski (2001), *op. cit.*

³¹⁷ See Royer and Zarlowski (2001), *op. cit.*

³¹⁸ See Yin (1994), *op. cit.*

precautions to improve validity and reliability, rather than testing and assessing the research's validity and reliability (Allard-Poesi *et al.*, 2001)³¹⁹. Reliability is to be considered in the next subsection.

To ensure construct validity, this research triangulated the data collection process as much as possible. The data collection included a research focus phase and a case study phase which contained an exploratory phase and an action research phase (see Section 4.3). In the research focus phase, a number of general management and construction specific literatures were reviewed and synthesised (see Section 4.7.1). In the longitudinal twenty-two month case study phase, the data was collected by carrying out interviews, reviewing company documentation, presenting and debating the findings at a workshop, and carrying out an action research intervention.

Internal validity was strengthened by offering integrated research questions, hypotheses, a concept model, and gap analysis framework which provides internal focus and cohesion to the results.

To ensure external validity, an explicit research design was developed for a single case study, including an articulated sampling strategy for the case study selection (sample size, classification of organisations) and sampling strategy for interviews (see Section 4.6). This explicit research design allows other researchers to understand how the results were produced, and to challenge, or confirm, the results by being able to replicate the research process in other case studies.

▪ Reliability

Reliability is information on whether the instrument is collecting data in a consistent and accurate way. Simon and Burstein (1985)³²⁰, for example, state that “reliability is essentially repeatability – a measurement procedure is highly reliable, if it comes up with the same result in the same circumstances time after time, even employed by

³¹⁹ See Allard-Poesi, Drucker-Godard and Ehlinger (2001), *op. cit.*

³²⁰ Simon, J.L. and Burstein, P. (1985), *Basic Research Methods in Social Science*, 3rd ed., Random House: London.

different people.” This definition has been extended by Yin (1994:36)³²¹ who states that reliability is the extent to which a test or procedure produces similar results under constant conditions on all occasions.

The reliability of this research was strengthened in three ways. First, the overall research design has been explicitly articulated and, therefore, can be replicated by future researchers. Second, in the exploratory phase, a semi-structured interview protocol was used. The questions within this protocol were based on the research hypotheses (see Section 4.7.2). The same protocol was used for all five interviewees. The action research phase was unique to the case study company and concentrated on a specific intervention. This part of the research, therefore, is not repeatable. Finally, the methodology explored in the data analysis has been described to a design where other researchers can both trace this researcher’s analysis of the primary data and undertake *their own analysis of the same data*.

▪ Representativeness

In a very broad sense, representation means “the structure composed of the beliefs, values and opinions concerning a specific object, and the interconnections between them” (Allard-Poesi *et al.*, 2001:351)³²².

To ensure representativeness, the researcher paid attention to robust the single case study design by designing a careful sampling strategy when selecting the case study firm (sample size, classification of organisations) (see Section 4.6.2) and by designing an appropriate sampling strategy for the interviews (see Section 4.6.3).

▪ Generalisability

Generalisability has been defined as “the extent to which you can come to conclusions about one thing (often a population) based on information about another

³²¹ See Yin (1994), *op. cit.*

³²² See Allard-Poesi, Drucker-Godard and Ehlinger (2001), *op. cit.*

(often a sample)” (Vogt, 1993:99)³²³. The weakness of the case study approach is that the results cannot be generalised beyond the case study firm. This research adopts the position set out by Yin (2003:39)³²⁴ in that the results are generalised to theory (which is analogous to the way in which scientists generalise from experiments to theory) rather than to the wider population of SCKIPSFs.

The above discussions are summarised in Table 4.6.

Table 4.6 The tests for validation of this research

Tests		How it is achieved	
Validity	Construct validity (Data collection)	Data collection triangulation	<ul style="list-style-type: none">• Data was collected through multiple means, including a research focus phase, and a case study phase contained an exploratory phase and an action phase (see Section 4.3).• In the research focus phase, data was collected through a number of general management and construction specific literatures (see Section 4.7.1).• In the case study phase, data was collected through multiple sources, including interviews, company documentation, company workshop and interventions (see Section 4.7.2, 4.7.3 and 4.7.4).
	External validity	Research design	<ul style="list-style-type: none">• An explicit research design allowed other researchers to understand how to use it in other case studies (see Section 4.6).
	Internal validity (Data analysis)	Research design	<ul style="list-style-type: none">• Integrated research questions, hypotheses, a concept model and gap analysis framework, provided internal focus and cohesion to the results.
		A longitudinal case study	<ul style="list-style-type: none">• A longitudinal twenty-two month case study offered a rich picture which reduced the risks of misjudgement of the truth-value of the data (see Section 4.6.4).
Reliability		Research design	<ul style="list-style-type: none">• An explicit research design which other researchers can follow (see Section 4.6).
		Case study protocol	<ul style="list-style-type: none">• The use of the semi-structured interview protocol by asking the same questions to five respondents enhanced reliability of the exploratory phase of the research (see Section 4.7.2).
		Action research process	<ul style="list-style-type: none">• An explicit action research methodology which other researchers can follow (see Section 4.6.4).
Representativeness		Sampling strategy	<ul style="list-style-type: none">• The use of sampling strategy for the sampling design (sample size and classification of the firms) to select a suitable case study company and interviewees enhanced representativeness of the data (see Section 4.6.2 and 4.6.3).
Generalisability		Case study design	<ul style="list-style-type: none">• The sampling strategy enabled a representative SCKIPSF to be selected (see Section 4.6.2).

³²³ Vogt, W.P. (1993), *Dictionary of Statistics and Methodology*, Sage Publications: Newbury Park.

³²⁴ See Yin (2003), *op. cit.*

4.10 Summary and link

This chapter has set out the methodology used in this research. The next chapter presents the key results of the exploratory phase of the case study.

5.0 Research findings: case study - exploratory phase

5.1 Introduction

The aim of this chapter is to present and critically discuss the key findings from the exploratory phase of the case study (see Section 4.6.4). The concept model will be used as an analytical framework to identify and distinguish the key variables for 'successful' and 'unsuccessful' innovation (see Section 3.2). To enable this, the chapter will first develop a case study specific 'vocabulary' of concepts: namely; knowledge, innovation, relationship capital (RC), structure capital (SC) and human capital (HC). Second, using this vocabulary, seven innovations which have taken place in the case study firm will be analysed. The chapter is organised as follows:

- (1) The background of the case study company is described (section 5.2);
- (2) The Calderpeel perception of knowledge, innovation, relationship capital, structure capital and human capital, as described by the respondents are set out (section 5.3);
- (3) The company innovations identified by respondents are introduced (section 5.4);
- (4) The innovations categorised as being explorative in nature are discussed and analysed (section 5.5); and,
- (5) The innovations categorised as being exploitative in nature are discussed and analysed (section 5.6).

5.2 Background of the case study company

Calderpeel Partnership Ltd (herein known as Calderpeel) is an architectural design studio ('practice') located in south Manchester in the northwest region of England. Harry Calder, who is now chairperson of the company, founded the practice in 1991.

Calderpeel's principal markets are the Manchester city central and suburban residential sectors: varying from one off commission from domestic clients to repeat business from national house builders. Calderpeel currently has three principal

clients. Two clients are large organisations (more than 251 staff); whilst one is a micro organisation (less than 10 staff) (see Section 4.6.3). The clients all come from the private sector. Senior management believe the reasons that these clients remain with Calderpeel is that it has: the ability to deliver a good quality service; talented teams; and, built productive, ongoing client relationships.

A key external pressure for Calderpeel (as it perceives) is that its national clients are demanding that it is accredited with ISO 9000 and/or Investors in People (IiP). Calderpeel recognises that this demand for accredited status provides opportunities to access the public sector market, whilst ensuring that they remain the leaders in their current target markets. The Calderpeel management believe that IiP would practically benefit the organisation by providing a framework/model to incorporate better business practice and develop and maintain a “winning” team (Lamb, 2003)³²⁵. On 14th February 2003 Calderpeel was granted an IiP accreditation. Calderpeel is currently working towards ISO 9001 accreditation.

In May 2002 Calderpeel relocated from their long standing rented accommodation in Hale, and purchased their own office block in Altrincham. The new office is approximately five miles from the old office. The reason for the relocation was that it supported the first step in its strategy to grow the size of the practice. The new building has extra space (currently rented out to another firm) to ‘expand into’ if needed at a later stage. The move gave the company an opportunity to advertise its growth and to communicate to the marketplace its seriousness in becoming a very successful architectural practice with the capability and capacity to compete with larger local and regional practices.

Over the past five years the practice has grown significantly with an increase in turnover from £0.3m in 1999 to £1.6m in 2003 (see Figure 5.1). Employee numbers have grown: 12 in 1999; 34 in 2002; and, 40 in 2003. Turnover per employee increased from £25,000 per employee in 1999 to £40,000 per employee in 2003. Pre-tax profit levels have remained comparatively low compared to the growth in

³²⁵ Lamb, C.E. (2003), **An Assessment of the Impact of Investors in People on Architectural Practice**, Unpublished dissertation, April, Master of Business Administration, Manchester Metropolitan University. (Lamb is an employee of Calderpeel.)

turnover as a result of an explicit policy to invest in company growth (for example, the purchase of the new office in 2002).

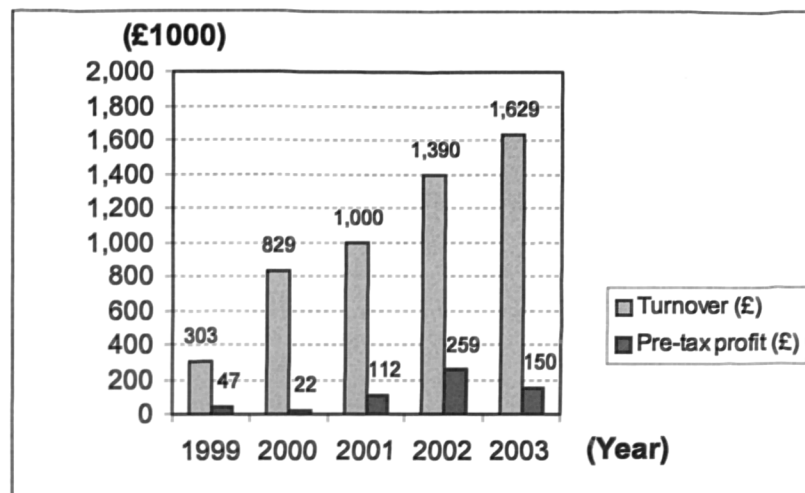


Figure 5.1 Calderpeel's turnover and pre-tax profit in the last five financial years

The practice is a limited company, and is owned and managed by a team of three equity directors – a chairperson, a managing director and a non-executive director. The organisation and management structure of the company is shown in Figure 5.2.

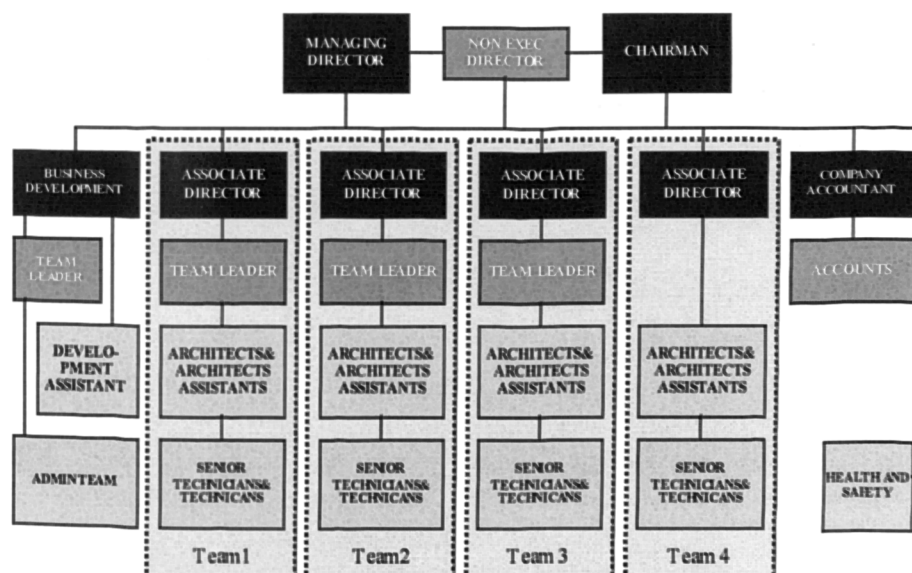


Figure 5.2 Calderpeel organisational structure

There are four teams and two support units within the practice. The support units are based on functional expertise: financial accounts and business development. The teams are organised as individual profit centres responsible for its own marketing, professional service development and delivery. Each team is made up of an associate director, a team leader (except team 4), and a number of architects and technicians. Team 4 undertakes minor works only. Only the associate directors report to the managing director.

The way work brought into the firm is shown in Figure 5.3. Work comes from two principal sources: clients and contractors. The potential commission is managed by an associate director initially, before reporting it to the senior management board, which comprises the directors and associate directors. The acceptance of the commission is made by the managing director in the management meeting. An appointed team manager (an associate director) goes back to his or her team and assigns project team members to deliver the project. Progress on the project is reported at subsequent senior management meetings.

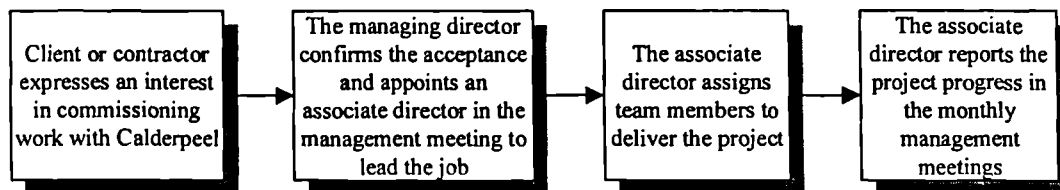


Figure 5.3 The commissioning and delivery of work process in Calderpeel

The workflow with the company is described as follows, using team 1 as an example. There are six staff in team 1: one associate director, one team leader, one architect (the job runner), one architectural assistant, one senior technician, and one technician. The associate director is the project team manager and assigns the task to team members. The associate director and the team leader are responsible for the delivery of the service to clients. The architect (the job runner) establishes detailed client and regulatory requirements for the job. The architectural assistant and two

technicians are responsible for the preparation of drawings and related technical documentation as instructed by the team leader and architect and as required by British Standards, building regulations, and the Calderpeel-specific CAD standards. All the team 1 members are located in the same block in the office. The teamwork is carried out in an informal way, such as ‘corridor’ discussions and informal meetings.

5.3 Calderpeel perception of knowledge, innovation, human capital, structure capital and relationship capital

5.3.1 Definition of knowledge

The variables making up Calderpeel’s perception of knowledge is set out in the cognitive map shown in Figure 5.4. The following discussion is supported by references to the cognitive map (for example, ‘8 3’ refers to supplier level). This notion is used throughout this chapter.

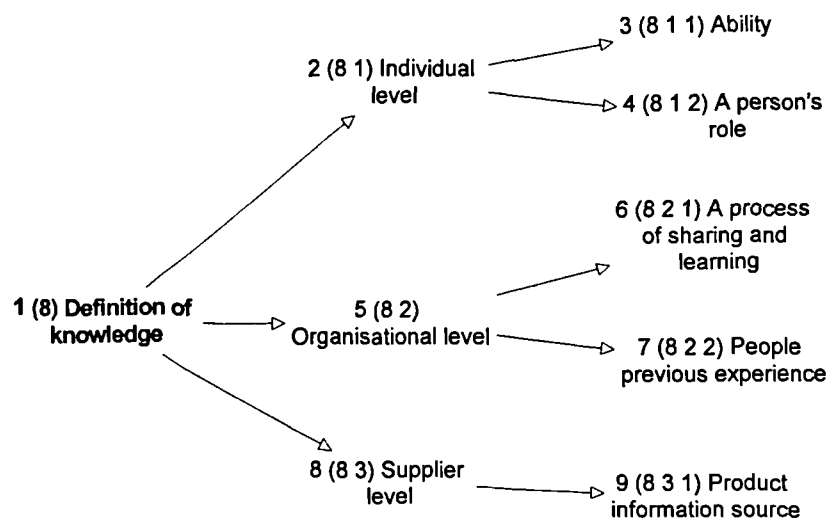


Figure 5.4 Knowledge cognitive map

The respondents viewed knowledge in a variety of ways depending on the level of resolution; be it at an individual level, company level or supplier level. At an

individual level, knowledge was conceived as the ‘ability’ (8,1,1) to perform a task competently. Respondent B, for example, stressed that knowledge was:

“the ability to carry out your job.”

Knowledge was also seen as the knowledge of ‘a person’s role’ (8,1,2) and how that role interacts with other roles within the firm. Respondent A, for instance, emphasised that knowledge:

“is knowing your role ...[and]... knowing your place in the team.”

At an organisational level, it was found that organisational knowledge is embedded within people. It was evident in ‘people previous experience’ (8,2,2) variable. Individual knowledge is seen as the building blocks for sharing and learning within the organisational community. ‘A process of sharing and learning’ (8,2,1) was emphasised by Respondent D, who expressed that knowledge is:

“the key, we cannot develop, unless we introduce knowledge and share knowledge within the rest of my team. It’s actually the key to what we do – sharing.”

This tacit view of organisational knowledge was supported by Respondent E, who described knowledge as:

“what you’ve learnt personally or tacitly from someone else, passed on knowledge.”

The development and sharing of knowledge is seen as specific to the firm and a potential source of unique, added value. Respondent D argued that:

“it’s very difficult to put what we do, or describe what we do to other people within the industry. Our knowledge is developed in-house, and then we share the product.”

The tacit conceptualisation of knowledge at an individual and organisational level migrates to a more explicit, ‘product’ view of knowledge at a supplier level. The supplier was ‘product information source’ (8,3,1) and was captured by Respondent B,

who stressed that knowledge at the supplier chain level was when:

“the supplier is able to give you information [on a specific product] you need to put on the task at the time.”

In summary, a ‘process’ view of knowledge is prevalent within Calderpeel activity, tacit understanding and sharing of knowledge and roles specific to individuals and firms. Knowledge is not seen as an ‘asset’ which is encoded and stored in databases. Knowledge is a living, personalised phenomenon - not ‘blocks’ of data and information.

5.3.2 Definition of innovation

The variables making up Calderpeel view of the definition of innovation is set out in the cognitive map shown in Figure 5.5.

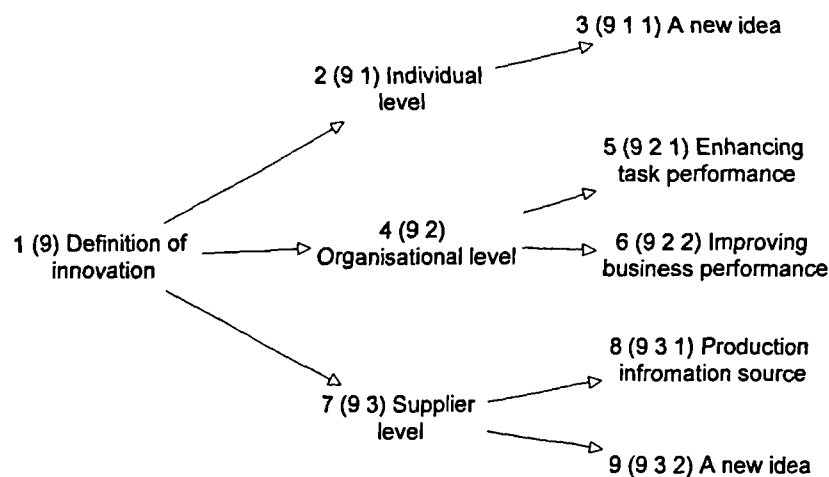


Figure 5.5 Innovation cognitive map

The respondents viewed innovation in a variety of ways depending on the level of resolution, be it at an individual level, company level or supplier level.

At an individual level, innovation is seen as ‘a new idea’ (9,1,1). Respondent E, for example, argued that innovation is a:

“new product or a new way of doing things.”

This concept of newness was extended to encompass individual creativity.

Respondent A, for instance, stated that innovation is:

“being able to think unlike your colleagues or unlike people before you.”

At an organisational level, innovation is seen as ‘enhancing task performance’

(9,2,1). Respondent B, for example, emphasised that innovation is:

“using the product that is better suited to performing the task.”

This perception was extended to explain that innovation at an organisational level needed to ‘improve overall business performance’ (9,2,2). Respondent E, for instance, argued that innovation is:

“a new way of doing things to improve the businessfor development.”

At the supplier level, innovation was conceived as being the same as an ‘individual’ innovation in terms of a new idea which has the benefit of input from relevant people in the supply chain. This was evident in ‘a new idea’ (9,3,2) variable and was demonstrated by Respondent D, who described innovation as:

“a one good idea. We then may need to develop that. We then may need other people knowledge, other people input from the industry.”

It was found that the supplier as ‘product information source’ (9,3,1). Respondent B stated that innovation is:

“looking for the supplier chain, all of the suppliers, to give you information to make sure that it is an innovative product, and add something new will be carried out on your job. That’s new compared the previous things you give them.”

In summary, innovation is seen to apply ‘a new idea’ to enhance the task and overall

performance within Calderpeel. The source of ideas is more likely to be from personal creativity or the outcome of social interaction, rather than learned from secondary sources such as trade journals or books.

5.3.3 Definition of human capital

The multi dimensional nature of human capital is portrayed in the cognitive map shown in Figure 5.6.

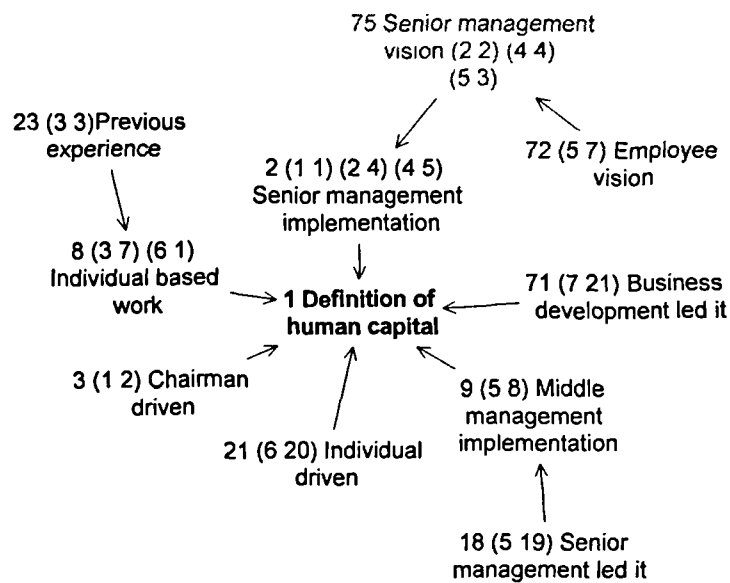


Figure 5.6 Human capital cognitive map

The respondents viewed human capital as being synonymous with the staff of Calderpeel. Respondent A, for example, commented that:

“the company is only as good as its people.”

Individual ability to create and implement ideas depends heavily on their ability to mobilise and synthesise appropriate bodies of expertise and experience to a specific application domain. The ‘previous experience’ (3,3) was evident in the ‘individual based work’ (3,7; 6,1) variable. The ability of staff to create ideas was evident in ‘senior management vision’ (2,2; 4,4; 5,3) and ‘employee vision’ (5,7) variables.

The ability of staff in implementing the ideas was evident in ‘senior management implementation’ (1,1; 2,4; 4,5), ‘middle management implementation’ (5,8), ‘senior management led it’ (5,19), and ‘business development led it’ (7,21) variables. The combination of the idea creation and implementation was evident in ‘individual driven’ (6,20) and ‘chairman driven’ (1,2) variables.

People are seen as the sources of information. Respondent D, for example, asserted that:

“the information source is the people.....rather than our product; not documents.”

The way information is collected is seen to be through people interaction. Respondent D, for example, emphasised that:

“It’s by just talking to people..... that’s how information is collected in the practice.”

Social interaction of this nature is this mechanism for knowledge sharing, Respondent C, for example, stressed that:

“During sharing knowledge with my colleague, so I got this idea that we have this new material.”

The perception was extended to explain that a process view of knowledge within the staff is seen as specific to the firm. Respondent D, for example, emphasised that:

“our industry, what we do, isn’t the sort of things, you can put down on the database, because what we do everything we design should be new, should be an idea to present, to develop.”

In summary, human capital within Calderpeel is seen as being very much synonymous with the knowledge and skills of individuals, and the ability of individuals and teams to mobilise and synthesise this knowledge and skills to specific application domains.

5.3.4 Definition of structure capital

The variables making up structure capital is set out in the cognitive map shown in Figure 5.7.

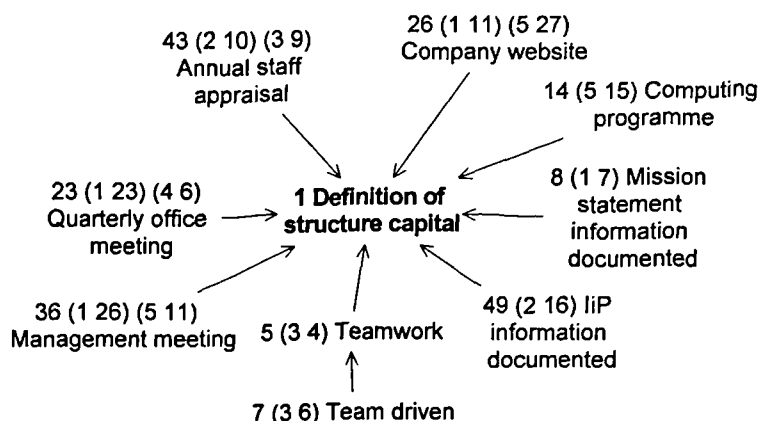


Figure 5.7 Structure capital cognitive map

The structure capital within Calderpeel was principally viewed as being the formalised organisational structure and document repositories which encourage and support people to share their knowledge. The process view of knowledge was captured in a recent company restructure including ‘management meeting’ (1,26; 5,11), ‘quarterly office meeting’ (1,23; 4,6), and ‘annual staff appraisal’ (2,10; 3,9) variables. This was evident in Respondent D, who expressed that:

“by looking at pictures, ideas and sharing and that was done informally. But we still need structures in the place to ensure we are sharing that information.”

Respondent B, for instance, described that:

“you get meetings every so often to present information and to share where the company standard is at any given time.”

The structure capital was also seen as the team structure to perform the job, from idea creation to delivering the service. This was evident in the ‘team driven’ (3,6) and ‘teamwork’ (3,4) variables.

The asset view of knowledge is evident within structure capital. This was illustrated in the ‘mission statement information documented’ (1,7), ‘IiP information documented’ (2,16), ‘computing programme’ (5,15), and ‘company website’ (1,11; 5,27) variables. Respondent C, for example, emphasised that:

“The information sources need to be accessible. Now we have a company manual and the structure within the company is all in there.”

In summary, structure capital is seen as the organisational context in which a process view of knowledge creation by staff can take place; and, knowledge content, from an asset perspective, encoded within accessible documentation.

5.3.5 Definition of relationship capital

The key variables making up relationship capital is presented in the cognitive map shown in Figure 5.8.

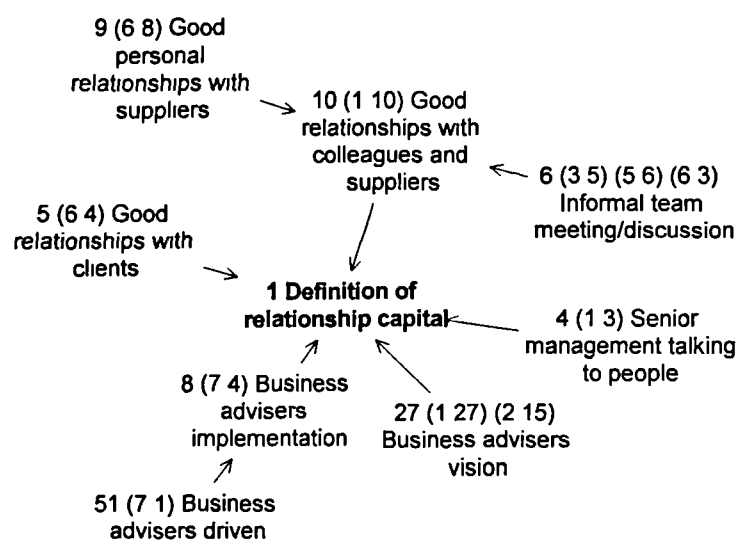


Figure 5.8 Relationship capital cognitive map

The relationship capital is seen as creating and maintaining good relationships with colleagues, suppliers, and company external business advisers. The importance of 'good relationships' was demonstrated in 'good relationships with clients' (6,4), 'good personal relationships with suppliers' (6,8) and 'good relationships with colleagues and suppliers' (1,10) variables. Respondent C, for example, described how to develop the relationship with clients:

“When you’re dealing with clients, you develop a relationship.”

The relationship capital is also seen as a key source of information. Through people interaction, the information is collected. This was seen in 'informal team meeting/discussion' (3,5; 5,6; 6,3) and 'senior management talking to people' (1,3) variables. Respondent D, for example, described how senior management collected the information in the architectural practice:

“Architecture is a very small world. Although a lot of companies are competitors and/or consultants.....you still talk to people a lot. We meet some friends from different organisations, especially the senior management here have a lot of contacts with other architects and understanding how they view us, it’s by just talking to peoplethat’s how information is collected in the practice.”

It was found that business advisers have an important influence on idea creation and implementation within the firm. This was evident in 'business advisers vision' (1,27; 2,15), 'business advisers driven' (7,1) and 'business advisers implementation' (7,4) variables. The business adviser implementation was captured by Respondent E, who stated that:

“[Business advisers] went to the open day and said what kind of courses have you got and they came away and asked what kind of courses they wanted and enrolled.”

In summary, relationship capital is seen as the creation and maintenance of enduring internal and external relationships. These relationships are both a rich source of ideas, and the arena for appropriate innovation to ensure successful problem-solving.

5.4 Description of identified company innovations

Seven innovations were identified by the Respondents as being significant firm-generated innovations over the last two years: four being deemed successful and three unsuccessful. Each innovation is briefly described below.

The development of the Calderpeel mission statement (innovation 1), the securing of Investors in People accreditation (innovation 2), the flow of new novel designs (innovation 3), and the company restructure (innovation 4), were identified as being significant firm-generated innovations over the last two years which were successful.

Innovation 1: mission statement is a statement that captures an organisation's purpose, customer orientation and business philosophy. Calderpeel's mission statement is "to be recognised as the leading north west design house dedicated to achieving working relationships which result in excellent architectural solutions." This mission statement was created and introduced to the company in October 2002.

Innovation 2: Investors in People (IiP) is the national standard which sets out a level of good practice for training and development of people to achieve business goals (for example, see CBE, 2003³²⁶). Calderpeel secured accreditation in February 2003, after a one-year period of preparation.

Innovation 3: new designs are novel forms of layout and structure. Calderpeel have consistently produced innovative designs for new buildings.

Innovation 4: company restructure is the way in which the company of people are to co-ordinate work and ensure successful delivery of service to the client. The company was restructured in 2002 to meet general business needs and to prepare itself for IiP accreditation.

Respondents identified the introduction and subsequent failure of in-house seminars (innovation 5), the introduction of the new materials (innovation 6), and the

³²⁶ CBE: Chamber Business Enterprises (2003), *IiP - Why Develop your People?*, 14th January
<<http://www.c-b-e.co.uk/biz/iip/develop.htm>>

Learndirect project (innovation 7) as being significant innovations over the last two years which failed.

Innovation 5: seminar is a type of meeting for an exchange ideas on a specific topic. The identified seminars within Calderpeel included IT, project briefing, and marketing. Two to three representatives from each team chosen by associate director and sent to attend IT and marketing seminars. In the project briefing seminar, a team appointed by the managing director to present one of their projects to the other three teams. The seminars started in August 2002, and petered out by February 2003.

Innovation 6: new materials are the building components, materials, or new products that the company has not used it before in its building designs.

Innovation 7: Learndirect project is funded by the UK government. This project aims to help people to develop their IT capability in getting easy access to information about what is available. Business advisers from the Learndirect project had an informal discussion with each member of Calderpeel staff during an open day in September 2002. Each employee then had his or her personal development plan (PDP). These PDP have not been progressed or embedded within the Calderpeel's appraisal system.

The research key findings indicate two types of innovation within the company: explorative innovation (see Section 5.5) and exploitative innovation (see Section 5.6). It is argued that firms achieve short-term success with explorative innovation (see Table 5.1 mode 1) and long-term success with exploitative innovation (see Table 5.1 mode 2). *The classification of explorative and exploitative innovation is used to structure the following sections, and is justified below.*

Table 5.1 Classification of explorative and exploitative innovation

Types of innovation	Mode 1: Explorative innovation	Mode 2: Exploitative innovation
Successful innovation	Innovation 3: New designs	Innovation 1: Mission statement Innovation 2: Investors in People Innovation 4: Company restructure
Unsuccessful innovation	Innovation 6: New materials	Innovation 5: Seminars Innovation 7: Learndirect project

- (1) **Explorative innovation** (mode 1) is viewed as innovation which focuses on client facing, project-specific problem-solving. Explorative innovation activity heavily relies on the capacity, ability and motivation of Calderpeel staff at an operational level to solve client problems and, in doing so, generates short-term competitive advantage (i.e. project specific). The outcome of this innovation focuses on effective and efficient delivery of services to satisfy current external project needs, but are often not embedded in the organisational structure capital due to management attention and company resources being constantly focused on current or future project-specific considerations. Explorative innovation activity will be discussed in Section 5.5.
- (2) **Exploitative innovation** (mode 2) is viewed as innovation which focuses predominantly on internal organisation and general client development activity which is not project-specific fee earning activity. Exploitative innovation activity heavily relies on the capacity, ability and motivation of

Calderpeel senior management at a social level to improve organisational effectiveness and efficiency to generate sustainable competitive advantage. The distinctive feature of exploitative innovation (compared to explorative innovation) is that new phenomena, systems or structures are securely embedded in the structure capital of the firm. Exploitative innovation activity will be discussed in Section 5.6.

The key proposition being made in this section is that the concept of exploitative and explorative innovation is an appropriate way of understanding knowledge-based innovation. The next section will present an analysis of the explorative innovations.

5.5 Mode1: Explorative innovation analysis

Two exploitative innovations were identified as being significant firm-generated innovations over the last two years. The successful explorative innovation was considered as new designs (innovation 3); whilst the unsuccessful one was the use of new materials (innovation 6) (see Section 5.4 for the description of innovation 3 and innovation 6). Both explorative innovations were identified by Respondent C, therefore, primary data is from this respondent only.

The key factors and interrelationships for the successful explorative innovation are shown in Figure 5.9 and Figure 5.10, and for the unsuccessful explorative innovation are shown in Figure 5.11 and Figure 5.12. These form the basis, along with appropriate extracts from the interview transcripts, for the following discussion.

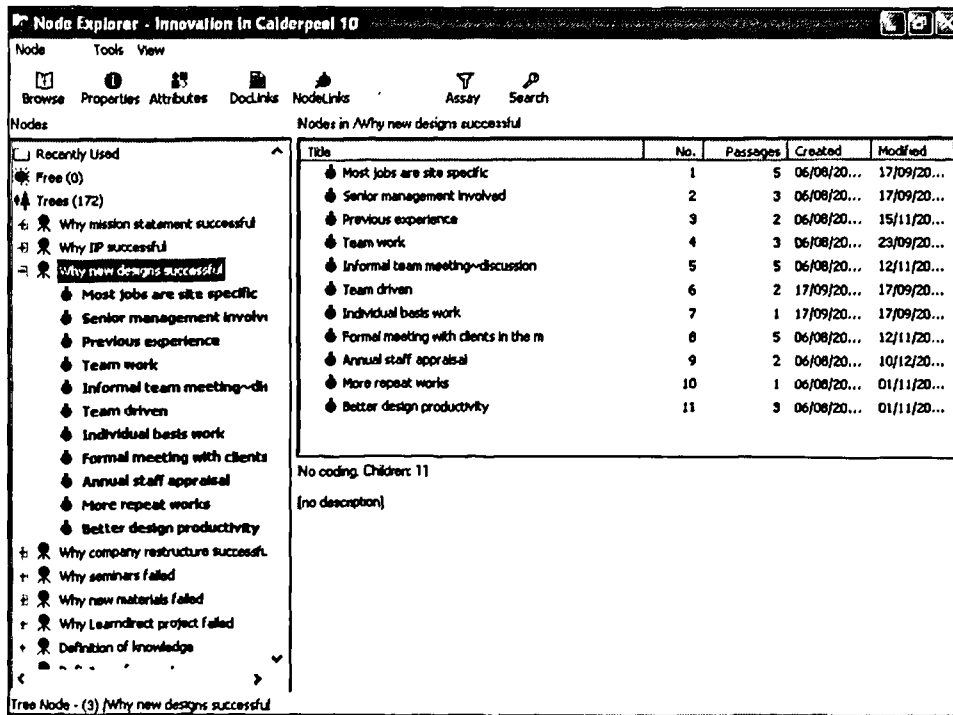


Figure 5.9 Successful explorative innovation (new designs) key notes

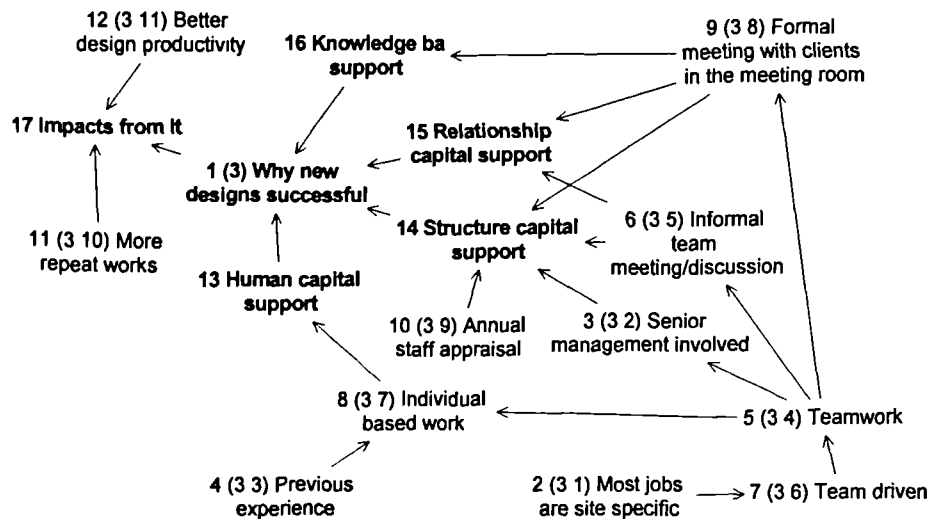
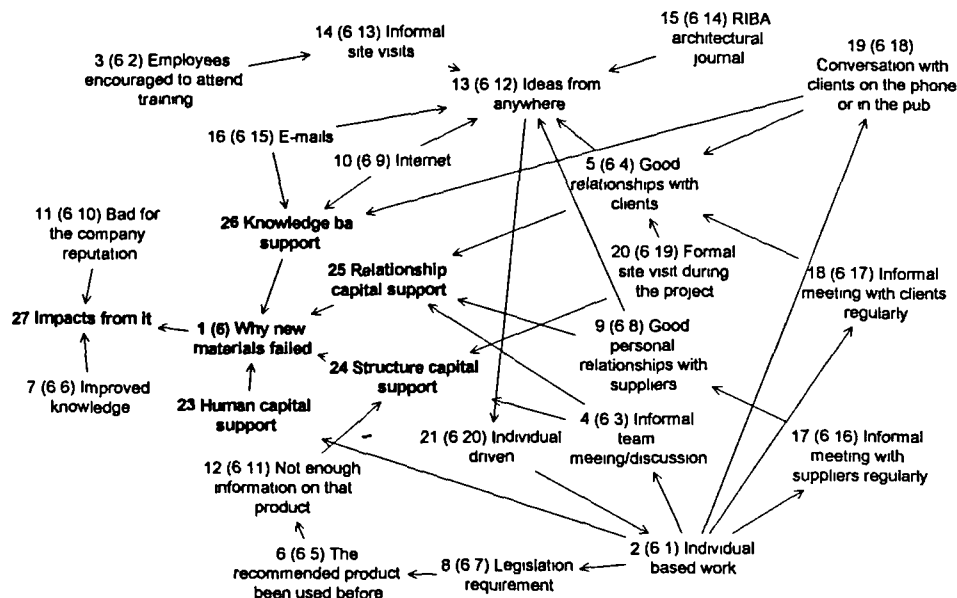


Figure 5.10 Successful explorative innovation (new designs) cognitive map

Node Explorer - Innovation in Calderpool 10					
Node Tools View					
Browse Properties Attributes DocLinks NodeLinks Edit Assay Search					
Nodes Nodes in /Why new materials failed					
<div> <div>Why seminars failed</div> <div>Why new materials failed</div> <div>Individual based work</div> <div>Employees encouraged to attend training</div> <div>Informal team meeting-discussion</div> <div>Good relationships with clients</div> <div>The recommended product had been used before</div> <div>Improved knowledge</div> <div>Legislation requirement</div> <div>Good personal relationships with suppliers</div> <div>Internet</div> <div>Bad for the company reputation</div> <div>Not enough information on that product</div> <div>Ideas from anywhere</div> <div>Informal site visits</div> <div>RIBA architectural journal</div> <div>E-mails</div> <div>Informal meeting with suppliers regularly</div> <div>Informal meeting with clients regularly</div> <div>Conversation with clients on the phone or in the pub</div> <div>Formal site visit during the project</div> <div>Individual driven</div> </div>					
Title	No.	Passages	Created	Modified	
Individual based work	1	2	25/08/20...	10/12/20...	
Employees encouraged to attend training	2	1	25/08/20...	04/11/20...	
Informal team meeting-discussion	3	3	25/08/20...	12/11/20...	
Good relationships with clients	4	2	25/08/20...	10/12/20...	
The recommended product had been used before	5	5	06/08/20...	25/08/20...	
Improved knowledge	6	5	24/08/20...	12/11/20...	
Legislation requirement	7	1	06/08/20...	15/11/20...	
Good personal relationships with suppliers	8	4	06/08/20...	10/12/20...	
Internet	9	1	25/08/20...	25/08/20...	
Bad for the company reputation	10	1	24/08/20...	23/09/20...	
Not enough information on that product	11	1	24/08/20...	23/09/20...	
Ideas from anywhere	12	2	25/08/20...	25/08/20...	
Informal site visits	13	2	06/08/20...	25/08/20...	
RIBA architectural journal	14	3	25/08/20...	25/08/20...	
E-mails	15	3	25/08/20...	10/12/20...	
Informal meeting with suppliers regularly	16	1	25/08/20...	15/11/20...	
Informal meeting with clients regularly	17	3	25/08/20...	15/11/20...	
Conversation with clients on the phone or in the pub	18	1	25/08/20...	10/11/20...	
Formal site visit during the project	19	2	25/08/20...	25/08/20...	
Individual driven	20	1	23/09/20...	23/09/20...	
No coding. Children: 20					
Tree Node - (6) /Why new materials failed					

Figure 5.11 Unsuccessful explorative innovation (new materials) key notes



5.5.1 Human capital

The human capital was found to be embedded within the capacity, ability and motivation of staff. Individual ability to compete successfully depends heavily on their ability to mobilise and synthesise bodies of expertise and experience in order to create knowledge that satisfies client demands. This was evident in the ‘individual based work’ (3,7; 6,1) variable. In successful explorative innovation, the ‘previous experience’ (3,3) was seen as being important for knowledge workers in performing their works. This was captured by Respondent C, who stated that:

“Design work is like showing clients what we’ve done before, showing clients other schemes, showing clients how it works previously. It’s like showing clients the different designs we can do.” (Innovation 3: new designs)

In unsuccessful explorative innovation, the adopted idea (a new material) had to be used before was shown in the ‘the recommended product been used before’ (6,5) variable. The previous experience was seen to give the staff and the client confidence in the adopting new idea. This was demonstrated by Respondent C, who expressed that:

“I have never [to be the first one to use a new material], but it must be difficult to use that new material if it has never used before, to be able to have confidence in it.” (Innovation 6: new materials)

The ‘most jobs are site specific’ (3,1) reality encouraged staff to be ‘self-motivated’ in that they are directly responsible for the creation and use of an idea within a project-specific situation. This was described by Respondent C, who stressed that:

“Most jobs are site specific any way. So ideas need to change, involve for specific clients, for specific site....” (Innovation 3: new designs)

The key distinction between successful and unsuccessful explorative innovation, from a human capital perspective, was the ‘social’ or ‘operational’ nature of the knowledge being applied to a specific innovation. ‘Operational’ activity is where the focus is on solving project-specific problems. These projects are either ‘external’, fee earning projects, or ‘internal’ but specific client-driven projects.

‘Social’ activity is where the focus is on generating non-project-specific innovation which build up general organisational capability and deeper client relationship over the medium to long term.

In successful explorative innovation, the application domain was a specific project, where knowledge gleaned from ‘social’ or ‘operational’ levels (see Section 5.5.3) was appropriately filtered and configured to meet the unique needs of the project. The creation and application of knowledge at an operational level was evident in ‘team driven’ (3,6) variable and was identified by Respondent C, who stated that:

“Initially ideas are always from within the team, and then we focus on integration with other teams within the office.” (Innovation 3: new designs)

In the cases of unsuccessful explorative innovation, the creation of ideas from individual creativity was seen in the ‘individual driven’ (6,20) variable and was captured by Respondent C, who stressed:

“...[using new materials] are down more on an individual basis.... ideas ...might come from individual, from me; might come from a supplier or might come from a client’s suggestion.” (Innovation 6: new materials)

It was found that the ‘ideas from anywhere’ (6,12) variable was particularly pertinent in unsuccessful explorative innovation. Ideas might come from the ‘internet’ (6,9), ‘e-mails’ (6,15), ‘good relationships with clients’ (6,4), ‘good personal relationships with suppliers’ (6,8), ‘RIBA architectural journal’ (6,14), and ‘informal site visits’ (6,13). Knowledge workers learn from such external or internal sources generate “background” knowledge, but this knowledge does not directly and immediately feed into current projects. Respondent C, for example, articulated that:

“Recently we have been looking at a large high rise apartment scheme, visits around Manchester, and looking at apartment schemes to look at what other people are doing to formulate some ideas for what we should be doing.” (Innovation 6: new materials)

In unsuccessful explorative innovation, ideas were socially derived but were not project specific at the time of its inception (see Section 5.5.3).

In summary, human capital for explorative innovation was found to be embedded within the capacity, ability and motivation of staff. The key distinction between successful and unsuccessful explorative innovation, from a human capital perspective, was the 'social' or 'operational' nature of the knowledge being applied to a specific innovation. In successful explorative innovation, the application domain was a specific project, where knowledge gleaned from whatever source ('social' or 'operational' levels) was appropriately filtered and configured to meet the unique needs of the project through the team structure. In contrast, unsuccessful explorative innovation was characterised by socially derived knowledge which was not adequately transformed to meet the need of a specific project, and was thus incompatible with the operational pool of knowledge being used.

5.5.2 Structure capital

The principal locus of structure capital was found to be the team structure and team working.

The structure capital within 'teamwork' (3,4) was seen as being important in progressing specific project issues. At an operational level, the 'teamwork' (3,4) was captured in activities including 'formal meeting with clients in the meeting room' (3,8), 'formal site visit during the project' (6,19), 'informal team meeting/discussion' (3,5; 6,3) and 'team driven' (3,6) variables. The way of the teamwork was described by Respondent C, who stressed that:

"So for a specific product [the team arranges] to look at that the product. The team working with that product will go and see that product." (Innovation 6: new materials)

The role of senior management in doing work through the team structure at an operational level was articulated in the 'senior management involved' (3,2) variable. It was evidenced by Respondent C, who stated the importance of senior management in the teamwork:

"Senior management will sometimes be part of these meetings.

Sometimes they go down to discussing individual jobs, and whether or not [clients] want to get a senior manager involved.” (Innovation 3: new designs)

In contrast, unsuccessful explorative innovation was found to have its foundations in individually created ideas derived from his or her ‘social’ relationship capital which were inappropriate for the specific project needs, and which were pursued relatively independently of the team. The role of the individual in doing work at an operational level was articulated in the ‘individual based work’ (6,1) variable and was captured by Respondent C, who stressed the early devolvement of responsibility to junior staff:

“A lot of younger, less experienced members of staff, get a quite lot of responsibility. [Innovation activity] doesn’t necessarily always need senior management.” (Innovation 6: new materials)

Although ‘the recommended product been used before’ (6,5) or the product had met ‘legislation requirement’ (6,7), ‘not enough information on that product’ (6,11) was identified as the key obstacle in unsuccessful explorative innovation. Respondent C, for example, asserted that:

“It’s generally a sales problem..... because it didn’t provide enough information about products.” (Innovation 6: new materials)

In unsuccessful explorative innovation, the socially derived ideas did not have sufficient demonstrable benefit or momentum to become embedded in structure capital. Explorative innovation success or failure was found to be determined by the ‘annual staff appraisal’ (3,9) and ‘formal site visit during the project’ (6,19) activities. The lack of ‘quantitative’ innovation performance measurement system was captured by Respondent C, who commented that:

“There isn’t really a structural reward system [for rewarding successful innovation] in place as for us I am aware of, but I think like Christmas bonus etc. If we’re doing well, performing well, we get feedback in that way. There is [the annual staff appraisal].” (Innovation 3: new designs)

In summary, the principal locus of structure capital was found to be the team

structure and the dynamics within these teams. Successful explorative innovation was found to have enduring senior management support from inception through to implementation, and supported by an enabling team structure which stimulated and developed team-based ideas at an operational level. In contrast, unsuccessful explorative innovation was found to have its foundations in individually created ideas derived from his or her 'social' relationship capital (see Section 5.5.3) which were inappropriate for the specific project needs, and which were pursued relatively independently of the team. These ideas did not become embedded at an operational structure capital level. In successful and unsuccessful explorative innovation, there was found to be a lack of 'quantitative' innovation performance measurement system to determine the success of innovation activity. Intuition and collective perceptions determine success or failure of an innovation. Limitation of relevant and updated information within the structure is seen to be a further, key obstacle in explorative innovation success.

5.5.3 Relationship capital

The relationship capital was evident within Calderpeel and was characterised as being at internal, client and supplier interaction domains of activity.

The relationship capital within 'an internal' context is seen as being important in nurturing communication and cohesion across vertical, hierarchical levels and horizontal 'teamwork' (3,4). This was shown in the role of 'informal team meeting/discussion' (3,5; 6,3) which was described by Respondent C, who stated:

**"[Relationship capital is] quite dominant in our firm really. That's working in the team and teams change within the company. So we need to have close relationships between our colleagues within the practice, and also senior management and lower levels of staff to encourage, and things like that, to seek advice when we need it."
(Innovation 3: new designs)**

At a client interaction level, relationship capital is viewed as being important in terms of '*operational*' interaction to progress specific project issues, and '*social*' interaction to forge and replenish non project-specific relationships with clients. 'Formal meeting with client in the meeting room' (3,8) and 'formal site visit during

the project' (6,19) were identified as being key operational relationship capital mechanisms, and were illustrated by Respondent C, who explained that:

“[The activities carried out to support the new designs] were formal presentations and meetings with the clients.” (Innovation 3: new designs)

The social interaction aspects of knowledge workers and clients interaction were captured in activity including 'informal meeting with clients regularly' (6,17) and 'conversation with clients on the phone or in the pub' (6,18). Respondent C, for example, articulated that:

“I go off and meet *clients* on a regularly basis. Then just cover whole, a lot of things specifically, generally to just talk about things.” (Innovation 6: new materials)

It was found that having good relationships with clients have significant influence in the application and acceptance of new ideas. Respondent C, for example, articulated that:

“I don't think I can remember specific cases where we have lost clients.....because, we have such good relationships with clients anyway. We are quite highly judged by the clients. We did quite a lot to make sure we look after the clients. So probably it is more a level of tolerance with us than with other companies. We can potentially make a few more errors to potentially make improvement afterwards.” (Innovation 6: new materials)

The good relationship with clients also had an input into the company marketing. This was stressed in the 'more repeat works' (3,10) variable and was captured by Respondent C, who articulated that:

“We don't advertise very much. It's mainly repeat work we get anyway. So we don't need to compete really.” (Innovation 3: new designs)

Interaction between knowledge workers and suppliers was emphasised in the 'good personal relationships with suppliers' (6,8) variable. Again, the distinction between 'operational level' and 'social level' interaction was evident. At an '*operational*'

level, Respondent C described the benefits in good relationship with suppliers:

“I have very good relationship with at least five suppliers. If I want it to show the client a new product,I will get the supplier to provide a sample which *is specific to the design* we are talking about.” (Innovation 6: new materials)

In contrast, at a ‘social’ level, the ‘informal meeting with suppliers regularly’ (6,16) variable was evidenced by Respondent C, who described that:

“Me, having informal meeting with much *suppliers* every few weeks if they have new products to show and ordinarily the supplier will want to come in and talk it through. Certainly the company wants to do that.” (Innovation 6: new materials)

It was found that the good supplier operational relationship capital is instrumented in generating the enabling conditions for creative action. This position was captured by Respondent C, who described:

“After developing the relationship with the supplier, you can ask them for [new material] information. You can find out more information if those suppliers are trusted.” (Innovation 6: new materials)

The logic of pursuing both ‘operational’ and ‘social’ relationship capital was that social relationship capital developed the supportive context within which operational relationships could prosper. This aspiration was commented on by Respondent C who argued that:

“If you have a good social relationship with clients, with consultants, it means you have good working relationship with them as well.” (Innovation 3: new designs)

The social relationship capital exposes knowledge workers to new possibilities to feed into operational relationship capital at a project specific level at a future date. Respondent C, for example, articulated:

“We can learn more about how the detail can be done correctly next time etc.” (Innovation 6: new materials)

In summary, relationship capital is seen as the results of internal, client and supplier interactions. Two broad types of relationship capital were grouped. First, 'operational relationship capital' was to progress specific project needs. Second, 'social relationship capital' was to forge and replenish non project-specific relationship with others at work. It was found that social relationship capital has a significant effect on feeding operational relationship at a specific project level at a future date.

The successful explorative innovation was found to have 'operational' and 'social' relationship capital sources which were fed into project-specific innovation needs. In contrast, unsuccessful explorative innovation was underpinned solely by 'social' relationship capital sources which did not meet project-specific innovation needs.

5.5.4 Knowledge capital

The knowledge capital where human capital, structure capital and relationship capital were brought together within explorative innovation was distinguished as being located in 'social' and 'technical' contexts.

In a 'social' context, knowledge capital was seen to stimulate interaction and collective 'process orientated' knowledge creation and conversion. In successful explorative innovation, the 'company environments' (such as office layout and meeting room) was found to be the basis within a social context in supporting team activity in explorative innovation. It was evident in 'formal meeting with clients in the meeting' (3,8) variable. Respondent C, for example, described the importance of the company layout in successful explorative innovation:

"All teams interact because of the office. The office is configured, so, for example, different resources and different floors and different people are configured. So everybody have to cross them in the office to see other people in their daily routine. So it is not about the people in the individual offices. They don't see other people during the day."
(Innovation 3: new designs)

In unsuccessful explorative innovation, the pub and telephone conversation was

found to be the basis within a social context in supporting individual activity and was evident in 'conversation with clients on the phone or in the *pub*' (6,18) variable. Respondent C, for example, stated the way he interacted with people:

"Telephone conversations, conversations in the pub and that kind of thing." (Innovation 6: new materials)

In a 'technical' context, knowledge capital was seen to support the search for external knowledge and sharing of 'asset orientated' knowledge. A 'technical' context view of knowledge capital within explorative innovation was seen to give an alternative to a 'social' context. Specifically, the importance of information technology (IT) such as 'the internet' searches (6,9) and 'e-mails' (6,15) was evident. The internet was identified as important technology for the information-gathering and was captured by Respondent C, who noted that:

"A lot of people get their updates from the architecture journal from RIBA, providing suggestions, new product etc. There is normally a link to that website." (Innovation 6: new materials)

The use of e-mail technology to share knowledge within the practice was evidenced by Respondent C, who stressed that:

"Quite often people who have been on seminars will provide a report, a formal type of report which is emails to everybody." (Innovation 6: new materials)

However, there was no evidence that project driven innovation was explicitly or adequately captured into the structure capital for subsequent retrieval and use in other projects by the same, or other teams.

In summary, knowledge capital is seen as the focal or integrating nexus in which innovation takes place. Two broad types of the nexus were distinguished. First, in a 'social' context, knowledge capital stimulated interaction and collective 'process orientated' knowledge creation and conversion. This took the form of office environments which supported team activity, such as meeting rooms and office layout. Second, in a 'technical' context, knowledge capital supported the search for external knowledge and sharing of 'asset orientated' knowledge. This took the form

of internet searches and e-mails respectively.

In successful explorative innovation, knowledge capital was associated with a combination of 'social' and 'technical' contexts, particularly when knowledge capital was channelled to project-specific, operational activity. In contrast, unsuccessful explorative innovation was seen to be brought about when the knowledge capital was limited to a 'technical' dimension, as it tended to be located at an individual-driven social level (for example, 'surfing the net' for new construction technologies) and did not lend itself to team-based, socially constructed innovation activity.

5.5.5 Innovation outcomes

The outcome of successful explorative innovation resulted in effective and efficient delivery of services to satisfy current project specific needs. This was evident in the 'better design productivity' (3,11), 'more repeat works' (3,10), and 'improved knowledge' (6,6) variables. Respondent C, for example, described how explorative innovation improved subsequent work productivity:

"Often when people have developed a successful detail, maybe a balcony that's worked really well, again it would get spread around the company. It improves productivity in future designs because you don't always want to redesign every part of building every time you do another building; it tends to try and make it more efficient for the design in the future. So we can almost use various parts of the building design again if it worked well in the first place." (Innovation 3: new designs)

Within this context, it was found the outcome of explorative innovation was not embedded in the organisational structure capital, but embedded in individual structure capital.

The negative impact from unsuccessful explorative innovation was that it could damage Calderpeel reputation, identified in the 'bad for company reputation' (6,10) variable. This was evidenced by Respondent C, who explained:

“It’s not good for the reputation but obviously if the product isn’t working, especially we can work around it to see if we can change it and get back to the supplier to ask if we can change it.” (Innovation 6: new materials)

In summary, the outcome of explorative innovation was found as focusing on effective and efficient delivery of services to satisfy current and/or future project-specific considerations/needs. It was found the outcome of explorative innovation in terms ‘best practice’ was not captured and embedded in the organisational structure capital.

5.6 Mode 2: Exploitative innovation analysis

Five exploitative innovations were identified as being significant, firm-generated innovations over the last two years (see Section 5.4). The successful exploitative innovations were considered as the Calderpeel’s mission statement (innovation 1), the accreditation of Investors in People (innovation 2), and company restructure (innovation 4). Unsuccessful exploitative innovations were viewed as seminars (innovation 5) and the Learndirect project (innovation 7).

The key factors and interrelationships for successful exploitative innovation are shown in Figure 5.13, 5.14, 5.15, 5.16, 5.17, 5.18 and 5.19), and for unsuccessful exploitative innovation are shown in Figure 5.20, 5.21, 5.22 and 5.23. These form the basis, along with appropriate extracts from the interview transcripts, for the following discussion.

Node Explorer

Tools View

Nodes

Nodes in Successful exploitative innovations

Title	Passages	Created	Modified
(1) Why mission statement succe			
(1 1) Senior management in			
(1 2) Chairman driven			
(1 3) Senior management te			
(1 4) Informal discussion in			
(1 5) Raised employees awar			
(1 6) Not all employees bou			
(1 7) MS information docum			
(1 8) E-mails			
(1 9) Company was director			
(1 10) Good relationships wi			
(1 11) Company website			
(1 12) Staff understood the			
(1 13) Company had identit			
(1 14) Company had structu			
(1 15) Company had future			
(1 16) Social activity			
(1 17) Office			
(1 18) Informal meeting			
(1 19) Informal presentation			
(1 20) Used in the marketin			
Annual staff appraisal	4	29/07/20...	10/12/20...
BD monitored the progress	3	17/08/20...	13/12/20...
Brand awareness	1	17/08/20...	10/09/20...
Business adviser vision	3	07/09/20...	10/12/20...
Business advisers driven	3	17/08/20...	15/11/20...
Business advisers implementation	1	17/08/20...	10/12/20...
Business advisers vision	2	27/08/20...	15/12/20...
Business development led it	2	17/08/20...	29/11/20...
Chairman driven	7	24/05/20...	08/11/20...
Chairman not committed	1	17/08/20...	29/11/20...
Clients and staff understood the fir	2	16/08/20...	13/12/20...
Clients wanted to know all team memb	1	16/08/20...	29/11/20...
Company had future direction	3	07/09/20...	03/11/20...
Company had future direction	1	25/08/20...	03/11/20...
Company had identity	7	08/07/20...	03/11/20...
Company had process	3	29/07/20...	03/11/20...
Company had structure	5	07/09/20...	03/11/20...
Company had structure and process	2	16/08/20...	03/11/20...
Company had team-based measurement sy	4	16/08/20...	13/12/20...
Company was directionless	3	11/06/20...	29/11/20...

Figure 5.13 Successful exploitative innovation key notes (1/6)

Node Explorer

Tools View

Nodes

Nodes in Successful exploitative innovation

Title	Passages	Created	Modified
(1 21) No specific way to me			
(1 22) Training			
(1 23) Quarterly office meet			
(1 24) Recruited new staff			
(1 25) Motivated staff			
(1 26) Management meeting			
(1 27) Business adviser visk			
(1 28) Open family culture			
(2) Why IP successful			
(2 1) E-mails			
(2 2) Senior management vi			
(2 3) Open family culture			
(2 4) Senior management in			
(2 5) Raised employee awar			
(2 6) People aware IP			
(2 7) Not all employees bou			
(2 8) Company had future di			
(2 9) Training			
(2 10) Annual staff appraisal			
(2 11) Company had proces			
(2 12) Informal discussion in			
(2 13) Improved company c			
Company website	4	14/06/20...	12/11/20...
Company website	2	10/09/20...	15/11/20...
Computing programmes	5	09/09/20...	10/12/20...
Cost a lot of money	1	17/08/20...	02/12/20...
Discovered some staffs' other skills	1	10/09/20...	29/03/20...
E-mails	1	07/09/20...	15/12/20...
E-mails	3	02/08/20...	10/12/20...
E-mails	3	10/09/20...	10/12/20...
E-mails	2	17/08/20...	15/12/20...
Employee vision	2	09/09/20...	10/12/20...
Employees encouraged to attend semin	6	10/09/20...	29/11/20...
Employees not buy in	4	17/08/20...	23/09/20...
Encouragement by using the free cour	1	17/08/20...	13/12/20...
Encouragement from all management	3	10/09/20...	29/11/20...
Encouragement from the team leader	1	17/08/20...	29/11/20...
Encouragement from top management	3	10/09/20...	29/11/20...
Everyone had a PDP	1	17/08/20...	15/11/20...
Free resources from government	2	17/08/20...	01/11/20...
Good ideas not captured	2	10/09/20...	29/11/20...
Good relationships with colleagues a	7	07/09/20...	29/11/20...

Figure 5.14 Successful exploitative innovation key notes (2/6)

Node Explorer				
Tools View				
Nodes				
Nodes in Successful exploitative innovation				
	Title	Passages	Created	Modified
(2 15) Business advisers visit	Improved business performance	1	25/08/20...	03/11/20...
(2 16) IP Information dodun	Improved company confidence	3	29/07/20...	15/12/20...
(2 17) Improved business pr	Improved company reputation	5	02/08/20...	13/12/20...
(4) Why company restructure su	Increased knowledge	1	10/09/20...	03/11/20...
(4 1) To reinforce the missio	Informal chat in the open day	4	17/08/20...	23/09/20...
(4 2) Clients wanted to know	Informal discussion in the office	13	07/09/20...	12/11/20...
(4 3) The company structur	Informal discussion in the office an	8	29/07/20...	27/08/20...
(4 4) Senior management vi	Informal meeting	6	07/09/20...	07/09/20...
(4 5) senior management in	Informal meeting	2	17/08/20...	10/09/20...
(4 6) Management meeting	Informal meeting-discussion in the p	7	09/07/20...	10/09/20...
(4 7) Quarterly office meetin	Informal presentation-workshop	17	10/05/20...	10/11/20...
(4 8) Informal team meetin	Informal team meeting-discussion	3	16/08/20...	17/09/20...
(4 9) Company had structur	Informal team meeting-discussion	15	09/09/20...	11/11/20...
(4 10) Clients and staff unde	Internet	2	17/08/20...	23/09/20...
(4 11) Company had team-b	It's stopped	3	10/09/20...	10/09/20...
(4 12) Too much work	Lost training opportunity	3	17/08/20...	02/12/20...
(5) Why seminars failed	Management meeting	4	07/09/20...	04/11/20...
(5 1) Discovered some staff	Management meeting	2	16/08/20...	04/11/20...
(5 2) Informal meeting-vlar	Management meeting	4	10/09/20...	10/11/20...
(5 3) Senior management vi	Management not drive it	6	09/06/20...	29/11/20...
(5 4) Management not drive				
(5 5) Senior management cl				

Figure 5.15 Successful exploitative innovation key notes (3/6)

Node Explorer				
Tools View				
Nodes				
Nodes in Successful exploitative innovation				
	Title	Passages	Created	Modified
(5 6) Informal team meeting	Middle management implementation	10	09/09/20...	10/12/20...
(5 7) Employee vision	Motived staff	5	26/05/20...	29/11/20...
(5 8) Middle management in	MS information documented	7	07/09/20...	03/11/20...
(5 9) No one had time	No one had time	15	07/06/20...	29/11/20...
(5 10) Not related to the job	No specific way to measure the perf	13	24/05/20...	07/09/20...
(5 11) Management meeting	No structure	4	07/06/20...	15/11/20...
(5 12) No structure	Not all employees bought into	2	11/06/20...	10/12/20...
(5 13) To reinforce the missi	Not all employees bought into	3	27/08/20...	10/12/20...
(5 14) The chosen people ar	Not related to the job	2	09/09/20...	10/12/20...
(5 15) Computing programmer	Nothing recorded	3	10/09/20...	12/11/20...
(5 16) Some staff sent to at	Office	4	07/09/20...	07/09/20...
(5 17) The team not motivat	Open family culture	2	07/09/20...	15/12/20...
(5 18) Employees encourage	Open family culture	4	25/08/20...	27/08/20...
(5 19) Senior management l	People aware IP	2	25/08/20...	27/08/20...
(5 20) Took too much time	People engaged in some projects more	1	10/09/20...	29/11/20...
(5 21) People engaged in ser	Quarterly office meeting	5	24/05/20...	04/11/20...
(5 22) The client's job had hi	Quarterly office meeting	3	16/08/20...	04/11/20...
(5 23) Staff understood the	Raised employee awareness	5	08/07/20...	03/11/20...
(5 24) Good ideas not captu	Raised employee awareness	2	02/08/20...	15/12/20...
(5 25) To develop motivatio	Recruited new staff	2	24/05/20...	29/11/20...
(5 26) To share knowledge				
(5 27) Company website				

Figure 5.16 Successful exploitative innovation key notes (4/6)

Node Explorer

Tools View

Nodes

Nodes in Successful exploitative innovations

Title	Passages	Created	Modified
Senior management choose attendees	5	09/09/20...	29/10/20...
senior management implementation	4	16/08/20...	10/12/20...
Senior management implementation	11	08/07/20...	10/12/20...
Senior management implementation	3	29/07/20...	10/12/20...
Senior management led it	5	09/09/20...	29/11/20...
Senior management not drive it	4	17/08/20...	23/09/20...
Senior management talking to people	4	07/09/20...	07/09/20...
Senior management vision	6	29/07/20...	20/12/20...
Senior management vision	2	16/08/20...	20/12/20...
Senior management vision	5	11/06/20...	10/12/20...
Social activity	8	07/09/20...	29/11/20...
Some staff learned some skills	2	17/08/20...	13/12/20...
Some staff sent to attend training	1	09/09/20...	10/12/20...
Something wrong with our IP	1	17/08/20...	17/08/20...
Staff understood the firm more	10	07/09/20...	15/12/20...
Staff understood the firm more	1	24/05/20...	15/12/20...
The chosen people are not majority	1	09/09/20...	09/09/20...
The client's job had higher priority	2	10/09/20...	29/11/20...
The company structure kept changing	3	16/08/20...	10/12/20...
The team not motivated	2	09/09/20...	29/11/20...
To develop motivation	3	26/05/20...	10/09/20...

Figure 5.17 Successful exploitative innovation key notes (5/6)

Node Explorer

Tools View

Nodes

Nodes in Successful exploitative innovation

Title	Passages	Created	Modified
The company structure kept changing	3	16/08/20...	10/12/20...
The team not motivated	2	09/09/20...	29/11/20...
To develop motivation	3	26/05/20...	10/09/20...
To make improvement in the business	2	10/09/20...	29/11/20...
To raise awareness	2	10/09/20...	10/09/20...
To raise employees' softer skills	1	17/08/20...	23/09/20...
To reinforce the mission statement	1	16/08/20...	10/12/20...
To reinforce the mission statement	1	10/09/20...	03/11/20...
To share knowledge	9	09/06/20...	10/09/20...
Too much work	1	16/08/20...	03/11/20...
Took too much time	7	09/09/20...	10/11/20...
Training	11	24/05/20...	12/11/20...
Training	1	29/07/20...	12/11/20...
Used in the marketing	12	24/05/20...	29/11/20...

Figure 5.18 Successful exploitative innovation key notes (6/6)

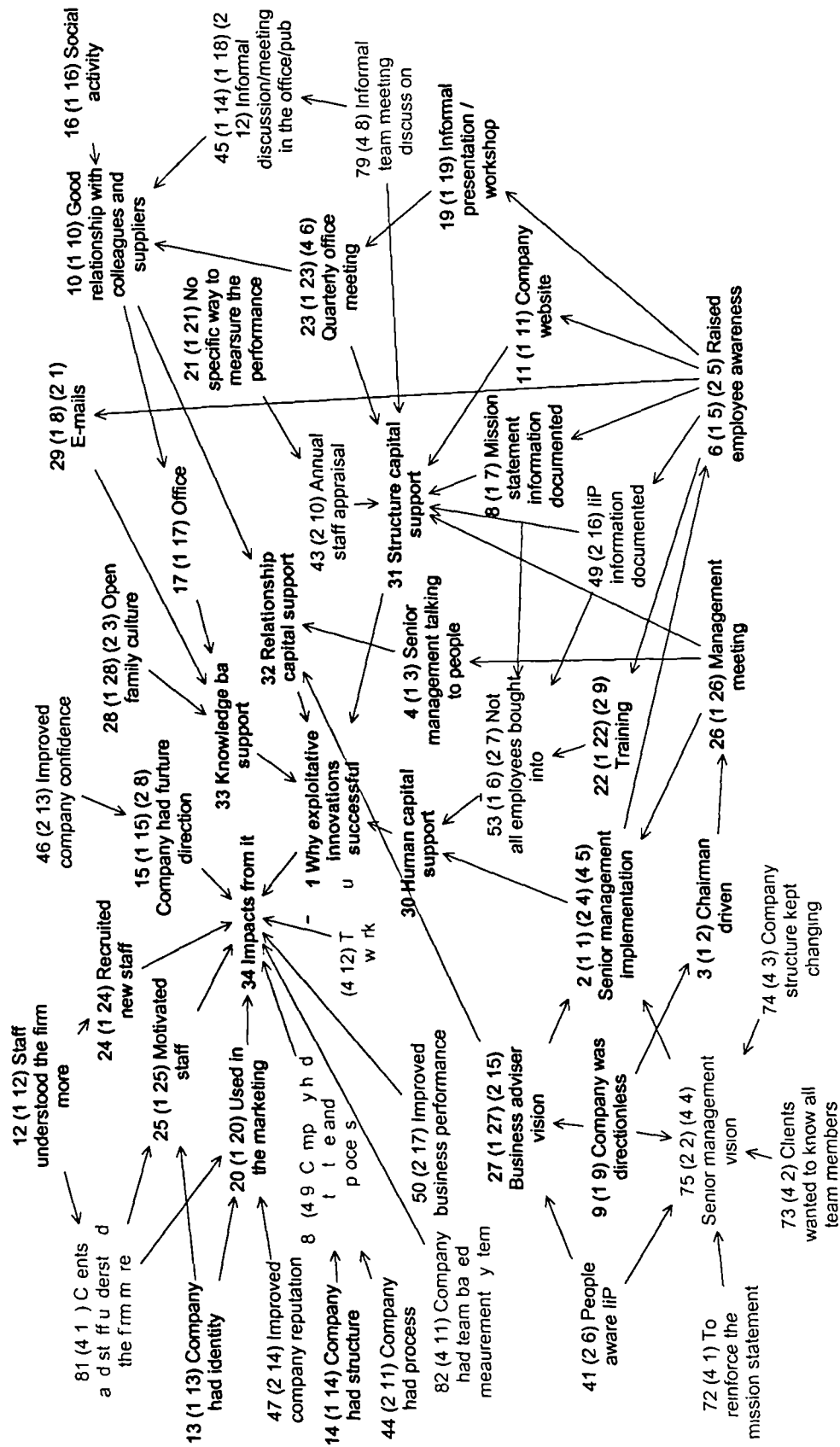


Figure 5.19 Successful exploitative innovation cognitive map

Node Explorer - Innovation in Calderpool 10

Set Tools View

Properties Attributes

Nodes

Nodes in Unsuccessful exploitative innovations

Title	Passages	Created	Modified
(5) Why seminars failed			
(5 1) Discovered some staff			
(5 2) Informal meeting-disc			
(5 3) Senior management vi			
(5 4) Management not drive			
(5 5) Senior management d			
(5 6) Informal team meeting			
(5 7) Employee vision			
(5 8) Middle management in			
(5 9) No one had time			
(5 10) Not related to the job			
(5 11) Management meeting			
(5 12) No structure			
(5 13) To reinforce the missi			
(5 14) The chosen people ar			
(5 15) Computing program			
(5 16) Some staff sent to att			
(5 17) The team not motiva			
(5 18) Employees encourag			
(5 19) Senior management l			
(5 20) Took too much time			
BO monitored the progress	3	17/08/20...	13/12/20...
Brand awareness	1	17/08/20...	10/09/20...
Business advisers driven	3	17/08/20...	15/11/20...
Business advisers implementation	1	17/08/20...	10/12/20...
Business development led it	2	17/08/20...	29/11/20...
Chairman not committed	1	17/08/20...	29/11/20...
Company website	2	10/09/20...	15/11/20...
Computing programme	5	09/09/20...	10/12/20...
Cost a lot of money	1	17/08/20...	02/12/20...
Discovered some staffs' other skill	1	10/09/20...	03/11/20...
E-mails	3	10/09/20...	10/12/20...
E-mails	2	17/08/20...	15/12/20...
Employee vision	2	09/09/20...	10/12/20...
Employees encouraged to attend semin	6	10/09/20...	29/11/20...
Employees not buy in	4	17/08/20...	23/09/20...
Encouragement by using the free cour	1	17/08/20...	13/12/20...
Encouragement from all management	3	10/09/20...	29/11/20...
Encouragement from the team leader	1	17/08/20...	29/11/20...
Encouragement from top management	3	10/09/20...	29/11/20...
Everyone had a PDP	1	17/08/20...	15/11/20...
Free resource from government	2	17/08/20...	01/11/20...

Unsuccessful exploitative innovations

Figure 5.20 Unsuccessful exploitative innovation key notes (1/3)

Node Explorer

Tools View

Nodes

Nodes in Unsuccessful exploitative innovations

Title	Passages	Created	Modified
(5 21) People engaged in so			
(5 22) The client's job had hi			
(5 23) People understood th			
(5 24) Good Ideas not capta			
(5 25) To develop motivatio			
(5 26) To share knowledge			
(5 27) Company website			
(5 28) Encouragement from			
(5 29) E-mails			
(5 30) Nothing recorded			
(5 31) To make improvement			
(5 32) It's stopped			
(5 33) To raise awareness			
(5 34) Encouragement from			
(5 35) Increased knowledge			
(7) Why Leamdirect project fai			
(7 1) Business advisers driv			
(7 2) To raise employees' so			
(7 3) Free resource from gov			
(7 4) Business advisers impl			
(7 5) Informal meeting			
(7 6) Emails			
Good Ideas not captured	2	10/09/20...	29/11/20...
Increased knowledge	1	10/09/20...	03/11/20...
Informal chat in the open day	4	17/08/20...	23/09/20...
Informal meeting	2	17/08/20...	10/09/20...
Informal meeting-discussion in the p	7	09/07/20...	10/09/20...
Informal team meeting-discussion	15	09/09/20...	11/11/20...
Internet	2	17/08/20...	23/09/20...
It's stopped	3	10/09/20...	10/09/20...
Lost training opportunity	3	17/08/20...	02/12/20...
Management meeting	4	10/09/20...	10/11/20...
Management not drive it	6	09/06/20...	29/11/20...
Middle management implementation	10	09/09/20...	10/12/20...
No one had time	15	07/06/20...	29/11/20...
No structure	4	07/06/20...	15/11/20...
Not related to the job	2	09/09/20...	10/12/20...
Nothing recorded	3	10/09/20...	12/11/20...
People engaged in some projects more	1	10/09/20...	29/11/20...
People understood the firm more	1	24/05/20...	29/11/20...
Senior management choose attendees	5	09/09/20...	29/10/20...
Senior management led it	5	09/09/20...	29/11/20...
Senior management not drive it	4	17/08/20...	23/09/20...

Figure 5.21 Unsuccessful exploitative innovation key notes (2/3)

Node Explorer

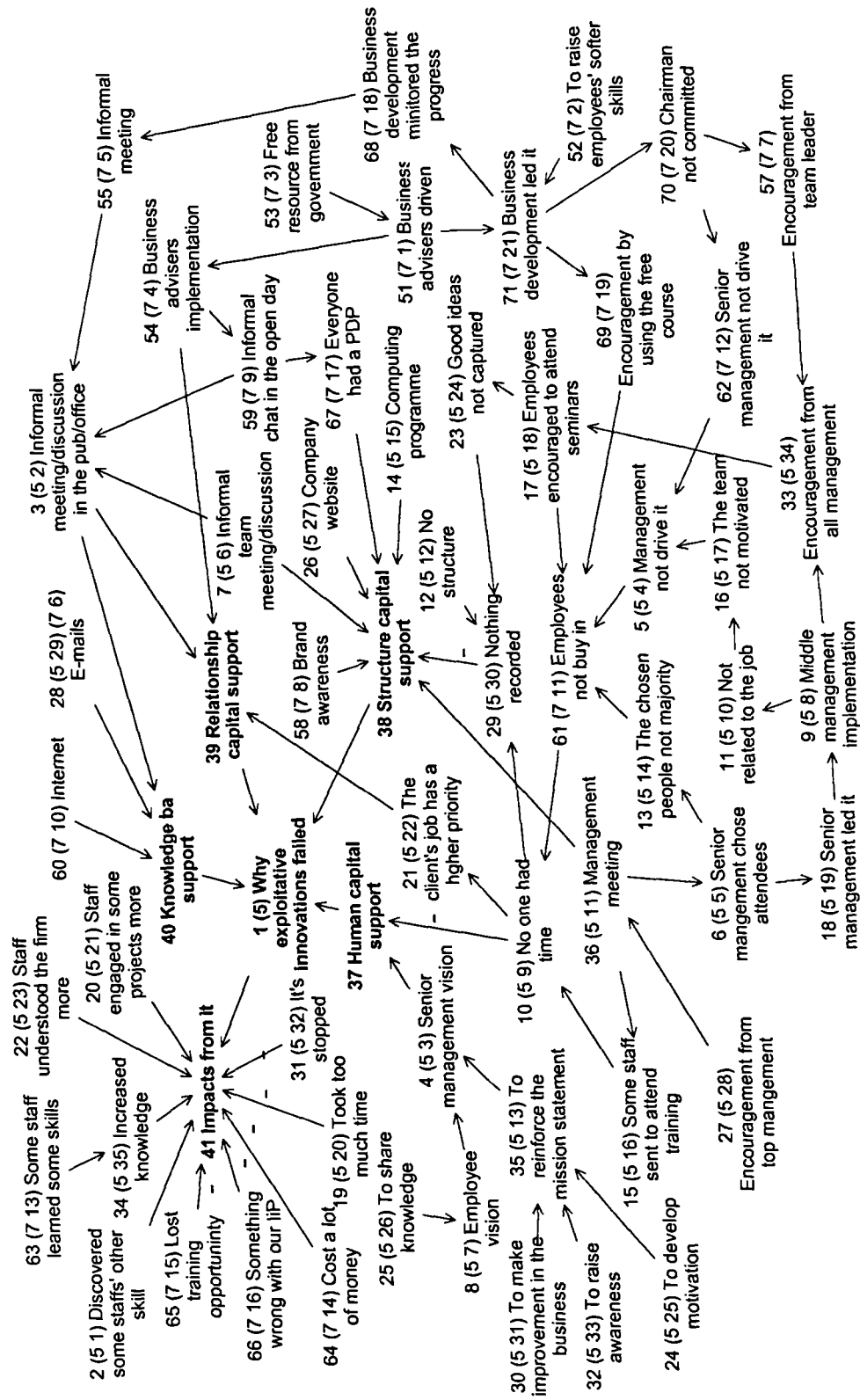
Tools View

Nodes

Nodes in Unsuccessful exploitative innovations

	Title	Passages	Created	Modified
(7) Why Learndirect project failed	People engaged in some projects more	1	10/09/20...	29/11/20...
(7 1) Business advisers driven	People understood the firm more	1	24/05/20...	29/11/20...
(7 2) To raise employees' so	Senior management choose attendees	5	09/09/20...	29/10/20...
(7 3) Free resource from gov	Senior management led it	5	09/09/20...	29/11/20...
(7 4) Business advisers impl	Senior management not drive it	4	17/08/20...	23/09/20...
(7 5) Informal meeting	Senior management vision	5	11/06/20...	10/12/20...
(7 6) Emails	Some staff learned some skills	2	17/08/20...	13/12/20...
(7 7) Encouragement from t	Some staff sent to attend training	1	09/09/20...	10/12/20...
(7 8) Brand awareness	Something wrong with our IP	1	17/08/20...	17/08/20...
(7 9) Informal chat in the op	The chosen people are not majority	1	09/09/20...	09/09/20...
(7 10) Internet	The client's job had higher priority	2	10/09/20...	29/11/20...
(7 11) Employees not buy in	The team not motivated	2	09/09/20...	29/11/20...
(7 12) Senior management i	To develop motivation	3	26/05/20...	10/09/20...
(7 13) Some staff learned sc	To make improvement in the business	2	10/09/20...	29/11/20...
(7 14) Cost a lot of money	To raise awareness	2	10/09/20...	10/09/20...
(7 15) Lost training opportu	To raise employees' softer skills	1	17/08/20...	23/09/20...
(7 16) Something wrong with	To reinforce the mission statement	1	10/09/20...	03/11/20...
(7 17) Everyone had a PDP	To share knowledge	9	09/06/20...	10/09/20...
(7 18) BD monitored the pro	Took too much time	7	09/09/20...	10/11/20...
(7 19) Encouragement by us				
(7 20) Chairman not commit				
(7 21) Business developmen				

Figure 5.22 Unsuccessful exploitative innovation key notes (3/3)



5.6.1 Human capital

The human capital for exploitative innovation was found to be principally embedded within the capacity, ability and motivation of senior management, and the level of employee participation in decision-making. Further, lack of time to implement ideas was found to be the critical obstacle for human capital in supporting successful exploitative innovation.

1. The capacity, ability and motivation of senior management

The role of senior management involves the envisioning, creation and application of knowledge. The ability of senior management to generate new ideas was seen as a key aspect for exploitative innovation. The initial ideas for successful and unsuccessful exploitative innovation predominantly came from senior management was evident in the 'senior management vision' (2,2; 4,4; 5,3) variable. The idea to restructure the company from senior management was demonstrated by Respondent D who said:

“[The company structures] are actually structured, introduced and driven by senior management. They set the structure and then went down through the teams. It’s always driven by senior management. It’s not really a discussion point from there, from the other members. It’s really senior management issue, director level.” (Innovation 4: company restructure)

In unsuccessful exploitative innovation, the idea to use seminars to share project information between teams from senior management was emphasised by Respondent E:

“This initial idea came from [senior management] trying to increase our tacit knowledge throughout the company because we have a big problem with communication. So we try to improve it then by using the project seminar.” (Innovation 5: seminars)

In this context, the ability to scan and sense external and internal market stimuli and to make appropriate internal responses appeared to come from the senior management level. The awareness of the external market demands by the senior

management was found to be reactive in nature. It was shown in the 'people aware liP' (2,6) and 'clients wanted to know all team members' (4,2) variables. Respondent B, for example, stated that how senior management sensed the need for liP:

“It is a couple of years ago; directors attended some business meetings in which it was stated that a lot of people are aware of the importance of getting Investors in People accreditation.” (Innovation 2: Investors in People)

The idea for the success of exploitative innovation was found to meet Calderpeel internal organisation needs or to develop general client relationship activity. The liP (innovation 2), for example, was evident in the 'company was directionless' (1,9), 'to reinforce the mission statement' (4,1; 5,13) and 'company structure kept changing' (4,3). This was evidenced by Respondent A with respect to the strategic focus within rationale for the need for a mission statement to respond to a lack of Calderpeel in the consent that:

“The company is very much ...directionless which we didn't know where we are going.....” (Innovation 1: mission statement)

The ideas which stimulated subsequently unsuccessful exploitative innovation were found to have primarily been driven by individual needs. This was demonstrated in the 'employee vision' (5,7), 'to share knowledge' (5,26), 'to develop motivation' (5,25), 'to raise awareness' (5,33), 'to make improvement in the business' (5,31), and 'to raise employees' soft skills' (7,2) variables. The Learndirect project (innovation 7), for example, was response to skills shortages, as emphasised by Respondent E:

“It was a new idea to try to raise the skills. Instead of being professional qualification it was more about developing soft skills, like time management or managing meetings. So we wanted to develop their softer skills.” (Innovation 7: Learndirect project)

The motivation of senior management to implement the innovation (see Section 5.6.2 for the description of senior management implementation) appeared important in determining whether or not exploitative innovation was successful. The need for

dedicated top management was identified by the 'chairman driven' (1,2) variable for successful exploitative innovation and was conveyed by Respondent A, who commented that:

**"The mission statement came from our desire from our *chairman*, and directors at the time to establish to what Calderpeel was and where it was going, so it came from senior management."
(Innovation 1: mission statement)**

Conversely, the senior management were not sufficiently motivated to drive the Learndirect project (innovation 7) into the company. This lack of senior management support was a significant contributory reason for its failure. It was evident in 'chairman not committed' (7,20) variable and was illustrated by Respondent E, who noted that:

"[*Chairman*] gives me the ok [but no more]. You're allowed to do [the Learndirect project], you can run the project. We had the open day, had lots of people attend it and that's about it." (Innovation 7: Learndirect project)

2. Employee participation

The employee participation in decision-making was seen to be important in successful and unsuccessful exploitative innovation. To make staff feel be part of the development of innovation was seen to be critical to the level of staff motivation to ensure its success. This imperative was epitomised by Respondent D, for example, who stated:

"People get motivated when they are a part of development, and everybody in the office was made to feel a part of the discussion.....because of a part of it, then the motivation comes with us." (Innovation 1: mission statement)

It was found high level of employee participation enabled the knowledge sharing between staff. This was demonstrated by Respondent D, who stated:

"Make people feel a part of the groups and the way you get people to talk, share what they thinking, by informal meetings. Externally –

more formal!” (Innovation 1: mission statement)

When there was not broad-based ownership of an issue, employees become alienated from the process, and ‘employees not buy in’ (7,11) which resulted in exploitative innovation failure and was evident in Respondent E, who stated that:

“People just don’t want to do it. People didn’t buy into it....They couldn’t be bothered.” (Innovation 7: Learndirect project)

However, ‘not all employees bought into’ (1,6; 2,7), exploitative innovations which were subsequently successful. Respondent E, for example, described that:

“A lot of people thought [IiP] was another fad.” (Innovation 2: IiP)

The distinguishing dynamic in the IiP (innovation 2) was that it was client-driven and engaged significant and enduring senior management championing and day-to-day commitment to its development and implementation.

A supporting mechanism to encourage the appropriate buy in of staff to participate in exploitative innovation, from a human capital perspective, was identified as training. This was evident in ‘training’ (1,22; 2,9), ‘some staff sent to attend training’ (5,16) and ‘employees encouraged to attend seminars’ (5,18) variables. The use of the training to ‘raise employee awareness’ (1,5; 2,5) was emphasised by Respondent D, who commented that:

“Our industry is based on training. You don’t arrive with knowledge; you gain it from this industry. You learn from other companies,There is a process to sharing knowledge.” (Innovation 1: mission statement)

Further, Respondent B explained that the training was used to develop professional knowledge:

“The only thing you can manage the knowledge from is to go on course.” (Innovation 5: seminars)

The firm commitment to training was further evidenced by Respondent E, who

articulated that:

“We encourage [employees] to develop themselves we invest in them with time and money.” (Innovation 7: Learndirect project)

Employees are also provided with the necessary finances to participate in external training which they feel will extend and develop their knowledge. This was noted by Respondent B, who noted that:

“You are encouraged to attend external courses that you want to do, then you are encouraged to attend it, and then the company will pay the bill for that.” (Innovation 2: IiP)

In contrast, two supporting mechanisms concerning the appropriate ‘buy in’ of staff to participate in unsuccessful exploitative innovation were identified as inappropriate encouragement and the innovation not being related to individual’s jobs.

Taking the first issue, ‘inappropriate encouragement’ was captured in activity including ‘encouragement from all management’ (5,34), ‘encouragement from top management’ (5,28), ‘encouragement from team leader’ (7,7) and ‘encouragement by using the free course’ (7,19) variables. Respondent A, for example, described that:

“The support to [seminars] is initially committed and encouraged. There is nothing about specifically but it was encouraged.” (Innovation 5: seminars)

It was found that ‘encouragement’ could sometimes be ‘coercive’ in nature. Respondent A, for example, stated that:

“We do actually *threaten* staff with, we pay the tuition fees, if you fail to attended these courses on a regular basis, then we have suggested that we may stop paying the tuition fees.” (Innovation 5: seminars)

Second, it was found that motivation of ‘buy in’ of staff used in unsuccessful exploitative innovation was socially derived motivation which was not transformed to meet project-specific needs. This was evident in ‘not related to the job’ (5,10) and

'the team not motivated' (5,17) variables. The seminars not being related to individual jobs was captured by Respondent B, who stressed that:

**"IT session just related to individuals, not related to jobs".
(Innovation 5: seminars)**

The team not being motivated was also emphasised by Respondent B, who noted that:

"In terms of motivation, I don't think [the seminars have] motivated the team in anyway." (Innovation 5: seminars)

3. Lack of time

The notion of 'no one had time' (5,9) was a *commonly cited factor in unsuccessful* exploitative innovation. The tension between the time and volatility of workload was stressed by Respondent A stating that:

".....[the seminars are] purely a failure of whoever was in charge of organising... Something, first of all, you don't have time to do it. Secondly, you have pressures from clients to do the work. It's very difficult to set up the time to deal with the scope we have discussed the project we are working on. The pressures of work removed our ability to handle these sessions." (Innovation 5: seminars)

Similarly, the nature and volatility of workload was expressed by Respondent D, who said that:

**"We should look back and said, right, we should do some that; we should do this or we shouldn't do that, and then set it. Something we know we can do because the system is in place. It has the information. We just need the time to look at the information within the team."
(Innovation 5: seminars)**

In summary, human capital was found to be embedded within the capacity, ability and motivation of senior management and employee participation in decision-making. The lack of time was found to be a key obstacle to successful exploitative innovation.

The key distinction between successful and unsuccessful exploitative innovation, from a human capital perspective, was the motivation of senior management to drive the innovation through to successful implementation, and to encourage appropriate employee participation in the process.

In successful exploitative innovation, the motivation of senior management to implement the innovation came from top management support. The 'buying in' of staff was encouraged through 'training' which met the unique needs of the teams and individuals. In contrast, in unsuccessful exploitative innovation, top management often did not sustainably commit to the innovation. As a consequence, senior management did not carry out the innovation implementation activities. The staff 'buy in' process was limited to socially derived motivation which was not transformed to meet the needs of the team instead of meeting the unique needs of individuals' roles and project tasks.

5.6.2 Structure capital

The structure capital for exploitative innovation was found to be principally located in the administrative system, the team structure and computer systems. There were found to be no quantitative innovation performance measurement systems.

The company administrative system took two key forms: appropriate structure and appropriate documentation. First, the importance of an appropriate structure was particularly pertinent in exploitative innovation. The success of exploitative innovation was seen to depend on the formalised structure which was captured in the 'management meeting' (1,26; 5,11) and 'quarterly office meeting' (1,23; 4,6) variables. The acceptance of the innovation was decided by the management board. This was demonstrated by Respondent D, who stated that:

"[Senior management] will have the meeting once a week for senior management, and then they will go back to that team and share that information with the rest of the team. So the process goes through that way." (Innovation 5: seminars)

The quarterly office meeting was used to enable the interaction between different levels was captured by Respondent D, who stressed that:

“Initially it was done through *quarterly meetings* of the whole office.....The process or the structure is laid down by senior management at that meeting. This is what we are doing from through that doing that road etc. So really getting everybody involved and letting them know what is happening through the quarterly meeting.” (Innovation 1: mission statement)

By contrast, the ‘no structure’ (5,12) variable played a crucial role in unsuccessful exploitative innovation. Respondent E, for example, indicated that:

**“[The Learndirect project] failed because there is no structure.”
(Innovation 7: Learndirect project)**

The necessity of the formalised structure was evidenced by Respondent A, who stated that:

“We tend to find that if the project is interesting then people will attend. We hold it in the office. We don’t hold it in the meeting room. So that is how it stops work anyway. I think the way we forward it is to establish probably basically formal every month system which was carried out as an interesting project comes in.” (Innovation 5: seminars)

The need of a formal structure for the *Learndirect* project (innovation 7) was demonstrated by Respondent E, who noted that:

“I think we will have to get the structure into [the *Learndirect* project]. Yeah, structure definitely. Formalise it.” (Innovation 7: Learndirect project)

Second, the importance of ‘appropriate documentation’ was evident in the ‘mission statement information documented’ (1,7) and ‘IiP information documented’ (2,16) variables. Appropriate documentation to ‘raise employee awareness’ (1,5; 2,5) was particularly addressed in successful exploitative innovation. Respondent C, for example, emphasised the relative importance of codifying knowledge in documentary form:

“There are copies of the mission statement document all around the office. We certainly know what it is!” (Innovation 1: mission statement)

Respondent E, for instance, explained that managerial efforts were made in order to ensure that knowledge sharing process happened:

“[Business Development] attached a tick form on the front [of the IiP information] to make sure they ticked their name off and passed it on and make sure everyone had read it.” (Innovation 2: IiP)

In contrast, ‘nothing recorded’ (5,30) was stressed in unsuccessful exploitative innovation, with the impact that the issue and lesson learned could not be encoded and documented. This was evident in ‘good ideas not captured’ (5,24) variable and was captured by Respondent A in the case of seminars said:

“Nothing was recorded because it’s informal.” (Innovation 5: seminars)

Specifically, a lack of time (discussed in Section 5.6.1) to take the minutes of seminars was emphasised by Respondent D, who stated:

“[The seminars are] more informal. That is, it isn’t really minuted or reports done or anything. That’s just more time.” (Innovation 5: seminars)

Appropriate documentation was seen as the key mechanism to reinforce exploitative innovation. This was evidenced by Respondent A, who stated that:

“We started doing an attendance record. It sounds high and almighty, but it is the way to make sure people will turn up. If you don’t turn up, if you haven’t given a good excuse it will be noticed.” (Innovation 5: seminars)

Although ‘everyone had a personal development plan’ (7,17), the Learndirect project (innovation 7) still failed. This failure was found to be more caused by the role of senior management (discussed in Section 5.6.1).

In combination, these variables show that the formalised system with appropriate

structure and documentation within structure capital was critical for successful exploitative innovation.

In successful and unsuccessful exploitative innovation, it was found that there was 'no specific way to measure the innovation performance' (1,21) within Calderpeel. There were no formalised measurement systems; rather, there were mechanisms such as 'annual staff appraisal' (2,10) and 'informal meeting' (7,5), but they did not explicitly or adequately address this issue. The determination of the perceived success or failure of an innovation was through informal-daily feedback, expressed by Respondent E, who noted that:

**"I have a chart to measuring people progress, but its not really measuring it in that kind of way. I just keep an eye on them."
(Innovation 7: Learndirect project)**

When it comes to feedback, the only formal feedback system for learning was the annual staff appraisal. Evaluations are often annual and were therefore regarded as a slow, if not irrelevant, feedback system.

The structure capital for exploitative innovation was supported by an enabling 'team structure.' The importance of stimulating and developing teamwork at an operational level was evident in the 'informal team meeting/discussion' (4,8; 5,6) variable which was raised by Respondent D, who stated that:

"For something to be supported it, it needs to be shared. So we have, we share with the team, the whole team discuss it." (Innovation 4: company restructure)

Within the team structure, the key distinction between successful and unsuccessful exploitative innovation, from a structure capital aspect, was that successful exploitative innovation was characterised by enduring senior management support from inception through to implementation (discussed in Section 5.6.1). The importance of 'senior management implementation' (1,1; 2,4; 4,5) was seen to be essential in successful exploitative innovation. This was described by Respondent E, who stated that:

“We didn’t really consult [our staff]...because [IiP] was more about the processes and things like that that top management had to put it in place. It didn’t really involve our staff much because apart from getting them to buy in, there wasn’t really much else to do.”
(Innovation 2: IiP)

In unsuccessful exploitative innovation it was found that senior management did not drive the implementation through the team structure. The support from management level in innovation activity, including ‘senior management chose attendees’ (5,5), ‘senior management led it’ (5,19), ‘middle management implementation’ (5,8), ‘business management led it’ (7,21) and ‘business management monitored the progress’ (7,18). Respondent A, for example, commented that:

“the failures all come from the management.” (Innovation 5: seminars)

Lack of senior management endeavour to drive the innovation into the organisation, resulted in exploitative innovation failing. This was evident in the ‘management not drive it’ (5,4) and ‘senior management not drive it’ (7,12) variables and was emphasised by Respondent E, who stated that:

“I got [senior management] commitment, but they didn’t drive it down the organisation.” (Innovation 7: Learndirect project)

The need of ‘senior management’ to drive the innovation into the organisation was emphasised by Respondent E, who stated:

“I suppose in the next year, when we come back from Christmas, I will get the *senior management* to drive [the Learndirect project]. That will make a big difference.” (Innovation 7: Learndirect project)

In a computer system context, structure capital took two key forms: the computing programme and the company website. The ‘company website’ (1,11; 5,27) was seen as a significant activity in supporting exploitative innovation. Respondent A, for example, explained the importance of the company website:

“The website is the biggest thing that we have done recently to

support [the mission statement].” (Innovation 1: mission statement)

The ‘computing programme’ (5,15) was particularly addressed in supporting exploitative innovation. Respondent A, for example, stressed:

“.....something like our job costing programming system, which is not necessarily new to us, but it does very well [it that it] helps memy management.” (Innovation 5: seminars)

In summary, the principal locus of structure capital within exploitative innovation was found to be the formalised administrative system (with appropriate structure and documentation), the team structure and computer systems. There were no quantitative innovation performance measurement systems. Successful exploitative innovation was found to have: formalised structures and documentation systems; enduring senior management support from inception through to implementation; and, supported by an enabling team structure which stimulated and developed team work at an operational level. In contrast, unsuccessful exploitative innovation was found to have: no formalised structures and documentation systems; and, no senior management support to drive the innovation down into the organisation.

5.6.3 Relationship capital

The key sources of relationship capital for exploitative innovation were located within business adviser, internal, client and supplier interactions.

At business advisers’ interaction level, relationship capital is seen as being important in terms of ‘operational’ interaction to fulfil the knowledge gap which Calderpeel did not have on its own. The ‘business advisers’ (1,27; 2,15; 7,1; 7,4), ‘free resources from government’ (7,3), have significant influence in the process of knowledge creation in exploitative innovation. In successful exploitative innovation, the need of the mission statement came from the business adviser and was captured by Respondent E, who stated that:

“[The idea of the mission statement] came through IiP, Investors in People. So it came through [business advisers], they said that if we have the mission, we will have more focus.” (Innovation 1: mission

statement)

The idea for the unsuccessful Learndirect project exploitative innovation from the business adviser was through the 'informal chat in the open day' (7,9), and was demonstrated by Respondent E, who noted that:

"[The idea of the Learndirect project] came from our business advisers again, consultants." (Innovation 7: Learndirect project)

Interaction between knowledge workers and colleagues was emphasised in the 'good relationship with colleagues and suppliers' (1,10) variable. Relationship capital within an internal context through team structure at 'operational level' and 'social level' interaction was evident. At an operational level, the 'informal team meeting/discussion' (4,8; 5,6) was emphasised by Respondent D, who stated that:

"A lot of is done informally. Talking again. From the take our client to look our portfolio because that is really our business which showing what the portfolio. [The team] will then talk to them about our company which is we are aiming for, which is what we do. It's really where we are going except the work. So it's more than as mean informal rather than sending out. It's really not, not sending out advice. It's more informal basis." (Innovation 4: company restructure)

Knowledge workers and colleagues interactions at a social level were captured in activity including 'informal discussion/meeting in the office/pub' (1,14; 1,18; 2,12; 5,2), 'informal meeting' (7,5) and 'social activity' (1,16). In successful exploitative innovation, this was demonstrated by Respondent C, who noted that:

"Sometimes we will go out, say, and play football together with sometime from a different team who works on a different floor who I don't see on a daily basis. Sometimes the company goes out, the whole company." (Innovation 1: mission statement)

In unsuccessful exploitative innovation, the social level interaction through 'the team structure' was emphasised by Respondent D, who explained:

"We have that interaction on that level with the whole company.....the different [teams] interact at a social level."

(Innovation 5: seminars)

At a client interaction level, relationship capital is viewed as being important in terms of 'operational' interaction to progress specific project issues, and to establish a foundation for the company marketing.

In successful exploitative innovation, the client was identified as being the principal operational relationship capital focus. This was evident in 'the client wanted to know all team members' (4,2) variable and was described by Respondent D, who commented that:

"A lot of clients...like to know all members of the team. When they pick up the phone who they are speaking to. They know that they can come back to the same person. So we don't just deal with senior management. We need to deal with each level because they are the people drawing the information. They are the one have the most knowledge. Therefore, they can share it. So, but they need to understand who draws within the team, the people." (Innovation 4: company restructure)

By contrast, 'the client's job has higher priority' (5,22) over non-client activity was a significant contributory reason for exploitative innovation's failure. This view was described by Respondent D, who expressed that:

"Other things come in which have a higher priority, primarily because we are still in the commercial business and if the work needs to be done and then it needs done. The client cannot wait because we have internal meetings." (Innovation 5: seminars)

It was found that marketing within Calderpeel is very much enmeshed with identifying and understanding particular clients, and this process was found to be proactive and informal in nature. Respondent A, for example, stated that:

"The marketing within the company is very informal and involves entertaining clients really." (Innovation 1: mission statement)

The informal nature of marketing was reinforced by Respondent A, who claimed that:

“A lot of jobs are through the words of mouth. The informal marketing is very important.” (Innovation 1: mission statement)

Interaction between knowledge workers and suppliers was emphasised in the ‘good relationship with colleagues and suppliers’ (1,10) variable at an ‘operational’ level. Respondent C, stated that:

“We have the good relationship with other professionals we use on a regular basis, other consultants.” (Innovation 1: mission statement)

In summary, relationship capital for exploitative innovation was located at business adviser, internal, client, and supplier interaction domains of activity. Relationship capital seems particularly crucial to knowledge creation.

In the cases of successful exploitative innovation, it was found that ‘operational’ and ‘social’ relationship capital sources fed into specific-project needs. In contrast, the unsuccessful exploitative innovation was underpinned solely by ‘social’ relationship capital sources which did not meet project-specific innovation needs, such as internal organisation and general client development activity.

5.6.4 Knowledge capital

The knowledge capital for exploitative innovation was associated with a combination of ‘social’ and ‘technical’ contexts. In a ‘social’ context, innovation activity was seen to take place in the company environment (such as office and open family culture) and pub. This was shown in the ‘informal discussions/meetings in the pub/office’ (1,14; 1,18; 2,12; 5,2), ‘office’ (1,17), and ‘open family culture’ (1,28; 2,3) variables. The company environment in Calderpeel serves as an important symbol of professionalism. The importance of the office to gather people together and to ‘raise employee awareness’ (1,5; 2,5) was captured by Respondent C, who stated that:

“The office has a quite good social structure as well. Lot of people come together and play football, and structured nights out with the company, curry night, and things like that, good for team building, that kind of thing.” (Innovation 1: mission statement)

The open family culture was particularly addressed in successful exploitative innovation. Respondent E, for example, illustrated that open family culture enabled employees to work towards a common goal:

“[Supporting IiP] really comes from the open family culture again. Supported investment in people. We had good employee buy in for it.....they could see the benefits for themselves as well as for the business.” (Innovation 2: IiP)

A ‘technical’ context was seen to complement to a ‘social’ context. The object of exploitative innovation was found to be the generation of organisation wide structure capital. Two types of mechanisms were used in a technical context: e-mails; and, internet searches. The use of ‘e-mails’ (1,8; 2,1; 5,29; 7,6) to ‘raise employee awareness’ (1,5, 2,5) was demonstrated by Respondent B, who noted that:

“Like an email which lets you know what is going on in the company.” (Innovation 2: IiP)

The use of the ‘internet’ (7,10) was particularly stressed in the unsuccessful exploitative innovation implementation phase. Respondent E, for example, stated that the Learndirect project was an on-line training:

“They have the open day. The learning is done through [business advisers’] company on the website.” (Innovation 7: Learndirect project)

In summary, knowledge capital for exploitative innovation was associated with a combination of ‘social’ and ‘technical’ contexts (see Section 5.5.4 for the description of the social and technical contexts). First, in a ‘social’ context, knowledge capital stimulated interaction and collective ‘process orientated’ knowledge creation and conversion. This took the form of office environments which supported team activity, such as meeting rooms and office layout. Second, in a ‘technical’ context, knowledge capital supported the capture, storage and retrieval of ‘asset orientated’ knowledge. This took the form of e-mails and the internet searches.

The key distinction between successful and unsuccessful exploitative innovation was the sources of ideas and their application. In successful exploitative innovation,

knowledge capital was used to channel to project-specific, operational activity. In contrast, in unsuccessful exploitative innovation, knowledge capital did not meet specific project needs (for example, on-line training for individual needs).

5.6.5 Innovation outcomes

The outcome of exploitative innovation was found to improve organisational effectiveness and efficiency. It was evident in the 'improved business performance' (2,17) variable and was captured by Respondent E, who noted that:

“Improve business and then again retention, recruitment and attraction, and turnover.” (Innovation 2: IiP)

The positive outcomes from exploitative innovation were reflected in five aspects in organisational performance: strategic direction, formalised structure and process, team-based performance measurement system, staff motivation and recruitment, and company marketing.

1. Strategic direction

The outcome of exploitative innovation was found to give the company strategic direction and was demonstrated by 'company had future direction' (1,15; 2,8) and 'improved company confidence' (2,13). For example, the use of IiP as company strategic direction was emphasised by Respondent E, who stressed that:

**“....we use the IiP as a spring board, to do different things like EFQM [European Foundation for Quality Management].”
(Innovation 2: IiP)**

2. The formalised structure and process

The introduction of a formal structure and process through implementing exploitative innovation has improved the process effectiveness. It was evident in the 'company had structure and process' (4,9), 'company had structure' (1,14) and 'company had process' (2,11) variables. Respondent B, for example, stated that

some standard procedures were established:

“We started to carry out the process previously wouldn’t have thought about when we were small.” (Innovation 2: IiP)

3. Team-based performance measurement system

The introduction of the company structure helped the management in evaluating each teams’ performance. It was present in the ‘company had team-based measurement system’ (4,11) variable and was captured by Respondent D, who stressed:

“We are able to look at that team. The director can just look at, to address, that team, that’s say, how much time within that team has been spent and what has been done by that team rather than look at the whole company, he can just look at that specific team and he is able to do that we the systems that we have, and then they come back to the team leaders, and they look at that is there any issues, and then they go from there.” (Innovation 4: company restructure)

4. Staff motivation and recruitment

The outcome of exploitative innovation was seen not only to encourage the retention of staff, but also to attract people to join the firm. The staff motivation and recruitment was evident in the ‘motivated staff’ (1,25) and ‘recruited new staff’ (1,24) variables. Respondent A, for example, indicated the use of mission statement to contribute to the socialisation of new staff:

“We use it...to achieve, to gain staff. The staff we give we have to buy into the mission statement maybe mindset. So that staff may be will be attracted in the mission statement.” (Innovation 1: mission statement)

It was found the motivation came from ‘staff understood the firm more’ (1,12; 5,23) and ‘clients and staff understood the firm more’ (4,10). Respondent A, for example, stated that the staff is motivated by the mission statement:

“The staff needs to be motivated. I think I cannot see the mission

statement motivates people, but I think it gives more understanding of the firm. If you get more understanding of the firm, how it's being run, then you feel your belong or by that effect you should feel more motivated.” (Innovation 1: mission statement)

5. Company marketing

The importance of “badges” was seen as important marketing devices. The appearance of IiP was crucial for market reputation; and the burden of maintaining the emphasis of ‘people focus’ reputation was something that both senior management and knowledge workers collaborated in sustaining. This was evident in the ‘improved the company reputation’ (2,14) variable and was emphasised by Respondent B, who commented that:

“The company name seems to be known a lot more.” (Innovation 2: IiP)

This enhanced reputation was felt to be important in attracting the company’s major clients and new clients. Respondent D, for example, indicated that the company’s major clients had an interest to know the company’s mission statement:

“[The mission statement] matters to some clients more than others. Some organisations they look at the mission statement; they would expect us to have a mission statement and feedback to the company they know where we are going. With others not interest. They want to see the work - not this! Yes, there is a benefit for some major clients - we know where we want to go.” (Innovation 1: mission statement)

The benefit for identifying the company itself was evident in the ‘company had identity’ (1,13) variable and was emphasised by Respondent A, who stressed that:

“[The mission statement] defines our products; it explains how our management is working and how our products are working for, and also it gives the company identity which we never had.” (Innovation 1: mission statement)

As a consequence, this identify could be ‘used in the marketing’ (1,20). For example, Respondent E expressed that the company used the mission statement in

the tendering and the marketing:

“We used our mission statement when we wrote our tenders and bids, so we advertised it and put it on the website as well.” (Innovation 1: mission statement)

It was found that unsuccessful exploitative innovation also contributed some unexpected benefits at an individual level. It was evident in ‘discovered some staffs’ other skills’ (5,1), ‘staff engaged in some projects more’ (5,21), ‘increased knowledge’ (5,35) and ‘some staff learned some skills’ (7,13) variables.

Respondent A, for example, stated that:

“Discovering that within some of teams, some of younger architects or technicians were quite good in presenting and also gained confidence in presenting in front of staff.” (Innovation 5: seminars)

Nevertheless, the outcome of exploitative innovation proved to erode organisational performance. The negative impacts from exploitative innovation were evident in the ‘too much work’ (4,12), ‘took too much time’ (5,20), ‘it’s stopped’ (5,32), ‘cost a lot of money’ (7,14) and ‘lost training opportunity’ (7,15) variables. Respondent D, for example, complained the unbalanced workload between teams:

“Balancing sometimes. Amount of work we do within the teams....Sometimes, the work is too much.” (Innovation 4: company restructure)

Respondent E mentioned that ‘something wrong with company liP’ (7,16):



“[The Learndirect project] ties in with liP....if we’re failing with that then we’ve obviously done something wrong with liP.” (Innovation 7: Learndirect project)

In summary, exploitative innovation was found to improve organisational effectiveness and efficiency, and generate sustainable competitive advantage. The successful exploitative innovation was found to improve organisational performance. In contrast, unsuccessful exploitative innovation was found to only improve individual performance, rather than collective, organisational performance.

5.7 Summary and link

This chapter presents the key findings from the exploratory phase of the case study. Two types of innovation in Calderpeel were identified: exploitative and explorative innovation. Key variables around company innovations are summarised in Table 5.2. These variables, and their interaction, were further explored and tested in the action research phase set out in the next chapter.

Table 5.2 Variables in explorative and exploitative innovations

Types of innovation		Variables	Human capital	Structure capital	Relationship capital	Knowledge capital	Outcome
Mode 1: 	Explorative innovation	Generic variables	<ul style="list-style-type: none"> The capacity, ability and motivation of staff 	<ul style="list-style-type: none"> Team structure Teamwork 	<ul style="list-style-type: none"> Operational RC: within internal, client, and supplier interactions Social RC: within internal, client, and supplier interactions 	<ul style="list-style-type: none"> Social context: company environments (office, meeting room), pub Technical context: e-mails, the internet 	<ul style="list-style-type: none"> Effective and efficient delivery of services to satisfy current and/or future project needs
		Distinctive variables for successful innovation	<ul style="list-style-type: none"> Social or operational nature of knowledge being applied to meet the project needs 	<ul style="list-style-type: none"> Team-based ideas Teamwork Senior management involvement through teamwork 	<ul style="list-style-type: none"> A combination of operational RC and social RC being applied to meet project needs 	<ul style="list-style-type: none"> A combination of social context and technical context 	<ul style="list-style-type: none"> Project performance improvement
		Distinctive variables for unsuccessful innovation	<ul style="list-style-type: none"> Social nature of knowledge not being applied to meet the project needs 	<ul style="list-style-type: none"> Individual-based ideas Individual based work Senior management not involved in teamwork Limitation of relevant and updated information within the structure 	<ul style="list-style-type: none"> Social RC not being applied to meet project needs 	<ul style="list-style-type: none"> Technical context 	<ul style="list-style-type: none"> Individual performance improvement
Mode 2: 	Exploitative innovation	Generic variables	<ul style="list-style-type: none"> The capacity, ability and motivation of senior management Employee participation 	<ul style="list-style-type: none"> The administrative system Team structure Computer systems 	<ul style="list-style-type: none"> Operational RC: within business adviser, internal, client and supplier interactions Social RC: within internal interactions 	<ul style="list-style-type: none"> Social context: company environments (office and open family culture), pub Technical context: e-mails and the internet 	<ul style="list-style-type: none"> Organisational effectiveness and efficiency
		Distinctive variables for successful innovation	<ul style="list-style-type: none"> Top management support Senior management implementation Some employees buy in Training 	<ul style="list-style-type: none"> Formalised structures and documentation systems Senior management implementation through the team structure 	<ul style="list-style-type: none"> A combination of operational RC and social RC being applied to meet project needs 	<ul style="list-style-type: none"> A combination of social context and technical context being applied to meet the project needs 	<ul style="list-style-type: none"> Organisational performance improvement
		Distinctive variables for unsuccessful innovation	<ul style="list-style-type: none"> Top management not supportive the implementation Lack of time Employees not bought in Inappropriate encouragement Not related to an individual job 	<ul style="list-style-type: none"> No formalised structures and documentation systems Senior management not driving the implementation through the team structure 	<ul style="list-style-type: none"> Social RC not being applied to meet project needs 	<ul style="list-style-type: none"> A combination of social context and technical context being applied to meet the project needs 	<ul style="list-style-type: none"> Individual performance improvement

6.0 Research findings: case study - action research phase

6.1 Introduction

The aim of this chapter is to describe the key findings from the action research phase of the case study and, in so doing, further test and develop the findings from the exploratory phase in a real world setting. This chapter is structured using the action research cycle phases discussed in Section 4.6.4. Each phase is divided into two sections. First, the ‘practice’ undertaken in the action research is described. Second, the researcher’s ‘reflection’ on that practice is discussed. This discussion is structured using human capital, structure capital, relationship capital and knowledge capital variables (see Table 5.2).

6.2 Diagnosis

6.2.1 Practice

The “start” of the diagnosis phase was a company workshop. The company workshop took place from 12 noon to 2 pm on Thursday 13th May 2004 in the Calderpeel boardroom. The purpose of the company workshop was to discuss and evaluate the key findings from the exploratory phase (see Chapter 5) and, based on this, to identify an action research intervention or innovation to be developed and implemented. The workshop members consisted of seven participants. The participants from Calderpeel were the five respondents from the exploratory interviews (see Section 4.6.3). The participants from the University of Salford were the PhD researcher (denoted as ‘researcher’ for the rest of this chapter) and her supervisor.

There were two main stages in the workshop (see Section 4.7.4). First, the researcher presented the key findings from the exploratory phase (see Appendix J). This stage was designed to stimulate a discussion by the group with a set of questions identified in the company general finding report (see Appendix H) being used as a stimulus. The main sections of the report took the form of questions. These were as follows:

The first question was “**what are the immediate innovations which Calderpeel should progress?**” Two potential innovations, along with their objectives, benefits and resource implications, were listed. There were an exit planning and a post project review protocol.

The second question was “**what is Calderpeel’s current position?**” It was found that the company was good at external innovation (explorative innovation) to solve one-off client problems, but not so good at internal innovation (exploitative innovation) to improve operational efficiency.

The third question was “**what are Calderpeel’s potential problems?**” This question was divided into two sub-questions. In the first sub-question, Calderpeel’s current position was discussed. In the second sub-question, Calderpeel’s potential problems were articulated. It was found that with the increasing growth of the firm, the limitation of current internal systems will probably become a restraining force.

The fourth question was “**why manage knowledge?**” Based on Calderpeel’s respondents’ perspective, there were five sub-questions under this main question. In the first sub-question, “what is knowledge?” was introduced. The second sub-question addressed the question “where knowledge is?” The third sub-question illustrated “what is knowledge management?” The fourth sub-question expressed “why manage knowledge?” In the final sub-question, “what are the potential benefits of managing knowledge?” was introduced.

The fifth question was “**what are potential improvement areas to sustain current growth?**” The potential improvement areas for Calderpeel were identified under the following classification: immediate wins, short-term wins, and mid- to long-term wins.

The final question was “**what are the key findings?**” This section was a summary of the above questions.

The Calderpeel representatives found the results of the company general finding report (see Appendix H) interesting and valid. Respondent E, for example, gave the

feedback as:

“The presentation looks great! It gives some good practical examples too.”

The second stage of the workshop moved on from the general debate to focus on the two proposed immediate innovations - exit planning (exit interview) and a post project review process. Both potential innovations were stressed in the exploratory phase as being high priority issues to be addressed.

The first proposed immediate innovation was exit planning. During the exploratory phase of the case study, the researcher found that there was no procedure in dealing with employees leaving the practice. The exit planning innovation was expected to capture and share important knowledge from staff leaving the practice, and to ensure stability and continuation of client service when key staff leave.

The second potential innovation was a post project review process. Calderpeel did not have any procedures to learn from project activity and measure project performance. Further, the researcher found that the company lacked appropriate structure and communication channels to encourage and support knowledge transfer between ‘ring-fenced’ project teams in a formal way. Respondent D, for example, described the benefit of having a post project review in the company system:

“.....if we did [post project reviews], then it would save time in the future and money from repeating mistakes.....We should, but we don’t really have it.”

The post project review process innovation was expected to: identify areas for improvements; reduce employees ‘reinventing the wheel’ or repeat their mistakes in future projects; and, help to build a strong sense of commitment and team spirit.

The adopted innovation was thus to develop and implement an interim (rather than post) project review process into the company. The rationale for this prioritisation was that Calderpeel did not have any systems of this in kind in place with, as an inevitable result, good practice and lessons learned not being captured and shared for

future projects. At the time, Calderpeel was preparing for ISO 9001 quality management system accreditation (which was called the quality assurance system in Calderpeel).

The associate director championed the innovation, and expressed support in providing appropriate access for the researcher to become embedded in the development and implementation of the action research intervention, and for allocating Calderpeel staff to form a task group.

The task group consisted of the researcher from the University of Salford, and a task group from Calderpeel. The role of a task group was to co-operate with the Salford researcher in conducting this action research intervention. The Calderpeel quality representative was the leader of the task group.

The company workshop minutes are shown in Table 6.1. There are two sections involved in the minutes. First, the **object and the key issues of this project** section clarified the key issues raised in the workshop and recommended issues of action. Second, the **responsibility** section identified the role and responsibility of the researcher and Calderpeel.

Table 6.1 Company workshop minutes

Company workshop minutes					
Project name	Innovation research and development project				
Attendees	Steven James, Caroline Lamb, Nigel Metcalfe, Ewen Miller, Lynn Palmer, Martin Sexton, Shu-Ling Lu				
Date	13 th May 2004 (Thursday)	Duration	12.00 ~ 14.00	Venue	Calderpeel meeting room
Meeting contents: This workshop refers to the general finding report to gain acceptance for a recommended issues of action. The following is a summary of this workshop. 1.The object and the key issues of this project <ul style="list-style-type: none"> • The "interim project review" has been decided as the company emergent innovation • This project will be conducted through the third party (The Salford researcher) • It is proposed that the deliverables of this project will be the interim project review policy, guidelines and checklists, and then will be integrated into the ISO 9001 Quality Management System • The reviewer should be the "the architect" rather than "the project leader" or "the associate director" • The client will be involved in this project. Thus, there is a need to define the role of the client and what benefits will be provided for the client. • The company will identify a project and a task group to co-operate with the Salford researcher (Shu-Ling Lu) in conducting this project • The interim project review policy, guidelines and checklists should be tested cross teams 2.Responsibility <ul style="list-style-type: none"> • The Salford researcher (Shu-Ling Lu) will work in the company and provide own laptop (from 24th of May to 23rd of July) • Caroline Lamb will be responsible for allocation of staff to engage in this project, for example, arranging the meetings etc. 					

6.2.2 Reflection

The adopted innovation - interim project review process innovation - was categorised by the researcher as an exploitative innovation as it focused on an internal organisation process which was not being developed for a specific project (see Section 5.4). The key variables for exploitative innovation were discussed in the Section 5.6 and summarised in Table 5.2. The discussion in this section is structured around the human capital, structure capital, relationship capital and knowledge capital

variables.

1. Human capital

The two generic variables within human capital for exploitative innovation identified in the exploratory phase were: the capacity, ability and motivation of senior management; and, employee participation. The distinctive variables between successful and unsuccessful exploitative innovation, from a human capital perspective, were: top management support; senior management implementation through the team structure; buy in of employee; and, the need of time to develop and implement the innovation activity (see Section 5.6.1). The principal variable at work in the diagnosis phase of innovation appeared to be the 'senior management' role.

The discussion during the workshop reinforced 'the capacity, ability and motivation of senior management' variable. The debate was principally led by Participant A (a senior manager), and Participant D (a team leader) from Calderpeel, and the two researchers from the University of Salford. The other three, more junior, participants from Calderpeel, appeared unwilling and/or unable to shape the flow of the discussion.

With respect to the first of the two proposed innovations, Participant A disagreed there was a need of for an 'exit planning procedure' due to the low rate employee retention:

"90% of staff has remained with us throughout [since the formation of Calderpeel in 1991]."

This opinion was not challenged by the other Calderpeel delegates.

The discussion then moved to the second proposed exploitative innovation - post project review. This idea was questioned and challenged by Participant A, who commented that:

"I don't think you can abstract that huge information from [the post project review]."

Participant D, however, disagreed with his view and suggested that there was a need of a 'post-project review':

"We are learning from each project – where we will spend time, where we will spend money. We should, but we don't. We should assess at the end of each project within the team. We should assess what went wrong and why, and why don't do it. Primarily we don't have time to do it. So we hope in the future we should be developing systems to assess how we can better be able to do things or learn from other things."

Participant A modified his view based on this agreement, and advocated that:

"Sometime obviously makes knowledge difficult to tap it into within the practice.....The project review system might help in that certain term."

Participant D supported his view and asserted that:

"The project is not about three or four weeks. It's about three or four years."

In response to this, the idea of an interim project review was stressed by Participant A, who stated that:

"...an interim project view on how [the project] is running would be useful."

The idea of an interim project review process as the focus of the action research phase was supported by Participant A. It can be said that this innovation was prioritised by the associate director (senior management). This is consistent with the key findings from the exploratory phase which emphasised the pivotal role of senior management in exploitative innovation. Further, it was found that senior management have a significant impact on engendering enthusiasm for new ideas amongst staff. After the associate director committed to the interim project review process innovation, other participants showed their 'high' interest to be involved in this project. Participant C, for example, stated that:

"Yes, I think the interim project review is a great idea."

This indicates that the initial level of employee participation was heavily influenced by senior management.

In summary, the key role of senior management in framing and prioritising innovation activity within the diagnosis phase was confirmed.

2. Structure capital

When considering the structure capital aspect, the administrative system, the team structure and computer systems, were found to be the generic variables in exploitative innovation. The distinctive variables for successful exploitative innovation were the presence of formalised structures and documentation systems; and, senior management endeavour to drive the implementation through the team structure (see Section 5.6.2).

First, the need of a ‘formalised structure’ into the interim project review process was immediately captured by Participant A, who noted that:

“... the idea must be formalised into the process. I don’t know how we do that.”

The argument for formalisation was counter balanced with a need to keep any process ‘resource light,’ and to be sympathetic to current work practices. This argument was advanced by Participant D, who stressed that:

“From my point of view, do we actually want to go down the Investors in People path? That’s formal. Sometimes we need to stay informal. That’s the way we learn, trying to demonstrate in, it’s not just detail, but contact.....The review comes from a couple of people sitting in Calderpeel and knowing what somebody is doing. That’s not something necessarily to formalise into chart or client satisfaction etc. It’s sharing knowledge andhow you reuse that information. So I think [the project review] will fix this.”

These arguably opposing views of ‘formal’ versus ‘informal’ were resolved by Participant A emphasising the need to:

“Make this review activity easy, simple and manageable.”

Participant A then fixed the responsibility and authority for the review at the architect level:

“....probably the architect to do the review rather than the associate director or the team leader to do the review.”

Second, the need of the team structure to implement the interim project review was noted. The idea of a task group came from the Salford PhD researcher's supervisor. This idea was adopted by Participant A, who noted that:

“...OK, let's do it.”

The researcher and the Calderpeel quality representative led the development and implementation of the interim project review process innovation, with the associate director being the senior management champion.

In summary, the key role of the formalised structures and documentation systems, and the key role of senior management endeavour in driving the innovation implementation through the team structure within the diagnosis phase was confirmed.

3. Relationship capital

The two generic variables within relationship capital for exploitative innovation in the exploratory phase of the case study were operational relationship capital and social relationship capital. The key distinctive variables between successful and unsuccessful exploitative innovation, was the source of the ideas and their application, i.e. for a specific project or for general organisation capability (see Section 5.6.3).

The issue of encouraging client involvement in the development of the interim project review process innovation was advanced by Participant A, who stated that:

“The more I get interested in this, I want to get the client involved [in the interim project review process].”

Participant A stressed the benefits of such client involvement, in the observation that:

“Learning back from the previous successful project, the more important it is to develop in more depth the relationship with clients.”

The proposed interim project review process innovation addressed the need to more adequately capture feedback from the client, both within respect to the ‘content’ of the work being delivered to the client, and the ‘process’ of how it was being delivered. The opportunity to further develop deeper relationships with clients was addressed by senior management. This ‘opening up’ of the internal workings of the firm to the client was perceived as being a stimulus for ongoing internal innovation and project-to-project learning; supporting the closer mutual development and successful delivery of the client brief; and, the forging of deeper, ‘whole firm’ relationships with clients (i.e. not just between firm associate directors and clients, but with technicians, and so on). This stressed the importance of clients and internal interactions at an ‘operational level.’ The interim project review process development, however, was not targeted at a specific live project; rather, it was envisaged that the new process would be part of the general organisational endeavour to gain ISO 9001 accreditation.

In summary, relationship capital in the diagnosis phase was located at a social level. The interim project review process innovation (exploitative innovation) was targeted at internal organisation activity, but not at a specific project. This is consistent with the key findings from the exploratory phase.

4. Knowledge capital

The knowledge capital for exploitative innovation was the focal or integrating nexus in which innovation takes place in social and technical contexts. The distinctive variable for successful and unsuccessful exploitative innovation was that knowledge capital was channelled to for a specific project or for general organisation capability (see Section 5.6.4).

In a social context, the company workshop in the boardroom encouraged face-to-face discussion and sense-making. There was no client or supply chain relationship

capital engagement. In a technical context, two mechanisms were used. First, 'the company general finding report' provided the clear aims and objectives for this workshop. Second, 'e-mails' was the main technical tool used in enabling communication between the researcher and the main contact person (Participant E). The interim project review process, however, did not target at a specific project instead of being a supporting process for ISO 9001 accreditation.

In summary, knowledge capital in the diagnosis phase was initially stimulated through the 'technical system' through the company finding report and by communication via e-mail. This provided the platform to commit Calderpeel staff to the 'social system' workshop. The source of the ideas and their application was to improve general organisation capability. This is consistent with the key findings from the exploratory phase.

6.3 Action planning

6.3.1 Practice

▪ Activity one: development of interim project review action plan

After the company workshop, the documents related to Calderpeel's ISO 9001 quality management system were sent to the researcher by the Calderpeel quality representative on 18th May 2004. These documents were produced by Calderpeel's external ISO consultant, including the draft of the Calderpeel quality manual, the Calderpeel partnership ISO 9001 action plan and so on (see Appendix B). After reviewing these documents, the researcher identified two key element issues:

- (1) The basic framework for the Calderpeel ISO 9001 quality management system was already in place. Calderpeel's "product" in its ISO 9001 system was identified as "architectural designs and services." Two broad types of services within Calderpeel were identified as "traditional contract" and "design and build contract."
- (2) Calderpeel, at that time, did not have any systems or evidence against the ISO 9001: 8.2.3 monitoring and measurement of processes and ISO 9001: 8.2.4

monitoring and measurement of product.

Based on the key issues set out in the minutes of the company workshop (see Table 6.1) and the documents which the Calderpeel quality representative sent, the initial interim project review process action plan was developed by the researcher (see Table 6.2) and sent to Calderpeel's quality representative on 21st May 2004.

The task force collaboratively developed an action plan for the development and implementation of the interim project review process innovation. The action plan was structured around a number of main questions (see Table 6.2), namely: what is an interim project review?; what is the object of this innovation activity?; what is the scope of this interim project review action?; what commitment is required from Calderpeel?; who benefits from the interim project review arena?; and, what is the intervention plan? The initial action plan provided a basis and focus for this collaborative action research.

Based on the action research plan, the researcher should have started working within Calderpeel from 24th May 2004. The researcher, however, did not receive any confirmation from Calderpeel before 22nd May 2004. The researcher decided to arrange a follow up meeting with the leader of Calderpeel task group (the quality representative) to move the innovation forward.

Table 6.2 Action plan: interim project review project

1. What is an Interim project review

- An interim project review is an activity where people reviewing what went well and what went badly during the project.
- The aim of this review is to praise each other on jobs well done as well as find ways to do things even better.

2. What is the objective of this innovation activity

- Develop and test the interim project review policy, guidelines, and checklists.
- Help the company to integrate the interim project review activity into the ISO 9001 Quality management system: 8.2.3 Monitoring and Measurement of Processes or/and 8.2.4 Monitoring and Measurement of Product.

3. What is the scope of this interim project review action

- Focus on “project” level: from establishing feasibility, agreeing design and obtaining permission, supervising traditional contract, and overseeing construction (refer to QP4 Feasibility and planning, QP5 Traditional contract, and QP6 Design and build).

4. What commitment is required from Calderpeel

- Identify the specific project
- Identify the actors (participants)
 - The task group (the project team)
 - The clients (the stakeholders)
- Provide “space” for the Salford researcher

5. Who benefits from the interim project review arena

- The company level: to improve processes efficiency or/and to ensure that the architectural service provided meets client expectations.
- The client level: (*unknown*)

6. What is the intervention plan

Table 1 Action plan for the interim project review

Activity	Method	Duration (May June July)	Time scale (week)								
			1	2	3	4	5	6	7	8	9
1 Analyse current practice in more depth 1-1 Identify the role of the actors 1-2 Identify KPIs	*Access to company documents *Interview with the task group	24/05/04 ~ 04/06/04									
2 Develop pilot policy, guidelines, and checklists	*Access to company documents *Interviews with the task group	07/06/04 ~ 18/06/04									
3 Review/define policy, guidelines, and checklists	*Interviews with the task group	21/06/04 ~ 25/06/04									
4 Test (when appropriate) policy, guidelines, and checklists cross-teams	*Involvement in appropriate company activity	28/06/04 ~ 09/07/04									
5 Analyse the test results	*Use computer software to analyse data	12/07/04 ~ 16/07/04									
6 Review/define policy, guidelines, and checklists	*Interviews with the task group	19/07/04 ~ 23/07/04									

▪ **Activity two: meeting with Calderpeel's quality representative**

The meeting with the Calderpeel quality representative took place on 16th June 2004 in the Calderpeel meeting room. Its objectives were to:

- (1) assess the organisation's level of compliance against the ISO 9001 Standard;
- (2) clarify the delivery of work process in Calderpeel;
- (3) confirm other members of the task group from Calderpeel; and,
- (4) confirm the date the researcher could start working within the firm.

With respect to the first issue, there was no difficulty in gaining access to confidential information/documents. These documents related to the Calderpeel practice included examples of job forms, drawing issue sheet, site record sheet and so on; and related ISO documents (see Appendix B). The researcher found that documents related to Calderpeel ISO 9001 system were formalised and documented, and were stored electronically. Documents related to Calderpeel daily routine work, however, were handwritten.

The 'delivering of work' in process was divided into three procedures against the ISO 9001 which are:

- (1) feasibility and planning procedure;
- (2) supervise traditional contract procedure; and,
- (3) oversee construction procedure.

The researcher recognised that there was a need to make the interim project review process fully integrated with the existing Calderpeel QA infrastructure. The researcher, however, found it was very difficult to do so. For example, the researcher found that Calderpeel's procedures confused 'product' and 'process' view, such as the feasibility work being mixed up with the company marketing and the architectural work (traditional contracts and design and build contracts). The Calderpeel quality representative, however, could not make a distinction between these three procedures. The Calderpeel quality representative suggested that the interim project review process should cover the whole business process rather than focus on the project level:

“I think [the interim project review process] should cover these three procedures.”

The researcher disagreed with this view and pushed through the proposition that the objectives of the interim project review process at the project level, and integrated it with the Calderpeel ‘existing’ ISO 9001 system (see Figure 5.3 for the description of the commission and delivery of work processes in Calderpeel). The researcher found, for example, the company lacked evidence against ISO 9001: 7.3.1 design and development planning. For instance, the evidence against ISO 9001: 7.6 control of monitoring and measuring devices within Calderpeel quality manual was:

“ISO 9001: 2000 is not relevant and is excluded.”

The researcher, however, disagreed with this argument and believed that building regulations, for example, was one of Calderpeel’s monitoring and measuring devices. This assertion was accepted by the Calderpeel quality representative.

With respect to the final two issues, when the researcher could start working within the firm and the allocation of staff to the task group were not confirmed.

6.3.2 Reflection

1. Human capital

The researcher realised that there were two practical problems with the development and implementation of the interim project review procedure from a human capital perspective. First, there was no Calderpeel staff trained and experienced in ISO 9001 quality management system. Within the action research team, the researcher was the only person with expertise and experience in implementing ISO 9001 within construction companies. The researcher found that there was real difficulty in communicating at an ‘expert’ level with the Calderpeel quality representative. The quality management expertise required for the innovation was largely outside of Calderpeel and the firm had to rely on external sources of capability (in particular, the external ISO consultant).

Second, resources, in the form of time and staff allocation, were still the main constraint in this collaborative endeavour. The initial aspiration was for the action plan to be co-authored by the researcher and the Calderpeel quality representative (Participant E). The co-authorship was aimed at ensuring the plan was appropriate in focus and to assist in creating shared ownership of the interim project review project. However, this co-authorship did not take place, with Calderpeel relying solely on the researcher. The sign-off the action plan by Calderpeel's quality representative was done by e-mail as follows:

“Everything is extremely hectic here at present - not had time to think!.....The project review proposal is fine.”

The researcher found the leader (the quality representative) of the Calderpeel task group did not provide proactive leadership; rather, other day-to-day work pressures took priority, resulting in the quality representative reacting to proposals from the researcher.

In summary, the lack of internal capability, and the lack of time and resources to move the innovation forward were found to be the main obstacles. This is consistent with the key findings from the exploratory phase.

2. Structure capital

The researcher found that there were two practical problems within the action planning phase. First, a lack of a formalised structure and documentation system within Calderpeel became an obstacle in sharing information between the researcher and the Calderpeel quality representative. The Calderpeel quality representative, for example, explained why she could not offer some documents which the researcher required:

“I haven't had an opportunity to dig out working copies....I can't find QR3 or QR4.”

Second, the senior management did not drive the interim project review action plan

through the team structure. The initial action plan for the interim project review process innovation was solely developed by the researcher. Although the Calderpeel quality representative (senior management) was involved in the development of the action plan, other task group team members from Calderpeel did not participate.

In summary, the lack of a formalised structure and documentation system, and lack of senior management driving the innovation implementation through the team structure were apparent in this phase. This is consistent with the key findings from the exploratory phase.

3. Relationship capital

The relationship capital in the action planning phase was located at a 'social level.' Interactions between the researcher and the Calderpeel quality representative were evident in the informal meeting in the Calderpeel meeting room and in telephone conversations. The importance of informal ways to carry out this innovation was emphasised. After developing the relationship with the Calderpeel quality representative, the researcher found there was no difficulty in asking for information and documentation from the company.

The researcher realised the importance of the client role for Calderpeel. An introduction of a '360-degree client' perspective into an interim project review project (interim project review session) was designed to enable client interaction at both project and organisational levels. The interactions had potential to help employees to build more collaborative partnerships and understand clients' business needs in order to identify other revenue opportunities.

In summary, relationship capital in the action planning phase was found to be at a 'social' level and it became the main constraint to moving the innovation forward. This is consistent with the key findings from the exploratory phase.

4. Knowledge capital

The setting up and co-ordination of the social knowledge capital was carried out principally within the technical knowledge capital. In a social context, knowledge capital was stimulated by face-to-face meeting and sense-making, with tacit knowledge being shared and stored in peoples' heads. In a technical context perspective, three mechanisms were used. First, 'the action plan' provided the clear aims, objectives and deliverables for the interim project review process innovation. Second, the use of 'e-mail' technology helped the knowledge sharing activity between the researcher and the Calderpeel quality representative prior to meeting. Also it helped the researcher to set up the meeting with the Calderpeel quality representative. Finally, the use of 'telephone' communication tool in the action planning phase was important, although there were often significant delays in Calderpeel staff returning calls.

In summary, knowledge capital was initially stimulated through the 'technical system' through the action plan and by communication via e-mail and telephone. This provided the platform to commit Calderpeel staff to the 'social system' meeting. This commitment, however, was limited due to higher project activity on specific projects; rather than the reallocation of resources to non-project specific innovation. This lack of adequate and sustained commitment was a key obstacle to progressing the innovation. This is consistent with the key findings from the exploratory phase.

6.4 Action taking

6.4.1 Practice

The action taking phase was held over a six-month period, from the end of May 2004 to the end of November 2004. There were six main activities within this phase (see Figure 6.1). These activities are discussed in turn.

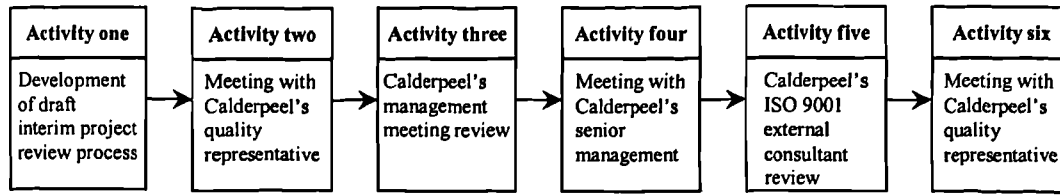


Figure 6.1 Six main activities within the action taking phase

▪ **Activity one: development of draft interim project review process**

Based on the objectives of this innovation activity (see Table 6.2), the first draft of the interim project review process (including the interim project review process policy, guidelines and checklists) was developed by the researcher (see Appendix K) and sent to Calderpeel's quality representative on 20th June 2004. The interim project review process was structured into nine main sections: interim project review policy; purpose of the process; scope of the process; references; definitions, responsibility and authority; overview of the process and activity descriptions; measures; and, appendix. Each section is briefly discussed below.

The **interim project review policy** section introduced the Calderpeel policy in conducting the interim project review activities, including its rationale and benefits.

The **purpose of the process** section introduced the purpose, objectives and measurement criteria of the interim project review process.

The **scope of the process** section described the scope to the interim project review process. The distinctive characteristics between 'high' focus and 'low' focus projects were made. There are three sub-sections under this section. The first subsection described the activities for low and high focus types of projects. The second subsection focused on illustrating the roles for low and high focus types of projects. The final subsection described the deliverables for low and high focus types of projects.

The **references** section guided the staff to the relevant ISO 9001 quality management system procedures.

The **definitions** section introduced the definition of the terms which used throughout this document.

The **responsibility and authority** section described the responsibility and authority of people who participated in the interim project review process.

The **overview of the process and activity descriptions** section expressed the workflow for the interim project review process. There are six sub-sections under this section. Each sub-section presented as an activity. The detailed work description was under each sub-section.

The **measures** section was designed to give staff the measurement criteria in determining the effectiveness of interim project reviews.

The **appendix** section listed of supporting checklists for the interim project reviews. The detailed questions which made up the checklists were not developed at this time.

There were two problems in the development of the detailed checklists. First, the key challenge the researcher encountered was ensuring that the interim project review process was in line with Calderpeel's ISO 9001 system. Further, checklists needed to be in line with Calderpeel work practices. This required the researcher working closely with Calderpeel. Second, the researcher had to integrate two different perspectives: the first was the Calderpeel senior management who were keen to have 'closed' checklists; the second, was the researcher who wanted to have 'open' checklists. The rationale for the closed checklist design was that Calderpeel's senior management were keen to find the hard, quantitative 'indicators' to measure the project performance. A closed questionnaire was, therefore, designed in response to the 'asset' view of knowledge. The initial idea to develop the interim project review process, however, was to share the project information between teams and to share 'tacit' knowledge between people. An open questionnaire was designed to stimulate and capture soft, qualitative project performance issues. The open questionnaire, was

thus designed in response to the ‘process’ view of knowledge.

This idea led the researcher to further distinguish between ‘high’ focus and ‘low’ focus projects. A closed checklist was used to measure the project performance and to help management activities for both types of projects. An open question checklist included a discussion session targeted at ‘high’ focus projects. This approach enabled precious human capital to be targeted and leveraged at ‘high focus’ projects. The distinction between ‘low’ and ‘high’ focus projects is discussed in Activity Two below.

The researcher decided to have a meeting with the Calderpeel quality representative to move the innovation forward.

▪ **Activity two: meetings with Calderpeel’s quality representative**

Two meetings were held in this stage. The first meeting took place on 21st June 2004 in the Calderpeel meeting room. Before the meeting, the first draft of the interim project review process (see Appendix K) was sent to the Calderpeel quality representative. The purpose of the meeting was to confirm that the focus and content of the interim project review process was in line with Calderpeel’s requirements, access to Calderpeel documents, and clarify the issues raised in the previous stage. A number of issues with the first draft of the interim project review process were highlighted by the Calderpeel quality representative during the meeting.

First, the criteria of the **purpose of the process** section for project performance (which were correctness, design, style, documentation and efficiency) were deleted (see Appendix K). The Calderpeel quality representative gave the feedback as:

“I don’t think we can measure it.”

Second, the criteria of the **scope of the process** section for distinguishing ‘low’ from ‘high’ focus projects were adopted by the Calderpeel quality representative. The five criteria were budget, time to deliver, team involvement, client involvement, and supplier involvement (see Table 6.3). The budget level at which a project was

deemed 'high focus' was not determined.

Table 6.3 The distinctive characteristics between high and low focus projects

Characteristic	High Focus	Low Focus
Budget	More than £ X	Less than £ X
Time to Deliver	More than 1 year to operation	Less than 1 year to operation
Client Involvement	No experience in the past working with this client	Good experience working with this client
Supplier Involvement	No experience in the past working with this supplier	Good experience in the past working with this supplier
Team involvement	More than 1 project team to operation	Only 1 project team to operation

The Calderpeel quality representative agreed to the researcher's idea to distinguish low from high focus project because:

"Things like the house extension, [the project] will be smaller..... we know it's possible to run the whole {interim project review} process,but there is no point to do so..... We are quiet happy and easy to manage [the low focus project].let's just concentrate on the [high focus project]."

Finally, the three sub-sections - activities, roles and deliverables - under the scope of the process, were deleted by the quality representative. The need of the simplicity was again stressed.

Based on the results of the meeting with the quality representative, the second draft of the interim project review process was revised and renamed as the interim project review handbook by the researcher.

The second meeting took place on 5th July 2004 in the Calderpeel meeting room. Before the meeting, the second draft of the interim project review process was sent to the Calderpeel quality representative. The purpose of the meeting was to confirm that the reversion made in response to the key issues raised in the first meeting met her requirements. Two unanswered questions / solved issues from the first meeting were discussed. First, the quality representative identified the characteristic of

budget criterion and switched the characteristic of client involvement criterion (see Table 6.4).

Table 6.4 The distinctive characteristics between high and low focus projects (version 1)

Changes	Characteristic	High Focus	Low Focus
Before	Budget	More than £ X	Less than £ X
	Time to Deliver	More than 1 year to operation	Less than 1 year to operation
	Client Involvement	No experience in the past working with this client	Good experience working with this client
	Supplier Involvement	No experience in the past working with this supplier	Good experience in the past working with this supplier
	Team involvement	More than 1 project team to operation	Only 1 project team to operation
After	Budget	More than £ 50,000	Less than £ 50,000
	Time to Deliver	More than 1 year to operation	Less than 1 year to operation
	Client Involvement	Good experience working with this client (principal clients)	No experience in the past working with this client
	Supplier Involvement	No experience in the past working with this supplier	Good experience in the past working with this supplier
	Team involvement	More than 1 project team to operation	Only 1 project team to operation

Second, the samples of project documents the researcher required were prepared by the Calderpeel quality representative.

The Calderpeel quality representative found the interim project review handbook valid and that it should be reviewed by the Calderpeel management board. The researcher requested that she present at the review meeting, however, the Calderpeel quality representative refused on the basis of company policy. A revised version of the interim project review process (the third draft) was confirmed by the Calderpeel quality representative through an 'e-mail.'

▪ **Activity three: Calderpeel's management meeting review**

The third version of the interim project review process was reviewed at the Calderpeel management meeting which took place on 12th July 2004. The meeting had been delayed by one week because of work pressures within Calderpeel. To reiterate, the action researcher was not present at this meeting, and the feedback given below is from written remarks on the tabled interim project review handbook made by all four Calderpeel's associate directors and one team leader. The common theme throughout the feedback was a requirement for further 'simplicity' in the interim project review process at to target the practise nature of Calderpeel's work. A team leader, for example, said that:

"we need to keep the processes simple to ensure take-upThe feasibility and planning phase process should be reduced by two thirds. We just need to know who the client is, what the brief is and whether we've sent a fee letter. We also need to ensure planning conditions are signed off and that the client signs off the design. In the design and build process innovation usually occurs after tender rather than after planning. There would be no snagging meetings or certificates for making good defects."

An associate director confirmed this need for greater simplicity by commenting:

"Seems to be a very large document; lost interest by the end of page 4. Checklist look good but too complicated – also not understood fully so difficult to then explain to team. The checklist could prove valuable in prompting action points for other things."

As well as the concerns expressed about the complexity of the process, there was a significant debate about the alignment of the interim project review process with the work undertaken by Calderpeel. An associate director, for example, commented that:

"Design and build and traditional contract checklists would have different questions. Post construction phase checklist could be better written in line with our business."

Similarly, a team leader said that:

"A specific innovation activity could be added to include the

reclarification of the scope of works, and tracking conditions for [Building Regulations]”

The key challenge the researcher encountered was securing consensus from the individuals within the meeting on how to progress the innovation. The researcher decided to arrange a follow up meeting with senior management and the quality representative to undertake what should be prioritised and to maintain senior management commitment to the interim project review process innovation.

▪ **Activity four: meeting with Calderpeel’s senior management**

Before the meeting with Calderpeel senior management, two pilot projects - one a ‘high focus’ type project, the other a ‘low focus’ type project - for testing the interim project review process were confirmed and sent by an e-mail to the researcher by Calderpeel’s quality representative on 13th July 2004:

“There are two projects for which we can use, namely Aspen on Nell Lane and Sidney Street. When do you want to hold your face-to-face meeting?”

There were two meetings held in this stage. The first meeting took place on 14th July 2004 in the Calderpeel meeting room. It was attended by two associate directors (senior management) and the researcher. One associate director (Participant A) was one of the respondents in the exploratory phase and participated in the company workshop. The second associate director was from team 2 (see Figure 5.2 for the structure of Calderpeel). The key issues carried out of the discussion are as follows.

First, both associate directors stressed that there was a need to further simplify the interim project review process. Two issues were raised. First, the documents were too complex, as noted by the second associate director:

“The documents we are looking to are to get down of it..... We got to simplify the works. We are looking into the architectural agreement documentation which basically is a listing of who is going to do what in what stages. So everyone is very clearly about what we are going to do.”

Further the second associate director expressed that there were too many questions within the checklist. The second associate director captured this in the question:

“Can you make this process simple and stupid?”

There was agreement between the two associate directors that the questions within the checklist were too many and too complex and needed to be reduced to two to three questions.

Second, both associate directors challenged the need to distinguish between ‘low’ focus and ‘high’ focus projects. Again, the requirement to further simplify the interim project review process was addressed. The second associate director said:

“I don’t know what your thought is? For example, you asked the question like did we obtain a copy of planning permission? [This is too detailed.]”

After explaining the rationale for this distinction by the researcher, both associate directors adapted the researcher’s proposal.

Finally, there were a debate between these two associate directors concerning where the responsibility and authority for the interim project review process should be located. Participant A thought the responsibility and authority for the review should be only at the architect level. The second associate director agreed that the role of the reviewer should be at the architect level, but the role of moderator and the approval authority should be at associate director level. There was no agreement between them because of time pressure - they had a meeting with clients outside of the office which they had to attend.

After the meeting with the two associate directors, the researcher had a follow up meeting with the Calderpeel quality representative. The three issues raised in the meeting with two associate directors, were considered and appropriate adjustment to the interim project review process made by the researcher and the quality representative as follows.

First, the researcher and the Calderpeel quality representative agreed that the need to further reduce the number of questions in the checklist from the original nine questions to three to four questions.

Second, the researcher and the Calderpeel quality representative agreed that the key indicators to distinguish between low focus and high focus project needed to be driven solely by Calderpeel business needs. The criteria of the **scope of the process** section for distinguishing 'low' from 'high' focus projects were reduced by the Calderpeel quality representative from five criteria which were budget, time to deliver, team involvement, client involvement, and supplier involvement to one which was client involvement (see Table 6.5). The rationale was to make the process simpler. The description of 'principal clients' for high focus of client involvement criterion was deleted by the Calderpeel quality representative due to sensitivity issues, i.e. accidental disclosure to client that they were not considered as 'principal clients.'

Table 6.5 The distinctive characteristics between high and low focus projects (version 2)

Changes	Characteristic	High Focus	Low Focus
Before	Budget	More than £50,000	Less than £50,000
	Time to Deliver	More than 1 year to operation	Less than 1 year to operation
	Client Involvement	Good experience working with this client (principal clients)	No experience in the past working with this client
	Supplier Involvement	No experience in the past working with this supplier	Good experience in the past working with this supplier
	Team involvement	More than 1 project team to operation	Only 1 project team to operation
After	Client Involvement	Good experience working with this client	No experience in the past working with this client

The distinctive characteristic between the low focus and high focus projects for client involvement remained. The Calderpeel quality representative made a comment, for example, on the criterion of supplier involvement as the process will be too complex:

“.....when you got a great, big development project, they are just so

many people being involved.”

Third, the responsibility and authority for different types of projects for the interim project review was made by the Calderpeel quality representative. The actors and their roles in the different types of project are described in Table 6.6.

Table 6.6 The responsibility and approval authority for high and low focus projects (version 1)

Roles	Types of project	Responsibility and approval authority
Moderator	High Focus	Associate / team leader
	Low Focus	Team leader
Reviewer	High & Low Focus	Job runner
Participant	High Focus	Project team / other teams /directors / clients etc.
	Low Focus	Project team

The meeting moved on to focus on the checklists. Each checklist was discussed. The final results for each checklist are presented in Appendix L. Based on the discussion, the fourth version of the interim project review process was produced and renamed as QW01 Calderpeel guidelines for interim project review (see Appendix L).

The key challenge the researcher encountered was securing consensus for, and sign-off of, the interim project review process. The researcher and the Calderpeel quality representative, to in line with Calderpeel’s ISO 9001 system, decided that the fourth version of the interim project review process, QW01 Calderpeel guidelines for interim project review (see Appendix L), needed to be reviewed by Calderpeel’s external ISO 9001 consultant.

▪ **Activity five: Calderpeel’s external ISO 9001 consultant review**

An external ISO consultancy is mainly leading Calderpeel’s endeavour to gain ISO 9001 accreditation. Mr. X, the company’s external ISO 9001 consultant, reviewed the latest version of the interim project review handbook, and noted that the interim

project review activity is the 'icing on the cake' for the customer satisfaction process and proposed the following:

- (1) Inclusion of an executive summary saying what the interim project review does.
- (2) Inclusion of operational flow charts for both 'high' focus and 'low' focus projects.
- (3) One-to-one interviews with the client should be included in the interim project review activity.
- (4) The feedback from the one-to-one interviews with client should be reviewed and discussed in the interim project review session.

In order to clarify and interpret these issues correctly, the researcher decided to have a meeting with the Calderpeel quality representative.

▪ **Activity six: meeting with Calderpeel's quality representative**

The meeting took place on 20th July 2004 in the Calderpeel meeting room. The purpose of this meeting was to discuss the changes proposed by the external ISO consultant.

Taking the first and second issues, the suggestion was rejected by the Calderpeel quality representative. These two issues Calderpeel's external ISO consultant suggested was to in line with Calderpeel's ISO 9001 flow chart. However, the overview of the process and activity descriptions was detailed in the section 7 of QW01 Calderpeel guidelines for interim project review (see Appendix L).

Considering the third issue, the idea of conducting one-to-one interviews with the client was adopted by the Calderpeel quality representative and it was decided to focus on 'high' focus projects. The quality representative also assigned herself to conduct the one-to-one interviews with the client work in her role as Calderpeel business development manager (see Table 6.7).

Table 6.7 The responsibility and approval authority for high and low focus projects (version 2)

Roles	Types of project	Responsibility and approval authority	
		After	Before (see Table 6.4)
Moderator	High Focus	Associate / team leader	Associate / team leader
	Low Focus	Team leader	Team leader
Reviewer	High Focus	Business development/ Job runner	Job runner
	Low Focus	Job runner	Job runner
Participant	High Focus	Project team / other teams /directors / clients etc.	Project team / other teams /directors / clients etc.
	Low Focus	Project team	Project team

The final issue proposed was adopted by the Calderpeel quality representative, and that the feedback from one-to-one interviews with the client would be discussed in the interim project review session (see Appendix L section 7). The rationale for this decision was to ensure client involvement and to further deeper the relationship with the client.

Based on these responses, the fifth version of the interim project review process was produced by the researcher and became part of the Calderpeel quality document system; namely, the QW1 interim project review handbook (Revision A) (see Appendix M). This document was sent to the Calderpeel quality representative on 21st July 2004.

The quality representative gave her feedback on 4th August 2004 and stated:

“Its mad busy here as usual and I'm conscious that I've given you no information, so rather than wait and give you a detailed explanation I am sending two [files] through and we can discuss later.”

6.4.2 Reflection

1. Human capital

The principal variable at work in the action taking phase of innovation appeared to be the 'individual' (the researcher) role. The researcher realised that two practical problems appeared in this phase. First, the lack of expertise and experience in developing and implementing ISO 9001 was still the major obstacle in the interim project review process innovation activity. Although Calderpeel ISO 9001 system has been in place from April 2004 (but not accredited), the researcher found that staff from Calderpeel had little working knowledge and experience of the system. The researcher found that ISO 9001 system was solely developed by Calderpeel's external ISO consultant and that inadequate training had taken place to build up ISO 9001 knowledge and capability all levels. The researcher found that her role was very much the same as Calderpeel's external ISO consultant. Any good practice generated by the researcher, therefore, was not being readily absorbed by Calderpeel.

Second, the lack of time by Calderpeel staff to develop the interim project review process was evident in the low level of employee participation. The researcher consistently found that other task group members were extremely busy and could not find 'time' to support the innovation. The researcher found herself having to play a considerable 'championing' and 'motivating role.' The researcher had to move the iterative process forward consistently by herself to show evidence of action and change, and, in so doing, assist in envisioning and motivating Calderpeel task force members.

In summary, the lack of internal capability, and time to move the innovation forward were again evident. This is consistent with the key findings from the exploratory phase.

2. Structure capital

There were two practical problems with respect to structure capital which appeared in

this phase. First, a lack of a formalised documentation system within Calderpeel remained a constraint in sharing information between the researcher and the Calderpeel quality representative in real time. When the researcher asked for more samples of working documents related to the two pilot projects, for example, the Calderpeel quality representative said:

“I am sure I can get same [the project fee letter] examples if you want.”

And for at least ten minutes, the Calderpeel quality representative made phone calls asking staff about the document:

“I thought everyone have [these project fee letter documents].....You haven’t seen them. So you don’t have one of them.....Does anyone have one of copies?”

By the end of the meeting, the researcher still did not receive the information.

The introduction of a formal procedure of interim project review highlighted a potential tension for small firms engaged in innovation activity. Small firms tend to have few formal processes. ISO 9000 quality management system, however, requires a significant degree of formalisation. Insistence on adherence to such formal procedures was seen to detract from the organic nature of Calderpeel. In order to avoid this, the idea of ‘high focus’ and ‘low focus’ was introduced into this innovation. The proposed systems allowed for flexibility, and, where possible, the interim project review process to be symbiotic with current work practices and, as a consequence, ‘resource light’ and ‘disruption free.’

Second, the lack of senior management implementation through the team structure was again evident. The researcher was the only person who mainly developed and implemented the interim project review process innovation. The Calderpeel quality representative ‘reactively’ led the innovation activity, as her priorities were on day-to-day, fee income producing projects. The ideas the researcher suggested were rarely challenged or questioned by the Calderpeel quality representative.

In summary, the lack of formalised structures and documentation systems, and lack of senior management in the innovation implementation activity through the team structure were found to be main obstacles in the action taking phase. This is consistent with the key findings from the exploratory phase.

3. Relationship capital

The relationship capital in the action taking phase was principally located in external and internal interactions at a 'social level.' Internal interactions were through informal meetings/discussions between the researcher and the Calderpeel quality representative, the researcher and Calderpeel's two associate directors, and Calderpeel itself. External interactions were through informal meeting between the Calderpeel quality representative and its external ISO consultant. In these interaction activities, the role of the researcher and Calderpeel's external ISO consultant was to bring new knowledge and changes into the company. The role of the researcher in this project was more like that of an external consultant, rather than an embedded action researcher.

The interim project review procedure addressed the importance of the 'client involvement.' Further, this criterion in terms of the 'good experience working with *this client*' was defined by Calderpeel as the principal distinctive characteristic between 'low' focus and 'high' focus projects. This stressed the importance of client interaction at an 'operational level.'

In summary, relationship capital in this phase was located at a 'social' level. The source of ideas and their application was not targeted at a specific project. The lack of operational relationship capital was found to be a key obstacle in the action taking phase. This is consistent with the key findings from the exploratory phase.

4. Knowledge capital

In a social context, a team working environment for the meetings was in the Calderpeel meeting room. The shared office environment provided the opportunities

to increase interactions between the researcher, Calderpeel's external ISO consultant and Calderpeel's senior management.

In a technical context, this took the form of e-mails and telephone. First, the feedbacks on the interim project review process documents from other participants (such as Calderpeel's senior management and quality representative, and its external ISO consultant) were by e-mails. The use of 'e-mail' technology helped the knowledge capturing and sharing activity. Also it helped the researcher to set up the meeting with the Calderpeel quality representative. Second, the use of 'telephone' communication tool in the action taking phase was an alternative tool. Many discussions and ideas exchange between the researcher and the Calderpeel quality representative were through the telephone conversation, when the Calderpeel quality representative made no response in e-mails.

In summary, knowledge capital was initially stimulated through the 'technical system' through the 'encoded' documents (interim project review procedure) and by communication via e-mail and telephone. This provided the platform to commit Calderpeel staff to the 'social system' meeting. The source of ideas and their application, again, did not target at a specific project. This is consistent with the key findings from the exploratory phase.

6.5 Action evaluation

6.5.1 Practice

The QW1 interim project review handbook (Revision A) (see Appendix M) has been in place from the end of July 2004. At this time, the task force anticipated an immediate impact from the interim project review process on the effectiveness of Calderpeel.

The initial external assessment for Calderpeel ISO 9001 accreditation was planned for August/September 2004. By the end of July, the researcher was informed by the Calderpeel quality representative that the external assessment for Calderpeel ISO 9001 accreditation was postponed to February 2005 due to the company workload.

This argument was advanced by the Calderpeel quality representative who noted that:

“Our [ISO] consultant thinks that we are not ready yet. Our system is like a new painting on the wall.”

Based on the documents the Calderpeel quality representative sent, the sixth version of the interim project review handbook – QW1 Interim project review handbook (Revision B) was revised by the researcher (see Appendix N).

By the end of January 2005, the interim project review process had not been implemented.

6.5.2 Reflection

1. Human capital

The human capital was found to be embedded within the capacity, ability and motivation of individual (the researcher). The lack of senior management implementation, the low level of employee participation (despite have the capability of doing so), and the lack of time to develop and implement the innovation, were found to be key obstacles in the interim project review process development.

The researcher believed that four principal reasons were main obstacles in the development and implementation of the interim project review process. First, the idea of the interim project review process was introduced and, to certain extent, championed by the action researcher. The researcher believed that the top management did not organically and intrinsically support the interim project review process innovation. This lack of ownership the innovation idea might well have manifested itself in the subsequent lack of senior management vision and support.

Second, senior management did not efficiently drive the interim project review process innovation into the organisation. The Calderpeel’s management (senior management and middle management) were positively impressed, intrigued and motivated to pursue the proposed development approach. However, in reality senior

management did not drive the interim project review process into the organisation as it was not a prioritised project-specific, fee earning activity. This issue led to the third issue.

Third, the lack of prioritisation the interim project review process innovation was shaped by, and shaped, the lack of time to allocate to the innovation. Terms like 'no time' and 'busy' were regularly mentioned.

Finally, the lack of internal capability became a constraint in the development and implementation of the interim project review process innovation. When the researcher asked for the opinion on the changes, sentences like 'I don't know', was regularly used. The discussions and meetings were principally led by the researcher. The issues and opinions the researcher suggested were rarely questioned and challenged by other participants.

In summary, the lack of top management vision, the lack of senior management support for implementation, the lack of internal capability, and the lack of time variables were the main constraints in this collaborative endeavour. This is consistent with the key findings from the exploratory phase.

2. Structure capital

Considering structure capital, the lack of formalised structures and documentation systems and lack of senior management to drive innovation through the team structure to develop and implement the innovation activities, were found to be key obstacles.

First, the lack of formalised structures and documentation systems within Calderpeel was found to be the key obstacle in the interim project review process development and implementation. First, a lack of a formalised structure for linking and co-ordinating people together resulted in a loose alliance between the researcher and Calderpeel. For example, information about this action research was passed within the task group members on an informal basis. Second, a lack of documentation system to encode the issues raised in the discussions/meetings increased

information/knowledge uncertainty.

Second, the lack of senior management support from inception through to implementation through the team structure at an operational level was found to be a key obstacle in the interim project review process innovation development and implementation.

In summary, the lack of the formalised structure and documentation system, and the lack of senior management implementation through the team structure were found to be key obstacles to progress innovation. This is consistent with the key findings from the exploratory phase.

3. Relationship capital

The relationship capital within the interim project review process innovation development and implementation was mainly located at the 'social' level, i.e. non-project specific innovation needs. The action research indicated that social relationship capital only helped the researcher to gain help and support to carry out her particular 'objectives' (the development of interim project review process innovation). This innovation, therefore, did not benefit from having 'operational' relationship capital to drive the innovation forward.

In summary, the lack of operational relationship capital was found to be the main obstacle in the interim project review process innovation development and implementation. This is consistent with the key findings from the exploratory phase.

4. Knowledge capital

The necessity for a combination of the social context and technical context was confirmed in the development and implementation of the interim project review process innovation. The knowledge capital within the interim project review process development and implementation was stimulated through the 'technical system' through the documents such as the company workshop report, the action research plan

and by communication via e-mails, the internet and telephone. This provided the platform to commit Calderpeel staff to the 'social system' such as the company workshop, and discussions/meetings in the Calderpeel company environment. The application of knowledge capital for the interim project review process innovation, however, did not meet a specific-project need, instead of being a supporting process for Calderpeel ISO 9001 accreditation. This issue was found to be the main constraint in the interim project review process innovation development and implementation.

In summary, the source of ideas and their application from a combination of social and operational contexts, which did not target at a specific-project, was found to be a significant obstacle to the interim project review process innovation development and implementation. This is consistent with the key findings from the exploratory phase.

6.6 Specifying learning

6.6.1 Practice

Specifying learning for Calderpeel arguably did not happen within the action research period. The development and implementation of the interim project review activity has 'paused' at the action taking phase (see Figure 6.2). It is the intention of Calderpeel to reactivate the interim project review activity in early 2005.

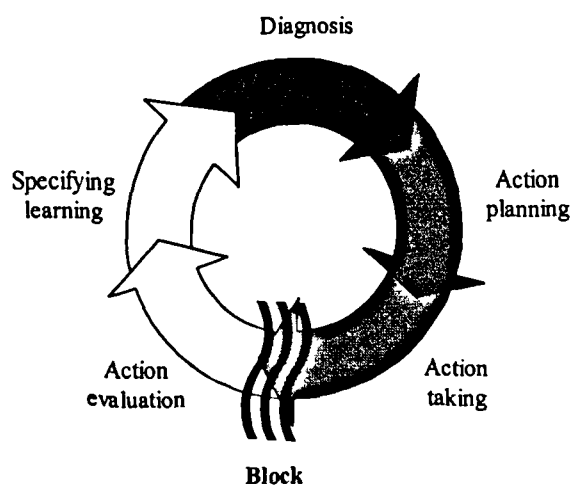


Figure 6.2 Learning block for Calderpeel

At this moment, Calderpeel have not captured any learning from the implementation of the interim project review process as it has not been implemented in a real world project setting.

6.6.2 Reflection

The following summarises the key reflections of the action research process. The purpose of specifying learning, as shown in Figure 6.3, is to draw generic lessons which can feed into subsequent (or concurrent) innovation activity.

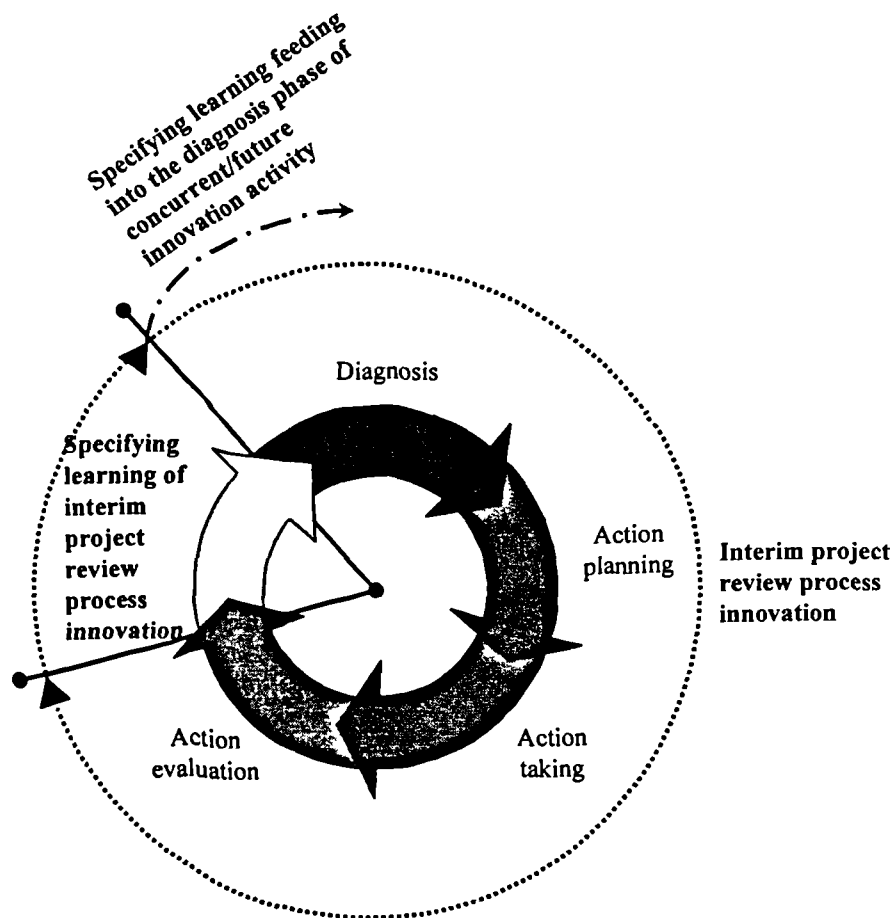


Figure 6.3 The specifying learning for the researcher

There are two generic specifying learning themes for the researcher. First, learning blocks within Calderpeel with regard to the development and implementation of the interim project review process are given (see Section 6.5.2). Second, mechanisms to

overcome these blocks for concurrent / future innovation activity are offered.

1. Human capital

Four key human capital variables emerged from the interim project review process innovation: lack of top management 'championing'; senior management not driving the implementation through the team structure; low level of employee buy in; and, lack of time to develop and implement the innovation activity (see Section 6.5.2).

The specifying learning for concurrent / future innovation is that these four key human capital variables should be appropriately addressed to bring about successful innovation activity. They are discussed below.

First, top management did not organically and intrinsically champion and support the interim project review process innovation. The interim project review process idea did not directly come from senior management vision; rather, it came principally from the researcher. This lack of ownership of the genus of the innovative idea might well have manifested itself in the subsequent lack of 'championing' of the innovation.

Second, senior management did not drive the implementation through the team structure, which resulted in the low level of employee participation. The specifying learning for further innovation activity is that senior management must drive, and seen to be driving, the innovation from inception through to implementation. The senior management commitment and involvement also would encourage staff to get involved in the innovation activity.

Third, inadequate resources were dedicated to the innovation because of full resource allocation to day-to-day fee income producing project activity. Innovation activity needs to be appropriately promoted and resourced, without this innovation will wither, and staff will increasingly view non-project specific future innovation activity as doomed to failure.

Finally, the company lacked appropriate internal capability in ISO 9000 quality management system which was necessary to locate and develop the interim project

review process innovation. Innovation activity needs to have adequate capability; if this is not present in the firm, the necessary capability needs to be recruited or developed internally through training and development; or, relevant external expertise brought in. In the case of external expertise, effort should be made to transfer this capability to firm staff, so that this capability is available after the external agent has gone.

In summary, top management championing and support, senior management implementation, the allocation of resources and the ownership of innovation are the main key variables to progressing innovation activity.

2. Structure capital

The key structure capital variable identified from the interim project review process innovation was the lack of the formalised structures and documentation systems (see Section 6.5.2). The specifying learning for concurrent / future innovation is that this key structure capital variable must be adequately addressed for successful innovation activity.

There is a need for adequate formalised structures and documentation systems to develop and implement innovation activity. First, a formalised structure enables roles and responsibility to be clearly assigned to progress the innovation. This formalisation legitimates the innovation through positional power or authority to capture the rationale and necessary information for the innovation and to share that information, is required. Second, formalised documentation systems in place with, an inevitable result, good practice and lessons learned will be captured and shared for future use. Further, the formalisation must be balanced with a need to keep any process 'resource light,' and to be sympathetic to current work practices.

3. Relationship capital

The lack of operational relationship capital was identified as key variable from the interim project review process innovation (see Section 6.5.2). The specifying

learning for concurrent / future innovation is that this key relationship capital variable must be present for successful innovation activity. The specifying learning for further innovation is that the innovation activity has to be tangibly linked to project activity. The operational relationship capital (i.e. project-specific needs) allows the project work to be organised and controlled by appropriate individuals with responsibility.

4. Knowledge capital

A combination of social and technical knowledge capital channelled to a specific project was identified as key variable from the interim project review process innovation from a knowledge capital perspective (see Section 6.5.2). Innovation supported by technical knowledge capital inadequately generates, shares, leverages and exploits tacit knowledge possessed by knowledge workers.

6.7 Summary and link

This chapter has presented the key findings from the action research phase of the case study. The next chapter brings together the key results from the exploratory phase and the action research phase of a case study to test the hypotheses set out in Chapter 3.

7.0 Testing of research hypotheses

7.1 Introduction

This chapter presents a discussion of key results from the exploratory phase (see Chapter 5) and the action research phase (see Chapter 6) of the case study by testing the meta hypothesis and six sub-hypotheses. The knowledge-based innovation concept model (see Figure 3.1) proved to be useful in both understanding innovation (the exploratory phase of case study) and managing innovation activity (the action research phase of case study), and, in so doing, provides a basis for testing the hypotheses set out in Chapter 3. Two principal types of innovation were identified in the exploratory phase of the case study: explorative innovation (see Section 5.5); and, exploitative innovation (see Section 5.6). An exploitative innovation – interim project review process innovation – was tested and validated in the action research phase of the case study (see Chapter 6).

7.2 Types of knowledge-based innovation

Two types of innovation within the company were identified as explorative innovation (see Section 5.5) and exploitative innovation (see Section 5.6). The concept of exploitative and explorative innovation was found to be a useful and valid way of understanding knowledge-based innovation. The research findings indicate that firms achieve short-term ‘project-based’ success with explorative innovation (see Figure 7.1 mode 1) and potential long-term ‘organisational’ success with exploitative innovation (see Figure 7.1 mode 2).

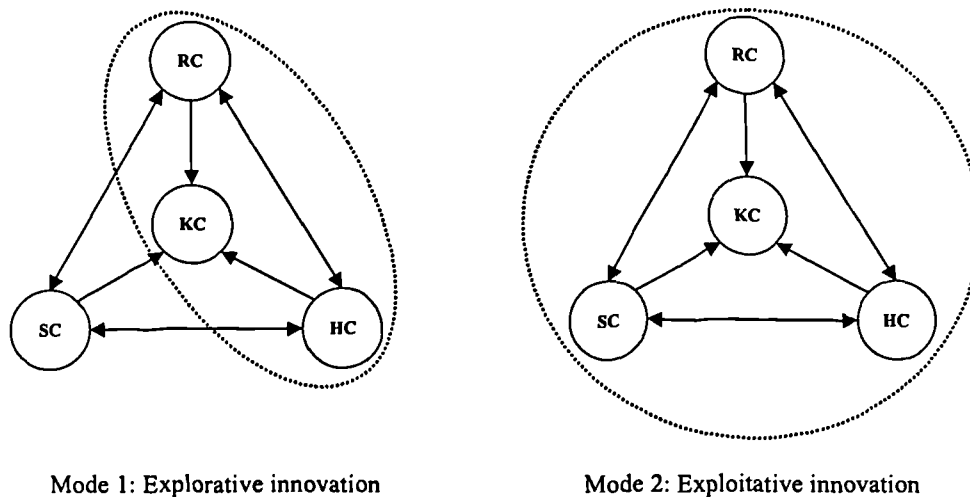


Figure 7.1 Types of knowledge-based innovation

Explorative innovation (mode 1) focuses on client facing, specific-project needs (external fee income producing project), resulting in effective and efficient delivery of services to satisfy current external project needs; whilst exploitative innovation (mode 2) focuses on organisational and general client development activity, resulting in organisational effectiveness and efficiency improvement, and, in so doing, potentially generating sustainable competitive advantage. The distinctive feature of exploitative innovation (compared to explorative innovation) is that new phenomena, systems or structures are more readily embedded in the structure capital of the firm. In contrast, explorative innovation tends to rotate around specific projects and the lessons learned are not encoded into the structure capital of the firm for subsequent retrieval and use.

The next section will test the research hypotheses set out in Chapter 3 on the basis on the data gathered and analysed in the case study (see Chapter 5 and 6).

7.3 Hypothesis 1: Knowledge-based resources

The first hypothesis posed in Section 3.4 was concerned with knowledge-based resources.

***Hypothesis 1:** A small construction knowledge-intensive professional service firm which develops integrated individual, organisational and client human capital, structure capital, and relationship capital will generate a more appropriate stock of resources for successful innovation.*

Hypothesis 1 consists of three sub-hypotheses. They are discussed below. At the end of this section, Hypothesis 1 will be discussed (see Section 7.3.4).

7.3.1 Hypothesis 1-1: Human capital

***Hypothesis 1-1:** A small construction knowledge-intensive professional service firm which develops integrated individual, organisational and client human capital will generate a more appropriate stock of human capital resources which will contribute to successful innovation.*

The analysis of the data from the exploratory phase and the action research phase provides general support for Hypothesis 1-1.

- **Explorative innovation**

The human capital for explorative innovation identified in the exploratory phase was embedded within the capacity, ability and motivation of staff (see Section 5.5.1) and external supply chain partners (see Section 5.5.3).

In successful explorative innovation, human capital was focused on a specific project at an 'operational' level with knowledge being elicited, mobilised and integrated from individual, organisational and client 'social' and 'operational' sources to progress project challenges with innovative solutions, e.g. new designs (innovation 3) (see Section 5.5.1). It was found that successful explorative innovation was mainly relied on staff (including individual knowledge workers, management and the client) working together through the team structure. The tangible and immediate project focus gave the innovation activity sufficient priority to secure adequate commitment and resources to ensure its success.

In contrast, in unsuccessful explorative innovation, knowledge from individual,

organisational and client human capital tended to be located at a non-project specific 'social' level, rather than at a project-specific 'operational' level, e.g. new materials (innovation 6) (see Section 5.5.1). These bodies of knowledge, without an integrating project context, were characterised as being disjointed with each other. Innovation activity from these sources, unless brought together and reconfigured to meet the needs of a particular project, lacked the prioritisation and legitimisation to claim resources to bring about successful innovation.

In summary, explorative innovation Hypothesis 1-1 was confirmed, i.e. successful innovation was characterised by integrated, operational human capital around a focal project context; whilst unsuccessful innovation was evidenced by disjointed bodies of knowledge located at a social level without the benefit of an integrating project conduit.

▪ **Exploitative innovation**

The human capital for exploitative innovation in the exploratory phase was embedded within the capacity, ability and motivation of staff (see Section 5.6.1) and external supply chain partners (see Section 5.6.3), particularly clients and suppliers.

Successful exploitative innovation was found to have the motivation of senior management to drive the innovation through the team structure to successful implementation, and to encourage appropriate employee participation in the process (see Section 5.6.1). First, the senior management role was seen as very much encouraging the integration of individual and organisational human capital through appropriate teamwork around projects. Projects for exploitative innovation were reviewed as 'internal' projects (rather than 'external' fee producing projects). Once this teamwork was in place, individual knowledge workers engaged with client human capital within the context of a specific project, e.g. mission statement (innovation 1), LiP (innovation 2), company restructure (innovation 4) (see Section 5.6.1). The key factor in successful exploitative innovation was senior management involvement in 'implementation activity.' The research findings indicate that in idea creation, senior management has a boundary spanning role as they have sufficient knowledge of

everyone's work, the firm, customers, suppliers, and the industry, to be able to integrate the divergent views of the stakeholders, and to come up with appropriate ideas. There were four important dimensions to the role of senior management in driving and implementing innovation activities: the allocation of project work into the team, teamwork supervision, the training and development of staff, and the motivation of staff to participate in innovation activity.

In contrast, unsuccessful exploitative innovation was characterised by three key human capital variables: lack of top management 'championing' of the innovation; senior management not driving the implementation of the innovation through the team structure; low level of employee participation; and, lack of time for staff to develop and implement the innovation activity, e.g. seminars (innovation 5), Learndirect project (innovation 7) (see Section 5.6.1). The key findings were confirmed through testing and validating in the action research phase. They are discussed below.

First, the key role of senior management in framing and prioritising innovation activity was confirmed as a key human capital variable for exploitative innovation success (see Section 6.2.2). This provided the innovation activity with the necessary 'championing' to forge and resource the bringing together of individual and organisational human capital (see Section 6.5.2 and 6.6.2). When the new idea did not directly come from the senior management, the motivation to champion the innovation was seen to be weaker (see Section 6.6.2).

Second, senior management did not drive the implementation through the team structure, which resulted in the third factor, low level of employee participation (see Section 6.5.2 and 6.6.2). Senior management must drive, and seen to be driving, the innovation from inception through to implementation. The senior management commitment and involvement was seen to encourage staff to get involved in the innovation activity.

Third, the lack of the internal capability was confirmed to be a key constraint to progress innovation (see Section 6.3.2, 6.4.2, 6.5.2 and 6.6.2). Innovation activity needs to have adequate capability; if this is not present in the firm, the necessary capability needs to be recruited in, or developed internally through training and

development; or, relevant external expertise brought in.

Finally, the lack of the capacity to ensure adequate allocation of time and resources to move the innovation forward was confirmed to be a key constraint to progress innovation (see Section 6.3.2, 6.4.2, 6.5.2 and 6.6.2). Innovation activity needs to be appropriately promoted and resourced. Otherwise, it was observed that company resources were allocated to day-to-day fee income producing project activity.

In summary, exploitative innovation Hypothesis 1-1 was confirmed, i.e. successful innovation was characterised by integrated, operational human capital around a tangible, client driven business need; whilst unsuccessful innovation was evidenced by disjointed bodies of knowledge located at a social level without the benefit of an integrating client-driven business need.

▪ **Summary**

In combination, the findings for explorative and exploitative innovation support Hypothesis 1-1, and indicate the following positions shown in Figure 7.2. The left hand side of diagram depicts successful innovation supported by an integrated, dynamic 'operational' project and/or client-driven business human capital locus. In contrast, the right hand side of diagram indicates that where there is no specific project or client-driven business focus, innovation fails because of disjointed and unfocused bodies of knowledge residing in individual, organisational and client human capitals at a social level.

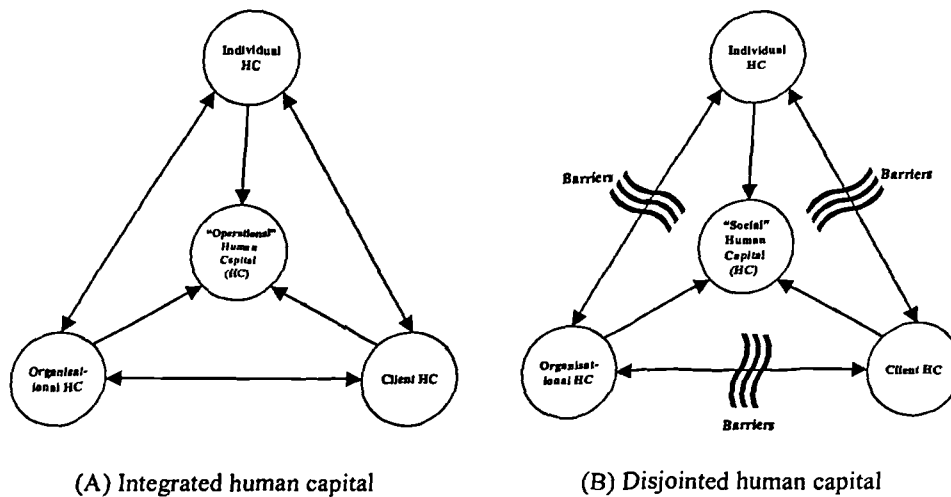


Figure 7.2 Hypothesis 1-1: Integrated and disjointed human capital for explorative and exploitative innovation

7.3.2 Hypothesis 1-2: Structure capital

Hypothesis 1-2: A small construction knowledge-intensive professional service firm which develops integrated individual, organisational and client structure capital will generate a more appropriate stock of structure capital resources which will contribute to successful innovation.

The analysis of the data for explorative innovation from the exploratory phase does not provide evidence to support for Hypothesis 1-2. On the other hand, the analysis of the data for exploitative innovation from the exploratory phase and the action research phase provides broad support for Hypothesis 1-2.

▪ Explorative innovation

The structure capital for explorative innovation identified in the exploratory phase was the creation and maintenance of appropriate team structures to enable purposeful and productive project-based teamwork. There was no 'quantitative' innovation performance measurement system to determine the success of innovation activity (see Section 5.5.2).

In successful explorative innovation, structure capital was found to have enduring senior management support for the setting up and maintenance of enabling team structures from inception through to implementation which stimulated and developed team-based ideas at an operational level (see Section 5.5.2). Two issues were raised. First, the senior management was seen to be the key enabler to bring together individual structure capital through the organisational team structure and to promote their engagement with client structure capital within the context of a specific project. Second, the team and communication structures encouraged and enabled ideas to be generated, progressed and integrated from individual and external supplier chain partners' structure capital to create team-based ideas to feed into specific project needs. It was found that the success of explorative innovation is often not embedded in the organisational structure capital due to management attention and company resources being constantly focused on current or future project-specific considerations.

In contrast, in unsuccessful explorative innovation, individually created ideas, derived from his or her 'social' relationship capital, were found to be inappropriate for specific project needs, and were pursued relatively independently of the team structure, e.g. new materials (innovation 6) (see Section 5.5.2). Three issues were raised. First, without an integrating project hub, senior management did not commit to setting up and maintaining appropriate structures to support the innovation activity. Second, without these team and communication structures, individual structure capital was separate from organisational and client structure capital. The individual, organisation or external supplier chain partners' structure capital did not become embedded at an operational structure capital level. Finally, the lack of specific structure capital was seen to limit the amount of relevant information within the organisational structure capital (see Section 5.5.2).

In summary, for explorative innovation Hypothesis 1-2 was falsified. Evidence shows that there was no integrated individual, organisational, and external supply chain partners' structure capital within successful explorative innovation.

▪ **Exploitative innovation**

The structure capital for exploitative innovation within the exploratory phase was embedded within formalised administrative systems, team structures, and computer systems. There were no quantitative innovation performance measurement systems (see Section 5.6.2).

The successful exploitative innovation was found to have: formalised structures and documentation systems; enduring senior management support from inception through to implementation; and, supported by an enabling team structure which stimulated and developed team work at an operational level, e.g. mission statement (innovation 1), IiP (innovation 2), company restructure (innovation 4) (see Section 5.6.2). In all of these innovations, the principal focus was to develop the structure capital in some way. The success of exploitative innovation was seen to be dependent on formalised structures and documentation systems. In addition, senior management support through 'the team structure' was essential for driving and implementing innovation activities such as the allocation of project work into the team and the supervision of teamwork.

In contrast, the unsuccessful exploitative innovation was found to have: no formalised structures and documentation systems; and, no senior management support to drive the innovation down into the organisation, e.g. seminars (innovation 5), Learndirect project (innovation 7) (see Section 5.6.2). The key findings were confirmed through testing and validating in the action research phase. They are discussed below.

First, the key role of the formalised structures and documentation systems, and the key role of senior management endeavour in driving the innovation implementation through the organisational team structure were confirmed as the key factors to develop and implement innovation activity (see Section 6.2.2). Further, it was emphasised that formalisation must be balanced with a need to keep any process 'resource light,' and to be sympathetic to current organisational structure capital (see Section 6.6.2).

Second, the lack of a formalised structure and documentation system was confirmed to be a key constraint to progress innovation (see Section 6.3.2, 6.4.2, 6.5.2 and 6.6.2). The need for a formalised structure to enable roles and responsibilities to be clearly assigned to progress the innovation and the need for formalised documentation systems to capture and share good practice and lessons learned for future use was confirmed as a critical element for the success of the interim project review process innovation (see Section 6.6.2).

Finally, the lack of senior management in the innovation implementation activity through the organisational team structure was found to be an obstacle in the progression of the innovation activity (see Section 6.3.2, 6.4.2, 6.5.2 and 6.6.2). Senior management was seen as having a key role in bringing together individual, organisational and external supplier chain partners' structure capital to progress specific project needs.

In summary, exploitative innovation Hypothesis 1-2 was confirmed, i.e. successful innovation was characterised by integrated, operational structure capital around a tangible, client-driven business need; whilst unsuccessful innovation was evidenced by disjointed structures and encoded knowledge located at a social level without the benefit of an integrating client-driven business need.

▪ Summary

Figure 7.3 (A) shows successful exploitative innovation supported by an integrated, dynamic 'operational' project and/or client-driven business structure capital locus. In contrast, Figure 7.3 (B) presents that where there is no specific project or client-driven business focus, innovation fails because of disjointed and unfocused structures and encoded knowledge residing in individual, organisational and external supply chain partners' structure capitals at a social level.

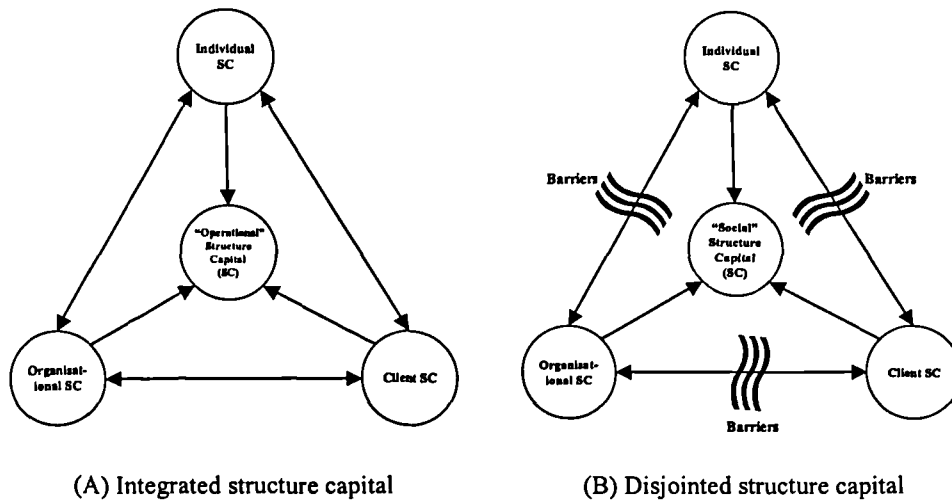


Figure 7.3 Hypothesis 1-2: Integrated and disjointed structure capital for exploitative innovation

7.3.3 Hypothesis 1-3: Relationship capital

Hypothesis 1-3: A small construction knowledge-intensive professional service firm which develops integrated individual, organisational and client relationship capital will generate a more appropriate stock of relationship capital resources which will contribute to successful innovation.

The analysis of the data from the exploratory phase and the action research phase provides general support for Hypothesis 1-3.

▪ Explorative innovation

The relationship capital for explorative innovation within the exploratory phase was located at internal and external supply chain partners' interaction domains of activity, particular clients and suppliers (see Section 5.5.3).

In successful explorative innovation, knowledge from individual, organisational and client 'operational' and 'social' relationship capital sources was integrated and fed into specific-project needs, e.g. new designs (innovation 3) (see Section 5.5.3). It was found that rich resources of relationship capital provided the variety of new ideas

to fuel successful explorative innovation. For example, within a project context, knowledge from external supplier chain partners (e.g. suppliers) was fed into a specific project.

In contrast, unsuccessful explorative innovation was underpinned solely by 'social' relationship capital sources which did not meet project-specific innovation needs - be their 'external' fee income projects or 'internal' project to promote organisational and general client development activity, e.g. new materials (innovation 6) (see Section 5.5.3). The bodies of knowledge from individual, organisational and external supply chain partners' relationship capital, without an integrating project context, were characterised as being disjointed with each other.

In summary, explorative innovation Hypothesis 1-3 was confirmed, i.e. successful innovation was characterised by integrated, operational relationship capital around a focal project context; whilst unsuccessful innovation was evidenced by disjointed bodies of relationship knowledge located at a social level without the benefit of an integrating project focus.

▪ **Exploitative innovation**

The relationship capital for exploitative innovation within the exploratory phase was located at internal and external supply chain partners' interaction domains of activity, particular clients, suppliers, and business advisers (see Section 5.6.3). The role of 'business adviser' was particularly stressed in exploitative innovation. The business adviser seems to be an important source of knowledge and information external to the company. The need for the company to be appropriated involved in such external business networks is thus especially important, as it often does not have the knowledge and resource needed to develop innovations on their own. The business advisers advised on generic company strategy and organisation rather than architectural professional issues.

In successful exploitative innovation, knowledge from individual, organisational and client 'operational' and 'social' relationship capital sources were integrated and fed

into specific-project needs, e.g. mission statement (innovation 1), IiP (innovation 2), company restructure (innovation 4) (see Section 5.6.3). In contrast, unsuccessful exploitative innovation was underpinned solely by 'social' relationship capital sources which did not feed into project-specific innovation rather than non-project-specific innovation (such as organisational and general client development activity), e.g. seminars (innovation 5), Learndirect project (innovation 7) (see Section 5.6.3). The key findings were tested and validated in the action research phase.

The relationship capital for exploitative innovation within the action research phase was located at 'social' level, i.e. non-project specific innovation needs (see Section 6.2.2, 6.3.2, 6.4.2, 6.5.2 and 6.6.2). The lack of operational relationship capital was confirmed as the key obstacle for the success of the interim project review process innovation (see Section 6.2.2, 6.3.2, 6.4.2, 6.5.2 and 6.6.2). The innovation activity has to be tangibly linked to project activity (i.e. project-specific needs) which brought together individual, organisational, and client operational relationship capital (see Section 6.6.2).

In summary, exploitative innovation Hypothesis 1-3 was confirmed, i.e. successful innovation was characterised by integrated, operational relationship capital around a tangible, client-driven business need; whilst unsuccessful innovation was evidenced by disjointed bodies of relationship knowledge located at a social level without the benefit of an integrating client-driven business need.

▪ Summary

In combination, the findings for explorative and exploitative innovation support Hypothesis 1-3, and indicate the following positions shown in Figure 7.4. The left hand side of diagram depicts successful innovation supported by an integrated, dynamic 'operational' project and/or client-driven business relationship capital locus. In contrast, the right hand side of diagram indicates that where there is no specific project or client-driven business focus, innovation fails because of disjointed and unfocused bodies of knowledge residing in individual, organisational and client relationship capitals at a social level.

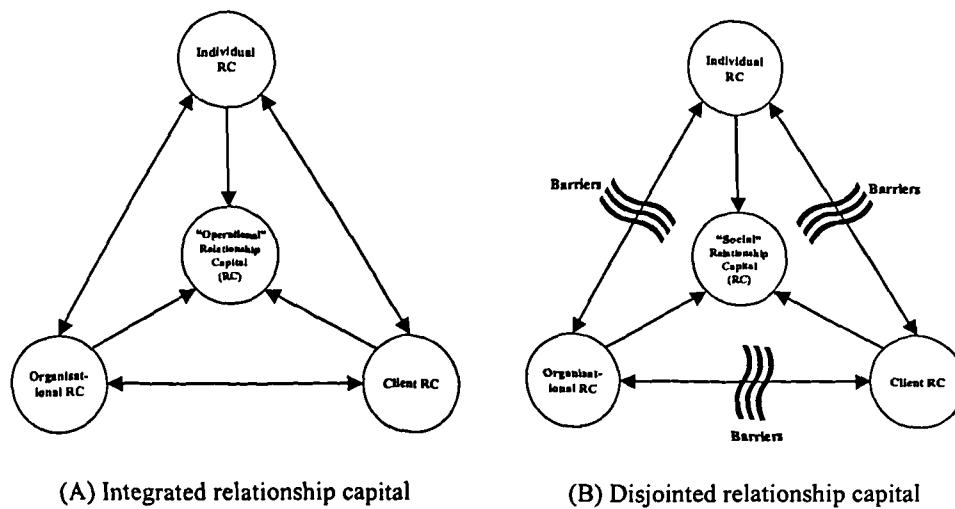


Figure 7.4 Hypothesis 1-3: Integrated and disjointed relationship capital for explorative and exploitative innovation

7.3.4 Comment on Hypothesis 1

Hypothesis 1 examines the knowledge-based resources for innovation. Table 7.1 summarises the outcome of the testing of the hypothesis.

Table 7.1 Summary of Hypothesis 1

Hypothesis	Testing results (Confirmed/ Falsified)	
	Explorative innovation	Exploitative innovation
H1: knowledge-based resources	Falsified	Confirmed
H 1-1: HC	Confirmed	Confirmed
H 1-2: SC	Falsified	Confirmed
H 1-3: RC	Confirmed	Confirmed

The research findings present a varied picture depending on whether the innovation was explorative or exploitative in nature. For exploitative innovation, Hypothesis 1 was confirmed. Successful exploitative innovation was characterised by integrated

individual, organisational and client human capital (see Section 7.3.1), structure capital (see Section 7.3.2), and relationship capital (see Section 7.3.3) around a specific client-driven need. The unsuccessful exploitative innovation was characterised by fragmented and unfocused individual, organisational and client human capital (see Section 7.3.1), structure capital (see Section 7.3.2), and relationship capital (see Section 7.3.3), and did not benefit from a specific client-driven need.

For explorative innovation, Hypothesis 1 appeared to not be falsified. Successful explorative innovation is characterised by integrated individual, organisational and client human capital (see Section 7.3.1) and relationship capital (see Section 7.3.3) around a specific project. The need for integrated individual, organisational, and client structure capital (see Section 7.3.2) was found not to be a prerequisite for successful innovation.

The next section will describe Hypothesis 2 related to capabilities.

7.4 Hypothesis 2: Capabilities

The second hypothesis posed in Section 3.4 was concerned with capabilities.

Hypothesis 2: A small construction knowledge-intensive professional service firm which generates and integrates exploitative and explorative capabilities through appropriate interaction between human capital, structure capital, and relationship capital will generate appropriate knowledge capital to stimulate and support successful innovation.

Hypothesis 2 consists of three sub-hypotheses. They are discussed below. At the end of this section, Hypothesis 2 will be discussed (see Section 7.4.4).

7.4.1 Hypothesis 2-1: Link between human capital and relationship capital

Hypothesis 2-1: A small construction knowledge-intensive professional service firm which generates and integrates exploitative and explorative

capabilities through appropriate interaction between relationship capital and human capital will make a positive contribution to knowledge capital.

The analysis of the data from the exploratory phase and the action research phase provides broad support for Hypothesis 2-1.

▪ **Explorative innovation**

In the exploratory phase of the case study, successful explorative innovation was supported by explorative capability generated by relationship capital and human capital interaction at an 'operational' level, e.g. new designs (innovation 3) (see Section 5.5.1 and 5.5.3). It was evident that knowledge workers actively drew upon their operational and social relationship capital sources to acquire information and knowledge that was relevant to current specific projects.

In unsuccessful explorative innovation, it was evident that there was inadequate operational explorative capability generated by relationship capital and human capital; rather, the interaction was at a social level decoupled from the specific needs of a project, e.g. new materials (innovation 6) (see Section 5.5.1 and 5.5.3).

In summary, explorative innovation Hypothesis 2-1 was confirmed, i.e. successful innovation was supported by explorative capability generated by operational relationship capital and human capital interaction around a specific project context; whilst unsuccessful innovation was evidenced by disjointed interaction between social relationship capital and human capital in non-specific project domains.

▪ **Exploitative innovation**

In the exploratory phase of the case study, in successful exploitative innovation, exploitative capability was evident when relationship capital and human capital was engaged with operational project, client-driven business needs, e.g. mission statement (innovation 1), IiP (innovation 2), company restructure (innovation 4) (see Section 5.6.1 and 5.6.3). It was found that ideas for successful exploitative innovation came from 'operational' and 'social' relationship capital sources which were fed into a

specific project (innovation 1 and innovation 3 were used to support innovation 2: IiP accreditation project).

In unsuccessful exploitative innovation, there was inadequate exploitative capability generated by relationship capital and human capital interaction at an operational level; rather, it tended to be located at a 'sterile' social level which was viewed by staff as not being relevant for their immediate project work, e.g. seminars (innovation 5), Learndirect project (innovation 7) (see Section 5.6.1 and 5.6.3). The key findings were tested and validated in the action research phase. They are discussed below.

The lack of exploitative capability brought about by inadequate and inappropriate relationship capital and human capital interaction at an operational level within the action research phase was confirmed as a key obstacle for the success of the interim project review process innovation (see Section 6.2.2, 6.3.2, 6.4.2, 6.5.2 and 6.6.2). Two mechanisms were identified as core constraints for this innovation success. First, the idea of the interim project review process did not come from 'operational' relationship capital source; rather, it came principally from the researcher, i.e. from an external 'social' relationship capital source. This lack of ownership by the senior management of the genus of the innovative idea manifested itself in the subsequent lack of Calderpeel senior management 'championing' of the innovation. Second, there was a lack of appropriate internal human capital capability in quality management systems which resulted in the company having to rely on buying in relevant external expertise. It was found that there was little motivation to set up appropriate mechanisms to successfully transfer and develop this capability into the firm's internal human capital. The absence of appropriate knowledge transfer and internal human capital generation with respect to quality management systems exposes the firm to not having sufficient internal capability to operate, maintain and further develop its quality management systems once the external sources of capability are not present (in this case, the external quality consultant and the researcher).

In summary, exploitative innovation Hypothesis 2-1 was confirmed, e.g. successful innovation was supported by exploitative capability generated by operational relationship capital and human capital interaction around a tangible, client-driven

business need; whilst unsuccessful innovation was supported by exploitative capability generated by social relationship capital and human capital interaction around an intangible, non client-driven business need.

▪ **Summary**

In combination, the findings for explorative and exploitative innovation support Hypothesis 2-1. The key finding indicates that successful innovation supported by operational explorative and/or exploitative capabilities are targeted at, and stimulated by, project and/or client-driven business needs; whilst in unsuccessful innovation, interaction between human capital and relationship capital was located at a social level, rather than at an operational level.

7.4.2 Hypothesis 2-2: Link between structure capital and human capital

Hypothesis 2-2: A small construction knowledge-intensive professional service firm which generates and integrates exploitative and explorative capabilities through appropriate interaction between structure capital and human capital will make a positive contribution to knowledge capital.

The analysis of the data for explorative innovation from the exploratory phase does not provide evidence to support for Hypothesis 2-2. In contrast, the analysis of the data for exploitative innovation from the exploratory phase and the action research phase provides wide support for Hypothesis 2-2.

▪ **Explorative innovation**

In the exploratory phase of the case study, there was no clear evidence that successful explorative innovation was supported by explorative capability generated by structure capital and human capital interaction, e.g. new designs (innovation 3) (see Section 5.5.1 and 5.5.2). The knowledge gleaned from operational and social relationship capital sources was appropriately filtered and configured to meet a specific-project

need through the team structure. Through the team structure, the senior management supported the innovation activity from the idea creation to its implementation. This structure capital for explorative innovation, however, was fragile and temporary and not embedded within the company i.e. the interaction between human capital and structure capital ended when the project finished. This does not imply that Calderpeel's staff did not use explicit, codified material in creating knowledge; indeed, they frequently developed notes, drawings, designs, and so forth. However, this material was used for the specific project only, but was not encoded, or tacit knowledge transfer mechanism enabled, within the organisational structure for that enabled this knowledge to be reused by the originating team or the other three project teams within the company.

Similarly, there was evidence that unsuccessful explorative innovation was characterised by inappropriate explorative capability generated by structure capital and human capital interaction, e.g. new materials (innovation 6) (see Section 5.5.1 and 5.5.2). The knowledge for explorative innovation came from individuals from his or her 'social' relationship capital which was not adequately transformed to meet the need of a specific project, and which was pursued relatively independently of the team. The knowledge, therefore, was not embedded in the organisational structure.

In summary, explorative innovation Hypothesis 2-2 was falsified. There was no clear evidence that successful explorative innovation was supported by explorative capability generated by human capital and structure capital interaction.

▪ **Exploitative innovation**

In the exploratory phase of the case study, in successful exploitative innovation, exploitative capability was evident when human capital and structure capital was engaged with internal project, client-driven business needs, e.g. mission statement (innovation 1), IiP (innovation 2), company restructure (innovation 4) (see Section 5.6.1 and 5.6.2). A formalised structure and documentation system was perceived to the useful ways of capturing information and knowledge in published material such as company quality manual or company handbook. These materials were integrated by

knowledge workers to acquire knowledge and information at an operational level. It was evident that when Calderpeel documented knowledge in a systematic way staff were more aware of the knowledge and could readily access it. Through the formalised structure, staff was able to share their knowledge and expertise.

In unsuccessful exploitative innovation, exploitative capability was generated by structure capital and human capital interaction at a social level, e.g. seminars (innovation 5), Learndirect project (innovation 7) (see Section 5.6.1 and 5.6.2). Without a project focus, these exploitative innovations failed. The key findings were tested and validated in the action research phase.

The lack of exploitative capability brought about by inadequate structure capital and human capital interaction at an operational level identified in the action research phase was confirmed as a key obstacle for the interim project review process innovation success (see Section 6.2.2, 6.3.2, 6.4.2, 6.5.2 and 6.6.2). The interaction between human capital and structure capital was focused at a social level (see Section 6.6.2). Three core elements were identified. First, the lack of senior management commitment and involvement in the innovation activity through the team structure resulted in the low level of employee participation. The knowledge worker prioritised put his or her efforts into day-to-day fee income producing project activity, rather than engaging with the internal organisation development activity. (Indeed, this prioritisation of project work over general 'organisational development' was reinforced by individual performance being assessed against project delivery criteria - see Section 6.4.2 and 6.5.2.) Second, the lack of internal capability (human capital) in the firm, the development of innovation activity (such as ISO 9001 quality management system or the interim project review procedure) mainly carried out by external supplier chain partners (i.e. the researcher and Calderpeel's external ISO consultant). It was found that there was no appropriate mechanisms (e.g. training) set up to transfer this capability into the firm's internal human capital. The consequence of this can be predicated as the firm finding difficulty in operating, maintaining and further developing its quality management systems once the external business advisers are not present.

In summary, exploitative innovation Hypothesis 2-2 was confirmed, e.g. successful

innovation was supported by exploitative capability generated by operational structure capital and human capital interaction around a tangible, client-driven business need; whilst unsuccessful innovation was evidenced by disjointed interaction of social structure capital and human capital around a non-client-driven business need.

7.4.3 Hypothesis 2-3: Link between relationship capital and structure capital

Hypothesis 2-3: A small construction knowledge-intensive professional service firm which generates and integrates exploitative and explorative capabilities through appropriate interaction between relationship capital and structure capital will make a positive contribution to knowledge capital.

The analysis of the data for explorative innovation from the exploratory phase does not provide evidence to support for Hypothesis 2-3. In contrast, the analysis of the data for exploitative innovation from the exploratory phase and the action research phase provides broad support for Hypothesis 2-3.

▪ Explorative innovation

In the exploratory phase of the case study, there was no clear evidence that successful explorative innovation was supported by explorative capability generated by relationship capital and structure capital interaction at an operational level, e.g. new designs (innovation 3) (see Section 5.5.2 and 5.5.3). The knowledge from 'operational' and 'social' relationship capital sources was fed into specific-project needs. This knowledge was mobilised to produce innovation within a specific project context, but was not tangibly embedded within the structural capital of the firm for future retrieval and use. Notwithstanding this lack of linkage, the innovation within the context of the project was deemed successful. Any lessons learned from project-based innovation were very much located within individual workers. Knowledge transfer between individuals at a socialisation level (see Section 2.5.3) to develop knowledge capital, to a more limited extent, was evident within individual teams. However, the fairly rigid team structure within Calderpeel, where teams consisted of

stable, fixed membership (see Section 5.2), created a significant barrier to informal knowledge transfer between teams. The seminar (innovation 5) was an attempt to provide a mechanism to encourage such transfer, but the lack of specific project focus led to this innovation being unsuccessful.

Similarly, there was no clear evidence that unsuccessful explorative innovation was characterised by explorative capability generated by structure capital and relationship capital interaction, e.g. new materials (innovation 6) (see Section 5.5.2 and 5.5.3). The unsuccessful explorative innovation was underpinned solely by 'social' relationship capital sources which did not meet project-specific innovation needs. The relationship capital was presented as enabling conditions for knowledge creation and sharing. External supplier chain partners (e.g. suppliers) (see Section 5.5.3) was found to be an important source of new ideas. Without a project context, the knowledge sharing and creation only happened when a member of staff asked for advice. It was found that the knowledge worker within Calderpeel was learning internally from colleagues.

In summary, explorative innovation Hypothesis 2-3 was falsified. There was no clear evidence that there is a link between relationship capital and formal structure capital. Successful explorative innovation was not dependent on strong human capital and formal structure capital interaction.

▪ **Exploitative innovation**

In the exploratory phase of the case study, exploitative capability for successful exploitative innovation was evident when relationship capital and structure capital was engaged with internal project, client-driven business needs, e.g. mission statement (innovation 1), IiP (innovation 2), company restructure (innovation 4) (see Section 5.6.2 and 5.6.3). The successful exploitative innovation activity was tangibly linked to a specific-project activity. The operational relationship capital allows the project work to be organised and controlled by appropriate individuals with responsibility through the organisation structure.

In contrast, in unsuccessful exploitative innovation, it was evident that there was inappropriate exploitative capability generated by relationship capital and structure capital interaction at a social level, e.g. seminars (innovation 5), Learndirect project (innovation 7) (see Section 5.6.2 and 5.6.3). The key findings were tested and validated in the action research phase.

The lack of exploitative capability brought about by inadequate and inappropriate structure capital and relationship capital interaction at an operational level was confirmed as the critical constraint for the interim project review process innovation success (see Section 6.2.2, 6.3.2, 6.4.2, 6.5.2 and 6.6.2). The relationship capital was presented as enabling conditions for knowledge creation and sharing.

In the action research phase, the interaction between relationship capital and structure capital was located at a social level. This tended to be fairly sporadic as there was no training and no standard procedures for managing or documenting project. The results of the interim project review process were formally recorded only by the researcher. A distinct lack of formal structure limited the researcher to acquire relevant knowledge from other staff. In eliciting existing knowledge, the researcher relied heavily upon personal networks, particular with Calderpeel's quality representative.

In summary, exploitative innovation Hypothesis 2-3 was confirmed, i.e. successful innovation was supported by exploitative capability generated by operational structure capital and relationship capital interaction around a tangible, client-driven business need; whilst unsuccessful innovation was evidenced by disjointed interaction of structure capital and relationship capital at a social level without the benefit of an integrating client-driven business need.

7.4.4 Comment on Hypothesis 2

The outcomes of the testing of the sub hypotheses are summarised in Table 7.2.

Table 7.2 Summary of Hypothesis 2

Hypothesis	Testing results (Confirmed/ Falsified)	
	Explorative innovation	Exploitative innovation
H2: Capabilities	Falsified	Confirmed
H 2-1: link between HC & RC	Confirmed	Confirmed
H 2-2: link between SC & HC	Falsified	Confirmed
H 2-3: link between RC & SC	Falsified	Confirmed

The research results presented a mixed picture depending on whether the innovation was explorative or exploitative in nature. For exploitative innovation, Hypothesis 2 was confirmed, i.e. successful exploitative innovation was characterised by integrated human capital, structure capital, and relationship capital (see Section 7.4.1, 7.4.2 and 7.4.3) around a specific client-driven need; whilst unsuccessful exploitative innovation displaced fragmented human capital, structure capital, and relationship capital (see Section 7.4.1, 7.4.2 and 7.4.3), and did not benefit from a specific client-driven need.

For explorative innovation, Hypothesis 2 appears to be falsified. Successful explorative innovation was characterised by integrated human capital and relationship capital (see Section 7.4.1) around a specific project. The need for integrated structure capital (see Section 7.4.2 and 7.4.3) was found not to be a prerequisite for successful innovation. This apparent discrepancy that successful innovation can be produced without within strongly coupled formal structure capital is discussed in the meta-hypothesis below.

7.5 Meta hypothesis: Knowledge capital

The meta hypothesis was set out in Section 3.4.

Meta hypothesis: A small construction knowledge-intensive professional service firm which generates and integrates relationship capital, structure capital, and human capital through exploitative and explorative capabilities will create knowledge capital for successful innovation and sustainable competitive advantage.

7.5.1 Explorative innovation

The knowledge capital for explorative innovation identified in the exploratory phase is the focal or integrating nexus for relationship capital, structure capital and human capital, in which innovation takes place (see Section 5.5.4).

In successful explorative innovation, knowledge capital was associated with a combination of 'social' and 'technical' contexts where human capital, structure capital and relationship capital were integrated (see Section 7.3.1, 7.3.2, 7.3.3, 7.4.1, 7.4.2 and 7.4.3), particularly when knowledge capital were channelled to operational specific-project activity, e.g. new designs (innovation 3) (see Section 5.5.4). The research results indicate that explorative knowledge capital in Calderpeel was ultimately through people-to-people dialogue within a social context which brought together relationship capital and human capital. This dialogue was principally supported by social, informal structure capital, for example, face-to-face meetings and telephone conversations targeted at a specific project, through daily, informal conversations between colleagues and with external supply chain partners, e.g. clients.

In contrast, unsuccessful explorative innovation was seen to be brought about when the knowledge capital was limited to a 'technical' dimension, as it tended to be located at an individual-driven social level and did not lend itself to team-based, socially constructed innovation activity, e.g. new materials (innovation 6) (see Section 5.5.4). The research findings indicate that knowledge capital in unsuccessful explorative innovation was limited to a technical context where human capital and relationship capital was inappropriately integrated.

In summary, for explorative innovation the meta hypothesis was confirmed with respect to explorative capability, i.e. successful innovation was characterised by integrated, operational knowledge capital around a project focal; whilst unsuccessful innovation was evidenced by disjointed social knowledge capital around non-specific project context.

7.5.2 Exploitative innovation

The knowledge capital for exploitative innovation identified in the exploratory phase is the same as for explorative innovation, i.e. it is the focal or integrating nexus in which innovation takes place (see Section 5.6.4).

The knowledge capital for successful exploitative innovation was associated with a combination of 'social' and 'technical' contexts where human capital, structure capital and relationship capital were integrated (see Section 7.3.1, 7.3.2, 7.3.3, 7.4.1, 7.4.2 and 7.4.3) at an operational level, e.g. mission statement (innovation 1), LiP (innovation 2), company restructure (innovation 4) (see Section 5.6.4). For successful exploitative knowledge capital, knowledge workers were connected socially through social system (such as being involved in meetings and task forces in the meeting rooms, or in the pub). This enhanced the opportunity for relationship capital and human capital (access information and knowledge among themselves) to interact. The knowledge capital within technical dimension was through electronic documents, handwritten documents, the internet, e-mails. These technical mechanisms were used to support in human capital and relationship capital interaction. This integrated human capital, structure capital and relationship capital within social and technical contexts converged at a specific project need.

In contrast, in unsuccessful exploitative innovation, knowledge capital targeted at organisational and general client development activity e.g. seminars (innovation 5), Learndirect project (innovation 7) (see Section 5.6.4). These innovations failed as they did not represent tangible, immediate benefits to the firm at a project level. The key findings were confirmed through testing and validating in the action research phase.

The knowledge capital for exploitative innovation within the action research phase was initially stimulated through the 'technical system' through the 'encoded' documents and by communication via e-mail, the internet and telephone. This provided the platform to commit Calderpeel staff to the 'social system' meetings/discussions (see Section 6.2.2, 6.3.2, 6.4.2 and 6.5.2). This combination of social and technical knowledge capital did not channel into a specific project. The

lack of operational project focus was confirmed as key factor for unsuccessful exploitative innovation (see Section 6.6.2).

In summary, for exploitative innovation the meta hypothesis was confirmed with respect to exploitative capability, i.e. successful innovation was characterised by integrated, operational knowledge capital around a tangible, client driven business need; whilst unsuccessful innovation was evidenced by disjointed social knowledge capital around intangible, non-client-driven business need.

7.5.3 Comment on the Meta Hypothesis

The meta hypothesis for exploitative innovation was confirmed, i.e. successful exploitative innovation is generated by exploitative knowledge capital which is a product of appropriately integrated human capital, structure capital and relationship capital with social and technical contexts. In contrast, it was focal that successful explorative innovation was not dependent upon integrated structure capital; rather, the explorative knowledge capital was principally underpinned by strong relationship capital and human capital interaction around a specific project. This reality is consistent with the central tenet of professional services; namely, the co-production of the service between the client and the knowledge worker.

7.6 Summary and link

This chapter has presented the key findings within the context of the meta hypothesis and six sub-hypotheses being investigated in the research. The case study results confirmed the prevailing reality that SCKIPSFs tend to concentrate their efforts on reactive client facing, problem-solving innovation (explorative innovation), rather than proactive internal-organisational, general client development innovation (exploitative innovation).

The final chapter summaries this research, and draws implications and makes recommendations.

8.0 Conclusions

8.1 Introduction

The aim of this chapter is to discuss and summarise the research findings to draw implications for innovation theory and to address the research problem set out in Section 1.2 and research questions articulated in Section 2.7. The structure of this chapter is as follows:

- (1) A summary of the tested research hypotheses is presented (section 8.2);
- (2) Contributions to innovation theory are articulated (section 8.3);
- (3) Insights on the research problem based on the results are given (section 8.4);
- (4) The research questions are addressed (section 8.5);
- (5) Limitations of the research are set out (section 8.6); and,
- (6) Further research areas building from this research are given (section 8.7).

8.2 Summary of research hypotheses

8.2.1 Hypothesis 1: Knowledge-based resources

Hypothesis 1: A small construction knowledge-intensive professional service firm which develops integrated individual, organisational and client human capital, structure capital, and relationship capital will generate a more appropriate stock of resources for successful innovation.

For exploitative innovation, Hypothesis 1 was confirmed (see Section 7.3.4). Successful exploitative innovation was characterised by integrated individual, organisational and client human capital (see Section 7.3.1), structure capital (see Section 7.3.2), and relationship capital (see Section 7.3.3) around an ‘operational’ client-driven business focus. Unsuccessful exploitative innovation was characterised by fragmented and unfocused individual, organisational and client human capital (see Section 7.3.1), structure capital (see Section 7.3.2), and relationship capital (see Section 7.3.3), and did not benefit from a specific client-driven need.

For explorative innovation, Hypothesis 1 appeared to be falsified (see Section 7.3.4). Successful explorative innovation was characterised by integrated individual, organisational, and client human capital (see Section 7.3.1) and relationship capital (see Section 7.3.3) around an ‘operational’ project locus. The need for integrated individual, organisational, and client structure capital (see Section 7.3.2) was found not to be a prerequisite for successful explorative innovation. Where there was no specific project or client-driven business focus, explorative innovation failed because of disjointed and unfocused bodies of individual, organisational and client human capital (see Section 7.3.1), structure capital (see Section 7.3.2), and relationship capital (see Section 7.3.3) at a social level.

8.2.2 Hypothesis 2: Capabilities

Hypothesis 2: A small construction knowledge-intensive professional service firm which generates and integrates exploitative and explorative capabilities through appropriate interaction between human capital, structure capital, and relationship capital will generate appropriate knowledge capital to stimulate and support successful innovation.

For exploitative innovation, Hypothesis 2 was confirmed (see Section 7.4.4). The findings indicate that successful exploitative innovation supported by operational exploitative capability is targeted at, and stimulated by, tangible, client-driven business needs. Successful exploitative innovation was characterised by integrated human capital, structure capital, and relationship capital (see Section 7.4.1, 7.4.2 and 7.4.3) around a specific client-driven need. Unsuccessful exploitative innovation displaced fragmented human capital, structure capital, and relationship capital (see Section 7.4.1, 7.4.2 and 7.4.3), and did not benefit from a specific client-driven need. Interaction between structure capital and human capital was located at a social level, rather than at an operational level.

For explorative innovation, Hypothesis 2 appeared to be falsified (see Section 7.4.4). Successful explorative innovation was characterised by integrated human capital and relationship capital (see Section 7.4.1 and 7.4.3) around a specific project. There was no clear evidence that there was a link (interaction) between structure capital and

human capital (see Section 7.4.2) or relationship capital and structure capital (see Section 7.4.3). Success for specific explorative innovation was not determined by human capital and structure capital interaction or relationship capital and structure capital interaction.

The need for integrated structure capital (see Section 7.4.2 and 7.4.3) was found not to be a prerequisite for successful explorative innovation. This apparent discrepancy that successful explorative innovation can be produced without strongly coupled formal structure capital is discussed in the meta-hypothesis below.

8.2.3 Meta hypothesis: Knowledge capital

Meta hypothesis: A small construction knowledge-intensive professional service firm which generates and integrates relationship capital, structure capital, and human capital through exploitative and explorative capabilities will create knowledge capital for successful innovation and sustainable competitive advantage.

For exploitative innovation the meta hypothesis was confirmed with respect to exploitative capability (see Section 7.5.2). Successful exploitative innovation was characterised by integrated, operational knowledge capital around a tangible, client driven business need; whilst unsuccessful exploitative innovation was evidenced by disjointed social knowledge capital around intangible, non-client-driven business need.

For explorative innovation the meta hypothesis was confirmed with respect to explorative capability (see Section 7.5.1). Successful explorative innovation was characterised by integrated, operational knowledge capital around a project focal; whilst unsuccessful explorative innovation was evidenced by disjointed social knowledge capital around non-specific project context.

8.3 Contribution to innovation theory

8.3.1 Definition of knowledge-based innovation

The following definition of innovation set out in Section 2.5.5 was found to be useful and valid. Successful knowledge-based innovation is:

“The effective generation and implementation of a new idea which enhances overall organisational performance, through appropriate exploitative and explorative knowledge capital which develops and integrates, relationship capital, structure capital and human capital.”

This definition of knowledge-based innovation formed the basis for the knowledge-based innovation concept model. The next section will present this concept model.

8.3.2 Knowledge-based innovation concept model

The literature synthesis set out in Chapter 2 and Chapter 3 explored the general management and construction specific literature pertaining to innovation in SCKIPSFs. The literature review diagnosed the knowledge-based innovation concept model set out in Section 3.2 (see Figure 8.1). The literature was found, however, not extend its consideration to an explicit understanding of how these variables interact with each other (see Section 2.5.5). In developing and testing the conceptual model, this research confirmed the prevailing literature, but in a hitherto adequately addressed context of SCKIPSFs. These variables which make up the model are discussed as follows:

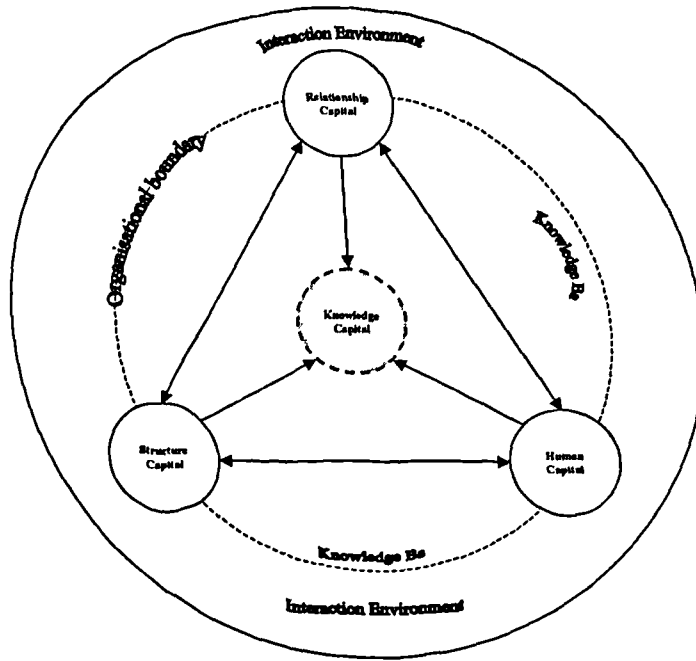


Figure 8.1 Conceptual knowledge-based innovation model for SCKIPSFs

1. Human capital

The **human capital (HC)** is defined as the capabilities and motivation of individuals within the SCKIPSF, client systems and external supply chain partners to perform productive, professional work in a wide variety of situations (see Section 2.5.4).

The research results confirm the importance of human capital in successful innovation. This is broadly consistent with the prevailing literature which notes that small businesses rely heavily on human capital (for example, see Barber and Manger, 1997³²⁷). The research findings draw attention to the importance of the company's internal capacity, ability and motivation. This is consistent with the literature that stresses that the internal capability to know how to discover, find, filter, gather, store, get access, and act on information to optimise performance was particularly important

³²⁷ Barber, E. and Manger, G. (1997), "Improving Management's Valuations of Human Capital in Small Firms", *Journal of Management Development*, 16/7, pp. 457-465.

in knowledge-intensive firms (Correia and Sarmiento, 2003)³²⁸.

For explorative innovation, the research findings indicate the critical role of staff capacity, ability and motivation. This is consistent with the literature on the role and capabilities of knowledge workers (Quinn *et al.*, 2000)³²⁹. Indeed, it was found that the nature of knowledge-intensive work encouraged staff to be 'self-motivated' in that they are directly responsible for the creation and use of an idea within a project-specific situation. This is consistent with Maister (1993)³³⁰ who emphasises that professionals are highly self-motivated to perform their own work. This view is extended by Scarbrough (1996)³³¹ and Tampoe (1993)³³² who identify personal growth, operational autonomy and task achievement as key motivators to the knowledge worker.

For exploitative innovation, the research findings indicate the dominant role of senior management, employee participation in decision-making, and time. First, the role of senior management in exploitative innovation involves the envisioning, creation and application of knowledge. The need for dedicated top management support to motivate senior management sufficiently in driving innovation was emphasised in exploitative innovation. This is consistent with the literature on SMEs which notes the significance of the role of the owner-manager in small business (for example, see Carter, 1996³³³; Vyakarnam *et al.*, 1996³³⁴). Second, the critical role of senior management in providing inspiration for employee participation in decision-making was particularly pertinent in exploitative innovation. Without senior management

³²⁸ Correia, A.M.R. and Sarmiento, A. (2003), "Knowledge Management: Key Competences and Skills for Innovation and Competitiveness", Paper presented at the Technology and HRM Conference on the Dual Interaction between Technology and Human Resource, 19th - 21st, CERAM Sophie Antipolis: France.

³²⁹ Quinn, J., Anderson, P. and Finkelstein, S. (2000), "Managing Professional Intellect: Making the Most of the Best" in J. Henry and D. Mayle (Eds.), *Managing Innovation and Change*, Sage publications: London, pp. 87-98.

³³⁰ See Maister (1993), *op. cit.*

³³¹ Scarbrough, H. (Eds.) (1996), *The Management of Expertise*, Blackwell: Oxford.

³³² Tampoe, M. (1993), "Motivating Knowledge Workers – The Challenge for the 1990s", *Long Range planning*, 26/3, pp. 49-55.

³³³ Carter, S. (1996), "Small Business Marketing" in M. Warner (Eds.), *International Encyclopaedia of Business and Management*, 5, Routledge: London, pp. 4502-4509.

³³⁴ Vyakarnam S., Jacobs, R. and Handelburg, J. (1996), "Building and Managing Relationships: The Core Competence of Rapid Growth Business", in *Proceedings of 19th ISBA National Small Firms Policy and Research Conference-Enterprising Futures*, 1, UCE Business School: Birmingham, pp. 661-683.

inspiration, employees subsequently become alienated from the innovation implementation process. Finally, the tension between the time and volatility of workload was evident. As a consequence, the need for 'time' resource was addressed in exploitative innovation. This is consistent with Chase (1997)³³⁵ who asserts that lack of time is the one of main barriers to knowledge transfer and innovation.

2. Structure capital

The **structure capital (SC)** is made up of systems and processes (such as company strategies, machines, tools, work routines, and administrative systems) for codifying and storing knowledge from individual, organisation, and external supply chain partners (see Section 2.5.4).

The key research findings indicate that principal focus for structure capital in exploitative innovation comprised the administrative systems, the team structure and computer systems; and, in explorative innovation, the team structure and teamwork. The research results reveal that the team structure, teamwork and senior management implementation through the team structure were pertinent in explorative and exploitative innovation. It was found that successful innovation had enduring senior management support from inception through to implementation, and supported by an enabling team structure which stimulated and developed teamwork at an operational level. This is consistent with Starbuck (1992)³³⁶ who notes the importance of social norms of teamwork within knowledge-intensive firms.

The key difference for exploitative innovation (compared to explorative innovation) is the necessity of the formalised systems and documentation systems within the firm. This is consistent with Blackler (1995)³³⁷ who emphasises that there is considerable reliance on 'encoded' knowledge for small businesses. The emphasis is on writing and documentation. However, it was found that the outcomes of explorative innovation in terms 'the lesson learned' or 'best practice' did not have sufficient

³³⁵ Chase, R.L. (1997), "The Knowledge-based Organisation: An International Survey", *Journal of Knowledge Management*, 1/1, pp. 38-49.

³³⁶ See Starbuck (1992), *op. cit.*

³³⁷ See Blackler (1995), *op. cit.*

demonstrable benefit or momentum to become embedded in structure capital; rather, the experiential learning stayed with the knowledge worker in a tacit form. This is consistent with both the professional service firm literature which stresses that individuals are the principal repositories of firms' competence (Morris and Empson, 1998)³³⁸, and with the small firm literature which emphasises that personal expertise is often not made explicit or codified (Shelton, 2001)³³⁹. The focus on individual, tacit repositories applied within specific projects resonates with the project-based organisation literature which identifies the common dislocation between project-based learning and company-wide learning (for example, see Gann and Salter, 1998³⁴⁰). The research findings strongly indicate that in the case of SCKIPSFs experiencing rapid growth, the limitation of formalised structures and systems is a restraining force for successful innovation.

In the prevailing literature, 'hard' innovation performance evaluation tools are seen as critical to ensuring improvements in organisation performance (for example, see Ahmed and Zairi, 2000³⁴¹). This research reveals no such clear relationship; rather, innovation is evaluated in a qualitative, ad-hoc manner. This arguably is consistent with the co-production nature of professional services but, as has been noted with exploitative innovation, as firms grow in size and complexity, there is an increasing demand for more calibrated, measured approaches to evaluating innovation in order to ensure adequate prioritisation and resource allocation.

3. Relationship capital

The **relationship capital (RC)** is the network resources of a firm. It is the resulting from interactions between individual, organisation, and external supplier chain partners, including reputation or image. Relationship capital is the means to leverage

³³⁸ Morris, T. and Empson, L. (1998), "Organisation and Expertise: An Exploration of Knowledge Bases and the Management of Accounting and Consulting Firms", *Accounting, Organizations and Society*, 23/5, pp. 609-624.

³³⁹ Shelton, R. (2001), "Helping a Small Business Owner to Share Knowledge", *Human Resource Development International*, 4/4, pp. 429-450.

³⁴⁰ Gann, D.M. and Salter, A.J. (1998), "Learning and Innovation Management in Project-based, Service-enhanced Firms", *International Journal of Innovation Management*, 2/4, pp. 431-454.

³⁴¹ Ahmed, R.K. and Zairi, M. (2000), "Innovation: A Performance Measurement Perspective" in J. Tidd (Eds.), *From Knowledge Management to Strategic Competitive: Measuring Technological, Market and Organisation Innovation*, Imperial College Press: Singapore, pp. 257-294.

human capital (see Section 2.5.4).

The research results confirm that relationship capital provides a critical network of contacts to enable creative action. This is consistent with the literature that relationship capital provides access to knowledge-based resources and is a valuable source of information (for example, see Hendry *et al.*, 1995³⁴²). Baker (2000)³⁴³, for example, argues that it is not “what you know”, but “whom you know.” The research findings identify that the key source of relationship capital for explorative innovation was located at internal, client, and supplier interactions (see Section 5.5.3); whilst for exploitative innovation was located at business adviser, internal, client and suppliers interactions (see Section 5.6.3). In addition, the research findings reveal ‘clients’ as being the principal agent in the interaction environment (see Section 5.5.3 and 5.6.3). The interaction environment is that part of the business environment which firms can interact with, and influence, including ‘the task environment’ (the environment where this client interaction occurs) and ‘the competitive environment’ (the environment where other firms which compete with the firm customer and scarce resources) (see Section 2.4).

It was evident that the initial ideas for explorative innovation were to meet specific project needs (client needs); and, the initial ideas for exploitative innovation targeted client-driven business needs. This is consistent with the literature by Schneider and Bowen (1995)³⁴⁴, who argue that service productivity is, to a significant degree, influenced by the exchange of information and resources between the service provider and client. The importance of client relationships view is emphasised by Tapscott (2000:12)³⁴⁵, who argues that “the wealth embedded in customer relationships is now more important than the capital contained in land, factories, buildings, and even bank accounts.”

The research findings further indicate that supplier interactions are very much meshed

³⁴² Hendry, C.A., Michael, B. and Jones, A.M. (1995), **Strategy through People: Adaptation and Learning in the Small-Medium Enterprise**, Routledge: London.

³⁴³ Baker, W. (2000), **Achieving Success through Social Capital: Tapping the Hidden Resources in Your Personal and Business Networks**, Jossey-Bass: San Francisco, CA.

³⁴⁴ Schneider, B. and Bowen, D. (1995), **Winning the Service Game**, Harvard Business School Press: Boston, MA.

³⁴⁵ Tapscott, D. (2000), **Digital Capital**, Harvard Business School Press, Boston, MA.

with identifying and understanding enabling knowledge, and this process was found to be proactive in nature. This is consistent with literature with Lee and Yang (2000:787)³⁴⁶, who argue that the relationship between a corporation and its suppliers is very important and can be regarded as an intangible and agile asset of the corporation. Stable and close relationships with suppliers mean that knowledge workers have more access to new, varied knowledge.

4. Knowledge capital

The **knowledge capital (KC)** is the dynamic synthesis of both the 'context' and 'process' of knowledge creation and conversion between Individual-Organisational-Individual knowledge base spiral, and the 'content' of relationship capital, structure capital and human capital (see Section 2.6). The research results demonstrate knowledge capital to be the focal or integrating social and technical nexus in which innovation takes place.

For explorative and exploitative innovation, knowledge capital in a 'social' context stimulates interaction and collective 'process orientated' knowledge creation and conversion. It has been widely accepted that organisational knowledge creation is heavily influenced by social processes (Chua, 2002)³⁴⁷. Nonaka and Takeuchi (1995)³⁴⁸ argue that the knowledge creation is heavily influenced by social interaction. Communication is the basis constituent in social interaction, according to Luhmann (1990:86-87)³⁴⁹: "without communication there can be no human relations." A supportive 'social context' within a SCKIPSF can be regarded as a key factor for successful innovation.

The knowledge capital in a 'technical' context supports the search for external knowledge and sharing of 'asset orientated' knowledge. It takes the form of IT (such as emails, internet), communication tool (such as telephone), records (such as

³⁴⁶ Lee, C. and Yang, J. (2000), "Knowledge Value Chain", *Journal of Management Development*, 19/9, pp. 783-793.

³⁴⁷ Chua, A. (2002), "The Influence of Social Interaction on Knowledge Creation", *Journal of Intellectual Capital*, 3/4, pp. 375-392.

³⁴⁸ See Nonaka and Takeuchi (1995), *op. cit.*

³⁴⁹ Luhmann, N. (1990), *Essays on Self-Reference*, Columbia University Press: New York, NY.

handwriting or electronic records) and so on. Email, for example, is perceived as being an important IT tool for knowledge-intensive firms (for example, see Robertson *et al.*, 2001³⁵⁰).

The research findings note, that through a 'technical' knowledge capital context, knowledge workers easily access explicit knowledge. In contrast, through a 'social' knowledge capital context, knowledge workers share their tacit knowledge, and it is this tacit interaction that is the principal source and driver of successful innovation.

8.3.3 Types of knowledge-based innovation

Two types of knowledge-based innovation identified in Section 5.4 were found to be an appropriate way of categorising the dominant modes of innovation observed in SCKIPSFs (see Figure 8.2). They are discussed below:

- (1) **Explorative innovation (mode 1)** is viewed as innovation which focuses on client facing, project-specific problem-solving. Explorative innovation activity heavily relies on the capacity, ability and motivation of staff at an operational level to solve client problems and, in doing so, generates short-term competitive advantage (i.e. project specific). The outcome of this innovation focuses on effective and efficient delivery of services to satisfy current external project needs, but are often not embedded in the organisational structure capital due to management attention and company resources being constantly focused on current or future project-specific considerations (see Section 5.5).
- (2) **Exploitative innovation (mode 2)** is viewed as innovation which focuses predominantly on internal organisation and general client development activity which is not project-specific fee earning activity. Exploitative innovation activity heavily relies on the capacity, ability and motivation of senior management at a social level to improve organisational effectiveness and efficiency to generate sustainable competitive advantage. The distinctive feature of exploitative innovation (compared to explorative innovation) is that

³⁵⁰ See Robertson, Sørensen and Swan (2001), *op. cit.*

new phenomena, systems or structures are securely embedded in the structure capital of the firm (see Section 5.6). This key difference between explorative and exploitative innovation is shown in Figure 8.2.

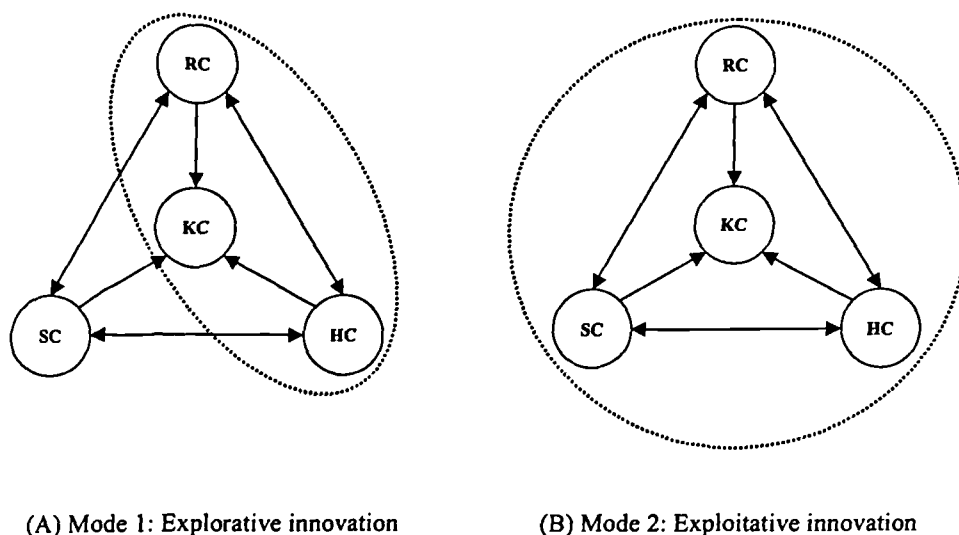


Figure 8.2 Types of knowledge-based innovation

The concept of explorative and exploitative routines (March, 1991)³⁵¹ was introduced in Section 2.5.5. It was noted that explorative routines focused on search, variation, experimentation, flexibility, and discovery to create new opportunities and resources to generate sustainable competitive advantage. In contrast, exploitative routines were characterised by refinement and efficiency activities to leverage existing resources to ensure competitive advantage.

The research findings challenge this distinction; indeed, in SCKIPSFs, it appears that the focuses of explorative and exploitative routines are reversed. Two modes of knowledge-based innovation have been discerned: explorative innovation and exploitative innovation. Explorative innovation was found to be located at immediate ‘new’ project domains, and entailed “search, variation, experimentation, flexibility and discovery” explorative activity to share project-specific problems. In contrast,

³⁵¹ See March (1991), *op. cit.*

exploitative innovation concentrated on implementing generic organisational infrastructure (such as ISO 9001 quality management system) to ‘refine’ and ‘improve the efficiency’ of the firm operations to exploit its capability for future activity.

The research findings further provide the characteristic generic and distinctive variables for successful and unsuccessful explorative innovation (see Table 8.1) and for successful and unsuccessful exploitative innovation (see Table 8.2).

Table 8.1 Variables for explorative innovation

Variables	Generic variables	Distinctive variables for successful innovation	Distinctive variables for unsuccessful innovation
Human capital	<ul style="list-style-type: none"> • The capacity, ability and motivation of staff 	<ul style="list-style-type: none"> • Social or operational nature of knowledge being applied to meet project needs 	<ul style="list-style-type: none"> • Social nature of knowledge not being applied to meet project needs
Structure capital	<ul style="list-style-type: none"> • Team structure • Teamwork 	<ul style="list-style-type: none"> • Team-based ideas • Teamwork • Senior management involvement through teamwork 	<ul style="list-style-type: none"> • Individual-based ideas • Individual based work • Senior management not involved in teamwork • Limitation of relevant and updated information within the structure
Relationship capital	<ul style="list-style-type: none"> • Operational RC: within internal, client, and supplier interactions • Social RC: within internal, client, and supplier interactions 	<ul style="list-style-type: none"> • A combination of operational RC and social RC being applied to meet project needs 	<ul style="list-style-type: none"> • Social RC not being applied to meet project needs
Knowledge capital	<ul style="list-style-type: none"> • Social context: company environments (office, meeting room), pub • Technical context: e-mails, the internet 	<ul style="list-style-type: none"> • A combination of social context and technical context 	<ul style="list-style-type: none"> • Technical context
Outcome	<ul style="list-style-type: none"> • Effective and efficient delivery of services to satisfy current and/or future project needs 	<ul style="list-style-type: none"> • Project performance improvement 	<ul style="list-style-type: none"> • Individual performance improvement

Table 8.2 Variables for exploitative innovation

Variables	Generic variables	Distinctive variables for successful innovation	Distinctive variables for unsuccessful innovation
Human capital	<ul style="list-style-type: none"> • The capacity, ability and motivation of senior management • Employee participation 	<ul style="list-style-type: none"> • Top management support • Senior management implementation • Some employees buy in <ul style="list-style-type: none"> ◦ Training 	<ul style="list-style-type: none"> • Top management not supportive • Senior management not driving the implementation • Lack of time • Employees not bought in <ul style="list-style-type: none"> ◦ Inappropriate encouragement ◦ Not related to an individual job
Structure capital	<ul style="list-style-type: none"> • The administrative system • Team structure • Computer systems 	<ul style="list-style-type: none"> • Formalised structures and documentation systems • Senior management implementation through the team structure 	<ul style="list-style-type: none"> • No formalised structures and documentation systems • Senior management not driving the implementation through the team structure
Relationship capital	<ul style="list-style-type: none"> • Operational RC: within business adviser, internal, client and supplier interactions • Social RC: within internal interactions 	<ul style="list-style-type: none"> • A combination of operational RC and social RC being applied to meet project needs 	<ul style="list-style-type: none"> • Social RC not being applied to meet project needs
Knowledge capital	<ul style="list-style-type: none"> • Social context: company environments (office and open family culture), pub • Technical context: e-mails and the internet 	<ul style="list-style-type: none"> • A combination of social context and technical context being applied to meet project needs 	<ul style="list-style-type: none"> • A combination of social context and technical context being applied to meet project needs
Outcome	<ul style="list-style-type: none"> • Organisational effectiveness and efficiency 	<ul style="list-style-type: none"> • Organisational performance improvement 	<ul style="list-style-type: none"> • Individual performance improvement

Going back to March (1991)³⁵², the argument put forward is that firms need to have a balance between activities that contribute to exploration of new opportunities, and knowledge and resources and activities that contribute to exploitation of the existing opportunities, knowledge and resources. The balance between exploration and exploitation is key to the understanding of the successful innovating firm. This issue is the focus of the next section.

³⁵² See March (1991), *op. cit.*

8.3.4 Definition of a successful knowledge-based innovating firm

The research findings revealed that there was no balance between, and integration of, explorative and exploitative knowledge capitals. The emphasis was on explorative innovation. Further, the results shows that successful explorative innovation appeared to not need integrated structure capital. It was evident, however, that lessons learned from projects were not captured at an exploitative knowledge capital level and fed into current or future projects.

It can be speculated that within SCKIPSFs there is too much emphasis on individual learning on the project level (explorative innovation) to be the detriment of the organisational level learning (exploitative innovation). (This deficiency was very much a stimulus for the interim project review process innovation described in Chapter 6.) The proposition is shown in Figure 8.3.

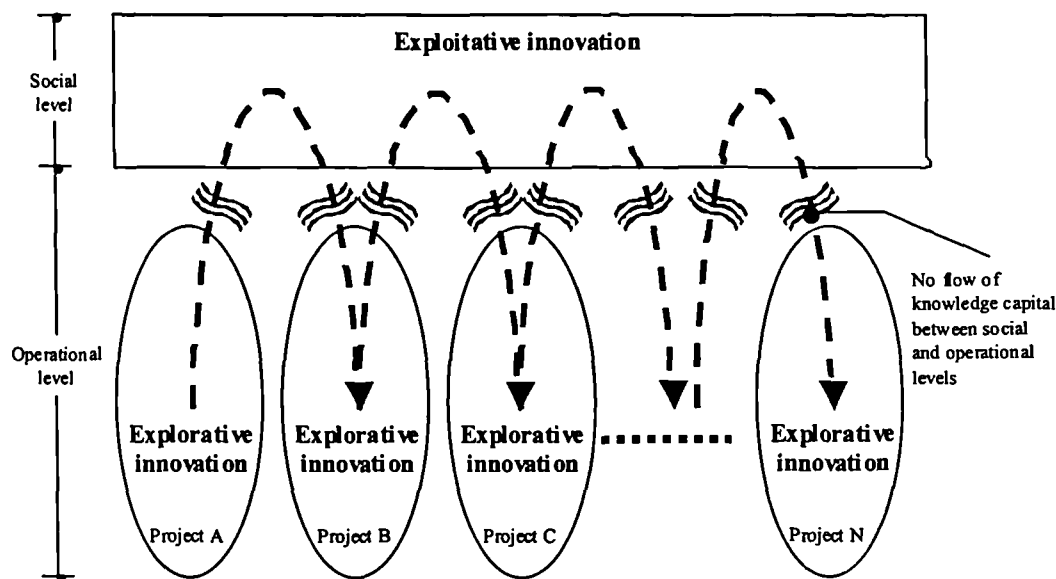


Figure 8.3 The boundary between explorative and exploitative innovation

At the bottom of the diagram, 'self contained' projects are shown where often successful explorative innovation taken place. However, there is not appropriate

structure capital in place to encourage the flow of ‘project’ knowledge capital to ‘organisational’ knowledge capital at the social level to stimulate exploitative innovation (shown in the top half of the diagram), and vice versa. There is thus not appropriate balance between explorative and exploitative innovation over time.

This lack of integration between explorative and exploitative knowledge capitals, along with the apparent lack of need for integrated structure capital for explorative innovation requires a reconsideration of “**what is successful innovation?**” This emphasis of explorative knowledge capital over exploitative knowledge capital is not sustainable within rapidly growing firms such as Calderpeel, as the limitation of structure capital will become increasingly evident as a significant restraining force for the effective integration of explorative and exploitative knowledge capitals. (This restraining force has arguably been recognised by Calderpeel in its aspiration to become ISO 9001 accredited, and in its decision to adopt the development and use of an interim project review process as the focus of the action research process - see Section 6.2.1.) The ideal balance between explorative and exploitative knowledge capital is shown in Figure 8.4.

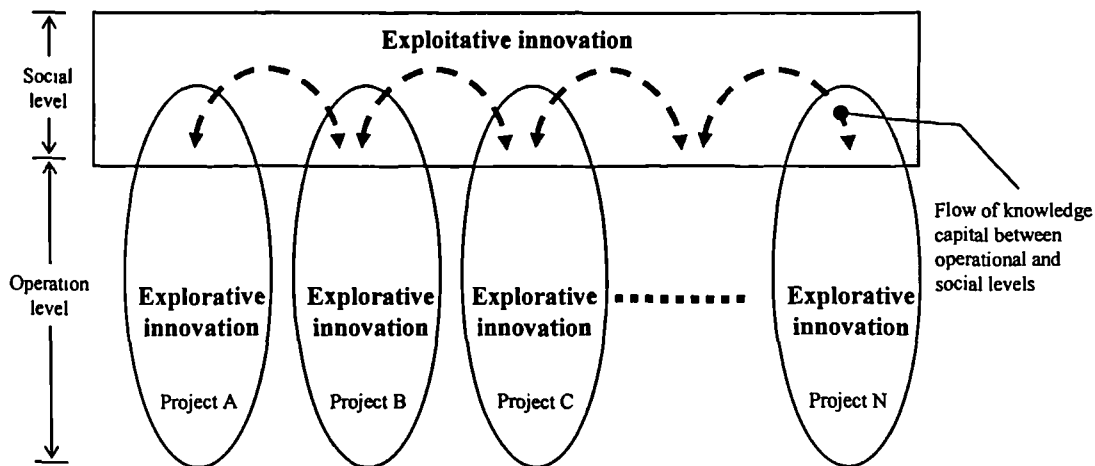


Figure 8.4 Ideal balance between explorative and exploitative knowledge capital

However, the lack of balance between explorative and exploitative knowledge capital is not inconsistent with this definition of successful knowledge-based innovation

proposed in Section 2.5.5. With the benefit of the research findings, it is now evident that this definition is only appropriate for ‘an’ innovation, but apparently does not adequately address the need for sustainable innovation activity at a firm level, i.e. a successful explorative innovation was found to not be creating exploitative knowledge capital to stimulate cumulative learning and innovation across projects over time.

The meta-hypothesis thus ushers in the need to consider not only “**what is successful innovation?**”, but “**what is a successful innovating firm?**” The reorientation of the question results in the need to consider the flow of integrated innovation overtime. The following definition of a successful knowledge-based innovating firm is offered to accommodate the time dimension:

“The effective generation and implementation of *a flow of new ideas* which enhance overall organisational performance *over time*, through appropriate exploitative and explorative knowledge capital which develops and integrates, relationship capital, structure capital and human capital.”

8.4 Comment on research problem

In developing and testing the conceptual knowledge-based innovation model, this research confirms the assertion in Section 1.2 that the prevailing construction guidance for successful innovation is not appropriate for SCKIPSFs. Three potential problems of this lack of explicit research into innovation in SCKIPSFs were identified. Each problem is addressed below.

1. Innovation theory tends to be based on manufacturing-based firms; rather than service-based firms in general, and on construction KIPSFs in particular (see Section 1.2).

The literature review identified that there are significant differences between innovations in manufacturing-based firms and service-based firms (for example, see Miles, 2000³⁵³). The literature review identified that innovations in the manufacturing sector often emphasise R&D work leading to ‘technological’ novelties

³⁵³ See Miles (2000), *op. cit.*

(for example, see Freeman, 1982³⁵⁴; Rothwell and Zegfeld, 1982³⁵⁵); whilst innovations in the service sector are often based on social networks leading to ‘non-technical’ innovations (for example, see Kandampully, 2002³⁵⁶; Sundbo, 1999³⁵⁷).

The research findings confirmed the ‘non-technical’ emphasis of innovation activity with, for example, effort being allocated to creating a novel mission statement and implementing new IiP management system. Technical innovation was evident in new building designs. This domain of innovation was found to be intrinsically different to manufacturing innovation, however, which creates new products which embody both new component and materials (component innovation) and new linkages between them (architectural innovation) (Henderson and Clark, 1990)³⁵⁸. In contrast, the technical design innovation was characterised by novel architectural innovation using existing components and materials.

The social characteristics of service innovation compared to manufacturing innovation were also confirmed. Innovation was found to be principally driven by unique co-production of knowledge and innovative solutions between professionals and their clients. This is in contrast to the linear, decoupled nature of manufacturing innovation where ‘interaction’ is with a homogeneous client ‘base.’ Further, the literature review identified that innovations in services are often more socially integrated than in manufacturing innovation (Bilderbeek *et al.*, 1994³⁵⁹; Sundbo, 1997³⁶⁰).

2. Innovation research tends to focus on non-project based firms in relatively stable supply chains; rather than project-based firms in relatively unstable supply chains in general, and on construction KIPSFs in particular (see Section 1.2).

³⁵⁴ See Freeman (1982), *op. cit.*

³⁵⁵ See Rothwell and Zegfeld (1982), *op. cit.*

³⁵⁶ See Kandampully (2002), *op. cit.*

³⁵⁷ See Sundbo (1999), *op. cit.*

³⁵⁸ Henderson, R. and Clark, K.B. (1990), “Architectural Innovation: The Manufacturing of Existing product Technologies and the Failure of Established Firms”, *Administrative Science Quarterly*, 35, pp. 9-30.

³⁵⁹ See Bilderbeek, Den Hertog, Huntink, Bouman, Kastrinos and Flanagan (1994), *op. cit.*

³⁶⁰ See Sundbo (1997), *op. cit.*

The literature review revealed that there are significant differences between innovations in non-project based firms and project-based firms (for example, see Gann, 2000³⁶¹; Gann and Salter, 2000³⁶²). First, the literature review identified that non-project based firms are better able, through functional hierarchy, to own and maintain innovation compared to project-based firms. Further, the literature review observed that project-based firms are often in loose coupled horizontal transactions between project teams (for example, see Turner and Keegan, 1999³⁶³). The research findings confirmed that innovation activity, particularly when exploration in nature in the result of co-production with the client. The 'tangible' fruits of innovation activity are 'owned' by the client in the form of an improved building or architectural service. The 'intangible' benefits of innovation do flow to, and accumulate in, individual professionals in the form of tacit knowledge which can be adopted and used in future projects.

Second, the literature review identified that the focus of innovation in non-project based firms is viewed as improving organisational performance (for example, see Nonaka and Takeuchi, 1995³⁶⁴; Young *et al.*, 2001³⁶⁵); whilst innovations in project-based firms are often seen as useful, but primarily as costly and dangerous (for example, see Keegan and Turner, 2002³⁶⁶). The research findings revealed that innovations in project-based firms are of benefit for both project and organisational levels (see Section 5.5.4 and 5.6.4). However, the principal focus was explorative innovation at a project level, as the benefit was seen as immediately and tangibly client-focused. This is consistent with the project-based organisation literature which argues that innovation is primarily perused within projects rather than a centralised 'innovation' function (for example, see Becher, 1999³⁶⁷; Gann, 1994³⁶⁸). In contrast, non-fee earning exploitation innovation was viewed as being of a lower priority, and inherently risks in terms of its opportunity costs of using up finite resource.

³⁶¹ See Gann (2000), *op. cit*

³⁶² See Gann and Salter (2000), *op. cit*.

³⁶³ See Turner and Keegan (1999), *op. cit*

³⁶⁴ See Nonaka and Takeuchi (1995), *op. cit*

³⁶⁵ See Young, Charns, and Shortell (2001), *op. cit*

³⁶⁶ See Keegan and Turner (2002), *op. cit*

³⁶⁷ Becher, T. (1999), *Professional Practices*, Transaction Publications: London.

³⁶⁸ Gann, D. (1994), "Innovation in the Construction Sector" in M. Dodgson and R. Rothwell (Eds.), *The Handbook of Industrial Innovation*, Edward Elgar: Aldershot, pp. 202-212.

3. Innovation research tends to focus on large firms; rather than small firms in general, and on construction KIPSFs in particular (see Section 1.2).

Four challenges unique to small manufacturing firms were identified (Rothwell and Zeguel, 1982)³⁶⁹. They are discussed below.

First, small firms have limited staff capability to undertake R&D compared to large firms. The research findings produced a varied conclusion to this assertion. For explorative innovation, it was found that the firm had sufficient capability to bring about project-based innovation. However, it was evident that the firm lacked capability to undertake non-architectural exploitative innovation; this was apparent in the use of external consultants to develop its quality management systems.

Second, the small firms have scarce time and resources to allocate to external interaction compared to large firms. The research findings did not confirm this argument for explorative innovation as the co-production reality of professional service resulted in continuous interaction with external clients. In contrast, for exploitative innovation, the resource allocation priority to project activity resulted in more limited interaction to absorb external ideas for general organisational development.

Third, small firms are often affected by the excessive influence of senior management. Small firms are often dominated by a single owner or small team who may use inappropriate strategies and skills. The research findings painted a bipolar picture in this regard. At an operational, project level, teams and individual staff were empowered to envision and implement innovation activity with little, if any, intervention from senior management. In contrast, at a social, non-project level, it was found that senior management played a significant gatekeeper role to what innovation activity was prioritised and resourced. This is consistent with the project-based organisation literature which notes that innovation activity is controlled by

³⁶⁹ See Rothwell and Zeguel (1982), *op. cit*

senior management coalition (Gann and Salter, 2003³⁷⁰). It was evident, however, that the senior management emphasis was on prioritising and resourcing external fee earning project activity.

Finally, small firms can have difficulty in raising finance and maintaining adequate cash flow which can result in limited scope for capital for ongoing innovation in innovation activity compared to large firms. The issue of finance, per se, did not emerge as an enabler or constraint for innovation activity. The co-produced, social nature of project-based innovation made the cost of human capacity the pertinent resource currency. The emphasis on explorative innovation was found to significantly erode the available human resource capacity to progress exploitative innovation.

In summary, the research findings confirmed that the prevailing innovation literature does not adequately capture and explore the unique nuances, characteristics and needs of SCKIPSFs.

8.5 Comment on research questions

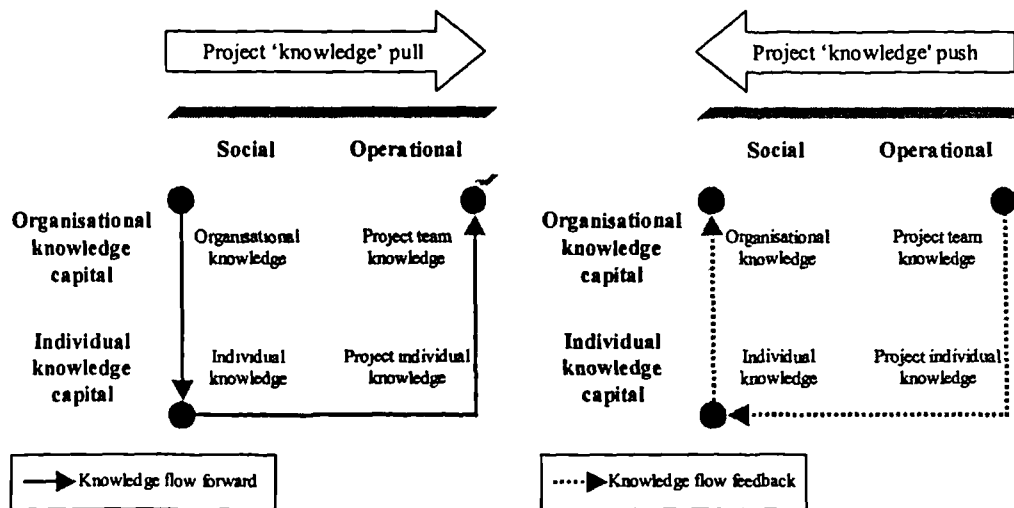
Q1: How do SCKIPSFs appropriately develop and manage knowledge interaction activities between individual-organisational-individual (I-O-I) knowledge ba spiral, and how do these arrangements affect innovation performance?

The research findings reveal that successful innovation in SCKIPSFs is principally characterised by “project pull” and “project push” I-O-I knowledge ba spirals which create dynamic project and/or client-driven knowledge capital. The phenomenon is shown in Figure 8.5.

The left hand side of the Figure depicts specific project requirements (either external fee-producing projects or internal client-driven projects) “pulling,” combining and

³⁷⁰ Gann, D. and Salter, A. (2003), “Project Baronies: Growth and Governance in the Project-based Firm”, *Proceedings of the DRUID Summer Conference: Creating, Sharing and Transferring Knowledge: The Role of Geography, Institutions and Organizations*, Copenhagen, 12th-14th June.

converting, ‘organisational knowledge’ and ‘individual knowledge’ to form specific ‘project individual knowledge.’ Individual project knowledge is integrated and leveraged to create ‘project team knowledge’ which is appropriately applied to create successful innovation. The feedback I-O-I knowledge ba spiral is complemented (as shown in the right hand side of Figure) by a feedback or “project push” knowledge ba spiral where new specific ‘project team knowledge’ feeds back to develop ‘project individual knowledge’, which, in turn, further enhances ‘individual and organisational knowledge.’ The tacit, experiential knowledge accumulation and learning is the basis for subsequent cycles of project-based innovation.



(A) “Project pull” I-O-I knowledge ba spiral

(B) “Project push” I-O-I knowledge ba spiral

Figure 8.5 Successful innovation driven by operational focus

In contrast, the research findings identify that unsuccessful innovation in SCKIPSFs is principally characterised by “organisation push” of disjointed, unfocused ‘social’ non-project and/or non-client-driven knowledge capital being “rejected” by day-to-day project priorities and activities. Without a project focus, innovation fails because the I-O-I knowledge ba spiral does not happen. The phenomenon is shown in Figure 8.6.

Figure 8.6 depicts that there is no specific project needs ‘pulling’ individual,

organisational knowledge together. Rather, generic 'organisational knowledge' is 'pushed' into a project team setting without appropriate filtering and adaptation to meet specific project needs. Further, the 'organisational knowledge' does not benefit from individual knowledge worker championing and tacit understanding. In combination, the 'organisational knowledge' is 'rejected' by the project. As a consequence, the feedback loop through, individual, project and organisational knowledge does not happen.

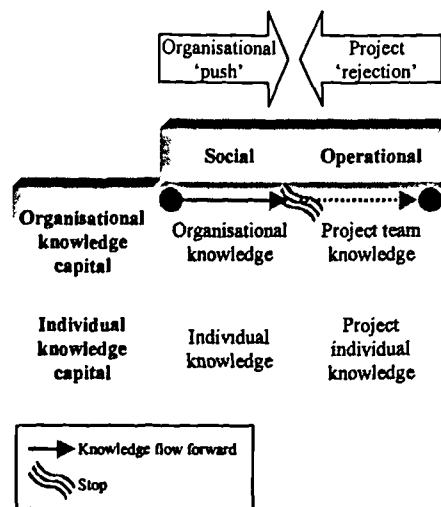


Figure 8.6 Unsuccessful innovation driven by social focus

Q2: How do SCKIPSFs appropriately manage and motivate their knowledge workers to create and engage in this development of, and alignment between, individual-organisational-individual (I-O-I) knowledge ba spiral?

The research findings identify that successful innovation in SCKIPSFs is principally focused on specific project needs and/or client-driven business needs. It was found that the interaction and co-production between the knowledge worker and the client within a 'project setting' is the principal vehicle for managing and motivating knowledge workers. Knowledge workers are intrinsically motivated to undertake interesting knowledge intensive work in their chosen field – in Calderpeel's case, to engage with clients to produce high calibre architectural solutions on a project-to-

project basis. The research findings indicate that ‘senior management commitment’ was the key for SCKIPSFs to manage and motivate their knowledge workers to create and engage I-O-I knowledge ba spirals (see Figure 8.7).

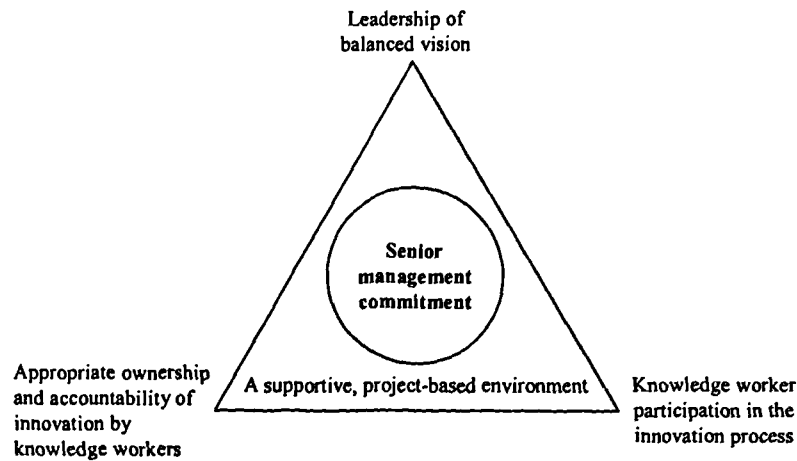


Figure 8.7 An ideal integration of individual and organisational needs

Senior management commitment to appropriate ‘leadership’ is necessary to generate an inclusive, galvanising strategic vision which balances and progresses both individual and organisational needs within a project-based setting; and, which empowers knowledge workers to meaningful ‘participate’ in the innovation process and to delegate appropriate ‘ownership’ and ‘accountability’ of the innovation to encourage its enduring relevance and success.

For Calderpeel, two key practical ways can be identified from the research results to assist in bringing about successful innovation. First, there is a need for senior management to have the capability to manage all aspects of the innovation process. It was evident, for example, in the action research phase, that senior management vision and support was missing at key stages. A contribution to a remedy for this is for senior management to have appropriate education and training in innovation management. Second, effective communication within and between project teams to create and manage innovation activity is essential. It was found that within Calderpeel the constant pressure of project delivery hampered this aspect of

innovation capability. Senior management should, therefore, establish and adequately resource knowledge sharing meetings which are independent from day-to-day project activity.

8.6 Limitations of research findings

A twenty-two month single case study was used to produce the research findings (see Section 4.6.3). The research findings are thus limited by the degree of 'representativeness' and 'generalisability' of the case study. These limitations have been addressed by: a sampling strategy to select a representative SCKIPSF, based on the size and type of firms (see Section 4.6.2), and, appropriate, rigorously applied, case study and action research approach (see Section 4.6.3), data collection techniques (see Section 4.7) and data analysis techniques (see Section 4.8).

In combination, the appropriate research design and evaluation, it is argued, permit the results to be generalised, with a significant degree of confidence, to the theoretical understanding of innovation within SCKIPSFs.

8.7 Areas for further research

The research findings indicate a number of broad areas for further study.

1. Testing the generalisability of the research with larger sample of SCKIPSFs

The study reported here was exploratory in nature and was based on a single case. The results could be fruitfully tested within a larger sample of architectural SCKIPSFs and other discipline SCKIPSFs (e.g. building survey and quantity survey practices) to strengthen or appropriately limit the generalisability of this research.

2. Cross-industry comparison

This research investigated innovation in small construction knowledge-intensive professional service firms. It would be interesting to compare and contrast the

findings with SKIPSFs in other industries to identify areas of commonality and difference with respect to innovation activity. In so doing, the work would contribute to knowledge and 'good practice' transfer across industry sectors.

3. Testing the relevance of the KIPSF to large construction firms

The research reported here is based on a 'small' sized construction company. The finding could be usefully explored from a large construction firm perspective to create a better understanding of large firm / small firm innovation in supply chain with respect to innovation. This has the potential to enhance our understanding of the interface between small and large firms in supply chains when they have significantly different approach to, and characteristics of, innovation activity with small and large firms.

8.8 Envoi

This research has provided an insight into innovation within SCKIPSFs through a twenty-two month case study comprising the exploratory phase and the action research phase. The results have demonstrated that SCKIPSFs have unique needs and characteristics that drive and shape innovation activity compared to large firms or non-KIPSFs. These signification differences are not adequately reflected in the prevailing innovation literature which tends to focus on large, manufacturing, non-project based firms. There is a clear need for this deficiency to be addressed, and a body of research which focuses on innovation in SCKIPSFs to be developed.

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Appendices

Appendix A Innovation in SMEs survey 2003 proposal



School of Construction & Property Management

Innovation in Construction Survey 2003

What is the purpose of this survey?

To help small construction and property professional service firms to innovate successfully and profitably

What are the benefits to the collaborating firms?


- ◆ Collaborating case study report for each firm to describing current innovation process and giving guidance on the areas of improvement.
- ◆ The opportunity to network with other construction and property professional service firms facing similar challenges and to share good practice
- ◆ The opportunity to forge long-term collaborative links with the school construction and property management, which is the highest rating in the building environment area in the UK

Why types of firms are we interested in?

- ◆ Small to medium size companies which have staff numbers between 11 and 100
- ◆ Consultancy firms (such as consulting, architecture, building service, building survey, and quantity survey etc).


What commitment is required for the collaborating firm?


- ◆ Interviews with six members of staff of different level of seniority Each interview will be 1 to 2 hours long.
- ◆ Access to company documentation where appropriate.
- ◆ All interviews and company documentation analysis will be in strictly confidential only articulated staff will be published.



Appendix B List of company documentation


No	Description	File type
1	Company Handbook	Electronic file
2	Calderpeel Quality Manual	Electronic file
3	CAD Handbook	Electronic file
4	Examples of job form	Hand written documents
5	Examples of drawing issue sheet	Hand written documents
6	Examples of site record sheet	Hand written documents
7	Examples of snagging sheet	Hand written documents
8	Examples of nonconformity report	Electronic file
9	Examples of nonconformity spreadsheet	Electronic file
10	Examples of audit schedule	Electronic file
11	Examples of audit check list	Electronic file
12	Examples of audit report	Electronic file
13	Examples of telephone conversations record	Hand written documents
14	Examples of induction record	Hand written documents
15	Examples of employee CPD record	Electronic file
16	Examples of client correspondence	Hand written documents
17	Examples of Calderpeel correspondence	Electronic file

 Calder Peel Partnership Ltd Calderpeel J			
Objective	Phase 1: Analysis <ul style="list-style-type: none"> General fact finding <ul style="list-style-type: none"> Understand general information about the firm and its employees, its key areas of business, market(s) which operating Successful / unsuccessful innovation within the firm <ul style="list-style-type: none"> Understand drivers, enabler and barriers for the firm to successful / unsuccessful innovation 	Phase 2: Evaluation workshop <ul style="list-style-type: none"> Feedback findings to the firm about its innovation performance and potential areas for improvement Identify innovation activity which company would benefit from (University of Salford input) 	Phase 3: Innovation <ul style="list-style-type: none"> Work in collaboration to bring about a successful innovation activity
Information gathering approach	<ul style="list-style-type: none"> Interviews Company documentation 	<ul style="list-style-type: none"> Workshop 	<ul style="list-style-type: none"> Interviews (involving in appropriate meeting, etc.) Observation Company documentation Questionnaire surveys
People	<ul style="list-style-type: none"> 1-2 senior management 1-2 project architects/managers 1-2 architect assistants/senior technicians 	<ul style="list-style-type: none"> 5-6 key people 	<ul style="list-style-type: none"> All relevant employees within the firm
Resource implications	<ul style="list-style-type: none"> Up to 90 minutes for each interview Assess to company documents 	<ul style="list-style-type: none"> Conference room (can be at University of Salford if required) Up to 3 hours 	<ul style="list-style-type: none"> Assess to company documents Involvement in appropriate company activity Up to 6 months
Time	01/11/2003 - 30/11/2003	01/12/2003 - 15/12/2003	01/01/2004 - 30/06/2004




Deliverable: General Finding Report

- Identification the firm's innovation performance and potential areas for improvement



Deliverable: Workshop Report

- Understanding the firm's current innovation performance
- Identification potential areas for future innovation performance improvement



Deliverable: Final Report

- Feedback on strength and weakness of innovation activity, and identification of potential areas for improvement

Doc Ref: Draft 1
 29/10/2003



Calder Peel Partnership Ltd

	Phase 1: Analysis	Phase 2: Evaluation workshop	Phase 3: Innovation
Objective	<ul style="list-style-type: none"> General fact finding <ul style="list-style-type: none"> Understand general information about the firm and its employees, its key area of business, market(s) which operating Successful / unsuccessful innovation within the firm <ul style="list-style-type: none"> Understand drivers, enabler and barriers for the firm to successful / unsuccessful innovation 	<ul style="list-style-type: none"> Feedback findings to the firm about its innovation performance and potential areas for improvement Identify innovation activity which company would benefit from in variety of Salford input 	<ul style="list-style-type: none"> Work in collaboration to bring about a successful innovation activity
Information gathering approach	<ul style="list-style-type: none"> Interviews Company documentation 	<ul style="list-style-type: none"> Workshop 	<ul style="list-style-type: none"> Interviews (involving in appropriate meeting, etc.) Observation Company documentation Questionnaire survey All relevant employees within the firm
People	<ul style="list-style-type: none"> 1 senior manager 2 project architects/managers 2 architect assistants/senior technicians/technicians 	<ul style="list-style-type: none"> 5 interviewees (can be more people attended if required) 	
Resource implications	<ul style="list-style-type: none"> Up to 90 minutes for each interview Assess to company documents 	<ul style="list-style-type: none"> Conference room (can be at University of Salford if required) Up to 3 hours 	<ul style="list-style-type: none"> Assess to company documents Involvement in appropriate company activity Up to 6 months
Time	17/11/2003 - 19/12/2003	01/01/2004 - 16/01/2004	01/02/2004 - 31/07/2004



Deliverable: General Finding Report

- Identification the firm's innovation performance and potential areas for improvement

Deliverable: Workshop Report

- Understanding the firm's current innovation performance
- Identification potential areas for future innovation performance improvement

Deliverable: Final Report

- Feedback on strength and weakness of innovation activity, and identification of potential areas for improvement

Doc Ref: Draft 2
06/11/2003

Appendix E Interview co-operation proposal



Innovation Survey 2003 in Calder Peel Partnership Ltd



- Aim of this survey is to help your company to innovate successfully and profitably.
- Purpose of this survey is to gather the information and experiences of your company in successful/unsuccessful innovation activities
- Interview and workshop plan

		Phase 1: Interviews	Phase 2: Workshop
Objective		<ul style="list-style-type: none"> Understand general information about the firm and you Understand drivers, enabler and barriers for the firm to successful / unsuccessful innovation from a wide range of business operations 	<ul style="list-style-type: none"> Evaluation interview findings to the firm about its innovation performance and potential areas for improvement
Information gathering approach		<ul style="list-style-type: none"> Face-to-face interview An audio recorder will be used through your interview 	<ul style="list-style-type: none"> Group discussion An audio recorder will be used through the workshop
Resource implication	Time	<ul style="list-style-type: none"> Up to 90 minutes 	<ul style="list-style-type: none"> Up to 3 hours
	Documentation	<ul style="list-style-type: none"> Assess to company documentation where appropriate related to innovation activities 	<ul style="list-style-type: none"> Assess to company documentation where appropriate related to innovation activities
Attendees		<ul style="list-style-type: none"> You 	<ul style="list-style-type: none"> You and other interviewees
Venue		<ul style="list-style-type: none"> Calder Peel Partnership Ltd 	<ul style="list-style-type: none"> Conference room in the Calder Peel Partnership Ltd
Duration		17/11/2003 - 19/12/2003	01/01/2004 - 16/1/2004

Deliverable: the word-processed document

- The content of your interview will be transcribed verbatim into the word-processed document.
- The word-processed document will be sent to you in order to check accuracy.

Deliverable: Workshop Report

Confidentiality

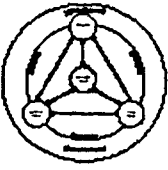

Although this survey requests your name and other specific information this is only for our purposes and will not be passed on to third parties or attributed directly in any public way.

For further information, please contact:

Shu-Ling Lu, PhD student, School of Construction and Property Management, University of Salford (E-mail: s.h.lu@salford.ac.uk, Tel: 0161 295 5352, Fax: 0161 295 5011)

17/11/2003

Appendix F Interview protocol

<p>Confidential</p> <p style="text-align: center;">Salford University - SCPM Innovation in SMEs in the Construction Industry THE 2003 INTERVIEW PROTOCOL</p> <div style="border: 1px solid black; padding: 5px; text-align: center; margin: 10px 0;">INTRODUCTION</div> <p>The interview is aimed for better understanding successful innovations in small knowledge-intensive professional service firms (SKIPSEs)</p> <p>By knowledge-based innovation we mean <i>the effective generation and implementation of a new idea, through appropriate development of, and conversion between, relationship capital, structural capital and human capital, to create knowledge capital, which enhances overall organisational performance.</i></p> <p>SECTION 1 is designed to collect background information about you, the company and its clients.</p> <p>SECTION 2 aims to understand in the way of your firm appropriate innovation and identify valuable resources and competences in innovation activities.</p> <p>You can go outside the boundaries of those questions to illustrate significant points you feel are important.</p> <p>Thank you for your time and support. Transcript will be sent to you for you to confirm that I have understood what you have said correctly.</p> <p style="margin-top: 20px;">If you would like to discuss anything further, please do not hesitate to contact:</p> <p>Shu-Ling Lu PhD student School of Construction and Property Management The University of Salford Bridgewater Building Salford Greater Manchester M7 1NU</p> <p>Tel. +44 (0) 161 295 5352 Fax. +44 (0) 161 295 5011 Web http://www.scpm.salford.ac.uk E-mail s.l.lu@salford.ac.uk</p>	<table border="1" style="width: 100%; border-collapse: collapse;"><tr><td style="padding: 2px;">Ref :</td><td style="width: 100px;"></td></tr><tr><td style="padding: 2px;">Date:</td><td></td></tr></table> <div style="text-align: center; margin-top: 20px;"></div> <div style="text-align: center; margin-top: 20px;"></div>	Ref :		Date:	
Ref :					
Date:					

Page 1 of 26

SECTION I: BACKGROUND

We are aware that much of the information we are asking you to give about your company may be commercially, or in other ways, highly sensitive. However, we assure you that all responses will be treated as **STRICTLY CONFIDENTIAL** and will be used for research purposes only. You or your company will not be identified or named in any publication arising from the research without your permission. Only aggregated data will be used.

A. About you

Name _____ Age: _____ No. of years with this company _____

Tel. No. _____ Fax. No. _____ E-mail _____

Your role/activity _____

Q1: Please tick "one box" to describe your position within your company:

- ☐ Top level management
☐ Middle level management
☐ First level supervisor
☐ Professional employee without supervisory role
☐ Other (Please specify) _____

Q2: Please tick "the relevant boxes" to describe your formal qualifications:

- ☐ 1 Graduate ☐ Cognitive / ☐ Non cognitive
☐ 2 Trainee members of professional institutions (Please specify) _____
☐ 3 Fully qualified members of professional institutions (Please specify) _____
☐ 4 Trained to HNC (Higher National Certificate) or HND (Higher National Diploma) (not included in 2 and 3)
☐ 5 Other (Please specify) _____

Q3: Please tick "the relevant boxes" to describe your company's status:

No.	No. of years with it	Main products/services	Type	Size
Company 1			<input type="checkbox"/> Public <input type="checkbox"/> Private	<input type="checkbox"/> Micro organisation (1-10 employees) <input type="checkbox"/> Small organisation (11-49 employees) <input type="checkbox"/> Medium organisation (50-250 employees) <input type="checkbox"/> Large organisation (more than 251 employees)
Company 2			<input type="checkbox"/> Public <input type="checkbox"/> Private	<input type="checkbox"/> Micro organisation (1-10 employees) <input type="checkbox"/> Small organisation (11-49 employees) <input type="checkbox"/> Medium organisation (50-250 employees) <input type="checkbox"/> Large organisation (more than 251 employees)
Company 3			<input type="checkbox"/> Public <input type="checkbox"/> Private	<input type="checkbox"/> Micro organisation (1-10 employees) <input type="checkbox"/> Small organisation (11-49 employees) <input type="checkbox"/> Medium organisation (50-250 employees) <input type="checkbox"/> Large organisation (more than 251 employees)

B. About your company (only one interviewee answer)**1. General corporate information**

Company name and address _____

Tel. No. _____ Fax No. _____ Website address _____

The business first established in _____ (year)

Company history _____

2. Company profile**Q1: Please tick "the relevant boxes" to describe your company's main activities and state approximately the percentage of its workload:**

- | | |
|---|--|
| <input type="checkbox"/> Multi disciplinary (%) | <input type="checkbox"/> Civil and Structural Engineering (%) |
| <input type="checkbox"/> Architectural (%) | <input type="checkbox"/> Planning (%) |
| <input type="checkbox"/> Surveying (%) | <input type="checkbox"/> Project management (%) |
| <input type="checkbox"/> Quantity surveying (%) | <input type="checkbox"/> Management consultancy (not project related) (%) |
| <input type="checkbox"/> Building services engineering (%) | <input type="checkbox"/> Other (Please specify) _____ (%) |

Q2: Please tick "one box" to describe your company's status:

- | | |
|--|--|
| <input type="checkbox"/> Public (Public Limited company with public investors) | <input type="checkbox"/> Proprietary (with owner managers) |
| <input type="checkbox"/> Subsidiary (Controlled by a parent company) | <input type="checkbox"/> Private (owners separate from management) |
| <input type="checkbox"/> Joint Venture | <input type="checkbox"/> Other (Please specify) _____ |

Q3: How many people does your firm currently employ?

No. of employees	<input type="text"/> <input type="text"/> <input type="text"/>	
No. of full-time employees	<input type="text"/> <input type="text"/> <input type="text"/>	No. of part-time employees <input type="text"/> <input type="text"/> <input type="text"/>
No. of fixed term or contract employees	<input type="text"/> <input type="text"/> <input type="text"/>	No. of temporary employees <input type="text"/> <input type="text"/> <input type="text"/>

Q4: How many employees do you have 12 months ago? **Q5: How many employees do you anticipate having in 12 months time?**

[illegible][illegible]

--

Q1: Please identify your principal clients:

No	Client name and percentage of its workload	Type	Size	Why do you feel this client comes to you
Client 1		<input type="checkbox"/> Public <input type="checkbox"/> Private	<input type="checkbox"/> Micro organization (1-10 employees) <input type="checkbox"/> Small organization (11-49 employees) <input type="checkbox"/> Medium organization (50-250 employees) <input type="checkbox"/> Large organization (more than 251 employees)	
Client 2		<input type="checkbox"/> Public <input type="checkbox"/> Private	<input type="checkbox"/> Micro organization (1-10 employees) <input type="checkbox"/> Small organization (11-49 employees) <input type="checkbox"/> Medium organization (50-250 employees) <input type="checkbox"/> Large organization (more than 251 employees)	
Client 3		<input type="checkbox"/> Public <input type="checkbox"/> Private	<input type="checkbox"/> Micro organization (1-10 employees) <input type="checkbox"/> Small organization (11-49 employees) <input type="checkbox"/> Medium organization (50-250 employees) <input type="checkbox"/> Large organization (more than 251 employees)	

(Note: Knowledge-based innovation is defined as 'the effective generation and implementation of a new idea, through appropriate development of, and conversion between, relationship capital, structural capital and human capital, to create knowledge capital, which enhances overall organisational performance'.)

Q1: How would you describe the term of 'knowledge' in the individual, organisational and supply chain level?

Description.	Discussion.
<p></p>	<p></p>

Q2: How would you describe the term of 'innovation' in the individual, organisational and supply chain level?

Description	Description

B. Company environment**Q1: Does your firm have any formal, written business strategy? If yes, how does it operate?**

Notes	Description	Discussion
<ul style="list-style-type: none"> What is your business strategy? How is the business strategy developed into the firm? How is the business strategy implemented into the firm? What are the role of directors, staff, clients and communication? 	<p style="text-align: center;">Informal <input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/> Formal</p>	

Q2: Does your firm have any innovation strategy? If yes, how does it operate?

Notes	Description	Discussion
<ul style="list-style-type: none"> What is your innovation strategy (e.g. IT, technology, communication, rewards/employee incentive etc)? How is the innovation strategy developed into the firm? How is the innovation strategy implemented into the firm? What are the role of directors, staff, clients and communication? 	<p style="text-align: center;">Informal <input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/> Formal</p>	

Q3: How does your company foster relationships (including those with its workforce, suppliers and clients) to encourage innovation activities?

Notes	Description	Discussion	Implied enablers/obstacles
<ul style="list-style-type: none"> What activities were carried out to foster relationships? How were these activities carried out? Who carried out these activities? 	<p style="text-align: center;">Informal <input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/> Formal</p>		

Q4: How does your firm develop the ability and motivation of its staff to bring about innovation?

Notes	Description	Discussion	Implied enablers /obstacles
<ul style="list-style-type: none"> • What activities were carried out to develop the ability and motivation of staff? • How were these activities carried out? • Who carried out these activities? 	Informal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Formal		

Q5: What structures and processes within your firm encourage/discourage innovation activities?

Notes	Description	Discussion	Implied enablers /obstacles
<ul style="list-style-type: none"> • What are the firm's structures and processes? • What activities were carried out to encourage/discourage innovation activities? • How were these activities carried out? • Who carried out these activities? 	Informal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Formal		

Q6: What knowledge management activity is in place to encourage knowledge sharing around innovations to take place?

Notes	Description	Discussion	Implied enablers /obstacles
<ul style="list-style-type: none"> • What is the firm's knowledge management activity? • What activities were carried out to encourage knowledge sharing? • How were these activities carried out? • Who carried out these activities? 	Informal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Formal		

C. Successful Innovation**C1. Identify successful innovations**

Q1: Please identify 'ONE' significant firm-generated successful innovation over the last two years. (Only senior manager answer)

Innovation 1
Chosen innovation
Why considered significant

Rate level of influence	Strength	Details
Senior management driven	+ □□□□ -	
Construction client driven	+ □□□□ -	
Legislation driven	+ □□□□ -	
Competitor driven	+ □□□□ -	
Your customer(s) driven	+ □□□□ -	
Your supplier(s) driven	+ □□□□ -	

Q2: Please identify 'ONE' significant firm-generated successful innovation over the last two years. (All interviewees answer except senior manager)

Innovation 2
Chosen innovation
Why considered significant

Rate level of influence	Strength	Details
Senior management driven	+ □□□□ -	
Construction client driven	+ □□□□ -	
Legislation driven	+ □□□□ -	
Competitor driven	+ □□□□ -	
Your customer(s) driven	+ □□□□ -	
Your supplier(s) driven	+ □□□□ -	

1. Generate a new idea

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> • What information sources were used (e.g. clients, suppliers, colleagues, reports etc.)? • What activities were carried out to scan for/collect information? • How were these activities carried out? • Who carried out these activities? 	<p>Team <input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/> Subject</p>		

How would rate the following characteristics of the information sources	Strength	Details
Accessibility	+ 00000 -	
Cost	+ 00000 -	
Fit	+ 00000 -	

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What activities were carried out to innovate from this information (e.g. evaluation etc.)? How were these activities carried out? Who carried out these activities? 	Informal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Formal		

How would rate the following characteristics of your company in the idea adoption phase?	Strength	Details
Structure focus	+ 00000 -	
Communication Internal	+ 00000 -	
Communication External	+ 00000 -	
Resources	+ 00000 -	
Authority	+ 00000 -	
Knowledge management	+ 00000 -	

2. Implement a new idea**Q1: How was the idea exploited?**

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> How was the innovation commercialised/utilised? What activities were carried out to commercialise/utilise this innovation? How were these activities carried out? Who carried out these activities? 	Active <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Passive		

How would rate the following characteristics of your company in the exploitation phase.	Strength	Details
Supply chain focus / commitment	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Marketing	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Resourcing	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Authority	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	

3. Company support**Q1: How was this innovation supported by your firm's relationships?**

Notes	Description	Discussion	Enablers / Obstacles
<ul style="list-style-type: none"> What relationships were used to support this innovation? What activities were carried out to support this innovation? How were these activities carried out? Who carried out these activities? 	Informal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Formal		

Q2: How did your firm develop the ability and motivation of its staff to support this innovation?

Notes	Description	Discussion	Enablers / Obstacles
<ul style="list-style-type: none"> • What activities were used to develop the ability and motivation of staff in order to support this innovation? • What activities were carried out to support this innovation? • How were these activities carried out? • Who carried out these activities? 	Informal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Formal		

Q3: How did structures and processes within your firm support this innovation?

Notes	Description	Discussion	Enablers / Obstacles
<ul style="list-style-type: none"> • What structures and processes were used to support this innovation? • What activities were carried out to support this innovation? • How were these activities carried out? • Who carried out these activities? 	Informal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Formal		

Q4: How was this innovation supported by knowledge management activity?

Notes	Description	Discussion	Enablers / Obstacles
<ul style="list-style-type: none"> • What knowledge management activity was used to support this innovation? • What activities were carried out to support this innovation? • How were these activities carried out? • Who carried out these activities? 	Informal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Formal		

4. Innovation performance measurement/indicators

Q1: What were the impacts from this innovation?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What were the expected/unexpected positive impacts from this innovation? What were the expected/unexpected negative impacts from this innovation? 			

Team ☐ ☐ ☐ ☐ ☐ Exploit

Q2: How did you measure this innovation performance?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What measurement/indicators (e.g. stakeholder attitudes, business results, etc.) were used to measure this innovation performance? What activities were carried out to measure this innovation performance? How were these activities carried out? Who carried out these activities? 			

Informal ☐ ☐ ☐ ☐ ☐ Formal

Q3: How do you intend to further develop/exploit the benefits from this innovation?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What activities were carried out to develop/exploit the benefits from this innovation? How were these activities carried out? Who carried out these activities? 			

Informal ☐ ☐ ☐ ☐ ☐ Formal

Ref :	
Date:	

C3. Successful Innovation 2 _____ (You identified)

1. Generate a new idea

Q1: Where did the initial idea(s) come from?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What information sources were used (e.g. clients, suppliers, colleagues, reports etc.)? What activities were carried out to scan for/collect information? How were these activities carried out? Who carried out these activities? 	Text □□□□□ Locked		

How would rate the following characteristics of the information sources	Strength	Details
Accessibility	+ □□□□□ -	
Cost	+ □□□□□ -	
Fit	+ □□□□□ -	

Q2: How was the idea adopted?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What activities were carried out to innovate from this information (e.g. evaluation etc.)? How were these activities carried out? Who carried out these activities? 	Informal □□□□□ Formal		

How would rate the following characteristics of your company in the idea adopting phase.	Strength	Details
Strategic focus	+ □□□□□ -	
Communication Internal	+ □□□□□ -	
Communication External	+ □□□□□ -	
Resources	+ □□□□□ -	
Authority	+ □□□□□ -	
Knowledge management	+ □□□□□ -	

Ref :	
Date:	

2. Implement a new idea

Q1: How was the idea exploited?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> How was the innovation commercialised/utilised? What activities were carried out to commercialise/utilise this innovation? How were these activities carried out? Who carried out these activities? 	Active <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Passive		

How would rate the following characteristics of your company in the exploitation phase?	Strength	Details
Supply chain focus commitment	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Marketing	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Resource cap	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Autonomy	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	

3. Company support

Q1: How was this innovation supported by your firm's relationships?

Notes	Description	Discussion	Enablers / Obstacles
<ul style="list-style-type: none"> What relationships were used to support this innovation? What activities were carried out to support this innovation? How were these activities carried out? Who carried out these activities? 	Internal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> External		

Confidential

Ref :

Date:

Q2: How did your firm develop the ability and motivation of its staff to support this innovation?

Notes	Description	Discussion	Enablers / Obstacles
<ul style="list-style-type: none"> What activities were used to develop the ability and motivation of staff in order to support this innovation? What activities were carried out to support this innovation? How were these activities carried out? Who carried out these activities? 	Informal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Formal		

Q3: How did structures and processes within your firm support this innovation?

Notes	Description	Discussion	Enablers / Obstacles
<ul style="list-style-type: none"> What structures and processes were used to support this innovation? What activities were carried out to support this innovation? How were these activities carried out? Who carried out these activities? 	Informal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Formal		

Q4: How was this innovation supported by knowledge management activity?

Notes	Description	Discussion	Enablers / Obstacles
<ul style="list-style-type: none"> What knowledge management activity was used to support this innovation? What activities were carried out to support this innovation? How were these activities carried out? Who carried out these activities? 	Informal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Formal		

4. Innovation performance measurement/indicators**Q1: What were the impacts from this innovation?**

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What were the expected/unexpected positive impacts from this innovation? What were the expected/unexpected negative impacts from this innovation? 	<div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> </div>		

Tact □□□□□ Exploit

Q2: How did you measure this innovation performance?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What measurement/indicators (e.g. stakeholder attitudes, business results, etc.) were used to measure this innovation performance? What activities were carried out to measure this innovation performance? How were these activities carried out? Who carried out these activities? 	<div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> </div>		

Informal □□□□□ Formal

Q3: How do you intend to further develop/exploit the benefits from this innovation?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What activities were carried out to develop/exploit the benefits from this innovation? How were these activities carried out? Who carried out these activities? 	<div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> </div>		

Informal □□□□□ Formal

D. Unsuccessful Innovation**D1. Identify unsuccessful innovations**

Q1: Please identify 'ONE' potentially significant innovation over the last two years which failed. (Only senior manager answer)

Innovation 1
Chosen innovation
Why considered significant

Rate level of influence	Strength	Details
Senior management driven	+ □□□□□ -	
Construction client driven	+ □□□□□ -	
Regulation driven	+ □□□□□ -	
Competitor driven	+ □□□□□ -	
Your customer(s) driven	+ □□□□□ -	
Your supplier(s) driven	+ □□□□□ -	

Q2: Please identify 'ONE' potentially significant innovation over the last two years which failed. (All interviewees answer except senior manager)

Innovation 2
Chosen innovation
Why considered significant

Rate level of influence	Strength	Details
Senior management driven	+ □□□□□ -	
Construction client driven	+ □□□□□ -	
Regulation driven	+ □□□□□ -	
Competitor driven	+ □□□□□ -	
Your customer(s) driven	+ □□□□□ -	
Your supplier(s) driven	+ □□□□□ -	

D2. Unsuccessful Innovation 1 _____ (Senior manager identified)

1. Generate a new idea

Q1: Where did the initial idea(s) come from?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What information sources were used (e.g. clients, suppliers, colleagues, reports etc.)? What activities were carried out to scan for/collect information? How were these activities carried out? Who carried out these activities? 	Text □□□□□ Text		

How would rate the following characteristics of the information sources	Strength	Details
Accessibility	+ □□□□ -	
Cost	+ □□□□ -	
Fit	+ □□□□ -	

Q2: How was the idea adopted?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What activities were carried out to innovate from this information (e.g. evaluation etc.)? How were these activities carried out? Who carried out these activities? 	Informal □□□□□ Formal		

How would rate the following characteristics of your company in the idea adopting phase	Strength	Details
Strategic focus	+ □□□□ -	
Communication Internal	+ □□□□ -	
Communication External	+ □□□□ -	
Resources	+ □□□□ -	
Authority	+ □□□□ -	
Knowledge management	+ □□□□ -	

2. Implement a new idea**Q1: How was the idea exploited?**

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> How was the innovation commercialised/utilised? What activities were carried out to commercialise/utilise this innovation? How were these activities carried out? Who carried out these activities? 	Active <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Passive		

How would rate the following characteristics of your company in the exploitation phase	Strength	Details
Supply chain focus commitment	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Marketing	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Resourcing	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Authority	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	

3. Company support**Q1: How was this innovation supported by your firm's relationships?**

Notes	Description	Discussion	Enablers / Obstacles
<ul style="list-style-type: none"> What relationships were used to support this innovation? What activities were carried out to support this innovation? How were these activities carried out? Who carried out these activities? 	Informal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Formal		

Q2: How did your firm develop the ability and motivation of its staff to support this innovation?

Notes	Description	Discussion	Enablers / Obstacles
<ul style="list-style-type: none"> • What activities were used to develop the ability and motivation of staff in order to support this innovation? • What activities were carried out to support this innovation? • How were these activities carried out? • Who carried out these activities? 	Informal □□□□□ Formal		

Q3: How did structures and processes within your firm support this innovation?

Notes	Description	Discussion	Enablers / Obstacles
<ul style="list-style-type: none"> • What structures and processes were used to support this innovation? • What activities were carried out to support this innovation? • How were these activities carried out? • Who carried out these activities? 	Informal □□□□□ Formal		

Q4: How was this innovation supported by knowledge management activity?

Notes	Description	Discussion	Enablers / Obstacles
<ul style="list-style-type: none"> • What knowledge management activity was used to support this innovation? • What activities were carried out to support this innovation? • How were these activities carried out? • Who carried out these activities? 	Informal □□□□□ Formal		

4. Innovation performance measurement/indicators**Q1: What were the impacts from this innovation?**

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What were the expected/unexpected positive impacts from this innovation? What were the expected/unexpected negative impacts from this innovation? 	Text <input type="text"/> Explicit		

Q2: How did you measure this innovation performance?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What measurement/indicators (e.g. stakeholder attitudes, business results, etc.) were used to measure this innovation performance? What activities were carried out to measure this innovation performance? How were these activities carried out? Who carried out these activities? 	Informal <input type="text"/> Formal		

Q3: How do you intend to further develop/exploit the benefits from this innovation?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What activities were carried out to develop/exploit the benefits from this innovation? How were these activities carried out? Who carried out these activities? 	Informal <input type="text"/> Formal		

D3. Unsuccessful Innovation 2 _____ (You identified)

1. Generate a new idea

Q1: Where did the initial idea(s) come from?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What information sources were used (e.g. clients, suppliers, colleagues, reports etc.)? What activities were carried out to scan for/collect information? How were these activities carried out? Who carried out these activities? 	Form <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Escher		

How would rate the following characteristics of the information sources	Strength	Details
Accessibility	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Cost	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Fit	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	

Q2: How was the idea adopted?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What activities were carried out to innovate from this information (e.g. evaluation etc.)? How were these activities carried out? Who carried out these activities? 	Informal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Formal		

How would rate the following characteristics of your company in the idea adopting phase	Strength	Details
Strategic focus	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Communication Internal	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Communication External	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Resources	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Authority	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Knowledge management	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	

Ref :	
Date:	

2. Implement a new idea

Q1: How was the idea exploited?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> How was the innovation commercialised/utilised? What activities were carried out to commercialise/utilise this innovation? How were these activities carried out? Who carried out these activities? 	Active <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Passive		

How would rate the following characteristics of your company in the exploitation phase:	Strength	Details
Supply chain focus / commitment	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Marketing	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Resourcing	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Authority	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	

3. Company support

Q1: How was this innovation supported by your firm's relationships?

Notes	Description	Discussion	Enablers / Obstacles
<ul style="list-style-type: none"> What relationships were used to support this innovation? What activities were carried out to support this innovation? How were these activities carried out? Who carried out these activities? 	Informal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Formal		

Ref :	
Date:	

Q2: How did your firm develop the ability and motivation of its staff to support this innovation?

Notes	Description	Discussion	Enablers / Obstacles
<ul style="list-style-type: none"> • What activities were used to develop the ability and motivation of staff in order to support this innovation? • What activities were carried out to support this innovation? • How were these activities carried out? • Who carried out these activities? 	Informal □□□□ Formal		

Q3: How did structures and processes within your firm support this innovation?

Notes	Description	Discussion	Enablers / Obstacles
<ul style="list-style-type: none"> • What structures and processes were used to support this innovation? • What activities were carried out to support this innovation? • How were these activities carried out? • Who carried out these activities? 	Informal □□□□ Formal		

Q4: How was this innovation supported by knowledge management activity?

Notes	Description	Discussion	Enablers / Obstacles
<ul style="list-style-type: none"> • What knowledge management activity was used to support this innovation? • What activities were carried out to support this innovation? • How were these activities carried out? • Who carried out these activities? 	Informal □□□□ Formal		

4. Innovation performance measurement/indicators**Q1: What were the impacts from this innovation?**

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What were the expected/unexpected positive impacts from this innovation? What were the expected/unexpected negative impacts from this innovation? 	<p>Test <input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/> Exploit</p>		

Q2: How did you measure this innovation performance?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What measurement/indicators (e.g. stakeholder attitudes, business results, etc.) were used to measure this innovation performance? What activities were carried out to measure this innovation performance? How were these activities carried out? Who carried out these activities? 	<p>Informal <input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/> Formal</p>		

Q3: How do you intend to further develop/exploit the benefits from this innovation?

Notes	Description	Discussion	Implied enablers / Obstacles
<ul style="list-style-type: none"> What activities were carried out to develop/exploit the benefits from this innovation? How were these activities carried out? Who carried out these activities? 	<p>Informal <input type="checkbox"/><input type="checkbox"/><input type="checkbox"/><input type="checkbox"/> Formal</p>		

Confidential

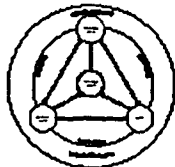


Ref :	
Date:	

Thanks for your input and co-operation. Transcript will be sent to you for you to confirm that I have understood what you have said correctly.

Please use the box below for any comments you wish to make.

Additional information

Appendix G Example of an interview transcript

Confidential	<table border="1" style="margin: auto;"><tr><td style="padding: 2px;">Ref :</td><td style="padding: 2px;">C-C-01</td></tr><tr><td style="padding: 2px;">Date:</td><td style="padding: 2px;">27-11-03</td></tr></table>	Ref :	C-C-01	Date:	27-11-03
Ref :	C-C-01				
Date:	27-11-03				
<p>Salford University - SCPM</p> <p>Innovation in SMEs in the Construction Industry</p> <p>THE 2003 INTERVIEW PROTOCOL</p>					
<div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: 80%;">INTRODUCTION</div>					
<p>The interview is aimed for better understanding successful innovations in small knowledge-intensive professional service firms (SKIPSFs)</p>					
<p>By knowledge-based innovation we mean <i>"the effective generation and implementation of a new idea, through appropriate development of, and conversion between, relationship capital, structural capital and human capital, to create knowledge capital, which enhances overall organisational performance"</i></p>					
<p>SECTION 1 is designed to collect background information about you, the company and its clients.</p> <p>SECTION 2 aims to understand in the way of your firm appropriate innovation and identify valuable resources and competencies in innovation activities.</p> <p>You can go outside the boundaries of these questions to illustrate significant points you feel are important</p> <p>Thank you for your time and support. Transcript will be sent to you for you to confirm that I have understood what you have said correctly.</p>					
<p>If you would like to discuss anything further, please do not hesitate to contact</p> <p>Shu-Ling Lu PhD student School of Construction and Property Management The University of Salford Bridgewater Building Salford Greater Manchester M7 1NU</p> <p>Tel: +44 (0) 161 295 5352 Fax: +44 (0) 161 295 5011 Web: http://www.scpm.salford.ac.uk E-mail: s.l.lu@pcr.salford.ac.uk</p>					
<div style="display: flex; justify-content: space-around; align-items: center;"></div>					
Page 1 of 21					

SECTION I: BACKGROUND

We are aware that much of the information we are asking you to give about your company may be commercially, or in other ways, highly sensitive. However, we assure you that all responses will be treated as **STRICTLY CONFIDENTIAL** and will be used for research purposes only. You or your company will not be identified or named in any publication arising from the research without your permission. Only aggregated data will be used.

A. About you

Name: _____ Age: 35 No. of years with this company: 2

Tel. No.: _____ Fax No.: _____ E-mail: _____

Your role/activity: Associate director managing people and inspiring people

Q1: Please tick "one box" to describe your position within your company:

- ☐ Top level management
☒ Middle level management
☐ First level supervisor
☐ Professional employee without supervisory role
☐ Other (Please specify) _____

Q2: Please tick "the relevant boxes" to describe your formal qualification:

- ☒ 1 Graduate (☒ Cognate / ☐ Non cognate) Architecture Diploma
☐ 2 Trainee members of professional institutions (Please specify) _____
☒ 3 Fully qualified members of professional institutions (Please specify) RIBA (Royal Institute of British Architects)
☐ 4 Trained to HNC (Higher National Certificate) or HND (Higher National Diploma) (not included in 2 and 3)
☐ 5 Other (Please specify) _____

Q3: Please tick "the relevant boxes" to describe your previous company's status:

No	No. of years with it	Main products/services	Type	Size
Company 1	3 Architect	Architectural	<input type="checkbox"/> Public <input checked="" type="checkbox"/> Private	<input type="checkbox"/> Micro organisation (1-10 employees) <input type="checkbox"/> Small organisation (11-49 employees) <input checked="" type="checkbox"/> Medium organisation (50-250 employees) <input type="checkbox"/> Large organisation (more than 251 employees)
Company 2	4 Architect	Architectural	<input type="checkbox"/> Public <input checked="" type="checkbox"/> Private	<input checked="" type="checkbox"/> Micro organisation (1-10 employees) <input type="checkbox"/> Small organisation (11-49 employees) <input type="checkbox"/> Medium organisation (50-250 employees) <input type="checkbox"/> Large organisation (more than 251 employees)
Company 3	2 Architect	Architectural	<input type="checkbox"/> Public <input checked="" type="checkbox"/> Private	<input type="checkbox"/> Micro organisation (1-10 employees) <input checked="" type="checkbox"/> Small organisation (11-49 employees) <input type="checkbox"/> Medium organisation (50-250 employees) <input type="checkbox"/> Large organisation (more than 251 employees)

SECTION 2: KNOWLEDGE-BASED INNOVATION DETAILS

(Note: Knowledge-based innovation is defined as "the effective generation and implementation of a new idea, through appropriate development of, and conversion between, relationship capital, structural capital and human capital, to create knowledge capital, which enhances overall organisational performance.")

A. Definition

Q1: How would you describe the term of 'knowledge' in the individual, organisational and supply chain level?

Description & discussion:

Individual level:

Knowledge: Gosh. For me, that's a tricky one. Knowledge is knowing your role I think. In the individual, knowledge is "knowing your place in the team." You can have that the team.

Organisational and supply chain level:

In the organisational and supply chain level is meant, "what you are trying to do, what you are trying to achieve to be gained." That's really I suppose.

It is very tacit based, not explicit based view. A lot of people think knowledge is the asset. It's more explicit point of view. You can capture knowledge and store it in the company. Yeah, absolutely.

Tact 00000 Jadedu

Q2: How would you describe the term of 'innovation' in the individual, organisational and supply chain level?

Description & discussion:

Individual level:

Innovation: Individual innovation is "being able to think unlike your colleagues or unlike people before you and always question."

Organisational and supply chain level:

Organisational and supply chain level is always being really what we called "ahead of the game and also ahead of your competition." Don't be afraid to take risks for the company. It's not necessarily - I don't believe innovation in the architecture has to do with the specification of particular products or services. I think innovation in the architecture can come from any angle; angles involve solving problems for the clients or for the individuals in the way in which they never expected. Yeah.

Yeah.

So, clients come to us to ask a building. The way we innovate might be telling him that he doesn't want a building. You know he wants to get a car. You look at the problem from a completely different angle, from anything else. So from our client conversation; I want the office; and I want it here. The way we innovate; no, you don't want your office there. We've gotta do is taking your existing office and leaving your few tenants there, until we find a better site. Being able to pack up the problem is part of the process of innovation. I think traditionally a lot of people think innovation in the architecture is pushing the performance of materials, which is part of it, but it is "Technical Innovation."

That's a very different point of view.

Tact 00000 Typist

C. Successful Innovation

C1. Identify successful innovations

Q1: Please identify 'ONE' significant firm-generated successful innovation over the last two years. (Only senior manager answer)

Innovation 1
Chosen innovation
Mission statement
(Note: To be recognised as the leading north west design house dedicated to achieving working relationships which result in excellent architectural solutions)
Why considered significant
<p>Can you identify one significant successful innovation over the last two years?</p> <p>I cannot give a one specific example of innovation within the business. I suppose identifying our mission statement. It sounds very dull, but the company is very much headless, not headless but "directionless" which we didn't know where we are going. The mission statement, which no doubt I have a copy of. It's vague, but it's quite strong in the way we really feel the company will be in the five years time for instance. I think that I have never been believed the mission statements. I always thought all that mission statements were management speak but they didn't really pay off, but looking at processes will be gone through to achieve the mission statement, I think, it is not necessary innovation, but I think what it managed to do is to reinvigorate the staff: people understand clearly where we are going and what goals are in one sentence. Apart from that, it really has levels of influence.</p> <p>Excuse me: can we go back to here? Do you mean it's like the company got the Investors in People accreditation? It's like the business strategy. It gives us the future direction. Do you mean that? It wasn't the system or a process. We are slowly innovating in that time. We have very good systems in place and some very poor systems in place. I will say the company is going through "puberty". You know we were very young and successful. When I go into view people, they don't know which way we are going. The mission statement which is essentially a sentence which defined the Calderpeel to go to the war. I think successfully manage to innovate this company to a certain extent. Does it make sense?</p> <p>Yeah.</p> <p>Right. In the simple form, I can pick the account system; I can pick the costing system; I can pick the method by which we collate time sheets. They are not innovations. They are procedurally essential. We did it quite well, but it isn't innovations. I hope innovators if you using innovation in its correct form is the mission statement which is really was new to us. It helps the whole organisation, we weren't disparate but to come together as one company. That was following generally to choose successful innovation over last two years is meant. Probably they are very helpful, but there is no single thing I can think of. Apart from that, we really I would class as innovative - I don't know if that helps.</p> <p>Normally, they will define the product innovation, service innovation, process innovation or organisational innovation. The company innovation is much about</p> <p>It is not a product. It is not a service. It is not management. It is all of them because what it does; it is a one statement, just one sentence. What it does; it defines our products, it explains how our management is working and how our products are working for, and also it gives the company identity which we never had.</p> <p>Ok</p> <p>Yeah.</p> <p>If I want to choose more "Mundane Innovation", then I have to pick something like our job, costing, programming system, which is not necessarily new to us but it does very well that a management which helps me my managed.</p>

If our product is always prescribed, there is no single product will turn on. It's always every product is new. So by that sense, it's always innovative from the next one. So, I cannot identify the product if it's innovative because I believe all I design is somewhere is innovated. So, I think I would prefer the job or costing system all in the mission statement.

Which one do you think is most important? Because other interviews will follow your answer to describe what they think about this successful innovation.
I think the two, the job costing, is probably most important. However, I think as in general feel, I will put the mission statement. I think the mission statement is more important to me. I will state the mission statement. I think it was quite a useful exercise.

Rate level of influence	Strength	Details
Senior management driven	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Construction client driven	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Legislation driven	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Competitor driven	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Your customer(s) driven	+ <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Your supplier(s) driven	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	

C2. Successful Innovation 1. Mission statement (Senior manager identified)

1. Generate a new idea

Q1: Where did the initial idea(s) come from?

Description & discussion

Where did the initial idea(s) come from?

The mission statement came from our desire from our chairman, and directors at the time to establish to what Calderpool was and where it was going, so it came from senior management

What activities were carried out to collect this information?

There was a seminar held at the office from one of the weekends with the senior management and associates, which is chaired by the independent chairman. It's like a workshop.

How was this workshop carried out? What did we do? Or through this workshop, we clearly identified our mission statement.

Essentially what we did? We then left and came back an hour later and concluded the mission statement, and there was a vast big presentation to the staff about the process. So, we had a senior management workshop, presentation to staff who were allowed to make their own comments and then it was adopted really

Do you mean, the idea was adopted by the senior management to decide it, or by the staff, they all agree with this mission statement?

You never get everyone to agree. There is always someone who will disagree. My general feeling is that I don't think anyone disagreed. I think a few people couldn't be bothered, but those who cared agreed, but it was adopted.

Task ☐☐☐☐☐ Explicit

How would rate the following characteristics of the information sources	Strength	Details
Accessibility	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Cost	+ <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	Cost is very good because it didn't cost too much.
Fit	+ <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	

Q2: How was the idea adopted?

Description & discussion

Informal ☐☐☐☐☐ Formal

How would rate the following characteristics of your company in the idea adopting phase:	Strength	Details
Strategic focus	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Communication Internal	+ <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Communication External	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Resourcing	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	We don't really apply.
Authority	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Knowledge management	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	

2. Implement a new idea

Q1: How was the idea exploited?

Description & Discussion

How was the innovation commercialised or utilised?
Badly.

Badly.

Yeah. I think it is a great decision and I am totally being forwarded it very well. So, how was innovation commercialised/utilised: it has been published and it was used, I think, predominately because of the investors in People.

What activities were carried out to commercialise/utilise this innovation - I means there's publicity within the practice. But not, we didn't, we certainly, I mean you would be hard pushed to find any clients who know our mission statement purpose. So, it's not been commercialised at all. I don't think it is in our product. I don't think our clients will need to know what our mission statement is. It's more our "internal market" thing. It's more - to give the staff understanding where the company is going and really see's itself.

Clients don't have to see that. They need to see the company delivering results. The staff needs to be motivated. I think I cannot see the mission statement motivates people, but I think it gives more understanding of the firm. If you get more understanding of the firm, how it's being run, then you feel your belong or by that effect you should feel more motivated. Another lengthy answer!

So you mean this mission improves the organisational performance and the process efficiency and motivates the staff. So maybe you mentioned it's badly used but it's still a successful innovation.

I think when you say commercialised, you cannot commercialise the mission statement, but to utilise it, it was probably utilised quite well because in a sense, it was an in-house thing, it was not meant for clients. All we do to commercialise it, I think is on our website.

Active ☐ ☐ ☐ ☐ ☐ Passive

How would rate the following characteristics of your company in the exploitation phase	Strength	Details
Supply chain focus / commitment	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	It didn't affect on supply chain if we have any.
Marketing	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Resourcing	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Authority	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	

3. Company support

Q1: How was this innovation supported by your firm's relationships?

Description & discussion

How was this innovation supported by the company relationships? What relationships were used to support this innovation?

The company is only as good as its people and if we can encourage them and get them to on around them, and we use our relationships to support that.

If they understand the company is going, on and support it, and then they will work better, better relationships with clients, therefore, for the business expand. So all the relationships we're used to support innovation. We discuss it with all of staff, at all level.

What activities were carried out to support this innovation? The workshops as I described

How was it carried out? One was held in a hotel down south which was conducted with the staff.

Who carried out these activities? Well, it was the senior management and staff. It's the whole company. It's the whole company really

Do you mean these activities were through the workshop, meeting to discuss with the staff with all level? Are both formal and informal very important for the company?

Yeah, I mean the workshop and our meetings are both informal. We had a presentation to the staff which was formal, but the workshop session after that was informal. We don't have many formal meetings in architecture because the way we work is very informal. That's what we do really

Do you mean the reason we set up this mission statement because it is easier to communicate with each other, isn't it? It's a part of the company support, this mission statement.

Gosh, I'm trying to think. It doesn't affect the day-to-day running of the business or the day-to-day effect on our people at all. It does absolutely no affect on them, but I think what it does do just reinforces what the company is about and I think that the communication around the staff was handled quite well

Informal ☐ Formal ☐

Q2: How did your firm develop the ability and motivation of its staff to support this innovation?

Description & discussion

How did the company develop the ability and motivation of staff to support this mission statement? I suppose we're engaged more now with training staff, a great deal more, whether that is to support the mission statement is another question. It's probably done as by identified who we are I suppose, and then we know we want to be the best, something I know like we want to be the leading firm in the north west. So we constantly striving we all of our staff, our teams, and customers - constantly

What do you mean by the training? Is training inside or outside (internal or external) training? Both.

So both training are formal or informal? I was suggested external one is informal. No, no. They are quite formal.

So both are formal. Yes.

Is any training plan to support this mission statement? Sometimes we break the mission statement down to objects

I suppose so, but not - If we have a seminar or general session, our mission statement normally they wouldn't turn up. Everything we do is trying to achieve our mission statement. So, I suppose it does support our mission statement - For what of a better expression.

Do we have any formal plans? Or only when the employee wants to attend the training courses, we approve them to attend?

Both are formal and informal systems. Caroline is very much involved in that - and would probably be able to answer that for better. I train all the architects in legal and professional practice matters in-house twice a week. They are informal. They are organised as training sessions, CPD sessions, both externally and internally. None of them are to deal with the mission statement, but all the mission statement gives us an understanding we want to be the best in the north west. A part of that, it is to ensure our staff are trained indirectly that training is going to our mission statement, but quite indirectly.

So in the company, we have senior and junior architects. Does senior and junior architects work together or work separately?

They work together

Does the company encourage the senior architect to teach the junior architect?

Yes. We are quite a young firm - at thirty four I'm one of the oldest members of staff which is ridiculous. So I have to, is part of my job, is to ensure that I am passing on my knowledge to younger members of staff. Likewise, we have people coming in from colleague. They have an understanding of design skills that - you know - they teach me. So, it is a "two-way process" really. I don't stand up and teach.

Informal ☐ Formal ☐

Q3: How did structures and processes within your firm support this innovation?**Description & discussion**

How did the company structures and processes support this mission statement, such as you said we have the job and costing system? Do we need to set up any structures or processes to support this mission statement?

Cricky. I will be honest I don't think there is a single process within the company is designed to support the mission statement, but all the processes in the company are designed to support the company. So, therefore, if the company supports the mission statement, and then every process is designed to support this innovation. But not a single process is set up with the sole aim of supporting the mission statement, every single process has been set up to help the company run more efficiently or • • • to produce drawings better or and whatever. So, there is no single process that I can identify which has been brought in especially support the mission statement to be honest.

How this mission statement was brought into the whole processes? Do we have any review works or who was responsible to do these things?

The mission statement • • • we didn't sit down and say we want to do a hundred houses a year. That's not the mission statement. The mission statement is to be the leading north west designer, or whatever. Really that is described what we are about. That is not a figure. That is not a target. That is not something we can actually say; Ah, we have achieved it. It is always intangible.

It looks like if we want to be the leading one, normally we would like to explore the new market, or explore • • •

I suppose what we think, I mean we start to look into the potential of different markets. We have started to look into the education and we do some work in the utilities. So we start looking into that. I think the mission statement probably started that. But it is not the process, it's just you go out and look for work. So the process doesn't support that. We are really just contacts. We really are making a concerted effort to expand our base, our "market base."

What activities were carried out to support this innovation? I think it was the marketing. It started generated things like the Investors in People, also the website was designed off the back of it - things like that.

How was it carried out? The marketing within the company is very informal and involves "entertaining clients" really.

Who carried out these activities? Anyone and everyone.

So there is no particular process to • • •

No. It is very much everyone buys them into it, and then everyone is responsible for it. You can go out to ask someone here do you feel you are responsible for the mission statement. I am sure people don't know what you are talking about, but in essence the mission statement is everyone's ownership and understanding of the company.

Informal OOOOO Formal

Q4: How was this innovation supported by knowledge management activity?**Description & discussion**

How was this innovation supported by knowledge management activity?

I suppose the website is the biggest thing that we have done recently to support the innovation. I suppose the website and the Investors in People. I suppose in the future, when we go to try to achieve ISO 9000, QA systems, they will become more critical.

I am still confused in this mission statement. After this mission statement set up, is any particular structure, or process, or relationship, or any activities used to support this mission statement?

The whole company supports the mission statement. There is no one person sitting in an office constantly checking if we are achieving that mission statement. We all know what the mission statement is, all know where we want to be, but we will never get there because you cannot suddenly stop it, you just need to keep going. It's a vague for you, I apologise for that, but there is no single system or person was responsible to ensure that the mission statement is uphold at all time. It's purely a device by which we define our company. I cannot think of a process or activity used to support the mission statement, this innovation.

So through the workshop, we announce the mission statement, and then we just do anything we are doing now. We don't try to explore the new market or . . .

Yeah, I think during the workshop with the mission statement is the main process, but also how do we view the company going forward. The marketing side come into that. Apart from the marketing process, we decided we needed ourselves, our mission statement, because someone said what you are going to do in five years time and what does Calderpeel mean. It's a bit tricky to define. The mission statement gives us that headline we can use to define ourselves. We don't holler it from the roof tops. Something is personal to the company. I think it gives us a goal to achieve but, not all of our decision-making is based entirely on our mission statement. It's a bit weird. Anyway, there is no explicit system I can say has been put in place to ensure our mission statement is achieved.

Why do we want to set up our mission statement? Because clients ask us or . . .

I think the company is getting bigger and people are getting older as well as new people coming. We felt the agreed helps us if we define where the company is going. Clients never ask you. They never say what you are going to do in the five years and where the company is going. However, I've used it in marketing on several years or in the five years, we want to be etc. It sets out our stall: where we want to be, where we want to go, what we want to do.

When we set up our mission statement, we want to be the leading design in north west. Do we look back to our resources and to then to explore other opportunities in the market or . . .

I don't know how we measure success because financially we are probably doing relatively well. I would be amazed, on a percentage basis, if we are doing any better than before, but we could possibly be. The way that I would judge the success is purely in achieving "commercial success", but also achieving "architecture success" - so we got good projects built. We had a high quality architectural content - a building that people will enjoy. That is what I judge the success. That is what the mission statement succeeds. If you look back in the five years, we haven't achieved the mission statement. It is difficult to see, but I will be amazed if we don't get close to it.

Informal OOOOO Informal

4. Innovation performance measurement/indicators

Q1: What were the impacts from this innovation?

Description & discussion

After implemented this mission statement, what was our expected or unexpected positive impacts from this, the mission statement?

That is a tricky thing. How do you judge it? There is no few system in place to judge it, because, do you become more successful because you are bigger than your competitor? I don't think so; do you become more successful because you got more money than your competitor? possibly; or do you gain respect or become more leading because you won more awards and far more respect than your competitors in the profession. I think that is the way I would judge it. And that's a very different thing to judge. How do you judge respect from other architects etc or your clients? If we judge just on money, then we would doing a load of boxes everyone and not care about the subject. But we care about the "passion" of design and architecture. So, the mission statement sets that out - really.

Do you mean follow this mission statement, there is no expected or unexpected things happen? When we implement this mission statement, do we think it will influence our future?

I think everything you do has an influence on where we are going in the practice. The mission statement just really gives everyone focus. So we know that we want to be the leading design house, whatever everyone wants to call it, in the north west. It established the fact that we know our market is in the north west. We did expand it a little bit. It's always established the focus. I suppose I would like to think how its enhanced performance. It's my point of view because I'm marketing to people. I have pride in knowing that the Calderpool are committed to be the top design in the practice in the north west and I will be more motivated to sell that design.

After we set out the mission statement, do we have any expected or unexpected positive impacts, such as commitment or anything else?

Expected positive impacts from this innovation was probably mainly at senior management level who were really happy that we have established what the company is all about and therefore, when we are going to meet clients or prospective clients, we have better "steer" as ahead the Calderpool is sitting in the market place and where it wants to be.

The other unexpected positive impact from this innovation, I suppose, it assisted in achieving the Investors in People and I think a slightly enhanced of the staff.

The expected negative impacts were some of staff thought it was a load of rubbish.

The unexpected negative impacts were we stopped. The mission statement, we haven't really moved forward, we really haven't moved the enthusiasm forward. Possibly that's an unexpected thing. Not huge.

Test ☐ ☐ ☐ ☐ ☐ Explicit

e

Q2: How did you measure this innovation performance?

Description & discussion

(See 3 Company Support, Q4 Description & discussion)

Informal ☐ ☐ ☐ ☐ ☐ Informal

Q3: How do you intend to further develop/exploit the benefits from this innovation?**Description & discussion**

How does the company intend to further develop/exploit the benefits from this innovation?

All right. How do you intend to further develop/exploit the benefits from this innovation? I think we intend to the market and utilize the staff I was talking about in the previous section - the positive impacts trying to make our market getting bigger and bigger. The positive impacts we used to ensure that we are doing a better job. Therefore, that was the mission statement.

How was it carried out? Again, it's our marketing, website and other such items.

Who carried out these activities? Generally it's the senior management • • • Generally it's the senior management carried out.

It sounds the mission statement was always carried out by senior management. Almost all activities were carried out by the senior management.

In talking about our mission statement. Yes, I would argue that or I will hope, that every member of staff has an innovation. If you interview another people, you will hear something else. Someone will say the balcony and managing to design certain buildings is innovative. I am looking at what the whole company right thing and trying to get one thing which may be possibly affects the company more than something else. But it has to start from somewhere; it has started with senior management. It will be interesting to hear from other areas actually.

In your statement, it seems the web site is very important for the mission statement in place or the workshop is very important for • • •

Yeah, the website is important in the sense that, mainly from my point of view because I interview all of the staff, most new members of staff. If you have been looked at the website, calderpool.com, it's a bit strange because I would have thought that you would have done that. The more important is when you look at the website and when you read the mission statement and that gives you a very concise understanding what the company is doing and it explains quickly what we want to do, where we want to go etc. So anyone joining the team, they always find the mission statement before they come into the interview. That's all about that. There is no marketing field we used to exploit this mission statement really. I mean apart from meeting people it would be. That is one of the benefits I suppose. We use it, I suppose, to achieve, to gain staff. The staff we give we have to buy into the mission statement maybe mindset. They want to be involved in a young firm that wants to be a leading design house. They don't want to be involved in a design school with a load of sixty year olds designing pubs. So that staff may be will be attracted in the mission statement.

So we just carry on this mission statement or we will set out another mission statement in the future?

I think that, yes, we will have to have a new mission statement eventually. You cannot buy in the same rules. I think in the short to medium time we will be retaining the mission statement. There is no point to change it yet.

Informal DDDDD Informal

D. Unsuccessful Innovation**D1. Identify unsuccessful innovations**

Q1: Please identify 'ONE' potentially significant innovation over the last two years which failed. (Only senior manager answer)

Innovation 1
<p>Chosen innovation</p> <p>Seminar</p> <p>(Note: IT session, Marketing seminar, Project briefing)</p>
<p>Why considered significant</p> <p>Can you identify one significant innovation over the last two years which failed? Potentially. Yeah. Gosh. Potential significant innovation which failed. Cricky. It's probably hundreds.</p> <p>The most important impact.</p> <p>I know. I am thinking.</p> <p>The one I am thinking is we did "the cooperative buildership" about five years ago which is a leaflet, which is absolutely useless, but that one didn't affect the company hugely.</p> <p>An innovation that failed?!</p> <p>I suppose there is a system established when we moved here to IT and discuss etc. Essentially every two weeks it's going to be the "marketing seminar" and "IT session" in house to discuss marketing in the firm. Another one is to discuss IT. They failed absolutely because it doesn't happen any more. After few weeks launched it and then stopped. So, it's a good innovation; it's a good idea but it's just stopped because no one had time for it - we're too busy. We spend most of time in the meeting and then we failed. I suppose those type of sessions that were actually set up but haven't been carried through. I think it's failed. I think there is a one potential innovation was failed.</p> <p>Do you mean the IT training program or</p> <p>No. No. No. All of the people who use computers. They will be one or two representatives from each team and they were supposed to gather every two weeks or once a month to discuss problems, upgrades software, like that. It's happened twice. It didn't happen for about twelve months or eighteen months. I think it had one just recently. There was also supposed to be a marketing seminar which never happened but I think that was a shame. Good ideas but don't go forward with it.</p> <p>Do you mean innovation is we set up the meeting to discuss the IT problem? So it is the internal discussion, formal discussion.</p> <p>Yeah.</p> <p>It's failed because people don't have time to do it.</p> <p>Exactly. We have a lot of these things. We have a one because we are a big firm. This is my fault. With a big firm, I was asked to set up once every month, a presentation of where one of the teams would present a significant scheme to the office, because not everyone knows what is going on in the office. It didn't I think. People are just too busy. I know it is my fault. I should chase it up. I think it is a good idea, but it is my fault, isn't it? There is another example. Some processes which has been set out, and then because of the pressure of the works, just slipped.</p>

Why do you think it is significant important? Because we waste a lot of time in the beginning or . . .

I think they are all significant in their own way, because the IT one is physically significant because you need to know what is going on with computers, and you need to know what we need to do. The marketing one is extremely significant because we don't have "a single marketing policy." The project briefing one is significant to ensure that we are reemphasis that we are a design practice. So, to some extent that is going back to the mission statement. We're reinforcing the mission statement.

They are all significant. They all have the influence.

Rate level of influence	Strength	Details
Senior management driven	+ ■■■■ -	Why were they failed? Because no top management support or . . . No, no Not really The failures are all come from the management That is five
Construction client driven	+ ■■■■ -	Construction client doesn't apply at all. So that will be zero
Legislation driven	+ ■■■■ -	Zero.
Competitor driven	+ ■■■■ -	Probably two
Your customer(s) driven	+ ■■■■ -	Zero.
Your supplier(s) driven	+ ■■■■ -	Zero

D2. Unsuccessful Innovation 1 Seminar (IT session, Marketing seminar, Project briefing)
(Senior manager identified)

1. Generate a new idea

Q1: Where did the initial idea(s) come from?

Description & discussion

Where did the idea come from?

The idea of the seminar came from management I suppose. That is generally where they come from.

What activities were carried out to scan for or collect this information?

Again, was with discussions with the staff. The sessions were carried out as informal meetings.

Who was responsible for these activities?

I (Ewen) was responsible for the project briefing one. The IT manager was responsible for the IT one. I think, I suppose now, Caroline would be the one who was responsible for the marketing one. There is those people identified who were responsible for those.

Tact ☐☐☐☐☐ select

How would rate the following characteristics of the information sources	Strength	Details
Accessibility	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Cost	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	Zero, it didn't cost too much.
Fit	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	

Q2: How was the idea adopted?

Description & discussion

How was the idea, the seminar, adopted? Why do you think it's a good idea?

Why do I think it's a good idea? Again, it was to ensure the smooth running of the practice, the IT and really to, with the marketing seminar essentially to make concerted, joined, targeted marketing. The project briefing is really to install enthusiasm in the staff, getting them excited about the project etc. So they all have good inherent ideas in the seminar. That's why they were established.

How was it carried out? Again, informal meetings.

Who carried out these activities? Myself, IT manager and Caroline (Business Development and Architectural Assistant) really I suppose.

Do we use formal or informal meetings?

Two (IT session and Project briefing) were be informal meetings; one was formal meeting. To be honest, they were pretty much informal.

Informal ☐☐☐☐☐ Formal

How would rate the following characteristics of your company in the idea adopting phase:	Strength	Details
Strategic focus	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Communication: Internal	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Communication: External	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Resourcing	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	Not enough people.
Authority	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	
Knowledge management	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	

2. Implement a new idea

Q1: How was the idea exploited?

Description & discussion

How was the idea used?
This is the one that failed?!

Yeah.

It wasn't. It just wasn't used. That's why it's failed because we do it. It wasn't use unfortunately. That's not the answer you are looking for.

Yes.

If we use it, I can tell you how it's used, how it's commercialised or utilised. It just hasn't happen. Really it wasn't. That's why it's failed really.

What activities were carried out to commercialise/utilise this innovation? None because we didn't do it.

How was it carried out? No one carried out. That's why it's failed because we just did nothing.

Active ☐ ☐ ☐ ☐ ☐ Passive

How would rate the following characteristics of your company in the exploitation phase	Strength	Details
Supply chain focus / commitment	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	Zero
Marketing	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	Zero
Resourcing	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	Zero.
Authority	+ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> -	Zero

Description & discussion

But we actually carried out it few times.

We have a couple of sessions, but really they just established what we were going to do. Really beyond that we should have continue them. Because we didn't, it failed absolutely. So now we have an IT manager who runs round like a headless chicken checking what everyone is doing. We don't have a marketing strategy. What projects are going on in the office? So it is not too bad. If those system were in place and these innovations were in place, that wouldn't be happening. So it wasn't that great really.

Do you mean when you are that one person, who is responsible for this seminar, then he needs to carry out these activities, no one will help him?

No. I carried out the project one, for instance, and it's purely on my behalf to organise it. The same would apply to the marketing, the IT stuff. It's purely a failure of whoever was in charge of organising. Something, believe it or not. It's very important. Something, first of all, you don't have time to do it. Secondly, you have pressures from clients to do the work. It's very difficult to set up the time to deal with the scope we have discussed the project we are working on. The pressures of work removed our ability to handle these sessions.

Active ☐ ☐ ☐ ☐ ☐ Passive

3. Company support

Q1: How was this innovation supported by your firm's relationships?

Description & discussion

How did the company support the seminar? Such the company offers people time to attend this seminar or encourage people to attend the seminar, or we have the meeting room • •

We have the access to the meeting room. We have support in the sense that if we need to get staff involved. We can put pressure on them to get involved. The company is partly supportive of that. But probably not supportive in the sense that they should have been kicking me up the arse to make sure I was doing it. Yeah, the company is quite supportive. The way to support the innovation will be the senior manager to encourage you from the front. Administration staff, they were all been to get involved.

What activities were carried out to support this innovation? Again, it comes from the senior management.

How was it carried out? My one is project briefing which is done in a workshop type of environment.

Who carried out these activities? That will be me, and two or three members of staff.

The meeting or workshop is formal or informal one?
Informal

Informal ☐ ☐ ☐ ☐ ☐ Formal

Q2: How did your firm develop the ability and motivation of its staff to support this innovation?

Description & discussion

How did the firm develop the ability and motivation of staff to support this innovation? Senior management encourage staff • •

No. Getting most specific project briefing is what I know most about. It was established that we would have these meetings at 5 o'clock on Friday. That brought us to go through five quarter to six, and then we take the staff to the pub to have a pint. So the motivation was that you could get to leave your desk half an hour early and we will buy you a pint. It sounds bland, but it is not spunky but we try to get them most interest. If you say to them you have to come in on Saturday morning to do this, they would never turn up. So, they essentially got half an hour away from their desks. There were interesting discussions.

What activities were carried out to support this innovation? Again, informal workshop and buying people a pint.

How was it carried out in the pub? No. Again, informal workshop the way we approach one of the teams analysis good for projects, we would like to publicise it in our office and then we will ask that team to identify a junior member of the team to present it because the senior staff are very used to presenting. We wanted to train the junior guy to present in a non threatening environment.

Who carried out these activities? No. Me, usually, similar chat.

Informal ☐ ☐ ☐ ☐ ☐ Formal

Q3: How did structures and processes within your firm support this innovation?

Description & discussion

How did the company structure and processes support this innovation? Something like equipment, structure or . . .

The support to this innovation is its initially committed to it and encouragement. There is nothing about specifically but it was encouraged. We have the entire support (structures and processes) to do it.

Informal ☐ ☐ ☐ ☐ Formal

Q4: How was this innovation supported by knowledge management activity?

Description & discussion

Any knowledge management activities were used to support this innovation? Something like record. After the workshop, we will record . . .

Right. Nothing was recorded because it's informal. I really think that exposure to people of what's going on in this office - design wise - will be a transfer of knowledge really. Someone is working on something exciting then we will tell them about it in the seminar, in the project because the more exposure there is the more ideas we get from them. That is a transfer of knowledge really but no formal way of recording that.

There is no record. We're just learning by doing in the office.
Yeah. It's difficult to describe.

Informal ☐ ☐ ☐ ☐ Formal

4. Innovation performance measurement/indicatorsQ1: What were the impacts from this innovation?

Description & discussion

Even if it's failed. What was the expected or unexpected positive impact?
Do you mean this unsuccessful innovation?

Yeah.

I suppose that I expect positive impacts were be the greater understanding of the design and architecture within the company, more unity between the teams, by chance, divided really, and people who is in the project having ownership of the project because they have to speak about it.

The unexpected positive impacts were discovering that within some of teams, some of younger architects or technicians were quite good in presenting and also gained confidence in presenting in front of staff, things like that.

The expected negative impacts were that we stop doing it. I expect that would happen.

The unexpected negative impacts were that some people didn't want to do that because they were very scared in presenting or they couldn't be bothered which I thought was a bit silly.

Tact ☐ ☐ ☐ ☐ Explicit

Q2: How did you measure this innovation performance?

Description & discussion

How did you measure this innovation performance? Well There is not much about the performance was being measured. It sounds a bit silly So it didn't perform because it wasn't happen. That was my weakness.

Do you mean because it stopped, so you didn't measure it?

Yeah. I mean, gosh. What measurement/indicators were used to measure this innovation performance?

Something like staff attitude, through these seminars, they get more closed or they get more . . .

Yeah. You couldn't measure it, that you could say that people got more engaged in the projects I suppose, but you couldn't measure it. You could say their performance the day before was watched the day after. So, it didn't get better.

What activities were carried out to measure this innovation performance? None.

How were these activities carried out? No one carried out these activities.

Informal DDDDD Formal

Q3: How do you intend to further develop/exploit the benefits from this innovation?

Description & discussion

How do you intend to further develop/exploit the benefits from this innovation? What we'll probably do is restart the process because we haven't developed or exploited any benefits from this innovation.

Because people don't have time, so this innovation was failed. Is it possible in the future, we will encourage staff or ask them to attend . . .

I think what we do is, we tend to find that if the project is interesting then people will attend. We hold it in the office. We don't hold it in the meeting room. So that is how it stops work anyway. I think the way we forward it is to establish probably basically "formal every month system" which was carried out as an interesting project comes in. One came in recently, I think one month a time, everyone would like to see it.

Do we have the formal reward system to encourage staff to attend this one?

Not much on this one (project seminar) but there is a training session that I don't like it to start because that is deadly dull stuff. It's all about the context, things like that. We do actually threaten staff with, we pay the tuition fees, if you fail to attend these courses on a regular basis, then we have suggested that we may stop paying the tuition fees. Because if I can manage to give up a couple of hours at lunch time to train staff when I'm busy, I'm very choiced off with someone who never turn up. So, we started doing an "attendance record". It sounds high and almighty, but it is the way to make sure people will turn up. If you don't turn up, if you haven't given a good excuse it will be noticed.

We said that we will restart this process. How do we restart this process? How were these activities carried out and who carried out these activities?

We have a management meeting every second Monday which I will probably suggest I will start it up and then it will be carried up to the management.

Who carried out to restart this program?

Me (Ewen).

Informal DDDDD Formal

Confidential

Ref :	C-C-01
Date:	27-11-03

Thanks for your input and co-operation. Transcript will be sent to you for you to confirm that I have understood what you have said correctly

Please use the box below for any comments you wish to make

Additional information

**Innovation in the
Calder Peel Partnership Ltd**



calderpeel

[GENERAL FINDING REPORT]

SHU-LING LU AND CAROLINE LAMB



**RESEARCH INSTITUTE FOR THE BUILT AND HUMAN ENVIRONMENT
UNIVERSITY OF SALFORD**

23rd APRIL 2004

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Introduction

The aim of this report is to give feedback from five interviews highlighting key issues and suggesting potential, high leverage, "quick win" areas for improvement in the innovation performance of calderpeel

The findings are based on interviews which were carried out with Steven James (architectural technician), Caroline Lamb (business development and architectural assistant), Nigel Metcalfe (architect), Ewen Miller (associate director), and Lynn Palmer (project architect).

The structure of the report will be structured around the following questions

- Q* What are the immediate innovations which calderpeel should progress?
- Q* What is the current position?
- Q* What are the potential problems?
- Q* Why manage knowledge?
- Q* What are potential improvement areas to sustain current growth?

1.0

Immediate innovations

Key potential improvement areas	Innovation 1	Innovation 2
	Post-project review (refer to section 3.2)	Exit planning (refer to section 4.0)
Objective	❖ To develop and test post-project review policy, guidelines, and checklists	❖ To develop and test exit planning policy, guidelines, and checklists
Benefits	<ul style="list-style-type: none"> ❖ To identify areas for improvements and ways to improve them ❖ To offer powerful opportunities for learning and innovation, therefore employees don't 'reinvent the wheel' or repeat their mistakes in future projects ❖ To help build a strong sense of commitment and team spirit in the team 	<ul style="list-style-type: none"> ❖ To capture and share important knowledge from staff leaving the practice ❖ To ensure stability and continuation of client service even when key staff leave
Resource implications for post-project review and exit planning	<ul style="list-style-type: none"> ❖ Allocation of calderpeel staff to engage in the development of post-project review and exist planning ❖ Space for the Salford researcher work in the company (Salford researcher will provide own laptop) ❖ Time up to 2 months (01/05/2004 ~ 30/06/2004) 	

2.0

What is the current position?

- ✦ Good at “external” innovation to solve “one-off” client problems.



- ✦ Not so good at “internal” innovation to improve operational efficiency.

This finding is further explored and supported in the following sections.

3.0

What are the potential problems?

3.1 What is caldpeel's position?

❖ Financial success	<i>"Financially we are probably doing relatively well."</i>
❖ Good at 'ring-fenced' team work	<i>"All jobs are supervised by senior management talking to the people. We are work in a quite close team."</i> <i>"Everything we are all in the team. That is the process and the structure - people involved"</i> <i>"For something to be supported it, it needs to be shared. ...we share with the team, the whole team discuss it."</i> <i>"To enable the relationship ... it's more about the team building social event."</i>
❖ Committed to architectural quality	<i>"The way that I would judge the success is purely in achieving commercial success, but also achieving architecture success."</i> <i>"If we judge on money, then we just do as well as everyone and not care about the subject. But we care about the passion by the designer and architecture."</i>
❖ The firm is very young	<i>"We are quite a young firm... I have to ..ensure that I am passing on my knowledge to younger members of staff."</i> <i>"A lot of younger, less experienced members of staff. get a quite lot of responsibility."</i>

3.2 What are the potential problems?

❖ Too busy, lots of work	<p>"No one had time.... we're too busy."</p> <p>"Balancing sometimes. Amount of work we do within the teams.... Sometimes, the work is too much"</p> <p>"Time, we need time"</p>
❖ Everything is done in 'ring-fenced' team	<p>"[Different teams] are supposed to just wander around the office and comment on schemes, but they never have time to do that"</p>
❖ Good ideas are not captured and further developed because of the pressure of the work	<p><u>Organisation level</u></p> <p>"Some processes which have been set out, and then because of the pressures of work, just slipped."</p> <p>"The pressures of work removed our ability to handle these sessions."</p> <p><u>Project level</u></p> <p>"If we did do [assessing the project], then it will save time in the future and money from repeating mistakes"</p> <p>"We should assess at the end of each project within the team. We should assess what went wrong and why, and we don't do it"</p>
❖ Lack of appropriate structure and communication channels to encourage and support knowledge transfer between 'ring-fenced' teams and projects and in a formal way (e.g. post project review)	<p>"We do encourage the communication between the team 1 and team 2 to share the information, but it is not always possible."</p> <p>"Trying to increase our tacit knowledge throughout the company because we have a big problem with communication."</p>

NOT A PROBLEM NOW!!!



BUT

With increasing growth of the firm the limitation of the internal systems will probably become a significant restraining force.

4.0

Why manage knowledge?

4.1 What is knowledge?

❖ Knowledge is largely tacit and is gained and refined through all activities, relationships (colleagues, clients, and suppliers), experiences and observation

"Knowledge is knowing your role Knowledge is knowing your place in the team to be gained."

"Knowledge means the ability to carry out your job."

"Knowledge is gained from experience from previous clients."

"Knowledge as an introduced and then must be shared for you train others to gain knowledge."

"Knowledge means... .. what you've learnt personally or tacitly from someone else, passed on knowledge."

"[Knowledge] means our experience."

4.2 Where is knowledge?

❖ Knowledge is mostly stored in heads of people.

"The information source is the people rather than our client, rather than our product, not document."

4.3 What is knowledge management?

❖ Knowledge management is more about "people networks", not "computer networks."

"Sometimes the admin team will come round and explain what they are going intending to do."

"It's by just talking to people... .. that's how information is collected in the practice."

4.4 Why manage knowledge?

<p>❖ The firm is in the creative and innovative business.</p>	<p><i>"We are in the creative business ...we got the creative idea in the way we do things."</i></p> <p><i>"What we do is design new technology."</i></p> <p><i>"Most jobs are site specific any way."</i></p> <p><i>"Quite often we try out new building components, materials, new products that we haven't used it before."</i></p> <p><i>"I believe all I design is somewhere is innovated."</i></p> <p><i>"Everything we design should be new, should be an idea to present, to develop."</i></p>
<p>❖ Knowledge is often shared and created when new situations are presented (e.g. new project comes in)</p>	<p><i>"The team meetings....The only thing that encourages knowledge sharing."</i></p> <p><i>"Our industry is based on training...There is a process to sharing knowledge."</i></p> <p><i>"Learning by doing. I am learning from others who have experience. That's the key within the practice."</i></p>
<p>❖ When employees require knowledge, trying to find the person they know rather than the right person to ask may be the only way of getting to the answer they need.</p>	<p><i>"We always share our knowledge if someone requires it."</i></p> <p><i>"We need to close relationship between our colleagues within the practice, and also senior management and lower levels of staff to encourageto seek advice when we need it."</i></p>
<p>❖ People prefer to receive information face-to-face rather than through on paper or electronically.</p>	<p><i>"Employees find more out from the informal discussion within the company really. I think it is quite rare that employees would have to look at the website to find something about the company rather than ask someone sitting next to you instead."</i></p>
<p>❖ Specification design in the past based on guesswork or trial and error.</p>	<p><i>"There have some new materials new products we used that we haven't known enough about it, detail correctly."</i></p> <p><i>"It's generally a sales problem.....Because it didn't provide enough information about products."</i></p>

4.5 What are the potential benefits of managing knowledge?

❖ People spend less time in researching/accessing required information/knowledge.	<i>"Our company structure, that's the sharing being able to share information and grow."</i>
❖ People learn right across the organisation, build on mistakes, and celebrate achievements.	<i>"If the product isn't working, We can learn more about how the detail can be done correctly next time etc."</i>
❖ Individuals and teams are links across remote locations or linked by information networks and communications mechanisms	<i>"It is not about the people in the individual office. They don't see other people during the day."</i> <i>"The different groups interact at a social level."</i> <i>"Through meetings informal, from gathering, social gathering. That was mainly."</i>
❖ Improved sharing of information encourages better quality working relationships.	<i>"You can find out more information if those suppliers are trusted."</i>
❖ Product development cycles (e.g. drawing package) accelerate due to the availability and use of shared knowledge and expertise	<i>"We have people coming in from college. They have an understanding of design skills ... they teach me"</i>
❖ There is greater innovation and building on ideas of others.	<i>"During sharing knowledge with my colleague, so I got this idea that we have this new material"</i>
❖ Individuals are encouraged to develop and to grow their shared expertise	<i>"We encourage [employees] to develop themselves ... we invest in them with time and money."</i> <i>"We send them on training courses, pay for them to do courses on the web and also hold in house seminars."</i>

5.0

What are potential improvement areas to sustain current growth?

5.1 Immediate wins

Ensure there is a mechanism for capturing the outputs and new learning opportunities from future projects when they are completed	❖ Establish post-project review policy, guidelines, and checklists
Conduct 'exit interviews' when people leave, to capture knowledge which will be missed	❖ Establish exit planning policy, guidelines, and checklists

5.2 Short term wins

Establish more formal structure system to capture and access knowledge context	<ul style="list-style-type: none"> ❖ Establish 'Road map' to find knowledge in the firm ❖ Transfer people/knowledge between projects/business to spread and gain knowledge (particularly managers) (such as assignment system) ❖ Invest more in knowledge transfer (e.g. project briefing) rather than skill building (e.g. learn direct project)
Create knowledge base	<ul style="list-style-type: none"> ❖ Establish 'products/components/materials' database
Establish evaluation and reward system	<ul style="list-style-type: none"> ❖ Supplier performance evaluation (e.g. information accuracy) ❖ Link rewards to knowledge contribution and use through such means as the appraisal system

5.3 Mid- to long-term wins

❖ Develop a knowledge management (KM) strategy	<ul style="list-style-type: none"> ❖ Role of IT (e.g. communication media) ❖ Innovation ❖ Competitive advantage ❖ Knowledge mapping
❖ Link to human resource (HR) strategy	<ul style="list-style-type: none"> ❖ Align KM strategy and HR strategy

5.0

Summary: What are the key findings?

Current position		<ul style="list-style-type: none"> ❖ Good at "external" innovation to solve "one-off" client problems, BUT not so good at "internal" innovation to improve operational efficiency
Potential problems		<ul style="list-style-type: none"> ❖ Not a problem now, BUT with increasing growth of the firm the limitation of the internal systems will probably become a significant restraining force
Potential improvement areas to sustain current growth	Immediate	<ul style="list-style-type: none"> ❖ Establish post-project review policy, guidelines, and checklists ❖ Establish exit planning policy, guidelines, and checklists
	Short term	<ul style="list-style-type: none"> ❖ Establish more formal structure system to capture and access knowledge context ❖ Create knowledge base ❖ Establish evaluation and reward system
	Mid- to long-term	<ul style="list-style-type: none"> ❖ Develop a knowledge management (KM) strategy ❖ Link to human resource (HR) strategy

Appendix I Each innovation key notes and cognitive map

Node Explorer - Innovation In Calderpeel 10

Node Tools View

Browse Properties Attributes DocLinks NodeLinks Assay Search

Nodes Nodes in /Why mission statement successful

Recently Used

Free (0)

Trees (172)

Why mission statement successful

- Senior management implerr
- Chairman driven
- Senior management talking
- Informal discussion in the of
- Raised employee awareness
- Not all employees bought in
- MS information documenter
- E-mails
- Company was directionless
- Good relationships with colle
- Company website
- Staff understood the firm m
- Company had identity
- Company had structure
- Company had future directi
- Social activity
- Office
- Informal meeting

Title	No.	Passages	Created	Modified
Senior management implementation	1	11	08/07/20...	10/12/20...
Chairman driven	2	7	24/05/20...	08/11/20...
Senior management talking to people	3	4	07/09/20...	07/09/20...
Informal discussion in the office	4	13	07/09/20...	12/11/20...
Raised employee awareness	5	5	08/07/20...	03/11/20...
Not all employees bought into	6	2	11/06/20...	10/12/20...
MS information documented	7	7	07/09/20...	03/11/20...
E-mails	8	1	07/09/20...	15/12/20...
Company was directionless	9	3	11/06/20...	29/11/20...
Good relationships with colleagues a	10	7	07/09/20...	29/11/20...
Company website	11	4	14/06/20...	12/11/20...
Staff understood the firm more	12	10	07/09/20...	15/12/20...
Company had identity	13	7	08/07/20...	03/11/20...
Company had structure	14	5	07/09/20...	03/11/20...
Company had future direction	15	3	07/09/20...	03/11/20...

No coding. Children: 28
(no description)

Tree Node - (1) /Why mission statement successful

Figure I.1 Successful innovation 1 - mission statement key notes (1/2)

Node Explorer - Innovation In Calderpeel 10

Node Tools View

Browse Properties Attributes DocLinks NodeLinks Assay Search

Nodes Nodes in /Why mission statement successful

Recently Used

Free (0)

Trees (172)

Why mission statement successful

- Senior management implerr
- Chairman driven
- Senior management talking
- Informal discussion in the of
- Raised employee awareness
- Not all employees bought in
- MS information documenter
- E-mails
- Company was directionless
- Good relationships with colle
- Company website
- Staff understood the firm m
- Company had identity
- Company had structure
- Company had future directi
- Social activity
- Office
- Informal meeting

Title	No.	Passages	Created	Modified
Company had structure	14	5	07/09/20...	03/11/20...
Company had future direction	15	3	07/09/20...	03/11/20...
Social activity	16	8	07/09/20...	29/11/20...
Office	17	4	07/09/20...	07/09/20...
Informal meeting	18	6	07/09/20...	07/09/20...
Informal presentation-workshop	19	17	10/05/20...	10/11/20...
Used in the marketing	20	12	24/05/20...	29/11/20...
No specific way to measure the perf	21	13	24/05/20...	07/09/20...
Training	22	11	24/05/20...	12/11/20...
Quarterly office meeting	23	5	24/05/20...	04/11/20...
Recruited new staff	24	2	24/05/20...	29/11/20...
Motivated staff	25	5	26/05/20...	29/11/20...
Management meeting	26	4	07/09/20...	04/11/20...
Business adviser vision	27	3	07/09/20...	10/12/20...
Open family culture	28	2	07/09/20...	15/12/20...

No coding. Children: 28
(no description)

Tree Node - (1) /Why mission statement successful

Figure I.2 Successful innovation 1 - mission statement key notes (2/2)

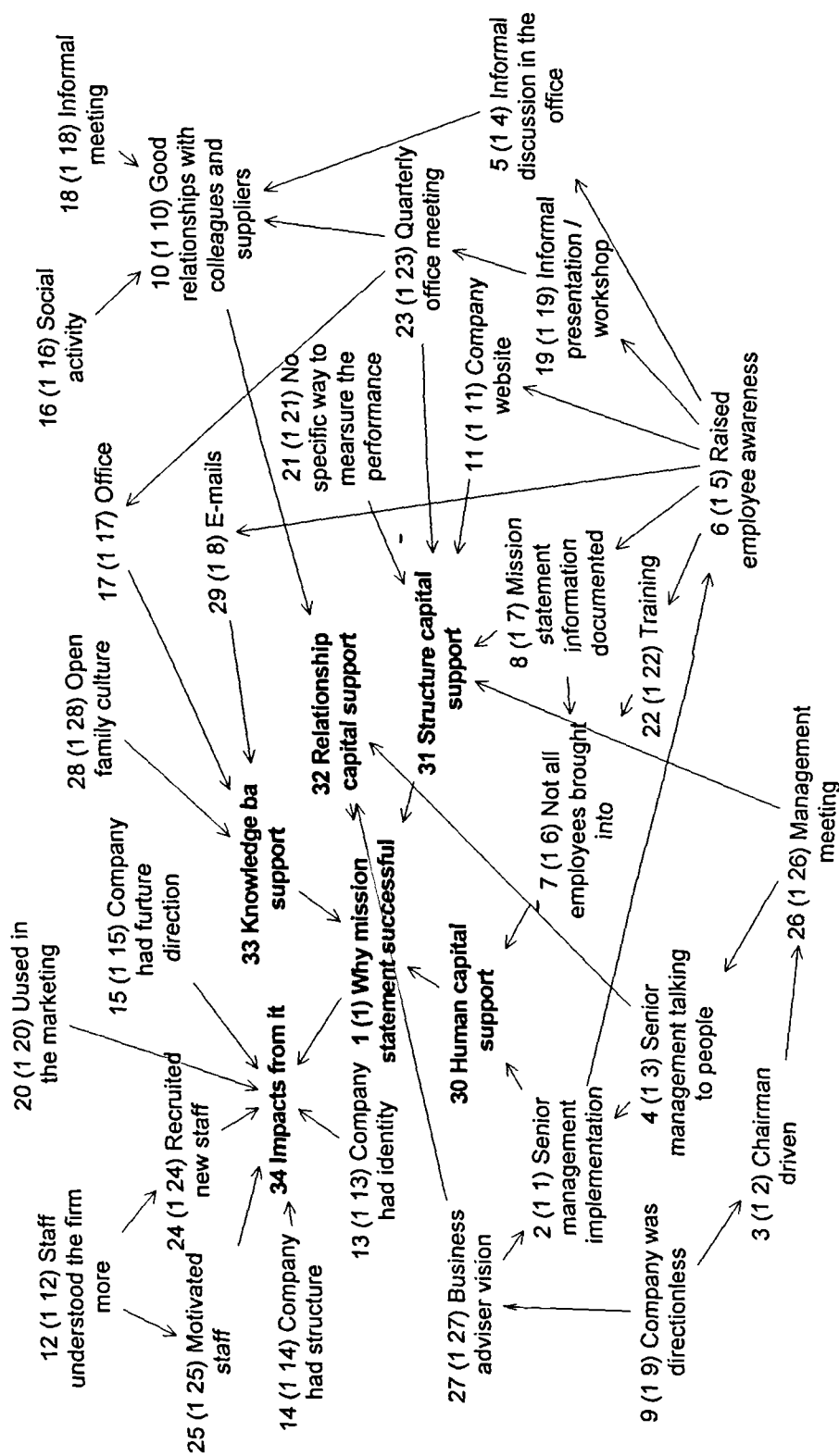


Figure I.3 Successful innovation 1 - mission statement cognitive map

Node Explorer - Innovation in Calderpeel 10

Node Tools View

Browse Properties Attributes DocLinks NodeLinks Edit Assay Search

Nodes Nodes in Why IP successful

Trees (172)	Title	No.	Passages	Created	Modified
Why mission statement successful	E-mails	1	3	02/08/20...	10/12/20...
Why IP successful	Senior management vision	2	6	29/07/20...	20/12/20...
E-mails	Open family culture	3	4	25/08/20...	27/08/20...
Senior management vision	Senior management implementation	4	3	29/07/20...	10/12/20...
Open family culture	Raised employee awareness	5	2	02/08/20...	15/12/20...
Senior management implement	People aware IP	6	2	25/08/20...	27/08/20...
Raised employee awareness	Not all employees bought into	7	3	27/08/20...	10/12/20...
People aware IP	Company had future direction	8	1	25/08/20...	03/11/20...
Not all employees bought into	Training	9	1	29/07/20...	12/11/20...
Company had future direction	Annual staff appraisal	10	4	29/07/20...	10/12/20...
Training	Company had process	11	3	29/07/20...	03/11/20...
Annual staff appraisal	Informal discussion in the office an	12	8	29/07/20...	27/08/20...
Company had process	Improved company confidence	13	3	29/07/20...	15/12/20...
Informal discussion in the office	Improved company reputation	14	5	02/08/20...	13/12/20...
Improved company confidence	Business advisers vision	15	2	27/08/20...	15/12/20...
Improved company reputation	IP information documented	16	2	02/08/20...	03/11/20...
Business advisers vision	Improved business performance	17	1	25/08/20...	03/11/20...
IP information documented	No coding. Children: 17				
Improved business performance	(no description)				
Why new designs successful					
Why company restructure successful					
...					

Tree Node - (2) /Why IP successful

Figure I.4 Successful innovation 2 - Investors in People key notes

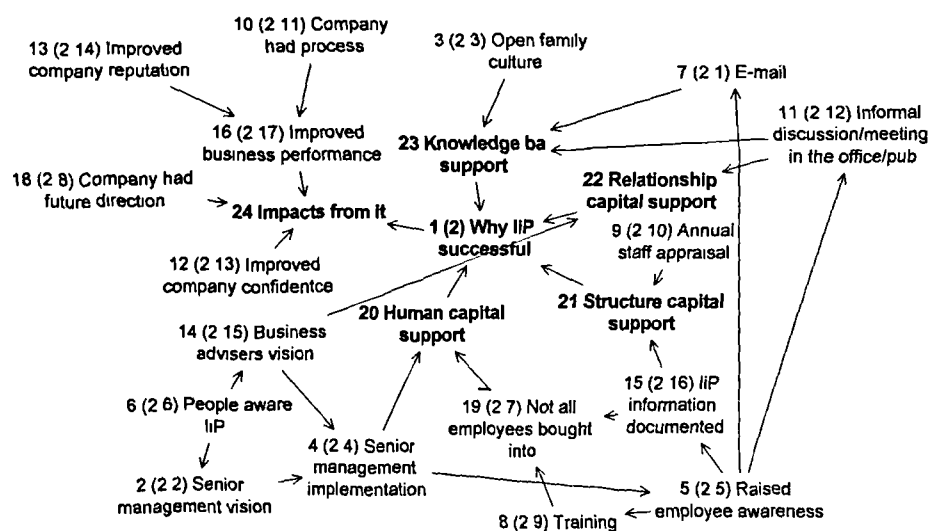


Figure I.5 Successful innovation 2 - Investors in People cognitive map

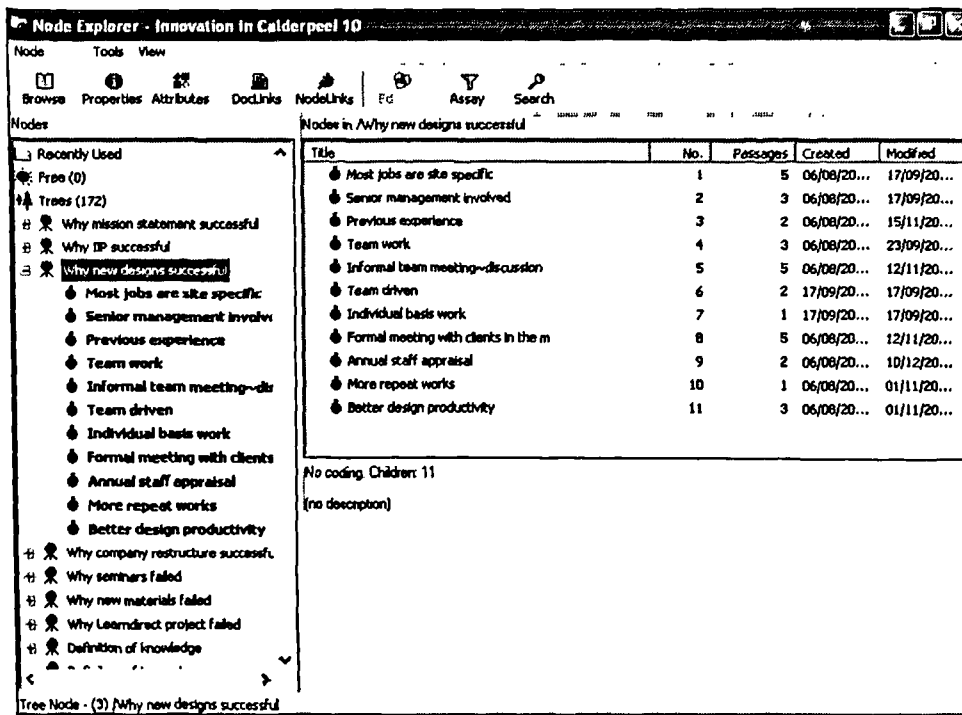


Figure I.6 Successful innovation 3 - new designs key notes

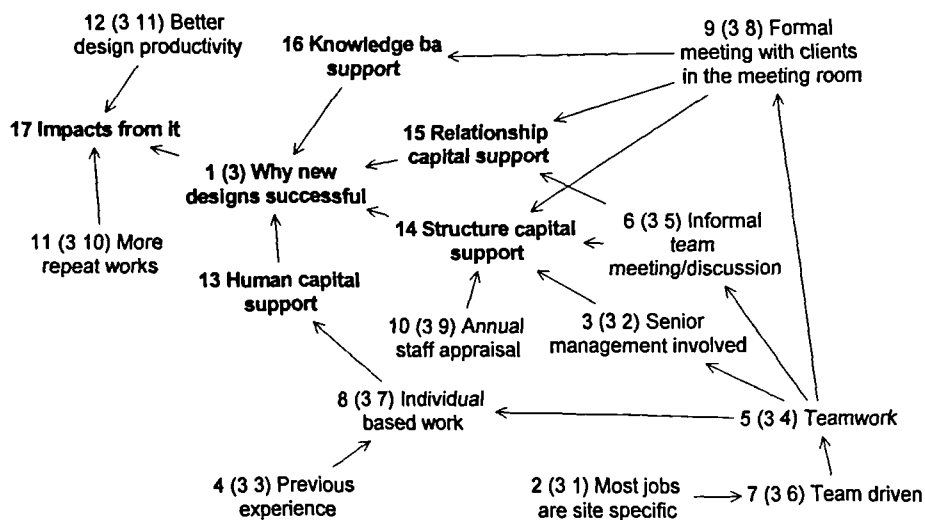


Figure I.7 Successful innovation 3 - new designs cognitive map

Node Explorer - Innovation in Calderpeel 10					
Node Tools View					
Browse Properties Attributes DocLinks NodeLinks Assay Search					
Nodes Nodes in /Why company restructure successful					
Recently Used	Title	No.	Passages	Created	Modified
Free (0)	To reinforce the mission statement	1	1	16/08/20...	10/12/20...
Trees (172)	Clients wanted to know all team memb	2	1	16/08/20...	29/11/20...
Why mission statement successful	The company structure kept changing	3	3	16/08/20...	10/12/20...
Why IP successful	Senior management vision	4	2	16/08/20...	20/12/20...
Why new designs successful	senior management implementation	5	4	16/08/20...	10/12/20...
Why company restructure successful	Management meeting	6	2	16/08/20...	04/11/20...
	Quarterly office meeting	7	3	16/08/20...	04/11/20...
	Informal team meeting-discussion	8	3	16/08/20...	17/09/20...
	Company had structure and process	9	2	16/08/20...	03/11/20...
	Clients and staff understood the fir	10	2	16/08/20...	13/12/20...
	Company had team-based measurement sy	11	4	16/08/20...	13/12/20...
	Too much work	12	1	16/08/20...	03/11/20...

No coding. Children: 12
(no description)

Tree Node - (4) /Why company restructure successful

Figure I.8 Successful innovation 4 - company restructure key notes

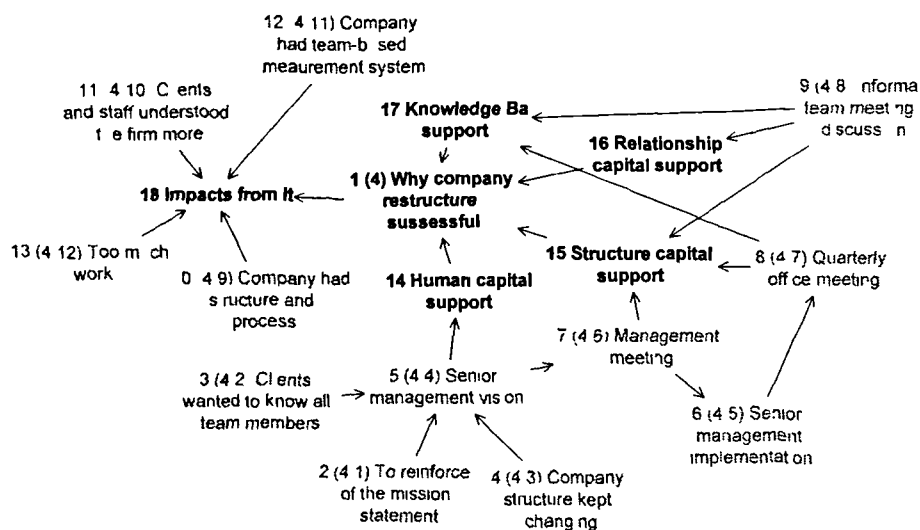


Figure I.9 Successful innovation 4 - company restructure cognitive map

Node Explorer - Innovation in Calderpeel 10

Node Tools View

Browse Properties Attributes DocLinks NodeLinks Assay Search

Nodes Nodes in /Why seminars failed

Title	No.	Passages	Created	Modified
Discovered some staffs' ott	1	1	10/09/20...	03/11/20...
Informal meeting~discussi	2	7	09/07/20...	10/09/20...
Senior management vision	3	5	11/06/20...	10/12/20...
Management not drive it	4	6	09/06/20...	29/11/20...
Senior management choos	5	5	09/09/20...	29/10/20...
Informal team meeting~dis	6	15	09/09/20...	11/11/20...
Employee vision	7	2	09/09/20...	10/12/20...
Middle management impler	8	10	09/09/20...	10/12/20...
No one had time	9	15	07/06/20...	29/11/20...
Not related to the job	10	2	09/09/20...	10/12/20...
Management meeting	11	4	10/09/20...	10/11/20...
No structure	12	4	07/06/20...	15/11/20...
To reinforce the mission stz	13	1	10/09/20...	03/11/20...
The chosen people are not i	14	1	09/09/20...	09/09/20...
Computing programme	15	5	09/09/20...	10/12/20...
Some staff sent to attend t	16	1	09/09/20...	10/12/20...
The team not motivated	17	2	09/09/20...	29/11/20...
Employees encouraged to a	18	6	10/09/20...	29/11/20...
Senior management led it	19	5	09/09/20...	29/11/20...
Took too much time	20	7	09/09/20...	10/11/20...
People engaged in some pr	21	1	10/09/20...	29/11/20...

No coding. Children: 35

Tree Node - (5) /Why seminars failed

Figure I.10 Unsuccessful innovation 5 - seminars key notes (1/2)

Node Explorer - Innovation in Calderpeel 10

Node Tools View

Browse Properties Attributes DocLinks NodeLinks Assay Search

Nodes Nodes in /Why seminars failed

Title	No.	Passages	Created	Modified
Computing programme	15	5	09/09/20...	10/12/20...
Some staff sent to attend training	16	1	09/09/20...	10/12/20...
The team not motivated	17	2	09/09/20...	29/11/20...
Employees encouraged to attend semin	18	6	10/09/20...	29/11/20...
Senior management led it	19	5	09/09/20...	29/11/20...
Took too much time	20	7	09/09/20...	10/11/20...
People engaged in some projects more	21	1	10/09/20...	29/11/20...
The client's job had higher priority	22	2	10/09/20...	29/11/20...
Staff understood the firm more	23	1	24/05/20...	15/12/20...
Good ideas not captured	24	2	10/09/20...	29/11/20...
To develop motivation	25	3	26/05/20...	10/09/20...
To share knowledge	26	9	09/06/20...	10/09/20...
Company website	27	2	10/09/20...	15/11/20...
Encouragement from top management	28	3	10/09/20...	29/11/20...
E-mails	29	3	10/09/20...	10/12/20...
Nothing recorded	30	3	10/09/20...	12/11/20...
To make improvement in the business	31	2	10/09/20...	29/11/20...
It's stopped	32	3	10/09/20...	10/09/20...
To raise awareness	33	2	10/09/20...	10/09/20...
Encouragement from all management	34	3	10/09/20...	29/11/20...
Increased knowledge	35	1	10/09/20...	03/11/20...

No coding. Children: 35

Tree Node - (5) /Why seminars failed

Figure I.11 Unsuccessful innovation 5 - seminars key notes (2/2)

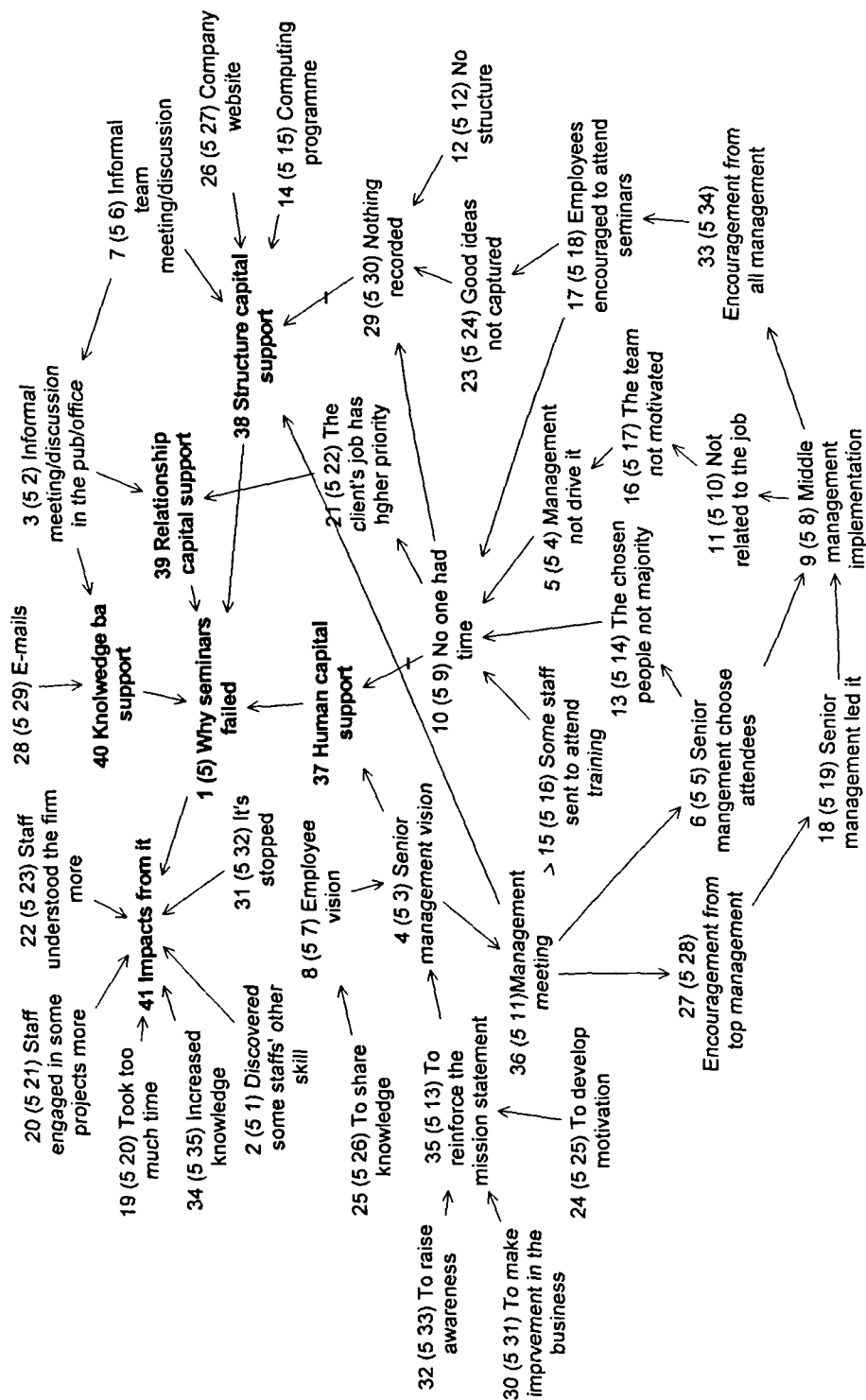


Figure I.12 Unsuccessful innovation 5 - seminars cognitive map

Node Explorer - Innovation in Calderpeel 10

Node: Tools View

Browse Properties Attributes DocLinks NodeLinks Assay Search

Nodes: Nodes in /Why new materials failed

Title	No.	Pages	Created	Modified
Individual based work	1	2	25/08/20...	10/12/20...
Employees encouraged to attend train	2	1	25/08/20...	04/11/20...
Informal team meeting~discussion	3	3	25/08/20...	12/11/20...
Good relationships with clients	4	2	25/08/20...	10/12/20...
The recommended product had been use	5	5	06/08/20...	25/08/20...
Improved knowledge	6	5	24/08/20...	12/11/20...
Legislation requirement	7	1	06/08/20...	15/11/20...
Good personal relationships with sup	8	4	06/08/20...	10/12/20...
Internet	9	1	25/08/20...	25/08/20...
Bad for the company reputation	10	1	24/08/20...	23/09/20...
Not enough information on that prod	11	1	24/08/20...	23/09/20...
Ideas from anywhere	12	2	25/08/20...	25/08/20...
Informal site visits	13	2	06/08/20...	25/08/20...
RIBA architectural journal	14	3	25/08/20...	25/08/20...
E-mails	15	3	25/08/20...	10/12/20...
Informal meeting with suppliers regu	16	1	25/08/20...	15/11/20...
Informal meeting with clients regul	17	3	25/08/20...	15/11/20...
Conversation with clients on the pho	18	1	25/08/20...	10/11/20...
Formal site visit during the project	19	2	25/08/20...	25/08/20...
Individual driven	20	1	23/09/20...	23/09/20...

No coding. Children: 20

Tree Node - (6) /Why new materials failed

Figure I.13 Unsuccessful innovation 6 - new materials key notes

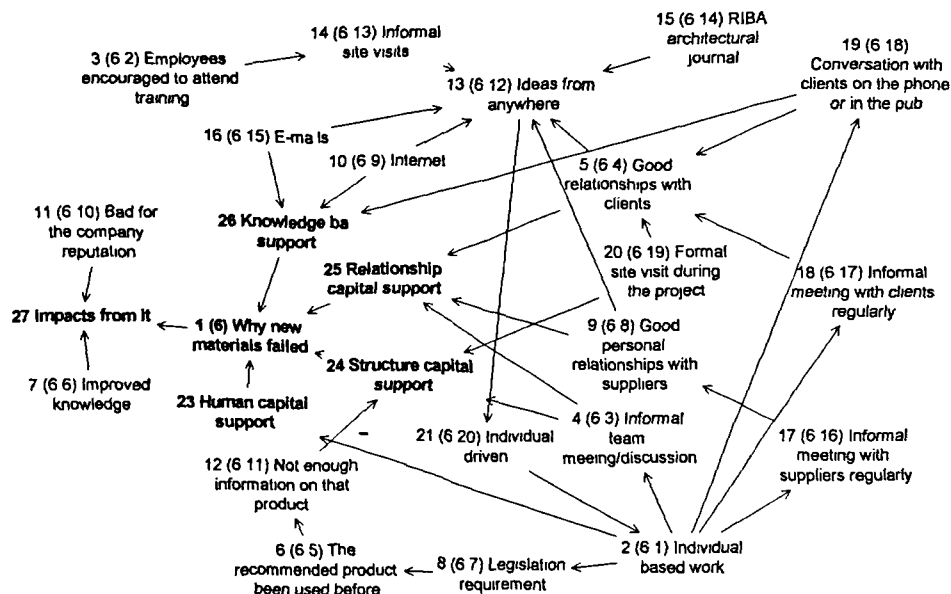


Figure I.14 Unsuccessful innovation 6 - new materials cognitive map

Node Explorer					
Tools View					
Nodes in /Why Learndirect project failed					
Title	No.	Passages	Created	Modified	
Business advisers driven	1	3	17/08/20...	15/11/20...	
To raise employees' softer skills	2	1	17/08/20...	23/09/20...	
Free resource from government	3	2	17/08/20...	01/11/20...	
Business advisers implementation	4	1	17/08/20...	10/12/20...	
Informal meeting	5	2	17/08/20...	10/09/20...	
E-mails	6	2	17/08/20...	15/11/20...	
Encouragement from the team leader	7	1	17/08/20...	29/11/20...	
Brand awareness	8	1	17/08/20...	10/09/20...	
Informal chat in the open day	9	4	17/08/20...	23/09/20...	
Internet	10	2	17/08/20...	23/09/20...	
Employees not buy in	11	4	17/08/20...	23/09/20...	
Senior management not drive it	12	4	17/08/20...	23/09/20...	
Some staff learned some skills	13	2	17/08/20...	13/12/20...	
Cost a lot of money	14	1	17/08/20...	02/12/20...	
Lost training opportunity	15	3	17/08/20...	02/12/20...	
Something wrong with our IP	16	1	17/08/20...	17/06/20...	
Everyone had a PDP	17	1	17/08/20...	15/11/20...	
BD monitored the progress	18	3	17/08/20...	13/12/20...	
Encouragement by using the free course	19	1	17/08/20...	13/12/20...	
Chairman not committed	20	1	17/08/20...	29/11/20...	
Business development led it	21	2	17/08/20...	29/11/20...	

Figure I.15 Unsuccessful innovation 7 - Learndirect project key notes

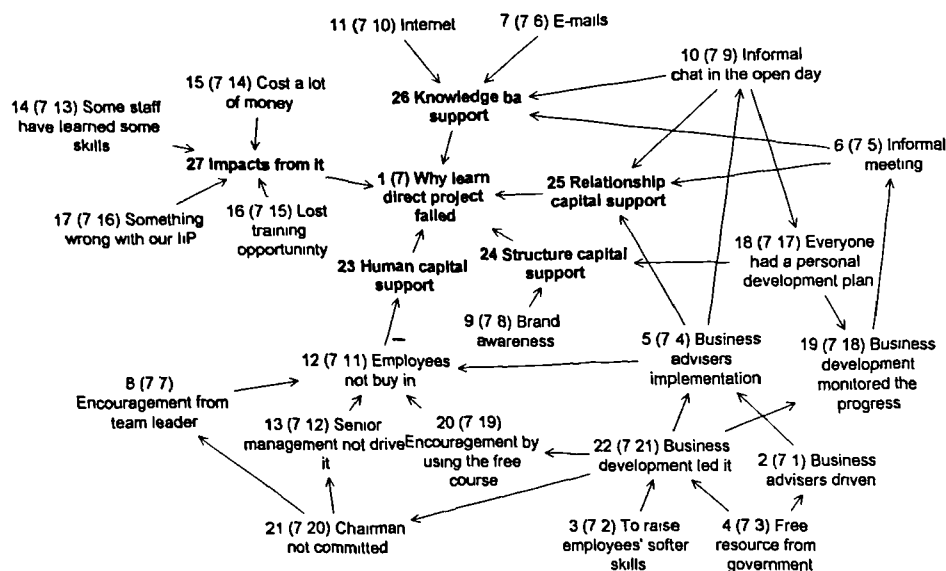





Figure I.16 Unsuccessful innovation 7 - Learndirect project cognitive map

Appendix J Company workshop presentation

The 1st Company Workshop

INNOVATION IN the Calder Peel Partnership Ltd: General Findings




Shu-Ling Lu and Caroline Lamb

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What is the current position?

- Good at "external" innovation to solve "one-off" client problems.
- BUT
- Not so good at "internal" innovation to improve operational efficiency.








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Presentation outline




- What are the key findings?
 - What is the current position?
 - What are the potential problems?
 - Why manage knowledge?
 - What are potential improvement areas to sustain current growth?
- What are the immediate innovations which calderpeel should progress?
 - Innovation 1: Post-project review
 - Innovation 2: Exit planning (Exit interview)
 - Action plan for post-project review and exit planning

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What is calderpeel's position?




■ Financial success	"Financially we are probably doing relatively well."
■ Good at 'ring-fenced' team work	"For something to be supported it needs to be shared. ...we share with the team, the whole team discuss it."
■ Committed to architectural quality	"The way that I would judge the success is purely in achieving commercial success, but also achieving architecture success."
■ The firm is very young	"A lot of younger, less experienced members of staff, got a quite lot of responsibility."

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What are the key findings?








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What are the potential problems?

- Too busy, lots of work
- Everything is done in 'ring-fenced' teams
- Good ideas are not captured and further developed because of the pressure of the work
- Lack of appropriate structure and communication channels to encourage and support knowledge transfer between 'ring-fenced' teams and projects in a formal way

NOT A PROBLEM NOW!!!

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What are the potential problems?

- BUT....
- With increasing growth of the firm the limitation of the internal systems will become a significant restraining force.

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What are the immediate innovations which calderpeel should progress?

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Why manage knowledge?

- Knowledge is often shared and created when new situations are presented (e.g. new project comes in)
- When employees require knowledge, trying to find the person they know, rather than the right person to ask, often means that people are NOT getting to the right answer.
- People prefer to receive information face-to-face rather than through on paper or electronically.
- Specification design in the past based on guesswork or trial and error.

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Innovation 1: Post-project review

- What is post-project review?
 - Is an activity where people come together to review a previous project

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What are potential improvement areas to sustain current growth?

- Immediate wins
 - Establish post-project review policy, guidelines, and checklists
 - Establish exit planning policy, guidelines, and checklists
- Short term wins
 - Establish more formal structure system to capture and access knowledge context
 - Create knowledge base
 - Establish evaluation and reward system
- Mid- to long-term wins
 - Develop a knowledge management (KM) strategy
 - Link to human resource (HR) strategy

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Objective and benefits of post-project review

- Objective
 - To develop and test post-project review policy, guidelines, and checklists
- Benefits
 - To identify areas for improvements and ways to improve them
 - To offer powerful opportunities for learning and innovation, therefore employees don't 'reinvent the wheel' or repeat their mistakes in future projects
 - To help build a strong sense of commitment and team spirit in the team

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Post-project review good practice

- Written policy, guidelines, and checklists
- Focus on
 - Identify items that were done well
 - Identify items that could improve
 - Identify items that are broken
 - Decide action plans
- To who, what, when questions
 - When should the review be in the project life-cycle?
 - What should be the agenda for review?
 - Who should participate in the review?

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Objective and benefits of exit planning

- Objective
 - To develop and test exit planning policy, guidelines, and checklists
- Benefits
 - To capture and share important knowledge from staff leaving the practice
 - To ensure stability and continuation of client service even when key staff leave

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Example from other firms : Questionnaire

- 1 Are you proud of our finished deliverables (project work products)? If yes, what's so good about them? If no, what's wrong with them?
- 2 What was the single most frustrating part of our project?
- 3 How would you do things differently next time to avoid this frustration?
- 4 What was the most gratifying or professionally satisfying part of the project?
- 5 Which of our methods or processes worked particularly well?
- 6 Which of our methods or processes were difficult or frustrating to use?
- 7 If you could wave a magic wand and change anything about the project, what would you change?
- 8 Did our stakeholders, senior managers, customers and sponsor(s) participate effectively? If not, how could we improve their participation?

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Exit planning good practice (1/2)

- Written policy, guidelines, and checklists
- Focus on
 - Capturing key knowledge from people in the company
 - The knowledge-focused interview is on knowledge that would be helpful to the next person in the job or to others in the firm with similar roles and responsibilities

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Innovation 2: Exit planning (Exit interview)

- What is exit planning?
 - As a way of capturing key knowledge from leavers rather than simply capturing human resources information.

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Exit planning good practice (2/2)

- To who, what, when questions
 - When should be conducted: as soon as you know a person is leaving
 - What should be the agenda:
 - For explicit knowledge: make sure they move relevant material to shared space (e.g. shared folders)
 - For tacit knowledge: review the key tasks the person does to ensure successful role/task succession
 - Who should participate: a peer or a relevant subject expert (who in the company might benefit from that person's knowledge what they need to know)

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Example 1 from other firms: Questionnaire

- What did you do?
- How did you do it?
- Why did you do it?
- What skills and competencies are most critical?
- Where are your documents/files?

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Discussion

Shu-Ling Lu and Caroline Lamb

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Example 2 from other firms: Questionnaire

1. Why are you leaving?
2. Was salary a factor?
3. Do you feel you were fairly compensated for the position you held?
4. Did you anticipate your job?
5. Was your job what you expected it to be? If not, how did it differ?
6. Do you feel you were placed in a position compatible with your skills? If not, explain.
7. Do you feel that there was the possibility for advancement in your position? If not, what do you feel prevented advancement?
8. Do you think you should have been offered more training/development within the position you held?
9. What was the greatest challenge you faced in your position?
10. What have been the most enjoyable aspects of your position? Why?
11. What have been the most enjoyable tasks in your position? Why?
12. Did you feel a sense of security in your position? If not, why?
13. How did you find the work within your department?
14. Was there anything the company could have done to improve morale?
15. What was your supervisor like to work for?
16. Were the working conditions suitable? (i.e. hours, work area, etc.)
17. Was the work too much or too little for you?
18. Did you feel you were well informed regarding the company's policies and procedures? If not, why?
19. Is there anything we could have done differently that may have affected your decision to leave?
20. Would you re-consider employment with the company?
21. Additional comments

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Action plan for post-project review and exit planning

Activity	Duration	Resource	Time scale (week)								
			1	2	3	4	5	6	7	8	
1. Analyse current practice in more depth	1 week	Access to company documents Interview to form a task group									
2. Develop pilot policy guidelines and checklists	1 week	Access to company documents Interviews with the task group									
3. Review/revise policy guidelines and checklists	1 week	Interviews with the task group									
4. Test (when appropriate) policy, guidelines and checklists	2 weeks	Involvement in appropriate company activity									
5. Review/revise policy guidelines and checklists	1 week	Interviews with the task group									

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Appendix K Process for interim project review

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Calder Peel Partnership Process for Interim Project Review (Recommended)



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AMENDMENT RECORD

Rev	Description of changes	Approved by Quality Representative	Date approved:
a	Original issue	Caroline Lamb	July 2004
b			

1. INTREIM PROJECT REVIEW POLICY

Calderpeel's interim project review policy is to implement and maintain an effective interim project review mechanism to ensure that it delivers good quality architectural designs and services for the clients and captures key knowledge within the company.

2. PURPOSE OF THE PROCESS

The purpose of the review is to define measures to monitor project progress, in order to identify what improvements can be implemented for current and future jobs.

The interim project review process consists of activities performed by a project team to gather information on what worked well and what did not, so that current and future projects can benefit from that learning.

This process might also be used after the project has finished, if the organisation deems it useful.

Specific project objectives will be set and reviewed through the interim project review process.

Projects will be graded on five criteria: correctness, design, style, documentation, and efficiency.

3. SCOPE OF THE PROCESS

A interim project review is generally done at the end of each significant phase, for example, the feasibility and planning phase, traditional contract phase, and design and build contract phase, so that knowledge are captured while they are still easily recalled. This process might be used with a project that completed some time ago, but for which the knowledge was not gathered.

This process has been tailored for High and Low Focus Projects, which will be conducted in two different ways. The table below identifies the characteristics of High and Low Focus Projects.

Characteristic	High Focus	Low Focus
Budget	More than £ X	Less than £ X
Time to Deliver	More than Y year to operation	Less than Y year to operation
Team involvement	More than 1 calderpeel project team involved	Only 1 calderpeel project team involved
Client involvement	No experience in the past working with this client	Good experience working with this client
Supplier involvement (e.g. M&E engineer, contractor etc.)	No experience in the past working with this supplier	Good experience in the past working with this supplier

In addition, interim project review checklists have also been tailored for the High Focus and Low Focus types of project. In some cases, these checklists have been identified as optional.

3.1 Activities

Characteristic	High Focus	Low Focus
Define the checklists to use and gather information		Use team discussion of those involved
Conduct interim project review checklists	May include different teams, the client etc.	Include just the team
Conduct interim project review session	Hold a formal meeting	Hold an informal discussion
Review summary report		
Distribute Lessons learned		Update the minimal set of factors, based on this project's experience

3.2 Roles

Role	High Focus	Low Focus
Moderator	Director/team leader	Team leader
Meeting Participants	Project team/other teams/client	Project team
Reviewer	Job runner	Job runner

3.3 Deliverables

Activity Deliverable	High Focus	Low Focus
	Questionnaire in a formal meeting	Informal questions in an informal team discussion
Lessons learned	Notes from a formal meeting	Notes from informal team discussions
Review summary report	Notes from a formal meeting	Notes from informal team discussions
Process Change Requests	May be filed by Quality Improvement Team	May be filed by the reviewer

4. REFERENCES

QP1 Document/record control
 QP2 Problems and complaints
 QP4 Feasibility and planning
 QP5 Traditional contract
 QP6 Design and build contract
 QP7 Control of job documentation
 QM Quality manual 5.6 Management review
 Company handbook the document filing procedures

5. DEFINITIONS

Interim project review.
 It is an activity where people reviewing what went well and what went badly during the project feeding lessons learned to current and future project.

6. RESPONSIBILITY AND AUTHORITY

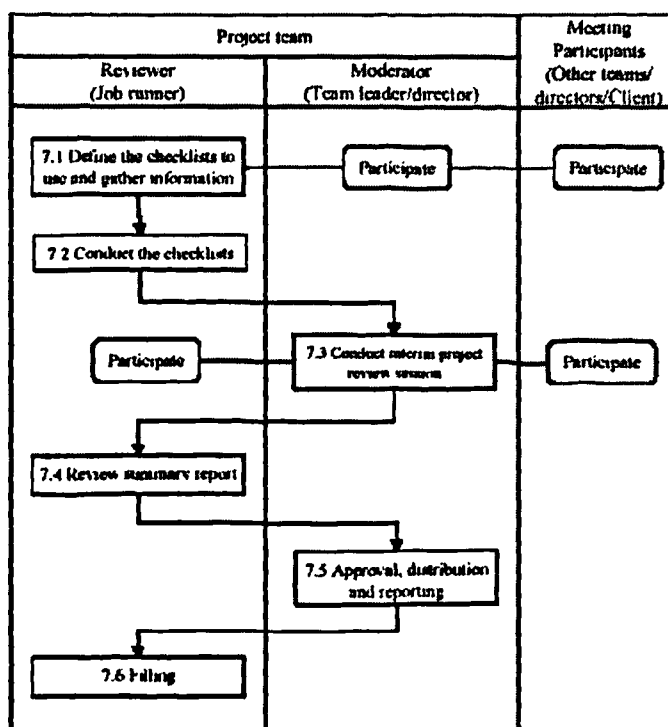
Those who generally participate in the interim project review process are members of the project team, key stakeholders, and users of the project deliverables or results.

The roles in the interim project review are described in the following table.

Role Names	Role Definitions
Moderator	Person who organises the sessions and facilitates any meetings
Team leader	Person who represents the project overall, generally a member of the development organisation which performed the project
Reviewer (Job runner)	Person handles the review, gathers information from participants and documents the final report of the interim project review for a project; generally a member of the project team which performed the project.
Participant	Any person or group who provide input to the interim project review, based on experience with the project or its results
Stakeholder	Any person or group who has interest in the provision for use of the required product or service (e.g. client, internal audit, operational support staff, etc.)

7. OVERVIEW OF THE PROCESS AND ACTIVITY DESCRIPTIONS

The diagram that follows shows the workflow for this process.



7.1 Define the checklists to use and gather information

7.1.1 The reviewer needs to confirm that the project team is performing the current interim project review process (i.e. either Low focus or High focus project).

7.1.3 The reviewer defines which checklists to use and to prepare any specific questions for the project purpose. The different types of checklists are described as follow:

- 1) Low focus projects:
 - > Develop the feasibility and planning phase checklist (QR11) on completion of feasibility and planning phase.
 - > Develop the traditional contract phase checklist (QR12) on completion of traditional contract phase.
 - > Develop the design and build contract phase checklist (QR13) on completion of design and build contract phase.
- 2) High focus projects:
 - > Develop the feasibility and planning phase checklist (QR14) on completion of feasibility and planning phase.
 - > Develop the traditional contract phase checklist (QR15) on completion of traditional contract phase.
 - > Develop the design and build contract phase checklist (QR16) on completion of design and build contract phase.

7.1.3 The reviewer selects and communicates to those involved in this review activity, and collects the relevant documents/records from them.

7.2 Conduct interim project reviews checklists

7.2.1 The reviewer uses the defined checklists to conduct the interim project review.

7.2.2 After conducting the interim project review, the reviewer needs to generate a review summary; build lists of those items that require discussion and consensus (things done right, things done wrong, risks missed, etc) in the interview project review session. Its purpose is to identify and to gain acceptance for a recommended issues of action (Preventive action and Corrective action).

7.2.3 Before the interim project review session, the reviewer needs to set specific questions and agenda, and distribute an announcement of the meeting to all participants. It gives meeting participants time to think about them and prepare their responses individually.

7.3 Conduct interview project review session

7.3.1 Based on the type of project, the team leader/director calls an informal team discussion or a formal meeting.

- 1) Low focus projects:
The team leader holds an informal team discussion to discuss the team's responses to the questions.
- 2) High focus projects:
 - The team leader/director calls a formal meeting with participants to order and conducts the session according to specific questions and the agenda.
 - The participants of this meeting can be the client, the managing director, relevant directors, and/or other teams.

7.3.2 The reviewer records all meeting proceedings and identify key issues (a list of lessons learned).

7.4 Review summary report

The reviewer needs to document results from session and then produces the review summary report.

7.5 Approval, distribution and reporting

7.5.1 The review summary report needs to be reviewed and approved by the team leader/director.

7.5.2 The team leader/director needs to review the review summary report, to identify actions needed by management, so that processes and project are continuously improving.

7.5.3 The team leader/director needs to ensure useful records from project are placed, and to determine how best to distribute key results of the interim project review (e.g. presentations at seminars).

7.5.4 The team leader/director reports interim project performance to the director/management meetings (refer to QM Quality manual 5.6 Management review).

7.6 Filing

The relevant documents/records will be filed by the reviewer (refer to QP1 Document/record control and QP 7 Control of job documentation).

8. MEASURES

Measures that can be used to determine the effectiveness of interim project reviews include the following.

Process Change Requests – (Optional) The measure should include the number of recommended changes, as well as an indication of the level of importance to the project team, any indication of when each change is needed, and recommendations for the content of the change.

Lessons learned – (Recommended) The measure should include a count of the number of lessons (e.g. new design, new material, risk factors) being added or changed in the organisation's collection.

Level of Participation – (Optional) Measure the participation of the project members and stakeholders in the interim project Review process, to understand the percent coverage of those who could have constructive input to improving the processes.

APPENDIX1 SUPPORTING CHECKLISTS

Please see the following checklists, accessible separately:

For Low focus projects

QR11 Feasibility and planning phase checklist (page 9)

QR12 Traditional contract phase checklist (page 10)

QR13 Design and build contract phase checklist (page 11)

For High focus projects

QR13 Feasibility and planning phase checklist (page 12)

QR14 Traditional contract phase checklist (page 13)

QR15 Design and build contract phase checklist (page 14)

**Appendix L QW01 Calderpeel guidelines for interim
project review**

QW01 Calderpeel Guidelines for Interim Project Review

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**Calder Peel Partnership
Process for Interim Project Review
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AMENDMENT RECORD

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1. INTREIM PROJECT REVIEW POLICY

Calderpeel's interim project review policy is to implement and maintain an effective interim project review mechanism to ensure that it delivers good quality architectural designs and services for the clients and captures key knowledge within the company.

2. PURPOSE OF THE PROCESS

The purpose of the review is to define measures to monitor project progress, in order to identify what improvements can be implemented and to gain acceptance for a recommended issues of action (preventive action and corrective action) for current and future jobs.

Specific project objectives will be set and reviewed through the interim project review process.

The interim project review process consists of activities performed by a project team to gather information on what worked well and what did not, so that current and future projects can benefit from that learning.

3. SCOPE OF THE PROCESS

A interim project review is generally done at the end of each significant phase, for example, the feasibility and planning phase, traditional contract phase, and design and build contract phase, for instance, before management review meetings, so that knowledge are captured while they are still easily recalled.

This process might also be used with a project that completed some time ago, but for which the knowledge was not gathered.

This process has been tailored for High and Low focus projects, which will be conducted in two different ways. The table below identifies the characteristics of High and Low focus projects:

Characteristic	High Focus	Low Focus
Client involvement	Good experience working with this client (principal clients)	No experience in the past working with this client

In addition, interim project review checklists have also been tailored for the High Focus and Low Focus types of project. In some cases, these checklists have been identified as optional.

4. REFERENCES

OP1 Document/record control
OP2 Problems and complaints
OP4 Feasibility and planning
OP5 Traditional contract
OP6 Design and build contract
OP7 Control of job documentation
QM Quality manual 5.6 Management review
Company handbook: the document filing procedures

5. DEFINITIONS

Interim project review:
It is an activity where people reviewing what went well and what went badly during the project feeding lessons learned to current and future project.

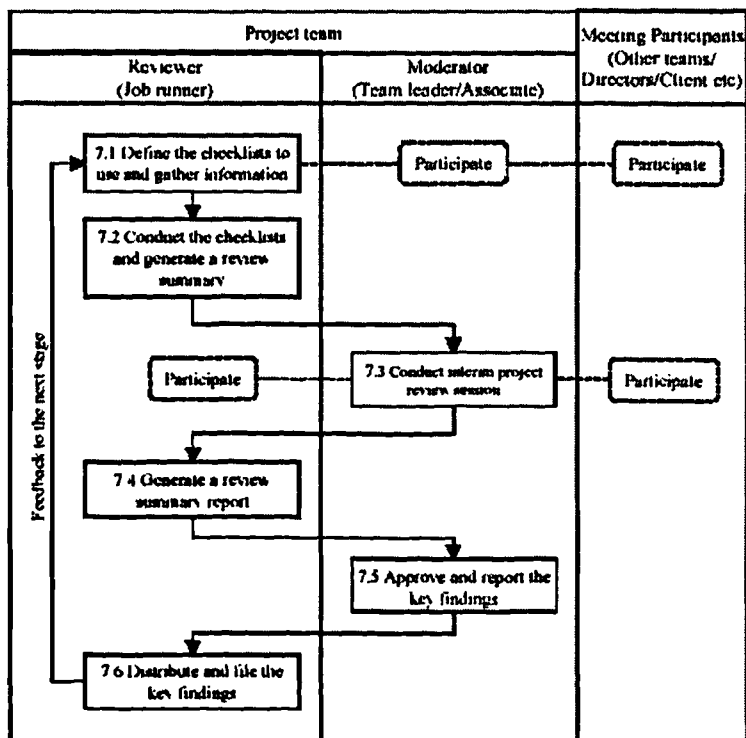
6. RESPONSIBILITY AND AUTHORITY

Those who generally participate in the interim project review process, their roles in the different types of project are described in the following table.

Role Name			Role Definitions
Moderator	High Focus	Associate / team leader	Person who organises the sessions and facilitates any meetings; generally a member of the development organisation who represents the project overall
	Low Focus	Team leader	
Reviewer	High & Low Focus	Job runner	Person handles the review, gathers information from participants and documents the final report of the interim project review for a project; generally a member of the project team which performed the project
Participant	High Focus	Project team / other teams / director / stakeholder	Any person or group who provide input to the interim project review, based on experience with the project or its results
	Low Focus	Project team	*Stakeholder: Any person or group who has interest in the provision for use of the required product or service (e.g. client, internal audit, operational support staff, etc.)

7. OVERVIEW OF THE PROCESS AND ACTIVITY DESCRIPTIONS

The diagram that follows shows the workflow for this process.



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7.1 Define the checklists to use and gather information

7.1.1 The reviewer needs to confirm that the project team is performing the current interim project review process (i.e. either Low focus or High focus project).

7.1.2 The reviewer defines which checklists to use and to prepare any specific questions for the project purpose (refer to QP4 Feasibility and planning, QP5 Traditional contract, and QP6 Design and build contract). The different types of checklists are described as follow:

- 1) Low focus and high focus projects:
 - > Prepare the feasibility and planning phase checklist (QR11) on completion of feasibility and planning phase.
 - > Prepare the traditional contract phase checklist (QR12) on completion of traditional contract phase.
 - > Prepare the design and build contract phase checklist (QR13) on completion of design and build contract phase.

2) High focus projects only:

- Prepare the feasibility and planning phase checklist (QR14) on completion of feasibility and planning phase or before the management review meeting, whichever comes first.
- Prepare the traditional/design and build contract phase checklist (QR15) on completion of traditional contract phase/design and build contract phase or before the management review meeting, whichever comes first.
- Prepare Post-Construction phase checklist (QR16) on completion of the project.

7.1.3 The reviewer selects and communicates to those involved in this review activity, and collects the relevant documents/records from them.

7.2 Conduct the checklists and generate a review summary

7.2.1 The reviewer uses the defined checklists to conduct the interim project review.

7.2.2 After conducting the checklists, the reviewer needs to generate a review summary; including lists (specific questions and agenda) of those items that require discussion and consensus (things done right, things done wrong, risks missed, etc).

7.2.3 Before the interim project review session, the reviewer needs to distribute an announcement with the review summary of the meeting to all participants. It gives meeting participants time to think about them and prepare their responses individually.

7.3 Conduct interview project review session

7.3.1 Based on the different types of project, the interview project review session will be conducted in two different ways.

1) Low focus projects.

- The team leader holds an informal team discussion to discuss the team's responses to the review summary (specific questions and agenda).
- The participants of this meeting include just the team.

2) High focus projects:

- The team leader/associate calls a formal meeting with participants to order and conducts the session according to the review summary (specific questions and the agenda).
- The participants of this meeting may include the client, the managing director, relevant directors, and/or other teams.

7.3.2 The reviewer records all meeting proceedings.

7.4 Generate a review summary report

7.4.1 The reviewer needs to document results and identify key issues from the interim project review session and then produces a review summary report.

7.4.2 A review summary report should involve:

1) The relevant checklists; and

2) Notes/minutes from the interview project review session (e.g. key issues, a list of good practice and lessons learned).

7.5 Approve and report the key findings

- 7.5.1 The review summary report needs to be reviewed and approved by the team leader/associate.
- 7.5.2 Based on the finding from the review summary report, the team leader/associate needs to identify actions needed by management, so that processes and project are continuously improving.
- 7.5.3 The team leader/associate needs to ensure useful records from project are placed, and to determine how best to distribute the key findings from the interim project review (e.g. presentations at seminars to all employee or the key findings distributed to all attendees).
- 7.5.4 The team leader/associate reports the key findings from the interim project review to the management meetings (refer to QM Quality manual 5.6 Management review).

7.6 Distribute and file the key findings

- 7.6.1 The key findings will be distributed at least to all meeting participants by the reviewer.
- 7.6.2 The relevant documents/records will be filed by the reviewer (refer to QP1 Document/record control and QP 7 Control of job documentation).

8. MEASURES

Measures that can be used to determine the effectiveness of interim project reviews include the following.

8.5.1 Process Change Requests – (Optional)

The measure should include the number of recommended changes, as well as an indication of the level of importance to the project team, any indication of when each change is needed, and recommendations for the content of the change.

8.5.2 Good Practice and Lessons learned – (Recommended)

The measure should include a count of the number of lessons (e.g. new materials/new products, risk factors) being added or changed in the organisation's collection.

8.5.3 Level of Participation – (Optional)

Measure the participation of the project members and stakeholders in the interim project review process, to understand the percent coverage of those who could have constructive input to improving the processes.

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APPENDIX1 QUALITY MANAGEMENT STANDARD FOR ARCHITECTURAL DESIGNS AND SERVICES

Quality management standard for architectural designs and services (page 9 ~ page 11)

APPENDIX2 SUPPORTING CHECKLISTS

Please see the following checklists, accessible separately:

For Low and High focus projects use

QR11 Feasibility and planning phase checklist (page 12)

QR12 Traditional contract phase checklist (page 13)

QR13 Design and build contract phase checklist (page 14)

For High focus projects use only

QR14 Feasibility and planning phase checklist (High focus project use only) (page 15)

QR15 Traditional/Design and build contract phase checklist (High focus project use only)
(page 16)

QR16 Post-Construction phase checklist (High focus project use only) (page 17)

Quality management standard for architectural design and service process and product (1/3)

Phase	Activity	Management item	Management standard	Management method				Inspector	Auditor	Note (Corrective action)
				Frequency	Timing	Tool	Data collection			
Feasibility and planning	Demonstrate the need	The client's needs record	Client acceptance	Each project	Client expresses interest		Standard project proforma	Team leader	Associate	
		Stakeholder list (initial)					Standard project proforma			Revise
		Statement of need (initial)					Standard project proforma			Revise
	Conceptualise or need	Stakeholder list (finalised)	Signed pre-fee letter	Each project			Standard project proforma	Team leader	Associate	Redefine
		Statement of need (finalised)					Standard project proforma			Redefine
		Design brief					Standard project proforma			Redefine the design brief
	Set up a project team	Assigned the right people to all project roles	Client acceptance	Each project	Within 5 days after receiving signed pre-fee letter		1 Architect's appointment record (QR12) 2 Employee CPD record (QR12)	Team leader	Associate	
	Feasibility study	Concept design plan								
		CDM assessment (initial)					Standard project proforma	Job runner	Team leader	
	Outline conceptual design	Sketch/layout plan	Signed fee letter				Drawing issue sheet	Job runner	Team leader	
		Detailed drawing (revised)					Drawing issue sheet	Job runner	Team leader	
	Prepare and submit planning application (PL)	1 PL submitted date 2 PL granted date 3 Planning Ref	Planning approval obtained	Each project	After obtaining cheque (fee) from client for planning permission		Standard project proforma	Job runner	Team leader	
	Report project progress in management meeting			Monthly	In the end of each month	Management meetings	1 Site record sheets 2 Snagging sheet 3 Meeting minutes	Team leader / Associate		
	Conduct interim project review	Feasibility and planning phase review		Each project	Low focus projects - on completion of the feasibility and planning phase. High focus projects - on completion of the feasibility and planning phase or before the management review meeting, whichever comes first	Feasibility and planning checklist (QR11) 2. Feasibility and planning checklist (QR14)	Review summary report	Job runner / Reviewer	Team leader	Report to director

Quality management standard for architectural design and service process and product (2/3)

Phase	Activity	Management item	Management standard	Management method				Inspector	Auditor	Note (Corrective action)
				Frequency	Timing	Tool	Data collection			
Traditional contract phase	Full design	Full concept design (drawings and specifications)	Client acceptance		After planning approval obtained		1. Construction status drawings and specifications 2. Drawing issue sheet	Job runner	Team leader	Review
	Prepares tender documents	CDM assessment (updated) Tender documents					Standard project proforma	Job runner	Team leader	
	Prepares and submit building regulations (BR) to Local Authority (LA) or NHBC	1 BR submitted data 2 BR approved data 3 Reference No.	Building regulation approval obtained	Each project	After obtaining cheque (fee) from client for building regulations		Standard project proforma	Job runner	Team leader	
	Appoint contractor	Contract documents	Client acceptance		Before construction works			Job runner	Team leader	
		CDM assessment (finalised)	All health and safety issues documented and finalised		Before construction works		Standard project proforma	Job runner	Team leader	
	Progress and supervise the job - construction	Inspection times		Weekly		Team discussions (informal meetings)	1. Site record sheets 2. AI's 3. Photographs 4. Meeting minutes		Team leader	
		Snagging inspection times		???			Snagging sheet	Job runner		
		Site meeting times		Monthly	Within 3 days after the meeting		Meeting minutes			
	Issue of certificate of marking good defects		Signed meeting minutes				Final certificate			
	Receive Payments during the construction stage totalling	Equal monthly instalments		Monthly	Within 5 days	Receipts	Invokes	Job runner	Team leader	Inform the client
	Report project progress in management meeting			Monthly	In the end of each month Friday	Management meetings	1. Site record sheets 2. Snagging sheet 3. Meeting minutes	Team leader	Associate	
	Conduct interim project review	Tradition contract phase review		Each project	Low focus projects - on completion of the tradition contract	Traditional contract checklist (QR12)	Review summary report	Job runner / Reviewer	Team leader	Report to director

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Quality management standard for architectural design and service process and product (3/3)

Phase	Activity	Management item	Management standard	Management method				Inspector	Auditor	Note (Corrective action)
				Frequency	Timing	Tool	Data collection			
Design and building contract	Obtain copy of planning permission	1 PL granted date 2 Planning Ref	Copy of planning permission obtained	Each project	Novelised after planning approval or appointed by the contractor			Job runner	Team leader	
	Produce construction working drawings		Contractor acceptance				Drawing issue sheet	Job runner	Team leader	
	Prepare and submit building regulations (BR) to Local Authority (LA) or NHABC	1 BR submitted date 2 BR approved date 3 Reference No	Building regulation approval obtained	Each project	After obtaining cheque (fee) from contractor for building regulations			Job runner	Team leader	
		COM assessment (finalised)	All health and safety issues documented and finalised		Before construction works		Standard project problems	Job runner	Team leader	
	Progress and supervise the job - oversee construction	Site visit, site meeting times	Signed meeting minutes	Weekly	During construction works	Team discussions (informal meetings)	1 Site record sheets 2 Meeting minutes	Job runner	Team leader	
	Issue of certificate of marking good defects	Snagging meetings	Signed meeting minutes	Monthly	During construction works		Snagging sheet			
	Receive Payments during the construction stage totalling		Equal monthly instalments	Monthly		Receipts	Final certificates invoices		Team leader	
	Prepare handover plan			Monthly	In the end of each month	Management meetings	1 Site record sheets 2 Snagging sheet 3 Meeting minutes	Team leader	Associate	
	Report project progress in management meeting						Review summary report	Job runner / Reviewer	Team leader	Report to director
	Conduct interim project review	Design and building phase review		Each project	Low focus projects - on completion of the design and building phase High focus projects - on completion of the design and building phase before the management review meeting, whichever comes first	Design and build contract checklist (QR13) 1. Design and build contract checklist (QR13) 2. Traditional/Design and build contract checklist (QR14)	Review summary report	Job runner / Reviewer	Team leader / Associate	
		Post-Construction phase review		Each project	In the end of the project	Post-Construction phase checklist (QR15)	Review summary report	Job runner / Reviewer	Team leader / Associate	

Feasibility and Planning phase Checklist

Job No : _____ Project Name : _____ Date (dd/mm/yy) : _____

No	Check item	Control standard	Control frequency	Check result		Comments	Corrective result
				Yes	No		

The reviewer: Signature _____ Date _____

Approved by associate/team leader Signature _____ Date _____

Traditional contract phase checklist

Design and build contract phase checklist

Feasibility and panning phase Checklist (High focus project use only)

Job No. :

Project Name :

Date (dd/mm/yy) : _____

No	Question	Comments
	Determine need and feasibility (Feasibility study)	
	Did our feasibility study identify all the project deliverables that we eventually had to build? If not, what did we miss and how can we be sure our future analyses don't miss such items?	
	Did our feasibility study identify unnecessary deliverables? If so, how can we be sure our future analyses don't make this mistake?	
	How could we have improved our need-feasibility phase?	
	(Insert your own questions here)	
	Project plan (Standard Project Proforma)	
	How accurate were our original estimates of the size and effort of our project? What did we over or under estimate? (e.g. deliverables, work effort, etc.)	
	How could we have improved our estimate of size and effort so that it was more accurate?	
	Did we have the right people assigned to all project roles? If no, how can we make sure that we get the right people next time?	
	Were our constraints, limitations, and requirements made clear to our client from the beginning? If not, how could we have improved our statement of need?	
	List team members or stakeholders who were missing from the kickoff meeting or who were not involved early enough in our project. How can we avoid these oversights in the future?	
	Were all team/stakeholder roles and responsibilities clearly delineated and communicated? If not, how could we have improved these?	
	Were the deliverables, specifications and milestones clearly communicated? If not, how could we improve this?	
	Deliverables (Drawings and planning decision)	
	Were you proud of our deliverables? If not, how could we have improved these?	
	Did all the important project players have creative input into the creation of the deliverables? If not, who were we missing and how can we assure their involvement next time?	
	Did those who reviewed the deliverables provide timely and meaningful input? If not, how could we have improved their involvement and the quality of their contributions?	
	Feedback	
	How could we have improved our work process for creating deliverables?	

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	Did we get timely, high-quality feedback about how we might improve our deliverables? If not, how could we get better feedback in the future?	
	(insert your own questions here)	

The reviewer: Signature _____ Date _____

Approved by associate/team leader: Signature _____ Date _____

Traditional/Design and build contract phase checklist
(High focus project use only)

Job No. :

Project Name :

Date (dd/mm/yy) :

No	Question	Comments
	Specifications for deliverables (suppliers of materials/components/specialists; contractors)	
	Were our constraints, limitations, and requirements made clear to our suppliers/contractors from the beginning? If not, how could we have improved our statement of need?	
	Were you proud of our detailed design specifications? If not, how could we have improved these?	
	Did all the important project players have creative input into the creation of the design specifications? If not, who were we missing and how can we assure their involvement next time?	
	Did those who reviewed the design specifications provide timely and meaningful input? If not, how could we have improved their involvement and the quality of their contributions?	
	How could we have improved our work process for creating deliverables specifications?	
	Were there any difficulties negotiating suppliers/contractors? How could these have been avoided?	
	Were there any difficulties setting up suppliers/contractors paperwork (purchase orders, contracts, etc.) or getting them started? How could these have been avoided?	
	[Insert your own questions here]	
	Specifications for Deliverables (Suppliers of materials/components/professionals; main contractor/subcontractors)	
	Were there any difficulties negotiating the vendor contract? How could these have been avoided?	
	Were there any difficulties setting up vendor paperwork (purchase orders, contracts, etc.) or getting the vendor started? How could these have been avoided?	
	[Insert your own questions here]	
	Deliverables (Supervision of the construction, drawings and building regulation approval)	
	Were you proud of our deliverables? If not, how could we have improved these?	
	Did all the important project players have creative input into the creation of the deliverables? If not, who were we missing and how can we assure their involvement next time?	
	Did those who reviewed the deliverables provide timely and meaningful input? If not, how could we have improved their involvement and the quality of their contributions?	
	How could we have improved our work process for creating deliverables?	
	Did we get timely, high-quality feedback about how we might improve our deliverables? If not, how could we get better feedback in the future?	

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	(insert your own questions here)	
	Feedback	
	How could we have improved our work process for creating deliverables?	
	Did we get timely, high-quality feedback about how we might improve our deliverables?	
	If not, how could we get better feedback in the future?	
	(insert your own questions here)	

The reviewer: Signature _____ Date _____

Approved by associate/team leader: Signature _____ Date _____

Post-Construction phase checklist
(High focus project use only)

Job No. :

Project Name :

Date (dd/mm/yy) : _____

No	Question	Comments
	Deliverables (housing)	
	Are you proud of our finished deliverables? If yes, what's so good about them? If no, what's wrong with them?	
	What was the single most frustrating part of our project?	
	How would you do things differently next time to avoid this frustration?	
	What was the most gratifying or professionally satisfying part of the project?	
	Which of our methods or processes worked particularly well?	
	Which of our methods or processes were difficult or frustrating to use?	
	If you could wave a magic wand and change anything about the project, what would you change?	
	Did our stakeholders, senior managers, customers, and sponsor(s) participate effectively? If not, how could we improve their participation?	
	Describe any early warning signs of problems that occurred later in the project? How should we have reacted to these signs? How can we be sure to notice these early warning signs next time?	
	Could we have completed this project without one or more of our suppliers/contractors? If so, how?	
	Did our hand-off of deliverables (e.g. built drawings) to the client represent a smooth and easy transition? If not, how could we have improved this process?	
	(Insert your own questions here)	
	Feedback	
	How could we have improved our work process for creating deliverables?	
	Did we get timely, high-quality feedback about how we might improve our deliverables? If not, how could we get better feedback in the future?	
	(Insert your own questions here)	

The reviewer: Signature _____ Date _____

Approved by associate/team leader: Signature _____ Date _____

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Appendix M QW1 Interim project review handbook
(Revision A)

CALDER PEEL PARTNERSHIP LTD

INTERIM PROJECT REVIEW
HANDBOOK



Revision A - July 2004

DISTRIBUTION

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I AMENDMENT RECORD

Rev	Description of changes	Approved by Quality Rep	Date approved:
A	Original issue	Caroline Lamb	July 2004
B			
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1 INTERIM PROJECT REVIEW POLICY

Calderpeel's interim project review policy is to implement and maintain an effective interim project review mechanism to ensure that it delivers good quality architectural designs and services for the clients and captures key knowledge within the company.

2 PURPOSE OF THE PROCESS

The purpose of the review is to define measures to monitor project progress, in order to identify what improvements can be implemented and to gain acceptance for recommended issues of action (preventive action and corrective action) for current and future jobs.

Specific project objectives will be set and reviewed through the interim project review process.

The interim project review process consists of activities performed by a project team to gather information on what worked well and what did not, so that current and future projects can benefit from that learning.

3 SCOPE OF THE PROCESS

An interim project review is generally done at the end of each significant phase, for example, at the feasibility phase, planning phase, upon building completion, and/or before management review meetings, so that knowledge is captured whilst still easily recalled.

This process might also be used with a project that completed some time ago, but for which the knowledge was not gathered.

This process has been tailored for High and Low focus projects, which will be conducted in two different ways. The table below identifies the characteristics of High and Low focus projects:

Characteristic	High Focus	Low Focus
Client Involvement	Good experience working with this client	No experience in the past working with this client

In addition, interim project review checklists have also been tailored for the High Focus and Low Focus types of project. In some cases, these checklists have been identified as optional.

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4 REFERENCES

QP1 Document/record control
QP2 Problems and complaints
QP4 Feasibility and planning
QP5 Traditional contract
QP6 Design and build contract
QP7 Control of job documentation
QM Quality manual 5.8 Management review
Company handbook: the document filing procedure

5 DEFINITIONS

Interim project review:

An activity where people reviewing what went well and what went badly during the project feed lessons learned to current and future projects.

6 RESPONSIBILITY AND AUTHORITY

Those who generally participate in the interim project review process, their roles in the different types of project are described in the following table.

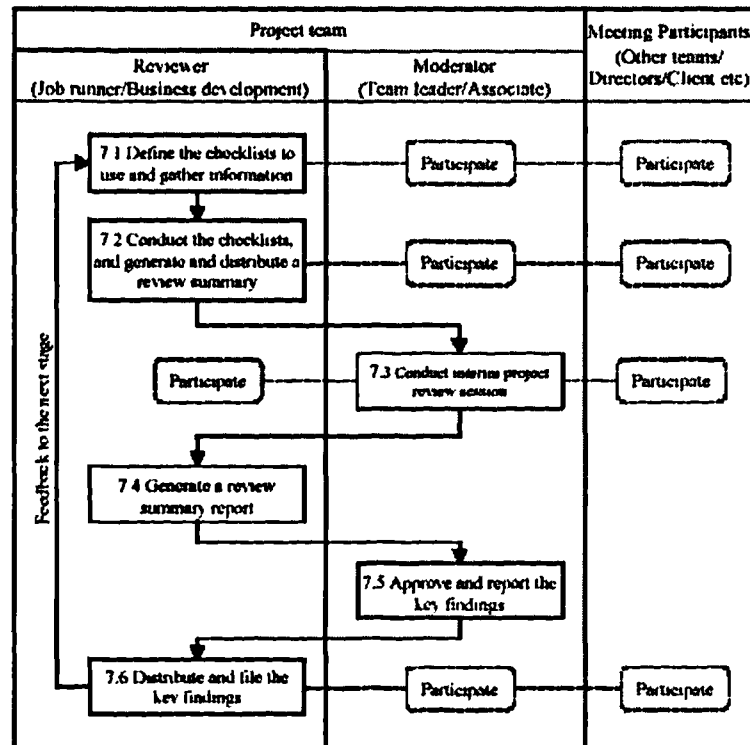
Role Name			Role Definitions
Moderator	High Focus	Associate / team leader	Person who organises the sessions and facilitates any meetings; generally a member of the development organisation who represents the project overall
	Low Focus	Team leader	
Reviewer	High Focus	Business development/ Job runner	Person manages the review, gathers information from participants and documents the final report of the interim project review for a project, generally a member of the project team which performed the project
	Low Focus	Job runner	
Participant	High Focus	Project team / other teams / directors / clients etc.	Any person or group who provides input to the interim project review, based on experience with the project or its results (e.g. client, internal audit, operational support staff, etc.)
	Low Focus	Project team	



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7 OVERVIEW OF THE PROCESS AND ACTIVITY DESCRIPTIONS

The diagram that follows shows the workflow for this process.



INTERIM PROJECT REVIEW HANDBOOK



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7.1 Define the checklists to use and gather information

7.1.1 The reviewer needs to confirm that the project team is performing the current interim project review process (i.e. either Low focus or High focus project).

7.1.2 The reviewer defines which checklists to use and prepares any specific questions for the project purpose (refer to QP4 Feasibility and planning, QP5 Traditional contract, and QP6 Design and build contract). The different types of checklists are described as follow:

1) Low focus projects.

Phase	Checklist	Reviewer
On completion of the planning phase	Feasibility and planning phase checklist (QR21)	Job runner
On completion of the traditional contract phase	Traditional contract phase checklist (QR22)	Job runner
On completion of the design and build contract phase	Design and build contract phase checklist (QR23)	Job runner

2) High focus projects

Phase	Checklist	Reviewer
Before the management review meeting or on completion of the planning phase, whichever comes first	Feasibility and planning phase checklist (QR21)	Job runner
	Interim project checklist (High focus project use only) (QR24)	Business Development
Before the management review meeting or on completion of the traditional contract phase, whichever comes first	Traditional contract phase checklist (QR22)	Job runner
	Interim project checklist (High focus project use only) (QR24)	Business Development
Before the management review meeting or on completion of the design and build contract phase, whichever comes first	Design and build contract phase checklist (QR23)	Job runner
	Interim project checklist (High focus project use only) (QR24)	Business Development

7.1.3 The reviewer selects and communicates to those involved in this review activity, and collects the relevant documents/records from them.



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7.2 Conduct the checklists, and generate and distribute a review summary

7.2.1 Based on the different types of project, the checklists will be conducted in two different ways.

1) Low focus projects:

- The job runner uses the defined checklists to conduct the interim project review by himself/herself.

2) High focus projects:

- The job runner uses the defined checklists to conduct the interim project review by himself/herself.
- The business development uses the defined checklists to interview the client.

7.2.2 After conducting the checklists, the reviewer needs to generate a review summary, including lists (specific questions and agenda) of those items that require discussion and consensus (things done right, things done wrong, risks missed, etc).

7.2.3 Before the interim project review session, the job runner needs to distribute an announcement with the review summary of the meeting to all participants. It gives meeting participants time to think about them and prepare their responses individually.

7.3 Conduct interview project review session

7.3.1 Based on the different types of project, the interview project review session will be conducted in two different ways.

1) Low focus projects:

- The team leader holds an informal team discussion to discuss the team's responses to the review summary (specific questions and agenda).
- The participants of this meeting include just the team.

2) High focus projects:

- The team leader/associate calls a formal meeting with participants to order and conducts the session according to the review summary (specific questions and the agenda).
- The participants of this meeting may include the client, the managing director, relevant directors, business development, and/or other teams.

7.3.2 The reviewer records all meeting proceedings.

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7.4 Generate a review summary report

7.4.1 The Job runner needs to document results and identify key issues from the interim project review session and then produce a review summary report.

7.4.2 A review summary report should involve:

- 1) The relevant checklists; and
- 2) Notes/minutes from the interim project review session (e.g. key issues, a list of good practice and lessons learned).

7.5 Approve and report the key findings

7.5.1 The review summary report needs to be reviewed and approved by the team leader/associate.

7.5.2 Based on the findings from the review summary report, the team leader/associate needs to identify actions needed by management and reports them to the management meetings, so that processes and projects are continuously improving (refer to QM Quality manual 5.6 Management review).

7.5.3 The team leader/associate needs to determine how best to distribute the key findings from the interim project review (e.g. presentations at seminars to all employees or the key findings distributed to all attendees).

7.6 Distribute and file the key findings

7.6.1 The key findings will be distributed at least to all meeting participants by the reviewer.

7.6.2 The relevant documents/records will be filed by the business development (refer to QP1 Document/record control and QP 7 Control of job documentation).

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8 MEASURES

Measures that can be used to determine the effectiveness of interim project reviews include the following.

8.5.1 Process Change Requests

The measure should include the number of recommended changes, as well as an indication of the level of importance to the project team, any indication of when each change is needed, and recommendations for the content of the change.

8.5.2 Good Practice and Lessons learned

The measure should include a count of the number of lessons (e.g. new design/new materials/new products, risk factors) being added or changed in the company's records.

8.5.3 Level of Participation

Measure the participation of the project members, clients, and/or other teams etc. in the interim project review process, to understand the percent coverage of those who could have constructive input to improving the processes.

APPENDIX1 QUALITY MANAGEMENT STANDARD FOR ARCHITECTURAL DESIGNS AND SERVICES

Quality management standard for architectural designs and services (page 11 - 13)

APPENDIX2 SUPPORTING CHECKLISTS

Please see the following checklists, accessible separately:

QR21 Feasibility and planning phase checklist	(page 14)
QR22 Traditional contract phase checklist	(page 15)
QR23 Design and build contract phase checklist	(page 16)
QR24 Interim project checklist (High focus project use only)	(page 17 ~ 18)

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Quality management standard for architectural design and service process and product (1/3)

Phase	Activity	Management item	Management standard	Management method			Inspector	Auditor	Note (Corrective action)
				Timing	Tool	Data collection			
Feasibility	Establish the client's details and requirements	The client's brief	Within one week	After the client expresses interest		Job form (QR1)	Associate	Director	
	Set up a project team and prepare pre-fee letter	An assigned project team Signed pre fee letter	Within one week	After meeting with the client	1 Architect's appointment 2 Employee CV	Job form (QR1)	Associate	Director	Revise
	Feasibility study (Work stage A)	Basic outline conceptual design (hand drawing)	Client sign off record	After receiving signed pre-fee letter		Pre-fee letter Drawing issue sheet	Job runner	Team leader	
	Prepare fee letter – the client confirming key requirements and constraints	Signed fee letter	Within one week	After confirming the client sign off the feasibility study		Fee letter	Job runner	Team leader	
Planning	Concept design (Work stage B)	1 Detail planning (Sketch/layout plan, detailed drawing) 2 CDM assessment (initial)	Client sign off record	After receiving signed fee letter	CAD manual, building regulations, BS NBS etc.	1 Drawing issue sheet 2 Standard project proforma	Job runner	Team leader	Revise and re-issue
	Prepare and submit planning application (PL) (Work stage D)	1 PL submitted date 2 PL decision date 3 Planning Ref	Planning decision obtained	After obtaining cheque (fee) from client for planning decision		Standard project proforma	Job runner	Team leader	Clearance of planning conditions upon a successful approval
	Conduct interim project review	Feasibility and planning phase review – Low focus project Feasibility and planning phase review – High focus project	Within one week	On completion of the feasibility and planning phase	Feasibility and planning phase checklist (QR21), Feasibility and planning phase checklist (QR21) Interim project checklist (QR24)	Review summary report	Job runner	Team leader	Report to associate
			Within one week	On completion of the feasibility and planning phase or before the management review meeting, whichever comes first		Review summary report	Job runner	Team leader / Associate	Report to director



Quality management standard for architectural design and service process and product (2/3)

Phase	Activity	Management item	Management standard	Management method			Inspector	Auditor	Note (Corrective action)
				Timing	Tool	Data collection			
Traditional contract phase	Full conceptual design (Work stage E)	1 Construction drawings and specifications 2 CDM assessment (revised)	Client sign off record	After planning approval obtained	CAD manual building regulations BS, NBS etc. Design team meetings to complete coordinated designs (twice per month) Meetings with Building Control for other statutory bodies (not including services) (Twice per month)	1 Construction status drawings and specifications 2 Drawing issue sheet 3 Standard project problems 4 Meeting minutes 5 Standard project problems	Job runner	Team leader	1. Revise and re-issue drawings 2. All health and safety issues documented and treated
	Prepare and submit building regulations (BR) to Local Authority (LA) or NHBC (Work stage F)	1 BR submitted date 2 BR approved date 3 BR Ref.	Building regulation approval obtained	After obtaining cheque (fee) from client for building regulations and submit application		Standard project problems	Job runner	Team leader	
	Prepare tender information (Work stage G & H)	Approval contractor list	Client acceptance	Client requires		Tender documents	Job runner	Team leader	
	Arrange pre-contract meeting / organise job progress and supervise the job (Work stage J & K)	scheme	Client acceptance	Before construction works		Minutes	Job runner	Team leader	
	Site visit								
	Receive inspection fee from contractor	Monthly payment	Correct amount	During construction works	Inspection (Weekly)	1. Site record sheets 2. AI's 3. Photographs 4. Meeting minutes 5. Snagging sheet	Job runner	Team leader	Check snags
	Issue of certificate and hand over (Work stage L)	1 Making good of defects certificate 2 Final certificate	Within one month	At practical completion	Snagging inspection (Monthly) Site meeting (Monthly) Receipts	1 Invoices 2 Fee letter 3 Good of defects certificate 4 Final certificate	Job runner	Team leader	Inform the contractor
	Conduct interim project review	Traditional contract phase review - Low focus project - High focus project	Within one week	On completion of the traditional contract	Traditional contract checklist (QR22)	Review summary report	Job runner	Team leader	Report to associate
				On completion of the traditional contract phase or before the management review meeting, whichever comes first	Traditional contract phase checklist (QR22) Interim project checklist (QR24)	Review summary report	Job runner	Team leader / Business development	Report to director



Quality management standard for architectural design and service process and product (3/3)

Phase	Activity	Management item	Management standard	Management method			Inspector	Auditor	Note (Corrective action)
				Timing	Tool	Data collection			
Design and build contract	Confirm any differences between employer's requirements and the contractor's proposals (Work stage F1)	Letter	Within one week	Notified after planning approval or appointed by the contractor			Job runner	Team leader	Not for construction purpose
	Obtain copy of planning permission	1. PL granted date 2. Planning Ref.	Copy of planning permission obtained	Notified after planning approval or appointed by the contractor		Standard project proforma	Job runner	Team leader	
	Check and inform contractor of implications of any conditions	Letter	Within one week	After obtaining copy of planning permission		Planning permission	Job runner	Team leader	Inform contractor
	Agree scope of works and the fee with the contractor	Signed fee letter	Within one week	After confirming any differences with the contractor		Fee letter	Job runner	Team leader	
	Produce working drawings (Work stage E)	1. Construction working drawings 2. Updated COM assessment	Client sign off record	After receiving signed fee letter	CAD manual, building regulations, BS, NBS etc. Design team meetings (once per month) Client meetings (monthly)	1. Construction status drawings and specifications 2. Drawing issue sheet 3. Standard project proforma 4. Meeting minutes	Job runner	Team leader	1. Revise and re-issue drawings 2. All health and safety issues documented and finalised and finalised and finalised
	Prepare and submit building regulations (BR) to Local Authority (LA) or NHBC (Work stage F)	1. BR submitted date 2. BR approved date 3. BR Ref.	Building regulation approval obtained	The contractor requires (fee) from contractor for building regulations and submit application		Standard project proforma	Job runner	Team leader	Issue BR to contractor
	Progress and supervise the job – oversee construction (Work stage K)	Site visit	Client sign off record	During construction works	Site meeting (weekly)	1. Site record sheets 2. Meeting minutes	Job runner	Team leader	Report to associate
	Prepare as built drawings and hand over (Work stage L)	As built drawings	Within one month	At practical completion		Drawing issue sheet	Job runner	Team leader	Re-issue to contractor
	Design and build contract phase review - Low focus project	Design and build contract phase review	Within one week	On completion of the design and build contract phase	Design and build contract phase checklist (QR23)	Review summary report	Job runner	Team leader	Report to associate
	Design and build contract phase review - High focus project	Design and build contract phase review	Within one week	On completion of the design and build contract or before the management review meeting, whichever comes first.	Design and build contract phase checklist (QR23) Interim project checklist (QR24)	Review summary report	Job runner	Team leader / Associate	Report to director
Overall process	Report project progress			At the end of each month	Management meeting (monthly)	1. Standard project proforma 2. Review summary report 3. Meeting minutes	Team leader / Associate	Director	



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Feasibility and Planning phase Checklist (QR 21)

Job No : _____ Project Name : _____ Job runner : _____ Signature : _____ Date (dd/mm/yy) : _____

No	Check item	Check result		Comments	Corrective Action
		Yes	No		
1	Did we establish the client's details and requirements in the job form within one week after the client expressing interest?				
2	Did we set up a project team and deliver pre-fee letter within one week after meeting with the client?				
3	Did the client sign the pre-fee letter?				
4	Did you proud of our feasibility study (work stage A)?				
5	Did we deliver the fee letter within one week after confirming the client sign off the feasibility study?				
6	Did the client sign the fee letter?				
7	Did you proud of our concept design (work stage C & D)?				
8	Did we get planning permission? 1 PL submitted date () 2 PL decision date () 3 Planning Ref. ()				
9	Did you conduct this review within one week (Low focus projects after completion of the traditional contract phase, High focus projects; after completion of the traditional contract phase or before the management review meeting, whichever comes first)? [Insert your own questions here]				
10					
11					

Approved by associate/team leader Signature _____ Date _____



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Traditional contract phase checklist (QR 22)

Job No	Project Name	Check item	Job runner		Comments	Corrective Action
			Check result	Signature		
No			Yes	No		
1		Did you proud of our full conceptual design (work stage E)?				
2		Did we obtain building regulations (BR) approval? 1 BR submitted date () 2 BR approved date () 3 BR Ref ()				
3		Did you proud of our tender information (work stage G & H)?				
4		Was the contractor client appointed from our approval contractor list?				
5		Did we hold a meeting to organise the job before construction works?				
6		Did we carry out inspection weekly during construction works?				
7		Did we carry out snagging inspection monthly during construction works?				
8		Did we attend site meeting monthly during construction works?				
9		Did we receive inspection fee from the contractor monthly during constructions works?				
10		Did we hand over good defects certificate and final certificate within one month after practical completion?				
11		Did you conduct this review within one week? (*Low focus projects after completion of the traditional contract phase High focus projects after completion of the traditional contract or before the management review meeting whichever comes first)				
12		(insert your own questions here)				

Approved by associate/team leader Signature _____ Date _____



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Design and build contract phase checklist (QR 23)

Job No :	Project Name :	Job runner	Signature	Date (dd/mm/yy) :	Check result		Comments	Corrective Action
					Yes	No		
No	Check item							
1	Did we confirm any differences between employer's requirements and the contractor's proposals within one week after novated after planning approval or appointed by the contractor?							
2	Did we obtain a copy of planning permission? 1 PL granted date () 2 Planning Ref ()							
3	Did we check and inform contractor of implications of any conditions within one week after obtaining copy of planning permission?							
4	Did we deliver the fee letter within one week after confirming any differences with the contractor?							
5	Did the contractor sign the fee letter?							
6	Did you provide our working drawings (work stage E)?							
7	Did we obtain building regulations (BR) approval? 1 BR submitted date () 2 BR approved date () 3 BR Ref ()							
8	Did we attend site meeting weekly during construction works?							
9	Did we hand over as built drawings within one month after practical completion?							
10	Did you conduct this review within one week (Low focus projects after completion of the design and build contract phase High focus projects after completion of the design and build contract or before the management review meeting, whichever comes first)?							
11	[Insert your own questions here]							

Approved by associate/team leader Signature _____ Date _____



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Interim Project Checklist (QR 24)

(High focus project use only)

Job No. :

Project Starting Date (dd/mm/yy) : _____

Project Name :

Phase	Question	Comments
Feasibility phase	Was the client happy with our deliverable (feasibility study)?	
	If yes, what was so good about it?	
	If not, did we have to reappraise the scheme and why?	
	How can we ensure we don't make this mistake in the future?	
	[Insert your own questions here]	
Planning phase	Was the client happy with our deliverable (presentation, scheme, planning decision)?	
	If yes, what was so good about it?	
	If no, what was wrong with it?	
	Did our consultants/specialists provide timely and meaningful input?	
	If not, how could we have improved their involvement and the quality of their contributions?	
	Did our project team, consultants/specialists/clients participate effectively (e.g. difficulties in negotiating with them etc.)?	
Detailed design phase	If not, how could we improve their participation?	
	[Insert your own questions here]	
	Was the client happy with our deliverables (building regulation approval, scheme)?	
	If yes, what was so good about it?	
	If no, what was wrong with it?	
	Did our consultants/specialists provide timely and meaningful input?	
Construction phase	If not, how could we have improved their involvement and the quality of their contributions?	
	Did our project team, consultants/specialists/clients participate effectively (e.g. difficulties in negotiating with them etc.)?	
	If not, how could we improve their participation?	
	[Insert your own questions here]	
	Was the client happy with our deliverables (oversee construction, scheme)?	
	If yes, what was so good about it?	
	If no, what was wrong with it?	
	Did our consultants/specialists/sub-contractors/suppliers provide timely and meaningful input?	
	If not, how could we have improved their involvement and the quality of their contributions?	



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Post construction phase	Did our project team, consultants/specialists/sub-contractors/suppliers clients participate effectively (e.g. difficulties in negotiating with them etc.)? If not, how could we improve their participation? (Insert your own questions here)	
	Was the client happy with our finished product (building completion)? If yes, what was so good about it? If no, what was wrong with it?	
	Was the client happy with the people assigned to the project? If no, how can we make sure that we get the right people next time?	
	Did we over or under our estimate original cost and programming of our project? How could we have improved our estimate of cost and programming of our project so that it was more accurate?	
	Were our constraints, limitations, and requirements made clear to our client/consultants/specialists/sub-contractors/suppliers from the beginning? If not, how could we have improved our brief?	
	What were the most frustrating parts of this project (e.g. methods, processes or materials etc.)? How would you do things differently next time to avoid this frustration?	
	What were the most satisfying parts of this project? (Insert your own questions here)	

The business development: Signature _____ Date _____

Approved by associate/team leader: Signature _____ Date _____

Appendix N QW1 Interim project review handbook
(Revision B)

CALDER PEEL PARTNERSHIP LTD

INTERIM PROJECT REVIEW
HANDBOOK



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Revision B - Jan 2005

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i AMENDMENT RECORD

Rev	Description of changes	Approved by Quality Rep	Date approved:
A	Original issue	Caroline Lamb	July 2004
B	Revision B	Caroline Lamb	Jan 2005
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1 INTERIM PROJECT REVIEW POLICY

Calderpeel's interim project review policy is to implement and maintain an effective interim project review mechanism to ensure that it delivers good quality architectural designs and services for the clients and captures key knowledge within the company.

2 PURPOSE OF THE PROCESS

The purpose of the review is to define measures to monitor project progress, in order to identify what improvements can be implemented and to gain acceptance for recommended issues of action (preventive action and corrective action) for current and future jobs.

Specific project objectives will be set and reviewed through the interim project review process.

The interim project review process consists of activities performed by a project team to gather information on what worked well and what did not, so that current and future projects can benefit from that learning.

3 SCOPE OF THE PROCESS

An interim project review is generally done at the end of each significant phase, for example, at the feasibility phase, planning phase, upon building completion, and/or before management review meetings, so that knowledge is captured whilst still easily recalled.

This process might also be used with a project that completed some time ago, but for which the knowledge was not gathered.

This process has been tailored for High and Low focus projects, which will be conducted in two different ways. The table below identifies the characteristics of High and Low focus projects:

Characteristic	High Focus	Low Focus
Client involvement	Good experience working with this client	No experience in the past working with this client

In addition, interim project review checklists have also been tailored for the High Focus and Low Focus types of project. In some cases, these checklists have been identified as optional.

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4 REFERENCES

QP1 Document/record control
QP2 Problems and complaints
QP4 Feasibility and planning
QP5 Traditional contract
QP6 Design and build contract
QP7 Control of job documentation
QM Quality manual 5.8 Management review
Company handbook: the document filing procedure

5 DEFINITIONS

Interim project review:

An activity where people reviewing what went well and what went badly during the project feed lessons learned to current and future projects.

6 RESPONSIBILITY AND AUTHORITY

Those who generally participate in the interim project review process, their roles in the different types of project are described in the following table.

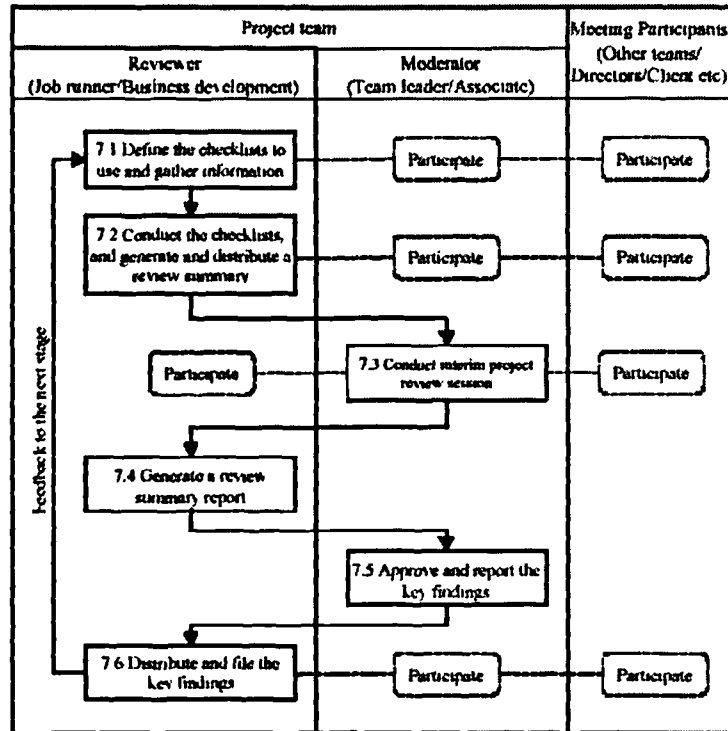
Role Name			Role Definitions
Moderator	High Focus	Associate / team leader	Person who organises the sessions and facilitates any meetings; generally a member of the development organisation who represents the project overall
	Low Focus	Team leader	
Reviewer	High Focus	Business development/ Job runner	Person manages the review, gathers information from participants and documents the final report of the interim project review for a project; generally a member of the project team which performed the project
	Low Focus	Job runner	
Participant	High Focus	Project team / other teams / directors / clients etc.	Any person or group who provides input to the interim project review, based on experience with the project or its results (e.g. client, internal audit, operational support staff, etc.)
	Low Focus	Project team	



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7 OVERVIEW OF THE PROCESS AND ACTIVITY DESCRIPTIONS

The diagram that follows shows the workflow for this process.



INTERIM PROJECT REVIEW HANDBOOK



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7.1 Define the checklists to use and gather information

7.1.1 The reviewer needs to confirm that the project team is performing the current interim project review process (i.e. either Low focus or High focus project).

7.1.2 The reviewer defines which checklists to use and prepares any specific questions for the project purpose (refer to QP4 Feasibility and planning, QP5 Traditional contract, and QP6 Design and build contract). The different types of checklists are described as follow:

1) Low focus projects

Phase	Checklist	Reviewer
On completion of the planning phase	Feasibility and planning phase checklist (QR21)	Job runner
On completion of the traditional contract phase	Traditional contract phase checklist (QR22)	Job runner
On completion of the design and build pre-novation phase	Design and build pre-novation phase checklist (QR23)	Job runner
On completion of the design and build contract phase	Design and build post-novation to contractor checklist (QR24)	Job runner

2) High focus projects

Phase	Checklist	Reviewer
Before the management review meeting or on completion of the planning phase, whichever comes first	Feasibility and planning phase checklist (QR21) Interim project checklist (High focus project use only) (QR25)	Job runner Business Development
Before the management review meeting or on completion of the traditional contract phase, whichever comes first	Traditional contract phase checklist (QR22) Interim project checklist (High focus project use only) (QR25)	Job runner Business Development
Before the management review meeting, or on completion of the design and build pre-novation phase, or on completion of the design and build contract phase, whichever comes first	Design and build pre-novation phase checklist (QR23) Design and build post-novation to contractor checklist (QR24) Interim project checklist (High focus project use only) (QR25)	Job runner Business Development

7.1.3 The reviewer selects and communicates to those involved in this review activity, and collects the relevant documents/records from them.



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7.2 Conduct the checklists, and generate and distribute a review summary

7.2.1 Based on the different types of project, the checklists will be conducted in two different ways.

1) Low focus projects:

- The job runner uses the defined checklists to conduct the interim project review by himself/herself.

2) High focus projects:

- The job runner uses the defined checklists to conduct the interim project review by himself/herself.
- The business development uses the defined checklists to interview the client.

7.2.2 After conducting the checklists, the reviewer needs to generate a review summary, including lists (specific questions and agenda) of those items that require discussion and consensus (things done right, things done wrong, risks missed, etc).

7.2.3 Before the interim project review session, the job runner needs to distribute an announcement with the review summary of the meeting to all participants. It gives meeting participants time to think about them and prepare their responses individually.

7.3 Conduct interview project review session

7.3.1 Based on the different types of project, the interview project review session will be conducted in two different ways.

1) Low focus projects:

- The team leader holds an informal team discussion to discuss the team's responses to the review summary (specific questions and agenda).
- The participants of this meeting include just the team.

2) High focus projects:

- The team leader/associate calls a formal meeting with participants to order and conducts the session according to the review summary (specific questions and the agenda).
- The participants of this meeting may include the client, the managing director, relevant directors, business development, and/or other teams.

7.3.2 The reviewer records all meeting proceedings.

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7.4 Generate a review summary report

7.4.1 The Job runner needs to document results and identify key issues from the interim project review session and then produce a review summary report.

7.4.2 A review summary report should involve:

- 1) The relevant checklists; and
- 2) Notes/minutes from the interim project review session (e.g. key issues, a list of good practice and lessons learned).

7.5 Approve and report the key findings

7.5.1 The review summary report needs to be reviewed and approved by the team leader/associate.

7.5.2 Based on the findings from the review summary report, the team leader/associate needs to identify actions needed by management and reports them to the management meetings, so that processes and projects are continuously improving (refer to QM Quality manual 5.6 Management review).

7.5.3 The team leader/associate needs to determine how best to distribute the key findings from the interim project review (e.g. presentations at seminars to all employees or the key findings distributed to all attendees).

7.6 Distribute and file the key findings

7.6.1 The key findings will be distributed at least to all meeting participants by the reviewer.

7.6.2 The relevant documents/records will be filed by the business development (refer to QP1 Document/record control and QP 7 Control of job documentation).

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8 MEASURES

Measures that can be used to determine the effectiveness of interim project reviews include the following.

8.5.1 Process Change Requests

The measure should include the number of recommended changes, as well as an indication of the level of importance to the project team, any indication of when each change is needed, and recommendations for the content of the change.

8.5.2 Good Practice and Lessons learned

The measure should include a count of the number of lessons (e.g. new design/new materials/new products, risk factors) being added or changed in the company's records.

8.5.3 Level of Participation

Measure the participation of the project members, clients, and/or other teams etc. in the interim project review process, to understand the percent coverage of those who could have constructive input to improving the processes.

APPENDIX1 QUALITY MANAGEMENT STANDARD FOR ARCHITECTURAL DESIGNS AND SERVICES

Quality management standard for feasibility and planning phase	(page 11)
Quality management standard for traditional contract phase	(page 12)
Quality management standard for design and build pre-novation phase	(page 13)
Quality management standard for design and build post-novation phase	(page 14)

APPENDIX2 SUPPORTING CHECKLISTS

Please see the following checklists, accessible separately:

QR21 Feasibility and planning phase checklist	(page 15)
QR22 Traditional contract phase checklist	(page 16)
QR23 Design and build pre-novation phase checklist	(page 17)
QR24 Design and build post-novation to contractor checklist	(page 18)
QR25 Interim project checklist (High focus project use only)	(page 19 ~ 20)

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Quality management standard for feasibility and planning phase

Phase	Activity	Management item	Management standard	Management method			Inspector	Auditor	Note (Corrective action)
				Timing	Tool	Data collection			
Feasibility	Establish the client's details and requirements	The client's brief	Within one week	After the client expresses interest		Job form (QR1)	Associate	Director	
	Set up a project team and prepare pre-fee letter	An assigned project team	Within one week	After meeting with the client	1. Architect's appointment 2. Employee CV	Job form (QR1)	Associate	Director	Revise
	Feasibility study (Work stage A)	Signed pre fee letter	Client sign off record	After receiving signed pre-fee letter		Pre fee letter	Job runner	Team leader	
	Prepare fee letter – the client confirming key requirements and constraints	Basic outline conceptual design (main drawing)	Client sign off record	After receiving signed pre-fee letter		Drawing issue sheet	Job runner	Team leader	
Planning	Concept design (Work stage B)	Signed fee letter	Within one week	After confirming the client sign off the feasibility study		Fee letter	Job runner	Team leader	
	Concept design (Work stage C & D)	1. Detail planning (Sketchbook plan, detailed drawing) 2. COM assessment (plans)	Client sign off record	After receiving signed fee letter	CAD manual, building regulations, BS, NBS etc.	1. Drawing issue sheet 2. Standard project proforma	Job runner	Team leader	Revise and re-issue
	Prepare and submit planning application (PL) (Work stage D)	1. PL submitted date 2. PL decision date 3. Planning Ref	Planning decision obtained	After obtaining cheque (fee) from client for planning decision		Standard project proforma	Job runner	Team leader	Clearance of planning conditions upon a successful approval
	Conduct interim project review	Feasibility and planning phase review – Low focus project Feasibility and planning phase review – High focus project	Within one week	On completion of the feasibility and planning phase On completion of the feasibility and planning phase or before the management review meeting, whichever comes first	Feasibility and planning phase checklist (QR21) Feasibility and planning phase checklist (QR21) Interim project checklist (QR24)	Review summary report Review summary report Review summary report	Job runner Job runner Business development	Team leader Team leader / Associate	Report to director
Overall process	Report project progress			At the end of each month	Management meeting (monthly)	1. Standard project proforma 2. Review summary report 3. Meeting minutes	Team leader / Associate	Director	



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Quality management standard for transitional contract phase

Phase	Activity	Management item	Management standard	Management method			Inspector	Auditor	Note (Corrective action)
				Timing	Tool	Data collection			
Traditional contract phase	Full conceptual design (Work stage E)	1. Construction drawings and specifications 2. CDM assessment (revised)	Client sign off record	After planning approval obtained	CAD manual, building regulations, BS, NBS etc. Design team meetings to complete coordinated designs (Twice per month) Meetings with Building Control or other statutory bodies (not including services) (Twice per month)	1. Construction status drawings and specifications 2. Drawing issue sheet 3. Standard project proforma 4. Meeting minutes 5. Standard project proforma	Job runner	Team leader	1. Reverse and re-issue drawings 2. All health and safety issues documented and finalised
	Preferential and submit building regulations (BR) to Local Authority (LA) or N-B-C (Work stage F)	1. BR submitted date 2. BR approved date 3. BR Ref	Building regulation approval obtained	After obtaining cheque (fee) from client for building regulations and submit application		Standard project proforma	Job runner	Team leader	
	Prepare tender information (Work stage G & H)	Approval contractor list	Client acceptance	Client requires		Tender documents	Job runner	Team leader	
	Arrange pre-contract meeting / expense job (Work stage J & K)	Scheme	Client acceptance	Before construction works		Minutes	Job runner	Team leader	
	Progress and supervise the job (Work stage J & K)	Site visit	Client sign off record	During construction works	Inspection (Weekly) Snagging inspection (Monthly) Site meeting (Monthly)	1. Site record sheets 2. A1's 3. Photographs 4. Meeting minutes 5. Snagging sheet 6. Meeting minutes	Job runner	Team leader	Check snags
	Receive inspection fee from contractor	Monthly payment	Correct amount	During construction works	Receipts	1. Invoices 2. Fee letter	Job runner	Team leader	Inform the contractor
	Issue of certificate and hand over (Work stage L)	1. Making good of defects certificate 2. Final certificate	Within one month	At practical completion		1. Good of defects certificate 2. Final certificate	Job runner	Team leader	
	Conduct interim project review	Traditional contract phase review Local Authority project phase review High focus project	Within one week	On completion of the traditional contract	Traditional contract checklist (QR22)	Review summary report	Job runner	Team leader	Report to associate
		Traditional contract phase review	Within one week	On completion of the traditional contract phase or before the management review meeting, whichever comes first	Traditional contract phase checklist (QR22) Interim project checklist (QR24)	Review summary report	Job runner	Team leader / Associate	Report to director
	Report project progress			At the end of each month	Management meeting (monthly)	1. Standard project proforma 2. Review summary report 3. Meeting minutes	Business development	Team leader / Associate	
Overall process							Team leader / Associate	Director	



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Quality management standard for design and build pre-novation

Work Stage	Activity	Document Production	Management standard	Timing	Reference Documentation	Covering Documentation	Inspector	Auditor	Note (Corrective action)
E	Detail Design preparation of general arrangement drawings.	Drawings	As clients timescale	Following written confirmation from client to progress to next stage	<ul style="list-style-type: none"> B.S Building Regulations Planning approved drawings 	<ul style="list-style-type: none"> Letter for client sign off Drawing issues 	Job runner	Associate	
F1	Preparation of drawings and specification for employer's requirements.	Drawings and specifications	As clients timescales	Following client's signature of Stage E drawings	<ul style="list-style-type: none"> Cost Plan B.S Building Regulations Stage E sign off drawings 	<ul style="list-style-type: none"> Minutes from design team meetings Letter for client sign off Drawing issues 	Job runner/ Team Leader	Associate	
	Building regulation application	Drawings and specification	Prior to project being tendered	Following receipt of cheque from client	<ul style="list-style-type: none"> B.S Building Regulations 	<ul style="list-style-type: none"> Forms Letters Cheque Drawing Issue 	Team Leader	Associate	
	Submission Date, Approval Date, Reference No.								
G	Production of drawings and specifications for tender	Drawings and specification	As the client's programme	Following client and cost consultant sign off of stage F1 drawings	<ul style="list-style-type: none"> Cost plan B.S Building Regulations Planning approval drawings 	<ul style="list-style-type: none"> Letter Drawing Issues 	Job runner/ Team Leader	Associate	
H	Checking tender returns for architectural compliance with the architects drawings and specification	Report	Within one week of request		<ul style="list-style-type: none"> Tender documents Tender returns 	<ul style="list-style-type: none"> Report 	Team Leader	Associate	
I	Undertake amendments as required to reflect any changes to the tender drawings and specifications	Drawings and specifications	Within two weeks of agreement	Following signature of any required variation orders and written client agreement	Contractors' proposals	<ul style="list-style-type: none"> Drawing Issue Letter 	Job Runner	Associate	
	Issue of contract information	Drawings and specification	Within 1 week of agreement	Following all party agreement		<ul style="list-style-type: none"> Drawing Issue 	Job Runner	Associate	
Overall process	Report project progress			At the end of each month	<ul style="list-style-type: none"> Management meeting (monthly) 	<ul style="list-style-type: none"> 4 Standard project proforma 5. Review summary report 6 Meeting minutes 	Team leader / Associate	Director	



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Quality management standard for design and build post-novation to contractor phase

Work Stage	Activity	Document Production	Management standard	Timing	Reference Documentation	Covering Documentation	Inspector	Auditor	Note (Corrective action)
F2	Obtain copy of all contract information drawings specification, planning approval to determine architectural scope of works prior to preparing fee letter	Signed fee letter before progression to next stage	Within 1 week		<ul style="list-style-type: none"> Fee schedule RIBA fee's Previous job costing Resources Contractors proposals 	Letter	Associate	Director	
	Prepare fee proposals and scope of works document		Within 1 week		Contractors proposals		Associate	Director	
	Obtain copies of the contractor's warranties & novation documentation for checking and signature	Signed novation & warranty documents	Within 4 weeks		<ul style="list-style-type: none"> RIBA Insurance Solicitors 	Letter	Associate	Director	
	Obtain copies of planning permission and approved drawings. Advise client & contractor on the nature of conditions and current set of drawings against the approved	Planning condition matrix & report	Within 1 week		Existing planning permission and contractors proposals	Report planning matrix letter	Team Leader	Associate	
	Detail design preparation of general arrangement drawings stage	Drawings	Within client timescales		<ul style="list-style-type: none"> Contractors proposals Planning permission 	Letter for client sign off Drawing issue	Job runner/Team leader	Associate	
	Building Regulations application Submission date. Approval date. Reference no.	Drawings and specification	Prior to start on site	Following receipt of critique from client	<ul style="list-style-type: none"> BS Building regulations Contractors proposals 	Forms Letter Drawing issue Check	Job runner/Team leader	Associate	
	Work stage F1 - Prepare general arrangement	Drawings & specification	Client timescales		<ul style="list-style-type: none"> Contractors proposals Building regulations BS 	Drawing issues	Job runner	Associate	
	Work stage F2	<ul style="list-style-type: none"> Drawings Specification Details Schedules 	Client timescales		<ul style="list-style-type: none"> Contractors proposals Building regulations BS 	Drawing issues	Job runner	Associate	
	Report project progress			At the end of each month	Management meeting (monthly)	1 Standard project proforma 2 Review summary report 3 Meeting minutes	Team leader / Associate	Director	
Overall process									



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Feasibility and Planning phase Checklist (QR 21)

Job No :	Project Name :	Job runner	Signature	Date (dd/mm/yy) :
No	Check item	Check result Yes No	Comments	Corrective Action
1	Did we establish the client's details and requirements in the Job form within one week after the client expressing interest?			
2	Did we set up a project team and deliver pre-fee letter within one week after meeting with the client?			
3	Did the client sign the pre-fee letter?			
4	Did you proud of our feasibility study (work stage A)?			
5	Did we deliver the fee letter within one week after confirming the client sign off the feasibility study?			
6	Did the client sign the fee letter?			
7	Did you proud of our concept design (work stage C & D)?			
8	Did we get planning permission? 1 PL submitted date () 2 PL decision date () 3 Planning Ref ()			
9	Did you conduct this review within one week (Low focus projects after completion of the traditional contract phase, High focus projects, after completion of the traditional contract phase or before the management review meeting wh chever comes first)? [Insert your own questions here]			
10				
11				

Approved by associate/team leader Signature _____ Date _____

Traditional contract phase checklist (QR 22)

Job No : _____ Project Name : _____ Date (dd/mm/yy) : _____

Job runner Signature _____

No	Check item	Check result		Comments	Corrective Action
		Yes	No		
1	Did you proud of our full conceptual design (work stage E)?				
2	Did we obtain building regulations (BR) approval? 1 BR submitted date () 2 BR approved date () 3 BR Ref ()				
3	Did you proud of our tender information (work stage G & H)?				
4	Was the contractor client appointed from our approval contractor list?				
5	Did we hold a meeting to organise the job before construction works?				
6	Did we carry out inspection weekly during construction works?				
7	Did we carry out snagging inspection monthly during construction works?				
8	Did we attend site meeting monthly during construction works?				
9	Did we receive inspection fee from the contractor monthly during constructions works?				
10	Did we hand over good defects certificate and final certificate within one month after practical completion?				
11	Did you conduct this review within one week? (Low focus projects after completion of the traditional contract phase High focus projects after completion of the traditional contract or before the management review meeting, whichever comes first)				
12	(Insert your own questions here)				

Approved by associate/team leader Signature _____ Date _____



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Design and build pre-novation phase checklist (QR 23)

Job No :	Project Name :	Job runner	Signature	Date (dd/mm/yy) :	
No	Check item	Check result		Comments	Corrective Action
		Yes	No		
1	Did we receive written client approval to progress to the next stage?				
2	Did we undertake the stage E scheme design and did it mean any alterations to the planning drawings?				
3	Were you happy with the planning drawings?				
4	Did we receive client sign off for the Stage E works?				
5	Did we make the building regulations application at the appropriate stage? 1 Submission Date. 2 Approval Date. 3 Reference No				
6	Did we complete the client requirement documentation specifications and drawings?				
7	Were you happy with the quality and detail of the information issued for tender?				
8	To what extent did we feel the contractors proposals affected the overall scheme?				
9	Were you happy with the resources allocated on the project?				
10	[Insert your own questions here]				
11					

Approved by associate/team leader Signature _____ Date _____



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Design and build post-novation to contractor phase checklist (QR 24)

Job No : _____ Project Name : _____ Job runner Signature _____ Date (dd/mm/yy) : _____

No	Check item	Check result		Comments	Corrective Action
		Yes	No		
1	Did we receive a full set of employers requirements/contractors proposals?				
2	Did we undertake stage E detail design works due to the nature of the documents received?				
3	What did you think of the documents received?				
4	Did we make the building regulation application? 1. Submission Date. 2 Approval Date. 3 Reference No.				
5	During the production information stage what were the most difficult and pleasing elements you undertook?				
6	What degree of influence did the contractor exercise over the design and details?				
7	Were you happy with the quality of information issued by Calderpeel and if not how could it have been improved?				
8	Were you happy with the resource allocated on the project?				
9	[Insert your own questions here]				
10					
11					

Approved by associate/team leader Signature _____ Date _____



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Interim Project Checklist (QR 25)

(High focus project use only)

Job No. :

Project Starting Date (dd/mm/yy) : _____

Project Name :

Phase	Question	Comments
Feasibility phase	Was the client happy with our deliverable (feasibility study)?	
	If yes, what was so good about it?	
	If not, did we have to reappraise the scheme and why?	
	How can we ensure we don't make this mistake in the future?	
	[Insert your own questions here]	
Planning phase	Was the client happy with our deliverable (presentation, scheme, planning decision)?	
	If yes, what was so good about it?	
	If no, what was wrong with it?	
	Did our consultants/specialists provide timely and meaningful input?	
	If not, how could we have improved their involvement and the quality of their contributions?	
	Did our project team, consultants/specialists/clients participate effectively (e.g. difficulties in negotiating with them etc.)?	
Detailed design phase	If not, how could we improve their participation?	
	[Insert your own questions here]	
	Was the client happy with our deliverables (building regulation approval, scheme)?	
	If yes, what was so good about it?	
	If no, what was wrong with it?	
	Did our consultants/specialists provide timely and meaningful input?	
Construction phase	If not, how could we have improved their involvement and the quality of their contributions?	
	Did our project team, consultants/specialists/clients participate effectively (e.g. difficulties in negotiating with them etc.)?	
	If not, how could we improve their participation?	
	[Insert your own questions here]	
	Was the client happy with our deliverables (oversee construction, scheme)?	
	If yes, what was so good about it?	
	If no, what was wrong with it?	
	Did our consultants/specialists/sub-contractors/suppliers provide timely and meaningful input?	
	If not, how could we have improved their involvement and the quality of their contributions?	