Zhang, Shiming (2016) *Managing in conflict: how actors collaborate in marketing green chemistry.* PhD thesis.

http://theses.gla.ac.uk/7167/

Managing in Conflict: How Actors Collaborate in Marketing Green Chemistry

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Submitted in fulfilment of the requirements for the degree of

Doctor of Philosophy

Adam Smith Business School

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Abstract

The purpose of this research is to investigate business relationships, by drawing on conflict theories from organization studies and taking a mid-range research perspective to further develop these into industrial marketing research. IMP researchers have examined conflict as a threat to established business relationships and commercial exchanges, drawing on theories and concepts developed in organization studies. I adopt the behavioural approach from organisation studies, and contracts with particularly the socio-psychological approaches relating to the affective emotions of small groups. I find that there is much in common between the definitions of conflict developed by March (1999) and the theories of Jehn and Mannix (2001) on the combination of affective and cognitive ways of undertaking activities in conflicts, as conflict as experienced, emotional, aligned with material entities. These approaches have had a great influence but have not been fully considered in business-to-business research. This thesis aims to investigate how actors manage, and manage in, conflicts, and how their relationships dynamics work within networks. I develop conflict research by drawing on the IMP and Market Studies approaches, which address the pervasive conditions of business activity, encompassing the relationships and resources experienced by actors as events which trigger emotions.

The overall research method chosen for this research is the case study. I identify five cases of relationships from the oil and gas industry's service sector and examine conflict, its emotional dimensions and actors' activities in conflicts within these cases in three empirical study chapters. Study 1 examines conflict of interest and resources and conflict as experienced by actors. Study 2 examines conflict from the emotional perspective by investigating a series of events and event-triggered emotions across the five cases of relationships. Study 3 focuses on adaptive activities undertaken in conditions of pervasive conflict, which produce incremental innovation.

I propose an explanation of how actors manage, and manage in, conflict given that they tend to value and maintain relationships beyond individual episodes of exchange. Conflicts are investigated in relationships from a network perspective, showing that actors experienced these while adapting to changes in their business setting (regulation, technology or/and cost), modifying their roles in that network. By identifying conflict with the organizing forms of relationships and networks, the research shows how actors handle conflict by pursuing and combining a number of strategies, distributing the conflict across

an enlarged network. By investigating the emotional dimension of conflicts, I find that affective emotion effects relationships and relationship dynamics. Actors transform and resource emotions with material entities, and in this process markets are shaped. Adaptations are part of the normal activities; actors, driven by medium term Chemical Management Service (CMS) contracts and cost pressures, undertake incremental innovation. An incremental innovation model is designed to illustrate the process of incremental innovation that operates for the 'green chemical' industry, and guides actors to contain costs through managing portfolios and resources, forecasting and innovation agenda, and reducing uncertainties in networks.

Key words

conflict; IMP, market studies; relationships; innovation; resources; chemistry; oil and gas industry.

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List of papers and publications associated with the thesis

1. Shiming Zhang, John Finch, Susi Geiger (2015). Adaptation in incremental innovating in Conflicts. 31st Industrial Marketing and Purchasing (IMP) Conference, Kolding, Denmark.

2. Finch, J., Zhang, S. & Geiger, S. (2013). Managing in conflict: How actors distribute conflict in an industrial network. Industrial Marketing Management, 42(7), 1063–1073.

3. Shiming Zhang, John Finch, Susi Geiger (2013). Learning Though Transforming Emotions in Relationship Dynamics. 29th Industrial Marketing and Purchasing (IMP) Conference, 2013, Atlanta, USA.

4. Shiming Zhang, John Finch, Susi Geiger (2012). Exploring Organizational Conflict in Business-to-business Marketing-to-business Marketing. 28th Industrial Marketing and Purchasing (IMP) Conference, 2012, Rome, Italy.

5. Shiming Zhang (2012). How Actors Collaborate in Marketing Green Chemistry from the Perspective of Conflict. 1st International Research Conference in Marketing, 2012, Glasgow, United Kingdom.

6. Shiming Zhang (2012). How Actors Collaborate in Marketing Green Chemistry. Doctoral Colloquium at 27th Industrial Marketing and Purchasing (IMP) Conference, Glasgow, United Kingdom.

Acknowledgement

For many years I have been fantasising about the moment of getting to write the acknowledgements. But I feel stuck for words about where to start. The story of this thesis started from the year 2010 when I commenced my PhD. I spent two years significant time at the Business School at the University of Strathclyde, building me a solid foundation to be a researcher. I transferred my research with my supervisor to the Adam Smith Business School at the University of Glasgow. Both schools provide wonderful experience for me. Over the years I have received great support from a large number of people.

I would like to start with talking about my supervisors. Prof John Finch and Dr Susi Geiger (from Business School, University College Dublin) led me to the business-to-business marketing research. Prof John Finch is my principal supervisor. He always gives me great freedom thinking in my work but guide me in right directions. I really appreciate his help over the years, the inspiring discussions that have really been an intellectual joy, the productive supervision meetings that help me make progress, and coffee and tea as well. My second supervisor Dr. Geiger deserves for gratitude for commenting and contributions in our project group meetings.

I will also thank the IMP Group and the IMP annual conference. In 2011, I participated the doctoral consortium, which was my first time had a chance to discuss my research with a group of IMP people. I would like to thank the convenors of the consortium, Dr. Catherine Welch Dr Debbie Harrison, Prof Wesley Johnston and other researchers at the consortium, who provided me help in setting my focus on 'conflict' in developing my future PhD research. I presented three papers at the IMP Annual Conference 2012, 2013 and 2015. I am much appreciated the constructive comments and feedbacks from the scholars at the conferences, which helped me with developing part of the empirical studies (Chapter 6 and Chapter 7, and Chapter 8) of the thesis.

I will also thank my viva examiner, Prof Judy Zolkiewski and Dr Anna Morgan-Thomas for their close reading, comments, and criticisms of my thesis, which I very much appreciate. The whole process of revision provided me a great opportunity to go back and to think over the research. I made revisions of the thesis, taking into close constructive account of their comments from the viva, which were very helpful indeed as I developed my PhD research further.

Author's declaration

I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

Signature:

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Chapter 1.   Introduction

In industrial markets, companies are increasingly highly interdependent and interconnected within networks. Relationships in industrial sectors seem to be in a state of complexity and dynamic change. Research into these relationships and interactions is an important aspect of marketing research, especially for the Industrial Marketing and Purchasing (IMP) group. Market actors consider industrial collaboration through long-term relationships as an important strategic mission, but such relationships and commercial exchanges are not always as stable as expected and can be threatened in conditions of conflict. Much of the established research in the field of relationships in industrial marketing has tended to focus on positive relationship constructs. The recent 'Call for Papers' for the *Industrial Marketing and Management* Special issue (deadline 15 December, 2014) on 'The Dark Side of Business Relationships: Antecedents and Consequences' suggested that there is 'limited literature which focuses on the dark side of relationships', and added that 'research examining the dark side of relationships is scant and very little has been concluded on how such effects can influence future relationship dynamics'.

It was drawn to my attention that conflicts could be an interesting research perspective through which to study business relationships when I presented and discussed this PhD research proposal in the doctoral colloquium at the 27th Industrial Marketing and Purchasing (IMP) Annual Conference in 2011. Since then, I have focused on researching business relationships from the perspective of conflict and contributed work to the 28th, 29th IMP conferences in Rome and Atlanta. One of my recent co-authored publications – 'Managing in Conflict: How Actors Distribute Conflict in an Industrial Network' (Finch, Zhang & Geiger, 2013) – is cited in the above mentioned 'Call for Papers'.

Conflict research has been a long-standing topic in organization studies. This research takes a mid-range perspective, drawing on conflict theories and concepts from organization studies and developing them into business-to-business settings, where the IMP and market studies approaches are adopted. The thesis advances the research on actors' relationships and their relationship dynamics from a perspective of conflict. It examines conflict as experienced by actors, the emotional dimension of conflicts and triggered emotions, and actors' adaptations in terms of managing conflicts, using the context of marketing green chemistry in the North Sea oil and gas industry. This chapter introduces the research setting – that of a specific industry that is highly regulated and technology-driven; outlines

the topic of the thesis; sets out the aim and the research questions; describes the research approaches; and provides an overview of the chapters.

1.1   Setting the Research Scene

This thesis investigates conflicts in the relationships of the actors involved in marketing chemicals and chemical services in the North Sea oil and gas industry. The research focuses on the production and supply of oilfield chemicals and services. However, the collaborations between business actors are made more complex because of the effects of environmental regulations on business activities, and this research investigates these. It also shows that chemical service companies not only deliver products and services to oil and gas operators to provide solutions for oil and gas production but also secure asset integrity and flow assurance across production facilities.

In terms of analysing actors' relationships within oilfield chemical markets, three issues should be taken into account. Firstly, the North Sea oil industry is mature; but with the development of the chemical industry, chemical supply companies, chemical service companies and oil and gas operators should be responsible for ecosystem problems caused by spillovers of chemical products. OSPAR is the "mechanism by which 15 Governments & the EU cooperate to protect the marine environment of the North-East Atlantic", which is legally binding and related to the European Commission (http://www.ospar.org/). OSPAR's Harmonised Mandatory Control Scheme (HMCS) and other similar schemes have become important factors in the political, social, economic and business environments. OSPAR and other organizations aim to improve the protection of human health and the environment by identifying the intrinsic properties of chemical products. This has a significant impact on the chemical markets of the oil and gas industry. On the one hand, these organizations try to enhance the incremental innovation and competitiveness of the chemical industry by encouraging products and services that meet environmental requirements. This is the so-called 'green chemistry'. On the other hand, they set regulations to help manage the risks from using chemicals and provide information for the chemical companies. Market actors experience a conflict caused by the increasing demand for green (environmentally acceptable) chemicals and the regulation of chemical products and services when they develop their chemical products and services for the market exchange.

Secondly, markets are social–technical–economic spaces and organizations in which actors interact. Relationships among and across industrial actors are not necessarily stable. In the North Sea oil and gas sector, the use of green chemistry draws companies and regulators into a specific state of uncertainty as a result of relationship dynamics. Chemical service companies must provide their customers with technical solutions to chemical problems based on green chemistry, and therefore require appropriate chemical products and technical capability from their suppliers. Relationships inevitably change as a result of the interests of different business actors. The inherent dynamics of the nature of relationships at different levels of the market (individual and organizational) create challenges for market actors in establishing and maintaining long-term healthy relationships, or even recovering or ending relationships. Therefore, because chemical service companies are in a middle role – providing technical solutions to oil and gas operators and buying chemicals from chemical suppliers – they experience conflicts related to cost when there is interaction over activities such as production, marketing, purchasing and innovation in terms of keeping their competitiveness in the market.

Thirdly, companies undertake activities to retain their competitiveness and this has an impact on healthy business relationships in networks. Business actors experience technology conflicts caused by competitors, customers and even regulators. Product research and development is perceived to be an important activity to create greater trust and market reputation, enlarged market share and increased profitability. Incremental innovation will never stop because business actors are involved in seeking products and services with better value. In the oil and gas chemical industry, these values must meet the requirements of environmental and safety regulations, demonstrate good performance in solving customers' technical problems and lower the costs of production and use.

In ISH (www.ihs.com) *Chemical 2015 Specialty Chemicals Update Report*, 'Sales of oil field chemicals worldwide are estimated to increase by 4% per year between 2015 and 2019 to more than $30bn. From the report, 'most of Western Europe's oil field production is in the North Sea, where the aging of wells has been accompanied by problems with corrosion and scale. In addition, European environmental concerns have led to restrictions or outright bans on many chemicals used previously, including alkylphenol/formaldehyde resin–based demulsifiers and olefin-based synthetic fluids.' In the oilfield chemistry market sector, it is the large corporations, who play leading roles and dominant the markets,

offering a wide range of oil field services, such as exploration, drilling, design, and engineering, like Baker Hughes, Champion Technologies, M-I SWACO,.

This research is conducted in the context of the North Sea oilfield chemical industry, which is highly driven by regulation, cost and technology. Actors, interdependent and interacting, pursuing the three targets of coping with regulation, reducing cost and improving their technologies, interact and make market exchanges happen. The next section is to introduce the research aim and research questions of the thesis.

1.2   Research Topic

Conflict is an interactive and dynamic process in which individuals or groups experience difficulties in making decisions and choosing alternatives (March and Simon, 1958; Cyert and March, 1963). March and Simon examine the role that individuals play in causing conflict so as to uncover the conditions in which conflict arises, and the reactions of individuals and organizations. Such reactions, usually aligned with individual or organizational goals, evoke alternatives, events and decision-making based on their sources (Cyert and March, 1963; Thompson, 1967). Actors move at a variety of levels in an organization (Rahim, 2011), and through phases as conflicts develop (Pondy, 1967). Research into organizational conflict has a long and constructive history. It addresses the conditions that create conflicts, the level of conflicts in organizations, communication during conflicts, styles of conflict, functional or dysfunctional conflicts, and conflict management and resolution (March and Simon, 1958; Cyert and March, 1963; Putman and Poole, 1987; Thomas, 1992; Gayle and Preiss, 1998). The research on organizational conflict influences business-to-business marketing research. This studies conflict in supply chains (Ehie, 2010), conflict in marketing channels (Chang and Gotcher, 2010; Zhou *et al.*, 2007), conflict between sales and marketers (Le Meuner-FitzHugh *et al.*, 2011; Massey and Dawes, 2007), and buyer and seller relationships (Ling-Yee, 2011; Plank and Newell, 2007; Plank *et al.*, 2006).

This thesis adopts March's definition of conflict (March, 1999, p. 217) as 'multiple-nested actors confronting multiple-nested time perspectives with references and identities that are consistent across individuals and across time'. Cyert and March (1963) address the behaviour of businesses in the first sentence of their book *A Behavioural Theory of the Firm: 'The way it makes economic decisions'*. Conflict as a pervasive condition of an

organization emerges when actors experience difficulty in deciding upon an alternative action (March and Simon, 1958, p. 112). This thesis develops the behavioural approach to organizations (March and Simon, 1958; Cyert and March, 1963; March, 1999, 2008) by following actors' reactions to perceived conflict. In industrial markets, conflicts in business relationships are directly experienced by actors and influence their behaviours. This is usually transformed and sequenced by manageable events and distributed networks.

Further, conflict is investigated through its emotional dimensions and emotions are aligned with conflicts. Emotions are triggered by events (Tähtinen and Blois, 2011). Emotions influence the trajectory a relationship takes, for instance through affecting trust, commitment, shared activities, common affiliations and actors' personal bonds (Andersen and Kumar, 2006; Jones and George, 1998; Ryan and Blois, 2010; Tähtinen and Blois, 2011; Lawler, 2001). Actors are affected (Weiss and Cropanzano, 1996; Amabile, *et al*., 2005) by event-triggered emotions. Research on conflict could focus on its affectiveness, which suggests a research topic on its emotional dimensions and consequences within small groups and teams (Jehn, *et al*., 2008).

I notice that conflicts inherently exist in business relationships, as a condition of actors' interactions with material effects, affective emotional dimensions, and sequenced features. This thesis is developed to advance the understanding of business relationships from a negative perspective, taking an IMP and market studies approach and looking at how actors experience conflict, which is a pervasive condition in business relationships and experienced by those involved in making business-to-business exchanges. Here there is something of a research gap. This could be filled with research focused on how conflict is a pervasive feature of the organising process, and how actors manage ongoing conflict in their networks and its affective emotions.

Therefore, taking the research setting into consideration, I have set the topic of the thesis as:

Managing in Conflict: How Actors Collaborate in Marketing Green Chemistry.

The following section of this chapter introduces the aim of the thesis and the research questions related to the research gap. The thesis aims to address the research gap through three literature review chapters, one methodology chapter and three chapters of empirical

studies. This chapter concludes with an overview of the organization of the chapters of the thesis.

1.3 Thesis Aim

The overall aim of this thesis is to **investigate how actors manage, and manage in, conflict, within relationships and networks.**

This broad aim is designed to advance conflict research in business-to-business settings taking a mid-range approach based on conflict studies in organization research. The thesis also examines actors' interactions and activities in terms of managing and managing in conflict. The existing literature is filled with in-depth research on the dimensionality, complexity and contingency nature of conflict (Song *et al.*, 2006), and on actors' responses to conflict (Song *et al.*, 2000; Xie *et al.*, 2003). The aim is developed from the reviewed literature which highlights some unexplored research issues on conflict in industrial relationship dynamics and networks, and looks at conflict as an inherent condition in business markets rather than in an unusual context. In terms of addressing the research aim, the thesis investigates perceived conflict in business relationships, affective emotions, and events and adaptations in terms of managing in a conflict in the business market. Three research questions guide the investigation, as set out below.

1.4 Research Questions

The thesis develops three research questions to guide the research aim. The three questions aim to fill the knowledge gap in business relationship research relating to the examination of conflict as being inherent and pervasive in networks and having emotional sequenced features in business relationship research.

Question 1: How does conflict function as a pervasive condition experienced and managed in business relationships?

This research question explores our understanding of the conflict that exists pervasively in business interactions, but is also experienced by actors. Taking a behavioural approach to organization (e.g. Cyert and March, 1963; March and Simon, 1958; March, 1999, 2008; Thompson, 1967), the thesis investigates perceived conflict, and its emotional dimensions

and reactions. Conflict is a pervasive and normal condition of business activity and has sequenced features. Conflicts are researched as sequenced in order to address the trajectory of consequences and conditions through which an event takes place. To address this question, the researcher compares five cases that involve relationships and examines the conflicts within each of the cases from the perspective of an IMP approach, by investigating the resource-based and structural qualities of the conflicts.

Conflict is experienced and perceived by actors, a process that usually produces affectiveness and alignment with events. This directs the research towards the second question, on the emotional dimensions of conflict.

Question 2: How do actors understand, transform and manage perceived emotions in business relationship dynamics?

Conflict is emotional. To address this research question, the emotional dimension of conflict is investigated. Actors experience conflict as interpersonal and affective, both in tasks and around cognitive differences about ideas and opinions. Small group studies (Jehn and Mannix, 2001; Jehn, 1997; Jehn, *et al*., 2008) have shown that conflicts that emerge within teams affect- covering questions of personal and emotional conflicts- and cognition- performing tasks, and designing processes to support and manage tasks within groups. This research question focuses on emotional conflict and the affective emotions triggered by events. Events trigger emotions in the process of resolving problems, developing relationships and managing conflict, and work as the carrier of relationship dynamics. Examining the emotions of actors in industrial markets is a route to understanding conflict sequences and relationship dynamics in networks, moving from interpersonal to inter-organizational phenomena. Conflicts are regarded as practice and performances by which emotions are transformed and managed. Actors transform emotions into other manifestations. This thesis is to revisit the IMP and market studies approaches to the functions of personal emotion in business interactions and address how actors understand, transform and manage emotions in business relationships.

Question 3: How do actors adapt to establish incremental innovation in conflicts?

The third research question relates to adaptations in conflict settings. Adaptation plays an important role in managing conflict and resourcing emotions. In the industrial market,

interaction in conflicts determines the behaviour of the actors and explains the driving forces that shape individual behaviour in markets (Håkansson and Snehota, 1995). There is some interesting thinking relevant to the third research question: Do actors adapt to establish incremental innovation with partners or beyond company boundaries? Do they establish more resources or become more adaptable? Are the adaptations in dyadic, triadic or some other form? And is there any change in the role of the market in the conflict-conditioned adaptation? Around these thoughts, three questions will be addressed in terms of answering the third research question:

1. How do actors adapt in terms of establishing incremental innovation?
2. How does incremental innovation take place?
3. What makes incremental innovation successful in network?

The thesis conducts three studies about the three research questions. The studies are developed in the empirical chapters outlined in section 1.5.

1.5   Research Approach

The choice of research method depends on the research aim and research questions (Ghauri *et al*., 1995). The research method adopted in this thesis is the case study. Dubois and Gadde (2002) address the contribution of case studies to the development of theory through the utilization of in-depth insights into empirical phenomena and their contexts. The overall philosophical underpinning that guides this research is pragmatism. Compared to post-positivism and constructivism, pragmatism provides an alternative approach to research questions focusing on the problem and the consequences of action, and being pluralistic and real-world oriented. I examine the nature and uses of the theory and the data required in the research. I consider abduction as an appropriate reasoning process which takes advantage of the flexibility of the case study method to build theory (Dubois and Gibbert 2010; Eisenhardt and Graebner, 2007; Dubois and Araujo, 2007).

Study 1 relates to research question 1 and adopts a comparative case study as the research design, taking a small theoretical sample of conflicts understood as a process (Eisenhardt, 1989; Yin, 1994). I set the relationship as the unit of analysis and selected five cases of relationships. By comparing five conflicts in the five cases, the thesis aims to assess conflicts so as to develop a 'deep understanding of the actors, interactions, sentiments, and

behaviours occurring for a specific process through time' (Brodie *et al.*, 1997). By following the actors involved in the conflicts, the thesis demonstrates the manifestations of each conflict and examines how these conflicts are experienced and managed in networks.

In Study 2 relating to research question 2, I adopt a case study approach together with longitudinal analysis. The Study addresses the emotional dimension of conflicts and assesses how emotion functions in business relationship dynamics. The thesis views relationship dynamics as a process consisting of material substances or events in time and space (Van de Ven and Poole, 2005). In epistemological terms, I adopt an approach that features process rather than variance because I expect the development of changes in the relationships. At the same time, the fieldwork focuses on finding consequences by describing sequences of events rather than connections of independent and dependent variables (Poole *et al.*, 2000).

For Study 3 relating to research question 3, I draw data from the cases of conflict in research question 1, and the longitudinal analysis of events and emotions in research question 2. I examine how actors manage conflict and event-triggered emotions in relationship dynamics across company boundaries, how they adapt to incremental innovation and how they acquire a set of market practices to shape a greener chemistry market by leaving the market away occasionally. In this way, the study addresses research question 3.

Data for Studies 1, 2, and 3 were collected through a combination of research interviews, observations at industry seminars, conferences and trade shows, and the collation of industry and company reports and documents. I began collecting data in early 2011, and sampled cases based on data from late 2012. Five cases of relationships were identified from interviews and observations. In Study 1, I compared conflicts in these cases and examined these conflicts, actors, resources and activities. A notable feature of the research was the examination of the connections and successions between cases and the conflicts in cases. Conflicts, events, affective emotions triggered by events (Study 2) and adaptations related to incremental innovation (Study 3) were also traced and analysed side-by-side or 'cross-case' while comparing the cases because events are usually aligned with conflicts. The three studies make up the three empirical chapters of this PhD research. The thesis is overviewed in the following section.

1.6   Thesis Overview

The thesis starts with a general introduction to the research area. It presents three issues as sources of the conflict existing in business relationships and relationship dynamics i.e., regulation, cost and technology, and proposes that conflicts inherently exist in market relationships. The research sets its context in the green chemistry market in the North Sea oil and gas production industry. For clarity, the thesis introduces some background knowledge of the industry such as its market structure, chemical production problems, and environmental regulation and its regional disparities. I identified that research into conflict and its emotional dimensions could be an interesting topic in the industrial marketing field. I introduce the topic, thesis aim and research questions in Chapter 1. I review behavioural and socio-psychological approaches to conflicts, and explore them in business-to-business marketing research (Chapter 2).

Chapter 2 reviews conflict research in organization studies by taking a mid-range approach. I adopt behavioural approaches and contrast it with socio-psychological approaches to find there are some overlaps in conflict and its affectiveness. Further, the research carries on to investigate the impact of the two approaches on IMP and Market Studies traditions. I revisit the IMP tradition and market studies and identify the conflict theories that are not fully developed in these areas. By exploring organization conflicts in business-to-business research, conflict is to be investigated as experienced by actors through business interactions, encompassing relationships and resources.

Chapter 3 examines conflict from IMP perspective, which is with a more structural and networked qualities. By developing Cyert and March (1963) and March (1999, 2008) and reviewing the main themes of IMP approaches, I identify conflict as pervasive condition of business actors from a perspective of network, and experienced by actors. Actors manage (in) conflict in terms of maintaining relationships beyond episodes of exchanges.

Chapter 4 investigates conflict and its emotional dimensions by drawing a practice approach to markets, pointing that market practice refers to activities that contribute to constitute markets (Kjellberg and Helgesson, 2007a). Examining emotions provides us a way of investigating conflicts and their apparatuses. Emotion has impact on relationships and relationship dynamics. I investigate emotion and its sequences, showing that actors

manage emotions in terms of transforming into other manifestations embedded with materialities, such as events, projects or tasks.

Chapter 5 addresses the philosophical underpinning of the research and methodologies, the reasoning process, coding and analysis methods. The thesis choose pragmatism as the philosophy positioning allowing a mid-range theories to provide a bridge between empirical finding and general theories. Abduction is the reasoning process of the research. Case study methods are adopted overall the whole thesis in three empirical studies.

Empirical studies and discussions are developed in three chapters (Chapters 6, 7 and 8). Chapter 6 examines conflict in business relationships by establishing a comparative case study, showing how actors draw on resources and manage conflict in a network. Longitudinal analysis is designed regarding the triggered emotions in conflict-aligned events in Chapter 7, thereby addressing how emotions are transformed and managed in relationship dynamics. In Chapter 8, incremental innovation is considered as a key adaptive activity in managing relationships in conflict. The concluding chapter (Chapter 9) outlines the main contributions and limitations of the thesis.

The green chemistry market is characterised by the application of science and technology, regulation, and exchanges within established relationships, where conflicts caused by cost, regulation, and technology are frequently experienced by actors. The most prominent areas of the research are developed from the market studies tradition and the IMP tradition. Market studies mainly concentrate on the application of science and society, and the commercialization of science. IMP research focuses on long-standing relationships. These have the same qualities as the industry area on which the thesis focuses. The objective of the next three chapters is to frame the theoretical positioning of the study by reviewing a behavioural approach and socio-psychosocial approaches and their influences on the two approaches of IMP and Market Studies. The chapters respectively focus on organizing conflict in business markets, conflicts in relationships, and conflicts and emotions in practice.

Chapter 2.   Organizing Conflict in Business Markets

2.1 Introduction

Conflict is under studied in a multidisciplinary way (De Dreu, 2005) and within and across many scientific disciplines, including philosophy, anthropology, psychology, sociology, politics, economics, and organizational studies. It is a type of specific interaction which exists within different levels of social entities (March and Simon, 1958) depending on the actors involved, and which deals with relationships both in society and between people (Mayo, 1960). Conflict is a phenomenon that pervades organizational relationships. As organizations have become dynamic contexts both internally and across other organizations, the capability of managing conflict has become more and more important.

Research into conflict is a long-standing topic in organization studies, and has looked at structural qualities, whether these are inter- or intra-organizational, its outcomes, and the strategic behaviours that may secure favourable outcomes (March and Simon, 1958; Cyert and March, 1963; Thompson, 1967; Pondy, 1967; Deutsch, 1977; Jehn and Mannix, 2001; Thomas, 1992). Conflict works as an organizational concept. Theories of organizational conflict have had a significant impact on marketing research, especially regarding supply chains and marketing channels (Ehie, 2010; Plank and Newell, 2007; Plank *et al*., 2006; Lam and Chin, 2005; Ford *et al*., 1975; Welch and Wilkinson, 2005). The existing research on marketing examines the conditions under which conflicts emerge; the reactions to individual and organizational conflicts; whether conflicts exhibit stable properties such as functionality or dysfunctionality; the influence of conflicts on strategic decision making; motivations to reduce conflicts; conflict management; and how conflicts can be avoided or resolved at relatively low cost with contractual or other negotiated incentives (Amason, 1996; Chang and Gotcher, 2010; Cheng and Sheu, 2012; Ndubisi, 2011; Webb and Lambe, 2007; Thomas, 1992, Wall and Callister, 1995).

I draw on March's definition of conflict (1999, p. 217) as a fundamental problem of organizing business activities, emerging as: 'multiple nested actors confronting multiple nested time perspectives with reference and identities that are inconsistent across individuals and across time'. I revisit the behavioural approaches to organization (e.g. March and Simon, 1958; Cyert and March, 1963; March, 1999, 2008) as these examine conflict among actors' interests as a pervasive condition of organizations. I begin with such

research partly because it remains an important influence in the field with a slowing moving nature, but also because it has had a notable influence on business-to-business marketing. I then contrast this with social-psychological analyses of conflicts as experienced by actors, typically working on specific tasks and affective emotions in small groups (Greer *et al*., 2008; Jehn, 1997; Jehn and Mannix, 2001). Without being decisively functional or dysfunctional, conflict can threaten to destabilize a relationship and actors are expected to manage conflict adaptively in order to re-stabilize their relationships and maintain their value (March, 2010).

I develop this chapter by taking a mid-range approach, describing and reviewing relevant theories on organizational conflict and identifying that conflict also has its own meanings and functions in industrial marketing research. I focus especially on the influences on IMP and Market Studies traditions, which will be expanded on and explained in Chapters 3 and 4.

2.2   Organizational Conflicts

Conflict is insufficiently studied (De Dreu, 2005) within and across many social scientific disciplines including philosophy, anthropology, psychology, sociology, politics, economics and organizational studies. The classical philosophy approaches see conflict as at the root of the development of society and as existing between classes (e.g. Marx and Engels). Communities reduce violence and force society development by building up a social relationship system and setting up regulations. In sociology, conflict is studied as a fundamental factor causing social participants to combine together and construct society. Human relationships and their behaviours within conflicts are also researched.

To narrow down the consideration of conflict from a social phenomenon to its impact on a group, a department, or an organization (March and Simon, 1958), the term 'conflict' describes a state of inter-organizational or interpersonal disagreement as a result of the dissimilarities of each party (March and Simon, 1958). Conflict definitions in the existing literature indicate perspectives of process, cause, phenomenon and function. Wall and Callister (1995) define conflict as 'a process in which one party perceives that [its] interests are being opposed or negatively affected by another party'. The interests and goals of parties are always considered as the major cause of conflicts (Cosier and Rose, 1977) as it is endemic to human relations (Plank *et al*., 2006). March and Simon (1958)

regard conflict as a social phenomenon of the negative development of relationships, whether between organizations or between individuals. Others define conflict through its functions, and emphasize the influence in the process of conflict resolution (Thomas, 2006). Pondy (1967) uses what has become an established and general categorization of conflict as something which includes a sequence of conflicting events, that can be functional or dysfunctional and that has the possibility of destabilizing an organization or other established means of organizing business activities. Pondy's definition presumes that conflict is triggered by events and in the succession of events. There is no single clear meaning for 'conflict', but all the definitions have one thing in common, i.e. two or more parties involved in an interactive situation with the purpose of achieving their respective values and goals. Conflict research in organization studies is enormously fruitful, covering the main areas of identifying change in organizations (Jehn and Mannix, 2001), recognizing the relationships between organizational actors (Getzels and Guba, 1954), managing conflicts (Wall and Callister, 1995), conflict resolution strategies (Argyris and Schön, 1996) etc., which provide a broader way of understanding the interactions in organizations.

2.2.1   The pervasive conflict

Conflict exists across many levels of society. These levels are those of the group, the organization and the individual. Conflicts can be classified as intra- (within) and inter- (between) conflicts. They can be intrapersonal, interpersonal, intra-organizational and inter-organizational depending on their levels. I have concentrated on organizational conflict because conflict is one of the major organizational phenomena and exists pervasively in and between organizations. Three classes of conflict exist in or between organizations: individual conflict, intra-organizational conflict and inter-organizational conflict. These partly overlap (March and Simon, 1958). Organizational conflict theory has been developed to provide an understanding of the relationship between individuals' actions and organizational actions. Conflict research about organizations has a great deal to offer, such as helping to identify organizational change (Jehn and Manix, 2001); recognising the roles and relationships of organizational actors (Getzels and Guba, 1954); managing conflicts (Wall and Callister, 1995); conflict resolution strategies (Argyris and Schön, 1996), etc. Conflict research provides a broad approach to the examination of interactions and organizational relationships.

The term 'conflict' is a concept that describes a state of inter-organizational or interpersonal disagreement caused by the dissimilarities between each party. Conflict helps identify how different levels of entities construct an organization and how human relationships change either in a functional direction (Parsons, 1966) to preserve stability, reach mutual objectives (Cosier and Rose, 1977) and encourage innovation, or in a dysfunctional direction (Parsons, 1966) causing distrust and poor decisions. Using the classic view of organization theorists, Fayol and Gray (1987) and Wall and Callister (1995) address organizational conflict in negative terms. Such conflict needs to be mitigated and resolved to gain efficiency in organizational performance (De Dreu and Weingart, 2003). Conflict causes disharmony to relationships. It can even end a relationship among parties or individuals because of differences in goals, interests, values and communication. But Pondy (1967) states that organizational theories 'do not admit that conflicts provide poor guidance in dealing with problems of organizational efficiency, stability, governance, and change, for conflict within and between organizations is intimately related as either symptom, cause, or effect, to each of these problems' (p. 504).

Within an organization, interpersonal conflict happens because of disagreements, incompatibility (Jehn and Mannix, 2001), negative emotion (Barsade, *et al.*, 2000) or interference (Pondy, 1967) between individuals or groups. Individual conflicts are important in and between organizations because other types of conflict arise from such individual decision-making issues (March and Simon, 1958). Conflict exists under the precondition of the interdependence of each party and their opposed tasks (Jehn and Mannix, 2001). Besides the structural and affective dimensions, conflicts can be considered in a processual way, looking at the process of interaction in organizations. Conflict is also useful in describing: (1) a normality of hostile relations based on events which exist pervasively within or between organizations; (2) dynamic factors that provoke change; (3) the inevitability of interaction in or between organizations; (4) a self-interested outcome based on the respective positions of individuals or organizations (Rahim, 2011).

2.2.2 Actors, roles, parties and values in conflicts

Individual actors each play a unique role in an organization. Roles in conflicts are behaviour associated with an emphasis on problems, which must be solved physically, and with the expectation (of others or oneself) of psychological goals. Actor, role and personality (Getzel and Guba, 1954) are three concepts that indicate the basic sources of

individual conflict. The actor on the one hand behaves in each conflict in a way that matches the functions of his or her particular role and personality construct in that conflict (Getzel and Guba, 1954). On the other hand, actors experience conflict over these roles and personality constructs in the process of that conflict. The reason why a role has a function in a conflict is because of the position which the role has in the organizational hierarchy. It is not so much that actors are concerned about the expectations people have of the role they are fulfilling; instead, it would be better to say that they care more about the hidden values inherent in their positions. The duties and obligations of positions force actors to achieve their interests, and oblige them to get into and out of conflicts. This is regarded as 'managing conflicts', examples of which are reaching a consensus or solving problems. Roles are functionally positioned on both sides of a conflict, and are the parties to a conflict. A conflict exists when the actors behind the parties to a conflict believe they have contrary goals and values. The parties come into existence because of position and compete for scarce resources. This sometimes leads to disagreement.

Parties can either be human individuals or business units. They are interdependent and positioned on both sides of conflicts, and they participate in making and reconstructing conflicts. The expected outcome of resolving both internal and external conflict is to make it functional. Role conflict is the phenomenon of intrapersonal or intragroup conflict because of misunderstandings over expectations of an individual's role or over a group's goal achievement within an organization. Four types of role conflict have been identified as intra-sender, inter-sender, inter-role and intra-role conflicts. Both the position and expectation of value change may cause role conflict (Getzels and Guba, 1954). Individuals are responsible for the tasks and goals that are allocated to them by an organization. Individuals may feel job dissatisfaction, distrust, lower commitment, and anxiety when role conflict happens. Role conflict, existing within an individual, leads to behaviours affected by triggered emotions over their position and decreases the effectiveness of an organization (Rizzo *et al.*, 1970).

At the higher level, organizations are also involved in role conflict as each organization has its own role expectations. Role conflicts not only exist within an organization but are also reflected in the interactions of key personnel between organizations (Rizzo *et al.*, 1970). Relationships both within and between organizations are under researched in organizational conflict studies. Conflict develops because the parties on each side are relationship-interactive and role-interdependent according to their values. The expected

outcome of resolving internal or external conflict is to lead the organization from conflict to collaboration. As Tuite *et al.* (1972) stated: 'It might be fair to say that one objective of a theory of optimal inter-organizational decision making is to move from conflict-cooperation to conditions of pure cooperation.'

The modern view of organizational conflict does not consider disharmony only as the passive and uncontrolled outcome of conflict, but as an interactive process that identifies how an organization interacts and works. Conflict is inevitable (Rizzo *et al.*, 1970), but an organization's goal is to develop an effective system to identify and manage uncontrolled conflict and find a resolution to problems. Organizations regard conflict as an interaction of actors to improve performance, and to form a well-balanced structure for an organization by creating a situation of compromise and collaboration. A conflict involves at least two or more parties of actors with incompatible interests. Actors in conflicts tend to resolve these interests or transform them into functional processes. Compared with dysfunctional conflict, functional conflict is goal oriented (McGrath *et al.*, 1984) and concentrates more on the shared objectives rather than personal inconsistency; functional conflict leads to healthy and positive outcomes rather than negative consequences; functional conflict is concerned more with the continuance of relationships rather than the ending of relationships; functional conflict promote organizations to distribute resources better rather than to misallocate them; functional conflict in business relations is a resource and a tool to adjust and improve rather than to cause problems.

Baron (1990) points five basic elements in a conflict as 'opposing interests', 'to be recognised', 'with beliefs', 'as a process' and 'with actions'. Actors are involved in pervasive conflicts because their goals and values align either to individuals or organizations. They create a conflict and interaction, gain understanding about the process, make decisions, mobilise resources, make adaptations, and resolve or at least partly resolve the conflict.

Managing in conflicts is a process of interaction with more or less frequent understandings and events (Song *et al.*, 2006). Conflicts may consist of one or more meshing episodes, i.e. latent conflicts, perceived conflicts, felt conflicts, manifest conflicts and conflict aftermath (Pondy, 1967). **Latent conflict** shows the underlying sources of conflict, which exist under three conditions: (1) parties on each side of the conflict compete to achieve scarce resources; (2) the parties drive for autonomy; and (3) the parties have different goals.

When the conditions of latent conflict are not tenable, parties may not perceive the conflict in the relationship with the latent conflict still exists. **Perceived conflict** results from a misunderstanding of each other's true position. The parties to the conflict promote better communication to resolve perceived conflict. The suppression mechanism and the attention-focus mechanism are used to limit the perception of conflict. The personalization of conflict may cause anxieties if individuals feel pressures and risks dysfunctionally outside the organization. **Felt conflict** leads to frustration and hostility. **Manifest conflict** is overt behaviours which signal open hostility. At this stage of conflict the parties do not value the relationship. Once manifest conflict is reached, it is followed by third party assistance, legal assistance, and the desirability of resolution. The final stage of conflict is '**conflict aftermath**' which follows any or all of the previous types. Conflict resolution comes from organizational learning (Pondy, 1967). Scholars and practitioners study organizational conflict in order to find a way to make rational decisions and engage in activities. I explore organizational conflict theory in business-to-business marketing by considering a behavioural approach and socio-psychological approaches in the next two sections.

2.2.3   The behavioural approaches

A Behavioural Theory of the Firm, written by Richard Cyert and James March in 1963, still influences studies about organizations and organizational behaviours. Its main contribution to organizational and behavioural studies is to show that 'the characterisation of economic actors in the theory of the firm should be consistent with what is known about the way individuals in a firm actually behave', and 'real behaviour and real decision practice lead, in turn, to a commitment to make economics more attentive to other social and behavioural science' (Augier and March, 2002, p. 6). In short, the book 'is about the business firm and the way it makes decisions' (Cyert and March, 1963, p. 1). The decisions of a firm are made in a process that supplements market factors with the internal operations of the firm. This requires a study of 'the effects of organizational structure and conventional practice on the development of goals, the formation of expectations and the execution of choices' (Cyert and March, 1963, p. 1). Firms encounter and resolve problems. They 'make decisions by solving a series of problems; each problem is solved as it arises; the organization then awaits for another problem to appear' (p. 119). The key principles of the behavioural approach are that 'decisions are intendedly rational but bounded by human and institutional limitations, that organizations accumulate and use slack, that attention is a

scarce resource, that firms satisfy with respect to aspiration levels, that firms adjust expectations and aspirations over time with respect to experience, and that firms can be seen as coalitions of individuals and groups with conflicting goals' (Augier and March, 2008, p. 2). The approach is established with dimensions of 'a political conception of organizational goals, a bounded rationality conception of expectations, an adaptive conception of rules and aspirations in making choices, and a set of ideas about how the interactions among these factors affect decisions in a firm' (Augier and March, 2002, p. 7).

Augier and March (2008, p. 3) define a firm as 'an adaptive, a coalition between different individuals and groups of individuals in the firm, each having different goals and hence possibly in conflict'. The goals of an organization indicate the demands of a political coalition. These demands change not only with the cognition and decisions of actors in the organization, but also with changes to external factors in the market. Goals of individuals are easy to identify because they are perceived directly by those individuals. To solve the problem of identifying organizational goals, Cyert and March (1963, pp. 26–27) suggest the need to: '(1) specify what an organization is in terms of the individual–organization dichotomy; (2) agree on the nature of the theoretical problems created by such a conception for the notion of organizational goals; and (3) identify a plausible solution to the theoretical problems'. As a coalition, a firm operates with the expectation that individual actors have different individual goals, but it nonetheless arrives at a statement of organizational goals collectively (Cyert and March, 1963). Therefore, organizational goals are reached as a process of dealing with the conflicts of potential goals in a coalition of diverse individuals and groups (Cyert and March, 1963; Augier and March, 2008).

The rational concept of expectations refers to the result of analysing obtained information, which involves processes that seek information and analyse it. As stated by Cyert and March (1992, p. 52): 'the formation and handling of information in a business firm and the way in which information about the environment is handled are expectations influencing business decision making'. Expectations are driven by goals and information search activity. The searching and analysing of information is a process in which problems are identified and solved. Information transmission exists in a decision system where conflict is only partly resolved because of the decentralisation of the collected information and the adoption of irrelevant information (Cyert and March, 1992). On the one hand, organizations require information 'to examine the effect of differing goals on estimations prepared by individual members of the organization', and on the other hand 'to consider the

net organizational effect of an information system operating under partial conflict of interest' (Cyert and March, 1992, p. 80). Information is communicated within the organization, and the effects of conflicts of interest are reflected in communicated information.

Decisions are made based on information, the analysis of information, and the expectations of actors. Organizations develop a set of alternatives depending on features of the organizational structure, the strategies of the organizations, and the internal and external resources that can be used. Thus, choices are made by selecting from alternatives in response to a problem in a way which aligns with goals (Cyert and March, 1992; March and Olsen, 1976; March, 1988). This is affected by 'the definition of a problem, by existing rules (which reflect past learning by the organization), by the order in which alternatives are considered (which reflect the location of decision making in the organization and past experience) and by anything that affects aspirations and attentions' (Augier and March, 2002). Conflict of interest is a key feature of organizations, where solutions to problems, rules and norms, different alternatives, goals, and factors such as cost can be sources of conflicts.

March sees conflict (1999, p. 217) as a fundamental problem of organising business activities. It is defined as: 'multiple nested actors confronting multiple nested time perspectives with preferences and identities that are inconsistent across individuals and across time'. In this definition, conflict has five characteristics. These are: (1) a pervasive condition in organising business activities; (2) actors who are identified with interests in different combinations, between individuals, as well as between organizations; (3) actors' multiple perspectives, identities and time frames, referring to organizations, groups, relationships and professions; (4) the processual and structural relationships of actors; and (5) the perception of differences of interest among people. Conflicts are pervasive because they arise from actors' interests, referring to time frames and indicating other material. Such material is in the form of durable and structural entities consistent with resources and relationships.

In March and Simon's book *Organizations* from 1958, conflict emerges as 'a breakdown in the standard mechanisms of decision making so that an individual or group experience difficulty in selecting an action or alternative' (March and Simon, 1958, p. 132). Individual conflict arises for three major reasons known as unacceptability, incomparability and

uncertainty. Organizational conflicts can grow out of individual conflicts. Actors react to conflicts by problem solving, persuasion, bargaining and politics (March and Simon, 1958). In a problem-solving process, actors assemble information, search for information and develop alternatives. The process of persuasion relies less on information gathering than on problem solving and on 'greater emphasis on testing sub-goals for consistency with other objectives' (March and Simon, 1958, p. 129). Bargaining indicates a process aimed at finding solutions that provide benefit to both parties where there are conflicts of interest.

Cyert and March (1963, p. 31) state that 'individual participants in the organization may have substantially different preference orderings (i.e. individual goals)'. In other words, organizations must deal with the 'obvious potential for internal goal conflict inherent in a coalition of diverse individuals and groups'. 'The goals of a business firm are [looked upon as] a series of more or less independent constraints imposed on the organization through a process of bargaining among potential coalition members' (Cyert and March, 1963, p. 43). The way that individual actors perceive conflicts depends on the sources of those conflicts (March and Simon, 1958). An organization is a coalition of actors in conflict – either latent or manifest – because of their different goals, either latent or manifested. Cyert and March (1963, p. 164) propose that 'most organizations most of the time exist and thrive with a considerable latent conflict of goals', to the extent that 'procedures for "resolving" such conflict do not reduce all goals to a common dimension or even make them obviously internally consistent' (Cyert and March, 1963, p. 164). Procedures require organizations to 'allocate resources to the various units within the organization' (Cyert and March, 1963, p. 179). Cyert and March argue that firms 'ameliorate conflict by accumulating resources (organizational slack), by decentralising information, and by attending sequentially to crises' (Cyert and March, 1963, p. 179). Accumulated resources are crucial, providing some slack by which adaptations to normal processes can be proposed, trialled, evaluated and made operational.

The behavioural theory of the firm provides a process-oriented approach to analyse decision-making in the pervasive conditions of conflict in and/or between organizations. As the behavioural approach has matured, so a greater dynamism has emerged within it. Thompson (1967, p. 126) argues that coalitions are formed under conditions of conflict and high aspirations, with conflict being endemic as a process not as an entity. A concept of a conflict system is proposed by March (1962). Conflicts arise 'when the most preferred states of all elementary units cannot be simultaneously realised' (March, 1962, p. 663).

This occurs when there is 'no allocative decision such that no one of the elementary units would prefer an alternative state of the system' (March, 1962, p. 663). The system may not directly contribute to resolving conflict but can simply become involved in the demands placed sequentially on it (March and Olsen, 1984).

Conflict can be detected within an organization's routines or in a symbiotic relationship to continuing conflict (Nelson and Winter, 1982, p. 110). Routines are patterns of interactions that represent solutions to problems experienced in organizational behaviour (Pierce *et al*., 2002). Truces can be powerful responses to conflict, stultifying otherwise potentially beneficial consequences such as organizational development and innovation and adaptive incremental experiential learning in practice (Nelson and Winter, 1982, p. 111; Lounamaa and March, 1987; Pierce *et al*., 2002). In the framework of an interpretation of experience, conflicts of interest within/across organizations are identified through conflicting interpretations based on actors' roles (Levitt and March, 1988) and interpretations of the political and economic environment (March and Olsen, 1984). Cyert and March (1992, p. 215) discuss unresolved conflict, and the continual negotiation of the relationship between the interests of an organization, its subgroups and its individuals, such that 'consistency is rarely achieved and difficult to sustain'.

March (1999) extends the argument across the preferences and identities of organizations, groups and individuals, and with respect to time periods within broader interactive settings, which he describes as 'ecological networks' (March, 1999, p. 46). In such situations, non-violent conflict may be a long-standing and regular feature causing dynamics in/across organizations where arenas exist to process adaptations (Ostrom, 1998) and learning (Herriott *et al*., 1985). Two types of adaptation exist in organizations. The first is 'experiential learning, the idea that organizations and the people in them modify their actions on the basis of an evaluation of their experiences'(Ostrom, 1998); the second is competitive 'selection and reproduction, the idea that organizations and the people in them are essentially unchanging, but survive and reproduce at different rates depending on their performance' (Denrell and March, 2001). Both forms of adaptation perform as devices for improving the fit between/within organizations and their environments.

Teece *et al*., (1997) develop the standard operating procedures first outlined by Cyert and March (1963) in their analysis of organizational behaviours by considering the concept of dynamic capabilities in a context of operating in conditions of rapid technological change.

They also add more dimensions such as 'the make/buy decision, external ties, and technology' (Pierce *et al*., 2002, p. 88). Teece and Pisano (1994, p. 57) address the way in which dynamic capability 'emphasises the key role of strategic management in appropriately adapting, integrating, and re-configuring internal and external organizational skills, resources, and functional competences toward a changing environment' where firms are in strategic conflict to remain competitive in markets.

Organizations require to adapt their dynamic capabilities, 'modifying beliefs and behaviours by observing their own and others' experiences, possibly making inferences about the cause of those experiences, but in any event adjusting propensities to favour the replication of actions and beliefs that have been associated with favourable outcomes in the past' (March, 2008, p. 6). The behavioural approach addresses questions related to conditions of conflict beyond the individual or groups of individuals, such as resources, routines, adaptations, and operating procedures (March, 2008). It implies a process of interactive adjustment of organizations' behaviour as a result of experienced conflicts.

Organizations are adaptively rational, suggesting that learning and behaviours are conditioned by actors' experiences (Pierce *et al*., 2002). Actors experience pervasive conflict and perceive affective emotions. Emotions are perceived in the process of 'joint decision making and the existence of differences in goals or differences in perceptions or both, and are necessary for intergroup conflict' (March and Simon, 1958, p. 135). Such perceptions influence human and organizational behaviours. March and Simon also comment that 'the interactions between motivational and cognitive factors are substantial' (March and Simon, 1958, p. 135) in terms of making a decision from a set of alternatives. These are 'attached to a set of consequences – the events that will ensue if that particular alternative is chosen' (March and Simon, 1958, p. 137). Pondy (1967, p. 298) states that conflict should be considered as a dynamic process, requiring '(1) antecedent conditions (e.g. scarcity of resources, politic differences) of conflictful behaviour; (2) affective states (e.g. stress, tension, hostility, anxiety, etc.) of the individuals involved; (3) cognitive states of individuals, i.e. their perception or awareness of conflictful situations; and (4) conflictful behaviour, ranging from passive resistance to overt aggression'. Thomas (1992) proposes an event sequence process model for the analysis of conflicting frameworks in organizations. This addresses the elements of conflict awareness: thoughts and emotions, intentions, behaviour and consequences. The behavioural approaches influences our

research questions, and suggests the ways in which actors, in the context of managing and managing in conflicts, can experience and make sense of conflicts and can adapt.

2.2.4   Socio-Psychological approaches

Jehn (1997) and Jehn and Mannix (2001) develop studies of conflict in teams and groups within organizations, arguing that these can be hotbeds of conflict (Jehn and Mannix, 2001, p. 238). Beginning with Boulding's (1963) definition of 'an awareness on the part of the parties involved of discrepancies, incompatible wishes, or irreconcilable desires' (Jehn and Mannix, 2001, p. 238), they develop a three-fold categorization of conflict as relationship, task and process (Jehn and Mannix, 2001). Relationship conflict refers to 'an awareness of interpersonal incompatibilities [and] includes affective components such as feeling tension and friction'; task conflict indicates 'an awareness of differences in viewpoints and opinions pertaining to a group task'; and process conflict is defined as 'an awareness of controversies about aspects of how task accomplishment will proceed' and 'pertains to issues of duty and resource delegation' based on roles and duties (Jehn and Mannix, 2001, p. 238–239). People experience conflict as inter-personal and affective, in tasks as around cognitive differences about ideas and opinions but 'void of the intense interpersonal negative emotions', and in processes in relation to how to organize and provide resources for tasks (Jehn and Mannix, 2001). The conflicts emerge within small groups and teams, and cover questions of affect – personal and emotional conflicts – and cognition – performing tasks, and designing processes to support and manage tasks within groups (Jehn, 1997; Jehn, *et al*., 2008). There are relationships between task conflicts (conflicts over work issues such as goal clarification), relationship conflicts (conflicts over interpersonal issues such as personality clashes) and process conflicts (conflicts over logistical issues such as the scheduling of meetings/events and the assignment of work), all of which also interact over time (Greer *et al*., 2008).

Jehn and Mannix's typology has a clear bearing on our second research question, as to how actors manage perceived emotions in business relationship dynamics. Greer *et al*. (2008) find from their simulations in small groups that the conflict types interact over time. Similarly, Jehn *et al*. (2008) recognise that conflicts have concurrent functional and dysfunctional effects on the performance of teams. They propose managerial involvement to reduce negative emotions across personal relationships, increase the ability to resolve conflicts in tasks, and encourage open norms in resolving conflicts in tasks and processes

(Jehn *et al*., 2008, p. 492). These findings overlap with our third research question (i.e. in terms of managing conflict, how do actors adapt to establish incremental innovation) but require careful interpretation as the research is from the perspective of dynamics and interactions within small groups and teams rather than business relationships that cross group and organizational boundaries.

2.3   Reconciling the Behavioural and Socio-Psychological Approaches

The definitions of March (1999) and Jehn and Mannix (2001) have much in common in their combination of affective and cognitive ways of deciding upon plans of action in conflicts. They differ in the extent to which they envisage actors' perceptions capturing and mobilizing conflict and shaping its consequences for an organization or smaller group. Where the behavioural theorists cover the conditions of conflict beyond the individual or groups of individuals, such as with respect to resources, routines and operating procedures, socio-psychological approaches focus primarily on conflict as experienced in forms of emotions. However, task and process conflicts – as types – allow people to draw upon ways of calculating among alternative actions or solving problems.

March and Simon (1958, p. 149–150) envisage the distinct processes by which conflicts are addressed as: problem-solving, persuasion, bargaining and politics, with the former two approaches requiring there to be a stable relationship or mimic intra-organizational interaction, and the latter two being more common among autonomous organizations. Problem-solving also indicates a cognitive and factual approach, with persuasion involving a mobilization of common norms, shared knowledge or mental models. Furthermore, Cyert and March (1963, p. 164–166) discuss the 'quasi-resolution of conflict' by means of local rationality, 'acceptable-level decision rules', and sequential decision-making. The local rationality expressed in these ideas is consistent with Jehn and Mannix's findings on task conflicts in teams and small groups. They find greater toleration of task conflicts, and greater functionality from it. This comparison has a bearing on our second and third research questions, on how conflicts are experienced in the form of emotions, and how actors adapt to manage in conflict, with a notable crossover on persuasion and open norms.

Revisiting the behavioural theories with the benefit of recent contributions to the study of conflict from social psychology, I am encouraged to combine the understandings from each. Both feature conflict as a pervasive condition, as experienced in and translated

through emotions, within which actors manage and cope. A particular conflict can be resolved, or at least negotiated, but we cannot expect that conflict to have a specific and unique corresponding antecedent, which itself can also be resolved. Rather, the process of organizing business activities draws with it conflicts, and organizing involves the provision of resources, operating procedures, or routines to manage at least some of these. With the first research question, we can expect 'unresolved conflict', in Cyert and March's (1992, p. 215) terms. Conflict is affectively experienced and manifested as emotions, which are usually triggered by events. The evaluation of emotions in business relationship dynamics provides us with a guide to study conflict and actors in conflicts further, and this is aligned to the second research question in the thesis, i.e. relating to emotions in conflicts. In the third research question for the thesis, I investigate actors' adaptation to conflict, which consists of managing relationships, interactions, resources, operating procedures and even personal cognitive emotions. The process of adaption can be seen as a process of sequential sampling (Denrell and March, 2001), where actors decide on alternatives in terms of managing, and managing in, conflicts.

2.4   Conflicts in Business-to-business Research

Highlighting some overlaps across the two approaches, conflict theory is continuously developing and has an impact on business-to-business marketing and its practice. As March and Simon (1958) state, conflicts can be addressed through a process of problem solving, persuasion, bargaining and politics. Ehie (2010) comments that conflict has an impact on business operations, i.e. the facilitation and hampering of the performance of companies. In industrial markets, actors experience and participate in conflict positively, and are willing to produce satisfactory outcomes for both parties rather than allow a zero-sum conflict where only one party wins. Conflict can be easily identified between sales and marketing personnel (Le Meunier-FitzHugh *et al.*, 2011; Chartered Institute of Marketing, 2011). Le Meunier-FitzHugh *et al.* (2011) analyse interpersonal conflict between marketing managers and sales managers within an organization by considering three communication variables as antecedents in the structural model, indicating frequency, bidirectionality and quality. As well as at the interpersonal level in business markets, conflict can also be found across organizations' (or companies') boundaries, such as between suppliers and their customers in sustainable supply networks, between those in different marketing and distribution channels, and across supply chains (Chang and

Gotcher, 2010; Duarte and Davies, 2003; Cheng and Sheu, 2012; Ndubisi, 2011; Plank *et al.*, 2006; Plank and Newell, 2007; Webb and Lambe, 2007).

Chang and Gotcher (2010) take an inter-organizational perspective on learning from conflict and explore occasions when conflict-coordination learning is used to resolve conflict by improving the capability to create value. Channel conflict is 'a situation in which one channel member perceives another channel member(s) to be engaged in behaviour that prevents or impedes it from achieving its goals' (Stern *et al.*, 1996, p. 306). Business market actors also perceive conflict from politics and from norms from regulators. Actors in business markets, for example, respond to new regulations. Veal and Mouzas (2011) consider the impact of regulations on business relationships, and the way regulations cause conflicts of interest in/between companies. They state that actors should interact with regulators regarding the creation of new regulations rather than just comply with the rules (Veal and Mouzas, 2011).

Research on conflict in business markets shows the impact of conflicts on organizational practice and performance. The impact is mainly dysfunctional and is resolved through the identification of goals, their divergence, the reasons for or antecedents of these divergences, and instruments of alignment - common with bargaining – such as incentives. Such resolution is supported by senior managerial involvement, and accompanied with dynamics in relationships. The entity at stake tends to be the direct value otherwise created by cross-functional interactions and exchanges (Lam and Chin, 2005).

2.5   Conclusions

Conflict, as a social phenomenon, exists in industrial relations and is experienced regularly by those involved in relationships and in making business-to-business exchanges; but the research in this area is continuously developing and influencing the industrial marketing research.

I adopt March's definition of conflict (1999, p. 217) as 'multiple-nested actors confronting multiple-nested time perspectives with references and identities that are inconsistent across individuals and across time'. Conflict, as a pervasive condition of organizations, is perceived and experienced by actors. Conflicts derive from interests behind the actors' roles in their organizations. The research on conflict suggests that there is a tension and

interplay between the conditions in which conflict is embedded and inherent, and the emotional experience, (Jehn and Mannix, 2001).

After reviewing the approaches to organizational conflicts, I note that work on the behavioural approach is slow moving but has had a great impact on organizational relationships and the interactions of actors in/between organizations. Although it is under researched by some IMP scholars, what research there is mainly shows the dysfunctional impacts conflict has on business relationships. From my investigation of the socio-psychological approach to conflicts, the effect of the affective and emotional dimensions of conflicts on the practices and performances of actors and their organizations is worth researching. Taking a mid-range stance on organizational conflict theory, I find that there is something to be contributed to industrial marketing research in the IMP and Market Studies traditions, perhaps as to the longevity of conflict as a pervasive condition in business relationships. I will briefly review the two main types of industrial marketing research (IMP and Market Studies) in Chapter 3, and develop the discussion of organizational conflict and conflict emotions in IMP and Market Studies in Chapter 4.

Chapter 3.   Conflicts in Relationships

3.1   Introduction

Business-to-business research has focused on conflicts in business practice and activity, as experienced or observed between organizations (Harrison, 2004). According to behavioural approaches to organization studies, conflict is a pervasive condition of organizations. It is perceived and experienced by actors and Conflicts arises from interests behind the actors' roles in the organization. In business-to-business research, the IMP tradition is influenced by Cyert and March (1963), and by March's (1999, 2008) later work. It is surprising that conflict is critical to their behavioural theory, but is not really well developed in the IMP work.

After reviewing the approaches to organizational conflicts in Chapter 2, I noticed that the behavioural approach is slow moving but does have a great impact on the relationships and interactions of actors in and between organizations. In this chapter, I set the behavioural approach (e.g. March and Simon, 1958; Cyert and March, 1963; March, 1999, 2008) as a standing point, taking a mid-range approach, to advance the IMP studies. In the investigation of conflict, there is a tension and interplay between the conditions in which conflict is embedded and inherent and the way in which conflict is experienced, which is emotional (Jehn and Mannix, 2001). I examine conflict among actors' interests as a pervasive condition of organizations. I begin with such research partly because it remains an important influence in the field, but also because it has had a notable influence on the IMP tradition.

In 1976, the Industrial Marketing and Purchasing Group began research into both theoretical and empirical aspects of business-to-business marketing, using the subjects of interaction, relationships and networks as major research drivers. The scholars involved were from five European countries and universities (the Universities of Uppsala, Bath, UMIST, ESC Lyon and the Ludwig Maximilians University). Since then, the IMP Group has on the one hand formed an empirically based research tradition using 'studies of how companies are doing business and of what is created when businesses and other organizations interact' in the context of long-term, stable relationships. The theoretical and empirical studies contribute to issues of 'marketing, purchasing, technological development, management, logistics, business communities and policy, all of which

challenge mainstream business theory and call for theoretical tools that allow investigations of the interactive aspects of the business landscape'. On the other hand, the IMP tradition focuses on a 'dynamic approach to economic exchange', covering the research topics of business relationships and networks (summarised from IMP Group website: http://www.impgroup.org).

The IMP tradition comes from a fundamental dissatisfaction with traditional marketing research, which is concerned with distribution channels and international companies developing long-term relationships (Bartels, 1988; Bucklin, 1965; Johanson and Wiedersheim, 1975). Håkansson (1982) suggests that there are four aspects of challenge in the IMP tradition: (1) IMP considers the importance of business relationships and challenges the 'narrow analysis of single discrete purchase' (Håkansson, 1982, p. 1); (2) IMP challenges positive marketing-mix practices concerned with a passive market; (3) IMP proposes the importance of the stability and longevity of business relationships, challenging the approach which emphasises an atomistic market structure with unstable buyers and sellers; and (4) IMP challenges the divisions used in examining the purchasing process and the marketing process. Turnbull, *et al.*, (1996) state that the majority of business markets should be considered as 'arenas within which buying and selling companies interact with each other', rather than being examined in isolation or as a process of action by the seller and reaction by the buyer. Thus, business markets should be studied in the context of interactions. The research on relationships, relationship dynamics and their management are a topic of interest in IMP research.

Moreover, in terms of the examination of industrial relationships, I find that market relationships are always influenced by other organizations or actors that also participate in and interact with the 'dyadic' interactions of buyers and sellers. In business markets, each company is involved in a complex network of relationships, consisting of the direct relationships that it has with its suppliers and customers, as well as with other organizations, such as regulators, third-party institutions, non-government organizations or others. Companies' relationships take place within their networks, which have their own dynamics which influence those relationships. This focuses our attention on examining the structural and behavioural dimensions of actors and their relationships in a networked and distributed context.

This chapter reviews the main themes of IMP approaches and investigates conflicts in relationships from an IMP perspective. It addresses relationships and resources as well as personal interactions so as to further analyse the impact of conflict on actors' behaviours and relationship dynamics in a networked context. This occurs within a network of actors in the process of adapting to incremental innovation, engaging in marketing, developing products and services, and making economic exchanges (Araujo, 2007). The chapter adopts the behavioural approaches and small group psychology of the IMP perspective, which considers conflict as pervasive and latent in relationships and as manifested through the mobilizing of resources and the production of affective emotions.

3.2   Interactions and Relationships

Relationships are basic and important in business markets. No company can operate without them. Holmlund and Törnroos (1997) define relationships as 'an interdependent process of continuous interaction and exchange between at least two actors in a business network context'. Companies that develop relationships obtain benefits by reducing the cost of market development, a process in which companies can be more efficient in exchanges. Once a business relationship has been established, benefits can be obtained by developing products and services, and adapting and tailoring resources to deal with specific sellers. But Ford *et al*., (2009) also consider relationships as the source of many problems. For example, 'business relationships take a long time to develop, they require investment and maintenance and they mean that a company's success depends not only on its own efforts but also on the efforts and intentions of others'. The IMP tradition indicates that 'companies on both the customer and supplier sides are dominated by some long-term business relationships with a limited number of counterparts' (Gadde and Håkansson, 2009) and the relationships take up staff time, in which case "the need for people to invest time in the ongoing relationships. This is different from the single 'transaction' or 'exchange' between buyer and seller that relates to the approach taken by market studies. To understand the marketing and purchasing process in business markets, an approach which focuses on the full context of the interaction should be adopted.

3.2.1   An interaction approach to business relationships

Interaction is the basic approach in IMP research. Håkansson (1982) argues that experienced marketers in industrial markets do not use traditional marketing approaches.

Instead, they introduce an interaction approach by addressing the characteristics of business markets as follows: (1) Business markets do not have a large number of individually significant customers because customers have different needs and vary in quantity. (2) Sellers and buyers cannot just be classified as 'active sellers' and 'passive buyers' because customers find they have specific requirements to meet and must seek out suitable suppliers. Both buyers and sellers expect to maintain the relationship between them because the cost of searching for suitable partners is high. (3) Actors in market exchanges may create and maintain long-term relationships rather than engage in one-time transactions. Interaction is a kind of extension of business exchange. Business interaction means that both parties (seller and buyer) act and react rather than just transfer products, services or money. Companies become involved in interaction for the purpose of exchanging information, skills, goods, services, money, technology, etc. The interaction approach (Håkansson, 1982) contributes to an understanding of the relationships between companies as well as uncovering the business behaviours associated with buying and selling in business markets.

3.2.1.1 The interaction model

I take an interaction approach to examining business relationships in this study. The interaction model is adopted to illustrate the basic framework of business interactions. This model explains the basic concept of marketing and purchasing industrial goods as an interaction process which happens between two parties within a certain setting. The two parties (a buyer and a seller) in the model are influenced by the relationship between them, the factors existing between them, and the business environment (Ford 1990). Four groups of variables are used to describe the interactions between buyers and sellers as follows: (1) the parties involved; (2) the elements and process of interaction; (3) the environment in which interactions take place; (4) the atmosphere of the setting which affects the interaction and which is in turn affected by that interaction (see Figure 3-1).
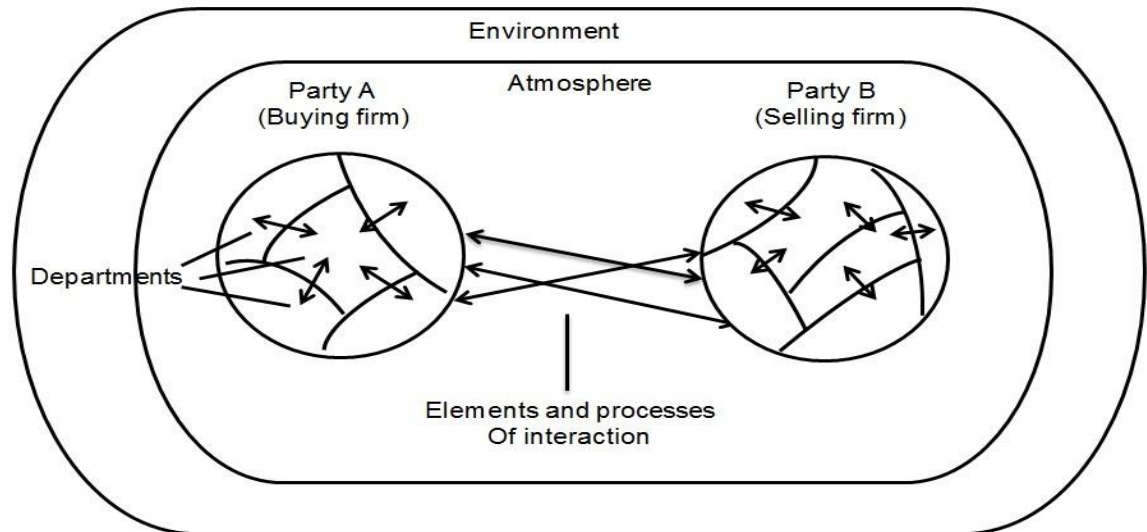
Figure 3-1: Main elements of the interaction model

(from Ford, 2002, p 23)

The connections between the interacting parties are based on their roles. The parties can either be organizations or individuals who represent an organization. Actors are allocated to sides of the interaction process and interact based on their interests behind their roles. Actors in an interaction make efforts to build up mutual trust and commitment (Bunduchi, 2008; Denize and Young, 2007; Geyskens *et al.*, 1998; Moorman *et al.*, 1992) in the interaction environment. The environment is also understood to be a context with aspects of market structure, dynamism, internationalisation, positioning in the manufacturing channel, and the social system (Ford, 2002). The atmosphere is a consequence of the relationships that are usually based on actors' expectations within the interactions. Interactions within a particular environment not only relate to the buyers and sellers who are involved, but also to the other actors within the market structure and social system such as non-government organizations, industrial organizations or government. Relationships between buying and selling companies in business markets are of long-term standing, which makes them different from those of individual exchanges such as a product or service exchange, an information exchange, a financial exchange or a social exchange. Marketing exchanges can be regarded as a construction of individual 'episodes'. These episodes are sequenced and progress through interactions to create long-term relationships. In this interaction process, actors in episodes of market exchange look for others with whom they can exchange, communicate, bargain or make adaptations.

The interaction process requires interacting parties to make adaptations to enable the relationship to develop with purpose. In business markets, interactions take place for a particular purpose such as seeking solutions for encountered problems. The interaction process may vary because of the relationships between the interacting parties. Håkansson (1982) illustrates the interaction process and its connection to situations through two variables: episodes and relationships (see Figure 3-2)

	Limited relationships	Extensive relationships
Simple episodes	I Classical model of exchange; switching between buyers and sellers	III Ongoing relationship; longer time horizon; routines in place
Complex episodes	II New exchange situation; actors getting to know one another	IV Cooperation; problem solving within the relationship

Figure 3-2: Classification of interaction processes

(adapted from Håkansson, 1982, p. 278)

Situations are classified as simple episodes and complex episodes. For a limited relationship situation, the scenario with simple episodes refers to the classic exchange model in which buyers and sellers are easily switched. But with complex episodes, the limited relationships scenario illustrates a new exchange situation in which more time and effort is spent in getting to know each other and to build trust. For extensive relationships, it is commonly the case that, with simple episodes, routines are developed to solve problems. In this situation, the problems cannot be fully solved because of the simplicity of the episodes, but they will be solved over time thanks to the development of on-going relationships. Scenario IV illustrates the type of close cooperative situation where problems are solved within relationships.

Relationships are established with specific purposes. Actors develop and maintain relationships for their own interests. Therefore, relationships are constructed and developed

to seek economic benefits, lower costs, higher profits, better products, better performances and better services. Actors participate in adapting to problems caused by the process of establishing, maintaining or even ending a relationship.

3.2.1.2 The nature of relationships

Companies establish relationships with their customers, suppliers and others. The analysis of these relationships has to be multifaceted for several reasons. First, relationships work as mediators to enable actors to work more efficiently in seeking out solutions for the problems they encounter. Secondly, relationships contribute to reducing the cost of evaluating partners as a result of the knowledge about them gained previously through the relationship. Thirdly, relationships can have problems because all relationships involve costs, which do not only relate to investment but also to disruption and loss of control (Ford, *et al.*, 2011). Relationships and the business environment are discussed in the literature (Anderson *et al.*, 1994) to demonstrate the role that interactions play in business. This analysis illustrates specific facets of company environments. Relationships are examined to provide understanding of the business activities between companies, and their business environments.

Ford (1980) indicates that products, the process technologies of companies, and the capability to find alternative actors are important factors in determining the nature of buyer–seller relationships. 'Compound relationships' consist of multiple simple relationships, a concept which explains how a company may interact with another company through several different individual relationships at the same time (Ross and Robertson, 2007). Ford (1980) points out that the analysis of relationships has to be 'separated between the overall relationship itself and the individual episodes which comprise it', which means it is important to consider the context of the overall relationship, i.e., the concept of the network.

Relationships are influenced by the norms and routines of selling and buying in conditions of collaboration or conflict. It is claimed that relationships are durable and malleable or adaptive, although they are not structural properties of industrial networks. They are ways in which business activities can be organized and secured, that allow for trust to develop, so allowing for collaboration and specialization (Håkansson and Snehota, 1989). Relationships support agreements among actors to exchange idiosyncratic, unstable and

perhaps unfinished intermediate goods and services to undertake activities jointly (Finch *et al.*, 2012). Relationships can become resources in themselves (Håkansson and Walusewski, 2002, 2008), extending to the support of further social interactions and exchanges (Finch et al., 2012; Harrison and Waluszewski, 2008). Actors establish and enhance relationships by tailoring their resources based on their interests in order to deal with their buyers or suppliers. In this process, more actors become involved, mutual adaptations are required, and trust and commitment are built between two companies. The interests of actors are both the sources of relationships and the key factors that make those relationships continue, i.e. in a dynamic condition (Mitrega *et al.*, 2012; Fynes *et al.*, 2005; Halinen *et al.*, 2012; Halinen and Tähtinen, 2002).

3.2.1.3 Influencing relationships

Ford (1980) shows that relationships are established and developed over time, and identifies five evolutionary stages of buyer and seller relationships, with the variables of experience, uncertainty, distance, commitment and adaptation. He examines how these five variables affect relationships in each of five stages – i.e. the pre-relationship stage, the early stage, the development stage, the long-term stage and the final stage – and indicates the importance of commitment and distance reduction in relationship development. Dwyer *et al.*, (1987) develop the research by introducing a relationship life cycle model, consisting of a pre-relation phase, development phase, maturity phase and decline phase for companies in competition. Others scholars, such as Wilson *et al.*, (2010), propose 'social partnerships' development and address the relationship types by examining economic scope, structure, interdependence and relationship outcomes. Håkansson and Ford (2002) point out factors that may influence relationships, such as previous activities, the learning of actors in relationships, companies' expectations and influences from other actors in the network.

Research on business relationship development and its influencing factors is significant (Dyer and Singh, 1998; Schmitz, 1995; Tahtinen and Halinen, 2002; Mitrega *et al.*, 2012; Vaaland and Håkansson, 2003). Such research has mainly developed from illustrating empirical business phenomena. All this research indicates that there is one thing business relationships have in common: no relationship can develop without interaction. Interactions between actors have impacts on the relationships and are interwoven with other actors in a broader network. This suggests another possible approach to

understanding the influences on relationships: the behavioural approach based on other disciplines and which analyses actors' affectiveness and experience (see chapter 2).

The importance of business relationships in business markets should be considered in the context of the capability of actors to cope with suppliers, customers and others in producing, marketing and purchasing products and services. Business markets are complex because sets of relationships, regarded as networks in the IMP tradition, interconnect. I will now develop the analysis of relationships at the network level. This helps to understand marketing in business markets from a more structural perspective.

3.3   Markets as Networks

In business markets, relationships exist across a network. Business networks are considered to be structures of activities that take place between companies or organizations. Relationships enable companies to interact, and create interdependent networks for companies. Business networks are constructed from the relationship between a focal company and its partner and the connections that relationship has with other relationships (Anderson *et al*., 1994). Networks are abstractly illustrated as sets of nodes, interdependent and connected with each other (Ford *et al*., 2011). These nodes are business units: for example, producers, customers, suppliers, service companies, facilities, technology departments and investment arms. The nodes are threaded together through relationships that are manifested in different ways in business networks. Analysing such networks provides us with a way to obtain a deeper understanding of a dynamic but structured industrial market. I will review the network theories of the IMP tradition and define processes and adaptations in the following sections of this chapter.

To understand business relationships, it is necessary to take networks into account (Ford, 1990; Håkansson, 1987; Håkansson and Johanson, 1993). A lot of work has been done on industrial networks in the areas of organizational marketing, business-to-business marketing and organizational buying behaviour (Achrol and Kotler, 1999; Webster Jr, 1992; Sheth, 1996; Johnston and Lewin, 1996; Möller and Wilson, 1995). The IMP tradition takes the dyadic relationship between market actors as the basic unit of analysis for the examination of the process of marketing and purchasing in industrial markets. The IMP tradition focuses on the long-term interactions of actors within networks as opposed to the market exchange approach which concentrates on connections and the operation of

networks (Easton, 1992; Cook and Emerson, 1987). A business network can be defined as 'a set of two or more connected business relationships, in which each exchange relationship is between business firms that are conceptualised as collective actors' (Anderson *et al*., 1994). The connections can take place between buyers and sellers, or even with third-party organizations. Companies in industrial markets are interdependent and have many connections between them. The network approach enables market actors to position themselves so that the network has a structure. Networks are stable but not static. Easton (1992) clarifies the concept of the 'network as process' by considering dynamics as a central feature in industrial networks. Actors participate in the dynamics. This then requires the investment of activities and resources to maintain a stable business network. Håkansson (1987) suggests a model for industrial networks, which uses three variables: actors, resources and activities. The aim of this model is on the one hand to analyse stability and development in industrial markets, and on the other hand to suggest a basis for research into the three variables (actors, resources and activities) in mundane markets in a changing context.

3.3.1 The ARA model

The concept of the 'industrial network' in the IMP tradition seems to appear for the first time in a paper by Håkansson and Johanson in 1984. The Activity–Resource–Actor (ARA) model is proposed and developed from the network approach by scholars such as Håkansson (1987), Håkansson and Snehota (1989), Håkansson and Johanson (1992) and Axelsson and Easton (1992). The ARA model was developed using a foundation of social exchange theory and an interactive approach, based on the framework of the process and the outcomes of interaction. Cook and Emerson (1978) define an exchange network as 'a set of two or more connected exchange relations'. Because no company exists in isolation (Håkansson, 1992), interactions take place between business actors and where this exchange happens, relationships establish and develop. As well as the actors in the exchanges, other actors are directly or indirectly involved in the interactions. A process of problem solving takes place between/among these actors through adaptation.

The components of ARA model are defined by interaction (Håkansson et al., 2009). Håkansson et al. (2009) also define three layers of activity, resource, and actor in the ARA model. Activities take place between two actors (or in later versions of the model three or more actors involved in nets), referring activities of production, logistics, administration,

deliveries, information handling, and etc. Resources in the model may become more or less adapted and more or less mutually tied together as their interaction develops, in either tangible or intangible format, consisting of 'raw materials, physical facilities, components, operating system and finance as well as human knowledge, ingenuity and ability.' (Håkansson et al., 2009, p. 65). Håkansson et al. (2009, p.137) define actors as 'a self-contained entity that is autonomous and independent with respect to others and to its environment', who are 'autonomous in how they choose to act and how they act determines the outcome of them.'

The ARA model describes the interaction process between companies in the general structure of a network. This model suggests that the interaction of the three variables (resources, activities and actors) is influenced by constellations of resources, patterns of activities and networks of actors (see Figure 3-3). The three variables interlink (Håkansson and Johanson, 1992; Håkansson and Snehota, 1995). Actors are defined as 'those who perform activities and /or control resources' (Håkansson and Johanson, 1992). In activities, actors 'use resources to change other resources' (Håkansson and Johanson, 1992). Activities are carried out for the purpose of pursuing actors' goals and processing their perceptions, and actors use resources as they perform activities.

The three variables add up to a relationship, influencing the determinants of the values and the consequences involved. They exist interactively in business networks through relationships of activity links, resource ties and actor bonds. As defined by Håkansson and Snehota (2002):

> Activity links regard technical, administrative, commercial and other activities of a company that can be connected in different ways to those of another company as a relationship develops.
>
> Resource ties connect various resource elements (technological, material, knowledge resources and other intangibles) of two companies. Resource ties result from how the relationships have developed and represent in themselves a resource for a company.

Actors' bonds connect actors and influence how the two actors perceive each other and form their identities in relation to each other. Bonds become established in interactions and reflect the interaction process.
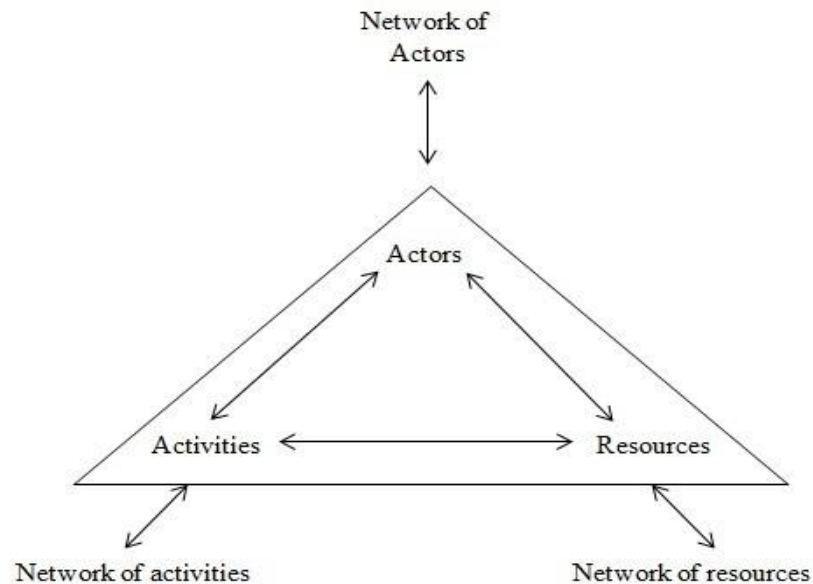
Figure 3-3: Basic structure of ARA model

(adopted from Håkansson (1987, p. 17)

Actors, resources and activities impact on each other and also performed a network of actors, a network of activities, and a network of resources interlinked to each other's networks. Detailed explanations of the three variables and their relationships are addressed in the following sections.

3.3.1.1   Actors and actor bonds

Actors play a central role in interactions and relationships in networks. Actors can be individuals, groups of individuals, departments of companies, companies, or organizations. Håkansson and Waluszewski (2002, p. 38) state that 'whether it is a physical resource, such as a product or a facility, or a social resource, such as a business unit or a business relationship, its features are interpreted, developed and preceded by individuals'. 'Companies or individuals, as actors in business networks, are bounded in their perceptions,

knowledge and capabilities and therefore different from each other' (Håkansson and Snehota, 1995, p. 192). Although actors can be seen in many forms and at many levels, it is 'individuals' who pull resources together to conduct activities. Håkansson and Johanson (1992) propose five functions of actors: performing and controlling activities; developing relationships through exchange processes; directly/indirectly controlling resources, on which activities depend; seeking to fulfil their respective goals and interests; and using differential knowledge of activities, resources and other actors in the network.

Actors in markets participate in acquiring scarce resources. They become involved by using their knowledge of the networks and relationships to increase their ability to control resources and activities. Actors interdependently possess resources in networks, and are driven by conflicting or common interests (Håkansson and Johanson, 1992). But the way actors see and interpret situations may vary and as a result the bonds and identities between them vary also (Håkansson and Snehota, 2002, 1995). Bonds exist in relationships between actors based on respective mutually beneficial interests. Actors are connected by bonds (Witkowski and Thibodeau, 1999) which might relate to economic interest (e.g. cost, benefit), norms (regulations, long-term contracts), technology (product and technology adaptations, Research and Development, innovation), cognition (knowledge, affect, appraisal), and social connections (trust, commitment, personal). Bonds both influence the cognition of actors towards resources, activities and other actors and create an organised structure.

3.3.1.2 Resources and resource ties

Resources are used and combined within a network of actors. Barney (1991) defines a company's resources as 'strengths that firms can use to conceive and implement their strategies'. In strategy process research, companies monopolise, control or combine resources for the purpose of enhancing their advantages. Resources have three characteristics (Håkansson and Johanson, 1992): control by actors, utilisation and versatility. There are three types: physical capital resources, human capital resources and organizational capital resources (Barney, 1991). Competence in acquiring resources signals the development of a company. Actors acquire physical capital resources through improving their technology, developing their equipment, testing and innovating. In order to acquire human capital resources, actors devote themselves to training, the building up of relationships and organizational learning (Argyris and Schön, 1996).

The process of actors accessing resources (Finch et al., 2012; Baraldi *et al*., 2012) is regarded as an individual organization's resource collection (Håkansson and Snehota, 1995). The resource collection not only refers to actors' own resources such as production facilities, plants and routines, but also to individuals, i.e. the skills and knowledge of staff. Both internal and external resources are connected and form a resources constellation. The ARA model is based on the relationships between the resource constellation, the pattern of activities and the network of actors. The model reveals the relationships between activity, resource and actor, and the specific role that resources play in a business context. Resources contribute to transformation and transfer activities. Håkansson and Johanson (1992) address the importance of experience of and knowledge about resources by introducing the concept of the heterogeneous nature of resources. Experiential learning and the adaptation of resources increase performance. New knowledge can be produced through the process of combining heterogeneous resources in new and improved ways.

Within a relationship, resource ties connect various resource elements, both tangible elements such as products and intangible forms such as knowledge or techniques. Resource ties exist among interacting actors. Håkansson and Snehota (2002) consider resource ties as structural elements adding to the structure of resource constellations. Resource ties pull resources into the process of relationship development so that actors can mobilise and access the resources of others to solve their own problems through resource adaptation and sharing innovation (Håkansson, 1987; Håkansson and Waluszewski, 2002).

3.3.1.3 Activities and activity links

Activities take place when actors combine, develop, exchange or create resources (Håkansson and Johanson, 1992). Håkansson and Johanson distinguish two forms of activity: transformation activities and transfer activities. In transformation activities, changes in resources are required. In transfer activities, a change takes place in the control over resources between/among actors within a network. Transfer activities are affected by the relationships of the actors involved. Håkansson and Johanson (1992) state that 'either certain transfer activities are performed in order to make possible certain transformation activities or certain transformation activities are performed in order to make possible certain transfer activities'. This is regarded as making adaptations. Moreover, these activities link with each other in different ways, usually with sequential features.

Activity links connect the business activities of companies (Ford and Mouzas, 2010). Once a relationship is built, technical, administrative or commercial activities are linked to each other. Activities are undertaken in exchanges and interactions. Because relationships change, the interaction activities need to change too. In this process, activity links represent coordination and ensure that sequential activities take place accordingly. By linking activities, actors can break down complex tasks or projects into individual tasks which can be achieved more easily. Besides the sequential feature, activity links reflect a horizontal interdependence of activities (Håkansson and Snehota, 2002). Activities are linked horizontally; for example, many supply companies have to make sure their technologies and products match their manufacturers' or customers' requirements.

The ARA model proposes an integrated analysis of stability and the development of networks. Stability is a vital feature for industrial markets but does not mean that the markets are static; dynamics are a central feature of industrial relationships. This thesis draws attention to the role of actors and sets of actors (Håkansson and Johanson, 1992) in changes in networked relationships.

3.3.2   Networks as a process

Further research shows that networks are dynamic (Håkansson and Johanson, 1992; Anderson *et al*., 1998, 2000; Thorelli, 1986; Halinen *et al*., 2012). Processes also play a role in the way networks function. Easton (1992) points out that inter-organizational relationships exist in networks, and enable the network process to achieve coordination. But the process of achieving coordination requires the interactions of actors, the mobilisation of resources, and the undertaking and adjustment of activities. Easton (1992) also concludes that a network's power and interest structure dominates network processes. Actors interact with each other in the network to access resources, which leads to certain events or activities.

There are two dialectical processes in the network: competition and cooperation. Competition takes place because of the differential interests and goals of actors, as well as their intention to access better resources. Cooperation illustrates the strong bonds between actors, but the bonds can also be broken in certain situations such as when new actors become involved, when new resources are mobilised and controlled, and/or when there are changes to the market environment. Zerrillo and Raina (1996) argue that the desire of

companies to avoid conflict leads to stability in relationships, but what the research finds is that conflict exists throughout business networks. This causes relationship dynamics that make events happen in organizations and markets. These events, either internal or external to a company, might be social and marketing events, technology events, or regulatory events. They are sequential within a process, and are dynamic forces in networks. Five change sequences are identified as follows (Easton and Lundgren, 1992): (1) *reflection*, which refers to company A seeking to establish a change in its exchange relationship with company B, which B in turn rejects and refuses; (2) *adaptation*, which refers to changes managed between actors through negotiations and interactions in dyadic relationships; (3) *absorption*, which refers to a company absorbing influences within its boundaries; (4) *transmission*, which refers to a change for company A being transmitted to another company/companies (e.g. company B) in the network in order to minimise the impact of the change on Company A; and (5) *transmutation*, which refers to a company not only agreeing to a change but also actively taking part in delivering it. Thus, changes are sequential in process and involve interactions with other actors. Besides these, any dynamic in a network requires the mobilisation of particular resources (Easton, 1992). Conversely, a company with limited resources needs to participate in accessing more and better resources.

Actors in networks participate in development in order to maintain business relationships and collaboration. A long-term analysis of 'social, economic, technical and political events between/among actors within the network' would contribute to research on the dynamics of business networks (Ford and Redwood, 2005). I notice that interactions in relationships always involve third party actors, which changes the way the actors bond. Networks need to change in order to maintain their stability, and actors must adapt to these changes. Adaptation in the network is examined in the next section so as to identify the conditions, which bring it about, and the effects it has on the industry.

3.4 Interactive Adaptation

To analyse interactions and events in the industrial market, this thesis both focuses on actors and how they adapt to make exchanges happen, and examines the triggered emotions of actors regarding their experiences and their cognitive sequences. The market studies approach and the IMP approach overlap in relation to adaptations (Brennan and Turnbull, 1996). In the market studies approach, adaptations are considered to take place as

markets perform and have relevance for market exchanges and business norms. Market exchanges are regarded as a process of adaptation, enabling exchanges to happen. Actors on both sides of an exchange will adapt to each other, and such adaptations have social characteristics embedded with the materialities (such as the techniques and resources in question) of that exchange. The IMP approach, however, concentrates on long-standing interactions and networks, where actors, resources and activities function to establish adaptations in networks rather than just in dyadic exchanges. In this section, I analyse adaptation as an interactive approach in business markets, and further examine it in a long-standing, distributed and conflicting context through investigating business responses to conflicts of cost, regulation and technology.

3.4.1 The concept of adaptation

Adaptation is an underdeveloped concept in the research on market exchanges and business interactions. Brennan and Turnbull (1996) define buyer and seller adaptions as 'behavioural modifications made by one company, at the individual, group, or corporate level, to meet the specific needs of another organization'. This stresses the role of relationships and interactions (one or both parties) in adaptations. They define adaptations as 'modifications at the individual, group or corporate level which are carried out by one or both parties in an exchange relationship in order to suit new needs or conditions, and which are designed initially for that specific relationship'. These definitions address the purpose and dyadic structure of adaptation but lack the 'content in adaptation'. Håkansson (1982) points out that adaptations can take place in product development, incremental innovation, investment, financial arrangements, information routines or social relations; these adaptations tend to make relationship more productive.

3.4.2 Dyadic adaptation

IMP researchers have comprehensively analysed adaptations in a dyadic context, focusing mainly on inter-firm adaptation. Inter-firm adaptation is described as a key interaction in business relationships (Brennan and Turnbull, 1995). Adaptive behaviour functions in buyer–seller relationships by influencing the activities of market actors (Brennan and Turnbull, 1999). Brennan *et al*., (2003) review classifications of adaptations, concluding that adaptations contribute to the development of mutual trust and the building of commitment. They adopt the concept of the power balance in a relationship, stating that unilateral adaptations are a response to power imbalances. The role of power in

interactions also influences the structures of adaptations, which suggests that an actor with weaker power would have to be the one to adapt to the stronger actor (Hallen *et al.*, 1991). Brennan and Turnbull (1999) comment that 'adaptations tend to increase the level of trust and commitment in the relationships'. But Jeffries and Reed (2000) argue that trust should be kept to within a certain range, and say that 'too much trust is as bad as too little trust'. Therefore, contracts (agreements) and social norms (governance structures) can assist in enhancing actors' performances both individually and in combination under conditions and forms of transactional high uncertainty (Cannon *et al.*, 2000). In industrial markets, suppliers invest in adaptation as a strategy in order to retain their business customers or maintain business relationships (Ahmad and Buttle, 2001). Adaptations do not just take place among suppliers; customers also adapt to certain factors such as changes in the business environment or to regulations (Halinen, 1994). Parties adapt as part of a process to identify factors that can facilitate or hinder environmental changes (Canning and Hanmer‐ Lloyd, 2001a). The process of adaptation involves events, activities and stages, in which 'affective foundations for trust also exist, consisting of the emotional bonds developed between individuals' (Canning and Hanmer-Lloyd, 2001b). The ability of a firm to undertake adaptations to change of technology is based on an interactive process of mobilizing resources, and reconfiguring of aggregate resources take place through the connecting functions of business relationships (Chou and Zolkiewski, 2012a).

3.4.3 Adaptation in networks

A change in business environment is considered to motivate adaptations. The intra-firm and inter-firm adaptations process model of Brennan and Canning (2002) shows that adaptations contribute to the uncertainty caused by changing business conditions, but also assist in the better utilisation of the resources tied to relationships. Hagberg-Andersson (2006) considers adaptation as a response to different parties in supply networks, and that it is therefore a response to '[a] buyer, another supplier in the supply chain, another potential buyer or to industry norms, for example environmental requirements'. In industrial markets, other parties may become involved in the process of adaptation, and the study of adaptation should be set in the context of networks rather than just dyadic relationships.

Although business relationships in networks begin with a dyad, dyads do not capture the essence of a network (Choi and Wu, 2009). Choi and Wu identify nine triadic archetypes

of buyer–supplier–supplier relationships, where adaptations happen among triads. Wuyts, *et al*., (2004) examine buyers' preferences for specific patterns of relationship among the buyer, intermediary vendors and suppliers of complex products, identifying buyers' value sequences for strong and weak ties. Buyers' value provides strong ties between the vendor and suppliers in the network. Madhavan *et al*., (2004) propose clustering and countering constructs as potential drivers of the triadic structure in which three companies can all have direct ties with each other. This contributes to the analysis of competitor alliance networks. Madhavan *et al*., (2004) also stress that the potential drivers of conflict vary across geographic and technological areas.

Adaptation can be multi-sited, involving several parties. The existing research has shown that intermediary vendors, other actors in the supply chain or other actors in distribution channels participate in adaptations and trust-building (Choi and Wu, 2009; Wuyts, *et al*., 2004; Svensson, 2004; Phillips *et al*., 1998), but there is limited research about actors' adaptations in more complex networks which involve industrial and government regulations.

3.5   The Dark Side of Relationships? – Conflict

Much research into relationships focuses on the positive aspects, e.g. trust, commitment, cooperation and coordination etc., and aims to investigate how these aspects can enhance business performance. But there is limited research which addresses the dark side of relationships. In the early 1980s, research on conflict and opportunism, as negative relationships constructs, drew the attention of researchers (Gaski, 1984). Further, conflict was studied in relation to the areas of value co-creation, cooperation, dependency and competiveness (Le Meunier-FitzHugh *et al*., 2011; Mele, 2011). Despite being relatively under-researched in the IMP tradition, conflict has a particular resonance because it highlights the goal of relationships between business units or organizations and their vulnerability. Conflict is inevitable in/across organizations, but an organization's goal is to develop an effective system to identify and manage uncontrolled conflict and find resolutions to transform it into functionality. Conflict is a consequence of interaction, and therefore is basic to the relationship development and trust building process. Organizations or individuals engage in interactions to achieve their own interests; since there are incompatible, a conflict emerges. Looking into conflict research, IMP researchers will benefit from a better understanding of the antecedents and consequences of relationships.

From the IMP perspective, research on the ending and recovering of relationships provides additional understanding of conflict and usable constructs. I draw the behavioural approaches for this thesis from organization studies. Through analysing conflict as a pervasive condition in relationships, research into conflict and actors' affectiveness will fill a gap between the pervasive organizing feature of conflicts and how actors experience and manage particular episodes. This will encompass relationships and resources, experienced by actors as events in the course of their adaptive business activities or tasks.

3.5.1   Relationship ending and recovery

The literature on conflict has had a focus on the destructive potential of conflicts, on relationships breaking down prematurely or in an unplanned and unanticipated way. The implication is that an organization had the potential to ensure valuable exchanges, but somehow failed to realize this potential, with the exchanges being disruptive to rather than supportive of, for instance, product and service development, incremental innovation or co-development. Identifying conflict helps us understand how different levels of entities construct a network and how human relationships change either in a functional direction (Parsons, 1966) to preserve social stability, reach mutual objectives (Cosier and Rose, 1977) and encourage innovating, or in a dysfunctional direction (Parsons, 1966) causing distrust and poor decisions. More effective management of that relationship, interaction or project could have avoided or resolved the conflict. Business actors are involved in multidimensional and conflicting relationships (Pinkley, 1990; Kjellberg and Helgesson, 2006) resulting from the actors' own goals, values and expectations. Exchange happens when conflict is resolved through the process of compromise and agreement about resources. Managing conflict has been a significant topic of research, looking at enhancing organizational effectiveness, organizational learning, the definition of roles of social entities, opposing interests among parties, and the goals of each party (Amason, 1996; Baron, 1984; Goodman and Pennings, 1977; Argyris and Schön, 1996). All of this helps place actors in the conflict and locates their positions in the network where relationships are constructed and developed.

In IMP research, a business relationship is a unit of analysis, identified through its value, longevity, accumulation of artefacts and practices, and interpersonal identities. Relationships have multiple concurrent roles, which can be outlined following the actors–resources–activities framework (Håkansson and Johansson, 1992). Due to the interactive

feature of relationship, actors are connected and positioned in different roles. Therefore, relationships emerge through regular interactions among actors, whether these are people representing companies, groups within companies, project teams with members from two or more companies, or even third party groups of people or organizations working on particular projects. Conflict is a particular form of relationship where actors bond in a way which depends on the interests behind their roles. Actors involved in activities to resolve encountered problems increase and decrease conflict within the framework of actors–resources–activities (Håkansson and Johansson, 1992).

3.5.2 Interaction and Conflict over Resources

Relationships are ways of preserving resources as long-lived assets or inputs for business activities. They are a form of informal governance and a response to the understanding that resources emerge or take a specific shape through interactions between actors. Actors wish to access mutual resources (Rahim, 2002), both internal and external; they also combine resources to make adaptations in response to conflict. Actors can use resources to enhance their capabilities to resolve pervasive conflicts. Indeed, resources continue to develop and adapt, interacting with one another within some overall business plan (Corsaro *et al*., 2012; Finch et al., 2012). Following the resource interaction model (Baraldi and Waluszewski, 2005; Håkansson & Waluszewski, 2002), relationships, alongside business units, facilities and intermediate goods and services, can be considered as resources for business activities and as a means of acquiring and gaining influence over other resources. Conflict is managed as a significant aspect of interaction, with the way in which resources are employed being based on actors' commitment (Ehie, 2010). Interaction, and its role in adaptation, contributes to the resolution of conflicts through resource integration. Mele (2011) says that process conflict 'is concerned with the delegation of responsibility and the allocation of resources' as tasks are undertaken.

The understanding of resources in connection with how relationships are developed in IMP research provides further impetus to our first and third research questions, on the role of resources and relationships in conflict, and on the role of adaptation in managing conflicts. The behavioural approach to conflict has influenced IMP research (Håkansson and Snehota, 2000; Brennan, 2006; Baraldi *et al*., 2007). In turn, IMP researchers – in ways not fully developed in behavioural approaches – see resources as malleable, developed and governed jointly as part of conflict and coalition. While recognising inter-organizational

issues, behavioural researchers concentrate on organization within individual business firms. In addition, durable relationships are forms of organization that support small groups, projects (Vaaland and Håkansson, 2003) and interpersonal trust, bonds and emotions (Ryan and Blois, 2010). The lesson to be taken from the behavioural approach to conflict in business-to-business marketing research is that there seems to be a gap in the research into conflict being a pervasive condition of business activity, encompassing relationships and resources experienced by actors as events in the course of their business activities or tasks. Actors use conflict as an instrument to improve performance and form a well-balanced structure of relations in the network by resourcing the conflict. Actors on both sides of a conflict resource the conflict with three types of resources: physical capital resources, human capital resources, and organizational capital resources (Barney, 1991).

Tähtinen and Blois (2011, p. 907) see relationships as a broader phenomenon where 'conflicts are emotionally defined and perceived by a triggering event'. Song *et al*., (2006) argue that research into conflict has become characterised by 'a conflict's dimensionality, complexity, and contingency', something that Mele (2011) and Tähtinen and Blois (2011) recognise in their assessment of emotions, affectiveness and relationships as dynamic dimensions, rather than discrete types, of conflict. Research has shown that conflict negatively affects team outcomes (De Dreu and Weingart, 2003). Greer, Jehn and Mannix (2008, p. 281) point out that relationship conflicts 'contain a high degree of emotionality, which may manifest itself in negative behaviours such as raised voices, hostility towards others, and threats and intimidation'. Thus, besides conflict itself, actors' experiences of conflicts and aligned events, the emotional consequences and their sequenced outcomes, are still worth visiting (see section 4.6).

3.5.3 Emotional Conflict in Relationship Dynamics

The affectiveness of conflict can be researched through a research topic on its emotional dimensions and consequences within small groups and teams (Jehn *et al*., 2008). It is also widely recognised that emotions play an important role in business relationships and relationship dynamics in industrial markets. IMP researchers have a long-standing interest in interactions and relationships but have only recently focused on interpersonal relationship dynamics as a dimension of the complexities of emotions and their dysfunctional effects in business-to-business relationships. One question that is becoming prominent is how emotions produced by social exchanges influence interactions and

relationship dynamics (Lawler, 2001), and what the sequences of emotions are. The sequences, are resourced events or tasks, which are used to study 'network dynamics that result from the process of business interaction' (Chou and Zolkiewski, 2012b). Mitręga and Zolkiewski (2012) address that negative aspects of relationships appear to bring different levels of negative feelings, as affective emotions. Emotions, whether positive or negative, and sequenced events emerge in relationships as a matter of course when actors are initiating, developing, maintaining or ending a business relationship (Jones and George, 1998). Chou and Zolkiewski (2012b) propose that network dynamics can be investigated by 'recognizing the temporal fluidity of the network boundary and the associated processes and events that affect this and using the concept of network positions and roles to analyse these processes and events.'

Research has also indicated that emotions influence the trajectory that a relationship takes, for instance, through affecting trust, commitment, shared activities, common affiliations and actors' personal bonds (Andersen and Kumar, 2006; Jones and George, 1998; Ryan and Blois, 2010; Tähtinen and Blois, 2011; Lawler, 2001). Most of the research on emotions focuses on the role of emotion as a factor in business relationships and in influencing the dynamics of interpersonal interactions (Kumar, 2008). Emotions also influence problematic relationships (Tähtinen and Blois, 2011). Relationships purposely change and develop because of actors' rational or analytical cognition that comes from managing emotions so that they can achieve sustainable collaborations (Ryan *et al.*, 2012).

3.6 Conclusions

The behavioural approaches to conflict influenced the development of IMP theories in the area of relationships. Conflicts exist pervasively in networks and are experienced by actors as a condition of undertaking business interactions. In this context, conflicts arise from regulations, costs and technology and can be examined in their structural, durable and networked dimensions. The IMP tradition views interdependencies and relationships as key factors in the construction of a market. The business process is regarded as a process of continuing interactions between actors who seek solutions to the problems they encounter (Ford *et al.*, 2001). Individuals usually have a significant impact on the interactions, but the interactions can also take place impersonally. However, the units of analysis for IMP are relationships, not individual actors, and interactions happen between/among individual actors either within dyads or in a network context. Business

relationships and networks are dynamic because of conflicts caused by economic interest, a change in industry norms, technological development and the cognition, trust and commitment of actors.

Actors, who occupy a central role in relationships, access and mobilise resources and undertake activities to adapt to a dynamic context. IMP researchers have mainly become concerned with how the advantages of actors' interactions across networks can be acquired by means of managing relationships, including the recovery of relationships (Salo *et al.*, 2009). After reviewing the literature, I realise that this research area is fragmented and not well developed. Ryan and Blois (2010) combine their research on the emotional qualities of actors' conflicts with the actors' own estimations of the value of a relationship as their activities become curtailed by a lack of resources. These emotional qualities and estimations of value are potentially durable and have an impact on activities planned or envisaged for the future. Overall, though, conflict has become associated more with the imminent end of a relationship and with coping with the aftermath (Harrison, 2004), or with the recovery of relationships, deemed valuable but made vulnerable in conflict. Less attention has been paid to assessing the functionality of conflict in networks and the calmer and strategic adaptations and resourcing of conflicts; this provides a gap for this thesis to fill.

In the next chapter, I examine organizational conflict studies and small group research on actors' affectiveness. An interesting approach is proposed with conflict investigated in its emotional dimension, looking at social characteristics alongside materialities – contest, practice and performances – in industrial markets.

Chapter 4.   Conflicts and Emotions in Practice

4.1   Introduction

In the literature on conflict and its emotions, Jehn and Mannix's (2001) work on intra-organizational research, typically small group settings, has been influential. Mele favours an extended view of relational conflict, as a 'multifaceted phenomenon' and a 'core category for understanding the more generic phenomenon of conflicts and conflict resolution' (2011, p. 1378). Actors in conflicts become affective about tasks and events based on their roles. Similarly, Tähtinen and Blois (2011, p. 907) see relationships as broader phenomena where 'conflicts are emotionally defined and perceived by a triggering event'. Song *et al*., (2006) argue that research into conflict has become characterized by 'a conflict's dimensionality, complexity, and contingency'. This is something that Mele (2011) and Tähtinen and Blois (2011) recognize in their assessment of emotions, events and relationships as elements of conflicts rather than as discrete types of conflict, which is relevant to our second research questions. Thus, conflicts and triggered emotions are embedded with material entitities, an area which has been somewhat neglected in industrial marketing research.

In the market studies approach, actors with different interests take part in market exchanges through calculative arrangements of material objects and devices, and individuals and collective agencies manage markets. In this process, individuals cognitively respond to their interpretations of information about materiality, so that conflicts are initially manifested as the emotions of individuals. This not only directs decision-making at both the individual and the collective level, but also influences trust and commitment in markets.

Çalışkan and Callon (2010) emphasise the concept of emotion and its effects on market shaping and maintenance, but also point out that emotions act as the lubrication 'without which, markets would collapse'. At the end of their paper, Çalışkan and Callon propose a research agenda on emotions, i.e. 'it would be useful to develop further studies of market emotions that grant a key role to materialities in the production of these very emotions. It is important to recognize that the notion of STA [socio-technical arrangement] is designed to encompass the emotional, corporal, textual and technical elements that contribute to the maintenance of markets'.

Conflict and its affective emotions have a great impact on the practices and performances of organizations, with actors in organizations translating the conflicts they experience. In this chapter, I develop thinking on conflict and affective emotions (Jehn and Mannix, 2001) through a practice approach, by which emotions are considered to be a potential topic for market studies research (Çalışkan and Callon, 2010).

4.2   A Practice Approach and Market Practices

Research on Markets has been undertaken using many approaches. There has been research reviewing the history of different schools and approaches to marketing theories (e.g. Hunt and Goolsby, 1988; Murphy and Enis, 1986; Sheth and Gross, 1988; Hollander, 1980; Webster, 1992). According to Araujo (2007), the study of marketing consists of three dimensions: the study of markets, market making, and marketing as an operation within pre-shaped markets. An increasing call for the study of markets, rather than marketing, aims to broaden marketing management and marketing research (Araujo *et al*., 2008). This section takes a practice-based approach to markets and market research, and involves an understanding of the practices that contribute to the performance of markets. The purpose of this section is to explore our understanding of how exchange happens and how markets are shaped and made to perform by multiple calculative agencies (Callon and Muniesa, 2005; Kjellberg and Helgesson, 2006).

The practice approach is usually adopted by technology scholars to examine the role of technologies in organizations (Suchman, 1987; Button, 1993; Hutchins, 1995; Orr, 1996). It uses practice methods, thereby addressing the product of actors' social activities. Many theories – accounting, marketing, strategy, organization theory and economics – influence practices and result in market shaping (Kjellberg and Helgesson, 2006). For example, Alderson (1965, p. 23) starts the first chapter of *Dynamic Marketing Behaviour* with a comment that 'A theory of marketing explains how markets work', which indicates that the root of marketing research is markets themselves. Callon (1998a) addresses the point that markets are constructed through a set of practices involving different forms of expertise and material devices. Thus the practice approach, as well as helping us to examine the role of technologies, also provides us with a route to examine phenomena of exchange and relationships in industrial markets.

A practice is 'a routinized type of behaviour which consists of several elements,

interconnected to one another: forms of bodily activities, forms of mental activities, "things" and their use, and a background knowledge in the form of understanding, know-how, states of emotion and motivation' (Reckwitz, 2002, p. 250). This thesis uses the practice perspective to understand markets and actors in markets. Feldman and Orlikowski (2011) point out that practice can be used in empirical, theoretical and philosophical ways to examine business and organizational phenomena. Empirically, the practice approach recognises the centrality of people and people's actions to organizational outcomes and the ongoing development of an organization's operations. Theoretically, the practice approach concentrates on explaining actors' activities. This particularly contributes to addressing the dynamics of everyday activities over time. Philosophically, the practice approach represents a distinct social ontology, focusing on social reality and questioning the status of the researched phenomenon. They make the point that social reality is fundamentally constructed by practices rather than being external to human agents.

This thesis takes a practice approach to established marketing research. Practices are recognised repertoires for which actors have expectations of performance, outcome and reference points. Actors also have a sense of self-accountability and of being held accountable locally or in context, rather than a feeling that this is just 'what actors do'. Kjellberg and Helgesson (2006, 2007a, 2007b) point out that markets are the consequences of three interlinked types of practice. Exchange practices are the most straightforward of the three market practices and involve the consummation of individual economic exchanges. Exchange practices include general and specific activities contributing to conditions to make exchange possible, such as goods distribution, comparative product testing, etc. Representational practices indicate how markets perform or how markets work. Representational practice is fundamental to shaping markets and bridging exchanges and market images, and shows how processes, decisions and choices can be based on the rational analysis of representations. Normalising practices are concerned with the formulation and reformulation of rules and norms concerning market behaviour. Normalising practice refers to the creation of normative objectives and their effect on markets. This threefold conceptualisation of market practices is enlightening when examining the realisation of markets. During the realisation process, activities are undertaken to create normative objectives, complete economic exchanges and generate representations. Kjellberg and Helgesson (2007a) address six types of links for the three practices through a translation of activities (see Figure 4-1).
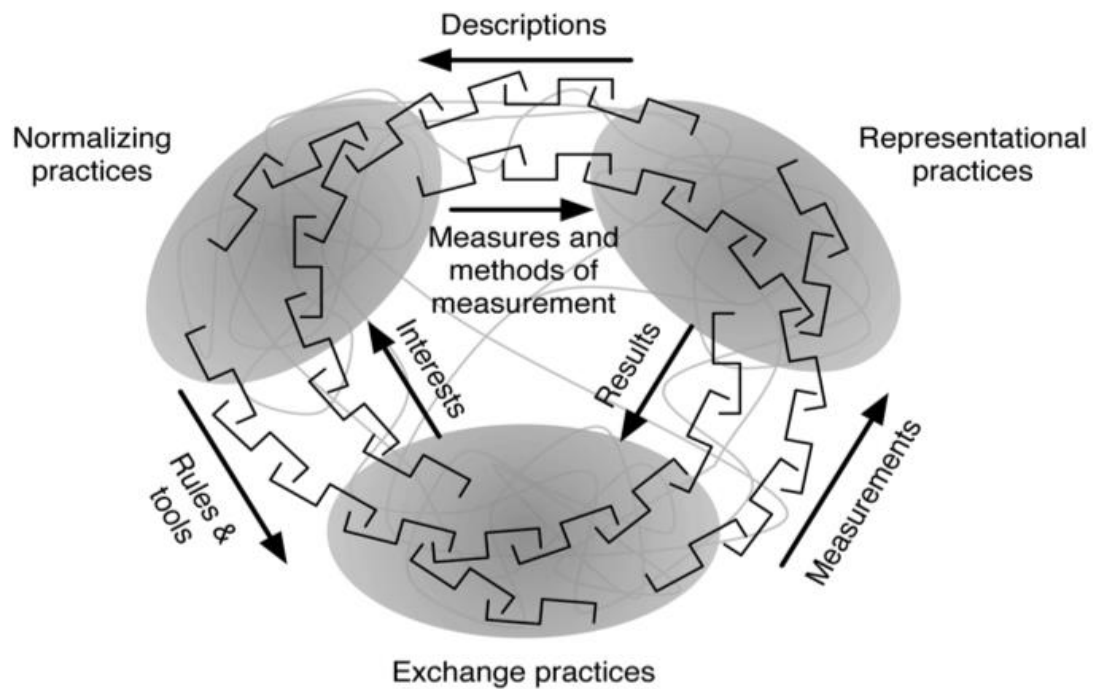
Figure 4-1: Constituting markets: possible links forged through translations between exchange, representational and normalizing market practices

(Kjellberg & Helgesson, 2007)

The model shows the links between the three practices. The concept of translation is used to describe norms, rules, truth, routines and extensions across time and space (Latour, 1999). Norms are translated into rules and tools for regulation. This affects exchanges. Purchasing works as a negotiated consequence of translations. The translated rules and tools from norms require adaptation to function in exchanges. Representations play a role not only in producing effects on exchange practices and feedback, but also in providing descriptions of an industry and the mundane activities that shape markets. Rules, tools, measures and measurements are intermediaries that connect the three types of practice. The translation of the three practices contributes to the identification of the nature and conditions of a market exchange, and an understanding of the sequences of activities and industrial events. It also addresses the reality of markets. Actors participate in making exchanges of products and services through the process of translation. As a result of this process, the relationships of market actors, regulators and other third party actors are

formed, developed and changed across time and space.

A broader concept of market practice provided by Kjellberg and Helgesson (2007a) is 'all activities that contribute to constitute markets'. Araujo *et al*., (2008) more narrowly specifies market practices as the 'bundles of practices including material arrangements that contribute to the performance of markets, highlighting a preference to study markets as ever-changing performances, rather than as stabilised entities, shaped by multiple and distributed calculative agencies'. Indeed, researchers in market studies have emphasised performance, implying that actors seek to recruit practices by their actions, and are aware of their accountability regarding performance. Market practices involve actors making markets calculable (Callon and Muniesa, 2005) and real, further indicating the importance of technologies and knowledge in industry markets. In terms of analysing the practice of actors and the scientific and technological effects of content on markets and market shaping, I notice that market practice is inevitably bound up with material entities (Orlikowski, 2007).

The practice approach to markets has influenced the research into markets since the 1990s. Marketing scholars have explored a practice-based approach to describe what market practitioners do (Brodie *et al*., 1997; Coviello *et al*., 2002) and have engaged in studies to construct and problematize markets (Pickering, 2010). The practice approach studies the performance of market actors rather than representations. This thesis examines theories of market studies which help translate technology, innovation, and exchanges of goods and services into market reality and market shaping. The Market Studies research group was formed at the Stockholm School of Economics, following a trajectory influenced by Science and Technology Studies (STS) researchers (Callon and Latour, 1981; Latour, 1986, 1996, 1999; Law, 1994). The research that relates STS to markets has been broad in extent and insightful (e.g. Helgesson and Kjellberg, 2005; Araujo and Spring, 2006; Rinallo and Golfetto, 2006; Araujo, 2007; Azimont and Araujo, 2007; Kjellberg, 2007; Kjellberg and Helgesson, 2006, 2007a, 2007b; Sjögren and Helgesson, 2007). A group of marketing scholars emerged in the mid-2000s from the Industrial Marketing and Purchasing Group, based in Rotterdam, and has broadened since then, establishing research projects to show how markets are constructed and shaped, how markets perform in practice, the role marketing plays in shaping markets, etc. (Kjellberg, 2001; Kjellberg and Helgesson, 2006; Araujo, 2007; Finch and Acha, 2008). As Latour (1987, p. 258) comments: 'we study science in action and not ready-made science or technology'. In other words, the researcher

studies actors in practical situations and takes into account their activities related to market making. The market itself is in an ongoing dynamic condition. Actors participate and take part in complex and dynamic socio-material markets (Feldman and Orlikowski, 2011; Orlikowski, 2007). 'Markets are not universal, self-contained entities, but rather take on distinct discursive forms and material practices across various social contexts and over time' (Venkatesh and Penaloza, 2006, p. 147). Callon and Muniesa (2005) propose that three elements constitute markets: economic goods, economic agents and economic exchanges. Furthermore, they take the concept of calculation and examine the calculability of goods, configuring calculative agencies and realising economic exchanges.

Araujo *et al*., (2008) propose that markets should be studied as sites of multiple and often conflicting sets of practices which deploy efforts to shape these markets. Araujo (2007) indicates that the study of marketing covers the following aspects: the study of markets, the study of market making, the study of marketing as it operates in markets, and the study of the actors' engagement in the performance of markets. Based on the definition of Araujo (2007), three elements are highlighted and addressed in the following section by reviewing the literature about the market studies approach (Araujo, Kjellberg & Spencer, 2008; Araujo & Kjellberg, 2009; Azimont & Araujo, 2007; Cochoy, 2007, 2008; Kjellberg & Helgesson, 2006, 2007a). This relates to market exchanges and market shaping (see section 2.1.1). By doing this, I am taking a practice approach to markets, which directs how market exchange should be framed and positions actors in those exchanges.

4.3   How are 'Things' Exchanged?

4.3.1   Market exchange

Individuals and organizations are engaged in purposeful social and economic exchanges with other people and organizations. The main purpose of market exchanges is utilitarian (Bagozzi, 1975), whether dealing with tangible goods or intangible services. Exchange is a basic human activity within social lives and is central to marketing (Håkansson and Prenkert, 2004). An exchange aims to meet and satisfy a human need. It is a conjunction of meaning between action and reaction, or a kind of interaction. Market exchange theory has its roots in economic sociology and the sociology of science (Callon, 1998b; Callon and Muniesa, 2005) and has a significant impact on market theory and marketing practices (Alderson, 1965; Hunt, 1976; Kotler, 1972; Sheth and Garrett, 1986). Many scholars have

defined market exchange. Hodgson (1988) states that market exchanges match the exchange of property to the exchanges between products and money, showing the materiality characteristic of market exchange. Bagozzi (1975) points out that marketers have tended to regard 'exchange' as signifying a special type that focuses primarily on direct exchanges of tangible goods between two parties. Granovetter (1985) refers to the concept from Polanyi (1957) that market exchange is embedded in the structure of social relations, and regards embeddedness as economic behaviour. He points out that exchanges are submerged in social interaction. This is an epiphenomenon of the market. Araujo (2007) proposes a definition of the process of market exchange as: 'a process of framing that allows distinct agents to come together and agree a price for the exchange of goods and money'. Three necessary conditions exist for market exchange to take place: actors in the exchange, some specific interest for exchange, and embeddedness. Callon (1998a) extends Granovetter's (1985) perspective on embeddedness in the structure of social relations and the supporting role which the modern industrial society plays in smoothing market exchanges. This concept is also bound up with materiality (Orlikowski, 2007) in the presence of two or more parties, units, actors or agents (Alderson, 1965). The agents that construct exchanges are human actors, interacting with each other and exhibiting human behaviour (Hagberg, 2010). Hagberg also points out that market agents (buyers and sellers) are shaped by the process of exchange through practices (Araujo *et al.*, 2008) rather than through pre-existing conditions in markets.

Buyers and sellers can be configured in certain relationships according to a particular mode of exchange (Callon and Muniesa, 2005) with the objective of exchanging goods and services to realise economic purpose (Callon, 1998b). Kjellberg and Helgesson (2007b) examine the connections between the ways in which economic exchanges take place by analysing the modes of exchange, the constitution of objects and the agents of exchanges. They take the concept of 'mode of exchange' from Lie (1992) as being to combine practices and activities in order to promote market exchanges. This helps to investigate constructed exchange relations (Lie, 1992). Three modes of exchanges are examined and compared: full service exchange, self-service exchange and distance exchange (Kjellberg and Helgesson, 2007b). Their empirical outcomes demonstrate that the self-service mode of exchange is the one that is involved in the process of gradual configuration and reconfiguration. This supports Callon (1998b, p. 253): 'framing represents a violent effort to extricate the agents concerned from [the network of interactions in which they are involved] and push them onto a clearly demarcated stage which has been specially

prepared and fitted out'. The configuration of the mode of exchange, exchange objects and exchanging agents are intertwined in the process of framing.

In the process of realising that market exchanges produce a set of practices (Lie, 1992), buyers and sellers encounter exchange possibilities (Spillman, 1999) and further develop their relationships and the framing of market exchanges. Araujo and Kjellberg (2009) address the fragile, incomplete and temporary features of the framing, and indicate that a multidimensional boundary delimits what is to be considered as part of the process of exchange between sellers and buyers. Buyers and sellers are configured on both sides of the boundary but they can be disrupted by the to-be made or ready-made events brought about by buyers, sellers or others, and this can be a condition for exchanges to take place. The study of Kjellberg and Helgesson (2007b) focuses on changes in physical properties, and in the agents and objects involved in dyadic exchange relations but does not take changes of context into account. Different modes of exchange involve different sequences of events for agent configuration. Any change in the process of the exchange reality has consequences for market shaping. For instance, changes in regulations influence normalising practices and the resulting relationships between buyers and sellers.

There seems to be a gap in the research on the condition and consequences of the configuration of exchange agents in dynamic and networked contexts. I examine agent configuration in the next section in order to understand how actors are involved in market shaping.

4.3.2   Agents configuration - *agencement*

Research about the configuration of agents in market exchanges originates from a recognition that markets are not created a priori but are shaped by actors. The analysis of the configuration of agents indicates that configurations are shaped by a variety of factors including human actors, tools, equipment, technical devices etc. This concept has been referred to as *agencement* by Callon (2005, 2008). Two important implications of this approach are addressed by Hagberg (2010). These are the role of material devices in markets and the unstable nature of actors, both of which could change depending on the entities that construct them. Du Gay indicates that agency:

> is distributed in the sense that the capacity to exert agency resides not simply in human beings but in the *agencement* – those fixtures and fittings, material

arrangements and devices which help furnish them with certain characteristics and enable them to act in particular environments. Different *agencement* produce different forms of action. Agency, rather than being a singular, universal and human-centred capacity, is distributed, plural and contingent upon particular socio-technical arrangements. Social agency does not have a unitary form. It varies with the forms of discourse, techniques and practices defining a given activity…

(2008, p. 50)

Agencement is a French word indicating 'arrangement' (or 'assemblage') and refers to 'the idea of a combination of heterogeneous elements that have been adjusted to one another' (Çalışkan and Callon, 2010). *Agencement* is defined as arrangements endowed with the ability to act in different ways, depending on their configuration. Agencies are consequences of socio-technical *agencements* depending on associations between social and material entities (Araujo and Kjellberg, 2009). Çalışkan and Callon (2010) highlight the socio-technical arrangement of markets and distinguish markets from other economic organizations. Callon (2009, 2010) explores the concept of socio-technical arrangements (STAs), referred to by Deleuze and Guatarri (1972), from three perspectives: (1) distributed action and cognition; (2) the anthropology of science and technology, mainly based on actor–network theory (ANT); and (3) the socio-anthropology of incapacity, focusing on socio-technical arrangements and actions. Based on Callon's perspective of distributed action and cognition, collective action is to be carried out through a combination of arrangements, including ideas of incremental innovation and technologies. Three advantages of adopting the concept of *agencement* according to Çalışkan and Callon (2010) are: (1) analysing the categories of agency is not as essential a task as describing *agencements* compared with analysing *agencements* themselves; (2) *agencement* enables us to make changes of size intelligible because a firm or a team can act as a single entity which is neither simpler nor more complicated than a single human being; this provides a way of analysing the practice of a firm through the activities of its representative; (3) *agencement* leaves the configuration of agency wide open, which enables the distribution of collective actions and regulatory responsibility. It is more precise to refer to socio-technical *agencements* rather than just *agencements* (Çalışkan and Callon, 2010) because STAs consist of material, technical and textual devices together with human beings and their cognition. From the perspective of an analysis of STAs, the concept of the market can

be explained through three characteristics (Çalışkan and Callon, 2010):

(1) Markets organise the conception, production and circulation of goods, as well as the voluntary transfer of some property rights attached to them. These transfers involve a monetary compensation which seals the goods' attachment to their new owners.

(2) A market is an arrangement of heterogeneous constituents that deploys the following: rules and conventions; technical devices; metrological systems; logistical infrastructures; texts, discourses and narratives (e.g. on the pros and cons of competition); technical and scientific knowledge (including social scientific methods); and the competencies and skills embodied in human beings.

(3) Markets delimit and construct a space of confrontation and power struggle. Multiple contradictory definitions and valuations of goods as well as agents oppose one another in markets until the terms of the transaction are peacefully determined by pricing mechanisms.

Based on Du Gay (2008), studying *agencement* provides a way to engage in deeper research into agent configuration in market exchanges. *Agencements* produce differentiated agents and positions in the market, and distribute agencies within socio-technical arrangements. As Callon and Çalışkan (2010) state: '*Agencements* denote socio-technical arrangements when they are considered from the point [of] view of their capacity to act and to give meaning to action'. Thus, the development of STAs is regarded as a process that involves a set of devices to combine social entities in markets. This is called 'marketisation' by Çalışkan and Callon (2009, 2010). The study of marketisation is the effort made to describe, analyse and make intelligible the shape, constitution and dynamics of a market's socio-technical arrangement. The process of marketisation is the main research focus of the so-called market studies developed by the Market Studies Group within the IMP.

4.3.3 Actors in STAs

The centralities (main agents) of marketisation are actors in practice. They are heterogeneous entities playing a main role in the agencement around market practice. Buyers and sellers are opposed in market exchanges and embedded with social and

material interests, which require them to follow economic calculation. Actors, such as sellers, buyers and others, evolve in *agencement* (Hagberg, 2010) and develop so that relationships rather than a single transaction are established through the process of exchange.

Araujo and Kjellberg (2009) conceptualise actors from a practice-based approach and propose that: (1) actors are positioned within temporal frames in which interactions between entities are part of some 'real-time' event or situation; (2) actors are emergent outcomes of associations seeking temporary interests in goods and services in markets; (3) actors are recognised by others so that relationships and networks are a priori issues; and (4) actors act as collectives with heterogeneous elements. Thus actors can be conceptualised as comprising STAs with specific characteristics.

> Depending on the nature of the arrangements, of the framing and attribution devices, we can consider agencies reduced to adaptive behaviours, reflexive agencies, calculative or non-calculative agencies, or disinterested or selfish ones, that may be either collective or individual . . . (Re)configuring an agency means (re)configuring the socio-technical *agencements* constituting it, which requires material, textual and other investments.

> (Callon and Çalışkan, 2005)

Kjellberg and Helgesson (2007b) provide an illustration of this in their study of the introduction of self-service in food retailing, and also highlight that market innovation may involve the active reconfiguration of market agencies. This thesis draws attention to actors. In industrial markets, an actor is 'made up of human bodies but also of prostheses, tools, equipment, technical devices, algorithms, etc.' (Callon, 2005, p. 4).

The discussion in this section about theories regarding agent configuration and socio-technical *agencement* strongly contributes to developing an understanding of the calculative practice of markets and the actors' role in shaping markets. The concept of STAs enables us to follow the long-term chain of the distributed and invisible role of actors. The *agencement* is translated from actors' cognition and involves multiple collaborating interactions (Hutchins, 1995) so as to influence further exchange relations between the actors. In this process, actors encounter, negotiate, bargain, collaborate,

conflict, compromise or even end relationships (Amason, 1996; Araujo and Minetti, 2010; Corsaro and Snehota, 2012; Fynes, et al., 2005; Tähtinen *et al.*, 2007).

4.4 Shaping Markets

4.4.1 Marketing practices and market shaping

The practice approach to market studies has been adapted and further developed as a result of the continuous construction of markets (Araujo, 2007). The emerging research draws attention to markets and market practices in shaping markets (Kjellberg and Helgesson, 2006; Mackenzie, 2003), and this enhances the research about marketing practice in market making. Araujo (2007) addresses two aspects of marketing practice:

> On one hand, they can only take shape and produce results if they can rely on a degree of stability of institutional frameworks and calculating agencies. On the other hand, marketing actions generate new forms of qualculation and requalification of goods which destabilize existing institutional frameworks and established modes of calculation.

Markets are shaped by and operate through multiple calculative agencies (Azimont and Araujo, 2007; Callon and Muniesa, 2005). Market exchanges are constructed from calculative agencies and calculable goods. The market-shaping literature highlights how markets continue to be set up and underscores that there is scope for strategic action to alter markets. It directs attention to new objects and means of innovation and other activities to be studied empirically. Geiger and Finch (2009) add to the discussion of agencies by directing attention to the role of salespeople in market shaping processes, suggesting that the agents involved in the market aspects of innovation may differ from those involved in the technical aspects. The interrelationship between the technological and the market aspects of innovation may, however, be close, as illustrated by Harrison and Kjellberg (2010) in their study of the making of a market for affinity biosensors. Araujo and Spring (2006) suggest that markets should be viewed practically as institutional arrangements and that the location of market interfaces is neither given nor arbitrary. Thus, markets are shaped by being formulated and reformulated within a certain context.

Different consequences for market shaping can be produced from exchange, normative or representational practices. For instance, normative practice provokes changes in routines in

product and service development; exchange practice may result in re-formatting market exchanges; representational practice can lead to a certain degree of adaptation. Market practice can be used to address the ongoing real market. Kjellberg and Helgesson (2006) state that market-shaping research can be undertaken by analysing market practice. For instance, market practice provides conceptual tools for a richer description of what is being shaped, and how a market is shaped by tracing processes, sequences and cognition of market practice.

4.4.2 Market-shaping events

Azimont and Araujo (2007) argue that a series of category review meetings organised between manufacturers and retailers functioned as events that shaped the market for a fast-moving consumer good, a non-alcoholic beverage. They draw empirical conclusions from the evidence based on a range of arguments, data and metrics. They even define and segment the category, proposed by manufacturers to retailers at an annual review, which had influenced the exchange routines between these actors. Markets are constructed through a range of calculative agencies participating in activities and events. The event of a category review in Azimont and Araujo (2007) – consisting of an acute sense of timing, the imaginative mobilisation of facts, data, forecasts and expert opinions, and the ability to appreciate and cope with different calculative devices – is one event that helped produce market shaping. They conclude that tracing events can help researchers uncover the process of market shaping in the following areas:

> (1) strengthening existing norms, conventions and category boundaries; (2) creating new conceptual frames by introducing new products or reformulating existing ones; (3) changing existing categorisations by repositioning products; (4) providing new metrologies and maps for classifying existing offerings and uncovering potential opportunities in new market spaces.

Marketing practices contribute to market shaping through a combination of events. The study also illustrates that markets as calculative collective devices (Callon and Muniesa, 2005) involve agencies configured in them and adapted towards each other before, during and after the events (see next section). Hagberg and Kjellberg (2010) characterise those who undertake marketing through three areas: (1) the constitution of agents; (2) the programmes of actions of agents; and (3) the capacities of agents. This shows the

differences between market agents, but does not develop further into the way marketing is undertaken in market-making, which market-shaping events may help to fulfil. Thus, tracing events offers us a way to illustrate market exchanges in a certain context, and thus to examine relationship dynamics in market-making. The limitations of Azimont and Araujo's (2007) approach are: they analyse only a single event and its function in the marketing strategy; they do not have evidence about how events are developed and sequenced; and they provide little information about the conditions for making events.

Besides events, Callon (1998a) also proposes that technical and intellectual devices are involved in helping to shape market exchanges. Orlikowski and Scott (2008) categorise existing technology research into discrete entities and mutually dependent ensembles. Barley (1988) emphasises the importance of associating technology with its organizational or social context when these share the same semantic domain. Technology is embedded in its relationship to social context (Orlikowski, 1992). It should be viewed as a combination of the implications of the physical and social entities that contribute to addressing markets as 'bundles of practices including material arrangements that contribute to market performance' (Araujo *et al.*, 2008, p. 8). But market reality is cognitively 'embedded' (Cochoy, 2007), with the implications of technology in a social context requiring a mixed process of human and non-human matters and issues to address (Latour, 2005). The term 'technology' in Winter's (1977) book *Autonomous Technology: Technics – Out-of-Control as a Theme in Political Thought* is used in three ways: technology as machines and devices (apparatus); technology as a technique associated with stylised behaviours and cognitions which constitute an instrumental act; and technology as a sense of organization with a specific arrangement of tools, people, tasks and materials. Orlikowski (2007) points out the problem of viewing materiality as an occasional issue, but does not consider that 'every organizational practice is always bound with materiality'. She also addresses the limitations of research into technological effects only (a techno-centric perspective) or interactions with technology (a human-centred perspective). Both a techno-centric approach and a human-centred approach divide technology and humans (Orlikowski, 2007). The techno-centric approach looks at the influence of technology on human action, assuming 'unproblematically that technology is largely exogenous, homogeneous, predictable, and stable, performing as intended and designed across time and place', but ignoring the association between technology and social influences. The human-centred approach focuses on human interaction with technology, where the meaning of technology may vary depending on the different interpretation of the people involved. Further studies

are proposed by Orlikowski and Scott (2008) to develop research on technology and propose a merger of technology and market practices with reference to 'socio-materiality'. Seeing materiality as integral to organising is preferable to focusing only on technological effects or on the people who use the technology. Materiality should be considered as 'performed relations', intertwining the social and material in practices, rather than as existing elements (Orlikowski, 2007) such as knowledge and technology management, incremental innovation, and technology and regulation adaptation. Socio-materiality shows material continuity (Finch and Geiger, 2010) and breaks down taken-for-granted boundaries with entirely saturated exchange agencies. It is a contribution with a different perspective from IMP, which usually focuses structurally on actors' interactions (Geiger and Finch, 2009; Håkansson and Ford, 2002; Waluszewski *et al.*, 2009). Humans are associated with materiality such as food, water, machines, computers, labs, etc., which are made sequentially by them. Humans and technology mutually shape each other. Orlikowski (2007) proposes that 'all practices are always and everywhere socio-material, and that socio-materiality is constitutive, shaping the contours and possibilities of everyday organizing'. Thus, the practices which create market-shaping events and exchanges are taken into account in this research, both with regard to their cognitive sequences and to their material conditions.

Actors in exchanges encounter incommensurability interplaying through calculative arrangements of material objects and devices (Finch and Geiger, 2010). These are cognised respectively as events and other manifestations. Individuals form cognition and behavioural responses based on the way they interpret the information about the material objects and devices and manifesting themselves as emotions. These emotions are also intertwined with other cognitive activities (Fang *et al.*, 2011), both individually and collectively (Colville and Pye, 2010). Çalışkan and Callon (2010) address the importance of affect and emotions in market maintenance. The concept of emotions applies equally to collective agencies but cannot be undertaken without the aid of material devices. Çalışkan and Callon (2010) also suggest that the study of market emotions is key to understanding materialities in the production of emotions. This thesis will fill these gaps by analysing the events and the cognitive approach to events, i.e. events-triggered emotions and their transformation, and by examining events and conditions of events in a distributed and sequenced context (see chapters 3 and 7).

4.5 Conflict and Emotions in Market Practices

In the market studies approach, studying emotions provides us with a way of examining conflicts, their material apparatuses, and their impact on market practices (Çalışkan and Callon, 2010). When considering market maintenance, Çalışkan and Callon (2010) stress the concept that emotions build trust in markets. In the socio-material arrangement of emotion-transformed events, it is 'not only so-called individual agencies and the *agencements* which make them effective; it applies equally to collective agencies (like firms)'. Transformed events, in the framework of performed emotions, are calculative devices. They also suggest that examining emotion would help us to understand 'materialities in the production of these very emotions, where STA contributes to encompassing the emotional, corporal, textual and technical elements (Çalışkan and Callon, 2010).

In this section, the researcher revisits emotions and their sequences. Existing research has focused on the emotional consequences of conflicts, the influence of emotions in relationships and the management of emotions. There is something of a gap between research about the emotional dimensions of conflict and research into actors' engagement in managing the transformation of emotions as the practices and performances of conflicts. In this section, I identify how actors understand, transform and manage emotions in business relationships.

4.5.1 Emotional dimensions of conflict

Conflict can be influenced strongly by emotions, given its affectiveness, relationship aspects and interaction dimensions. The emotional dimensions of a conflict would be an interesting way through which to discuss the conflict and its practices and performances. Studying the emotional dimensions of conflicts provides us with a guide to examine the organizational life of business actors in order to illuminate their behaviours and performances in conflicts, as well as their emotional activities involving commitment, drive and the capability to manage emotions (Research Question 2).

	Positive Emotions Motive-Consistent		Negative Emotions Motive-Consistent		
	Appetitive	Aversive	Appetitive	Aversive	
Circumstance-	Surprise				
Unexpected					
Uncertain	Hope		Fear		Low
Certain	Joy	Relief	Sadness	Distress	Control
Uncertain	Hope		Frustration	Disgust	High
Certain	Joy	Relief			Control
Other-caused	Liking		Dislike		Low / Control
Certain or					
Uncertain			Anger	Contempt	High / Control
Self-caused					
Certain or	Pride		Regret		Low / Control
Uncertain			Guilt	Shame	High / Control

Figure 4-2: Taken from Roseman's appraisal theory of emotions (Roseman, 1991)

I draw on Roseman's (1991) appraisal theories, which combine five appraisals that determine 16 emotions experienced by actors in any given event. These emotions are categorised as positive or negative. Positive and negative emotions shape actors' behaviour, affecting their appraisal of the trustworthiness of each other (Andersen and Kumar, 2006). Witkowski and Thibodeau (1999) address the key role of positive emotions in establishing and maintaining business relationships and enhancing trust. Negative emotions may threaten the ending of relationships and prolong trust building. I view relationships as a process rather than a thing. Relationships undergo changes in actors' knowledge and appraisal under different conditions.

Emotions, usually defined as intangible personal chemistry, are becoming of greater interest among researchers in different disciplines including organizational studies (Ashkanasy *et al.*, 2000; Fineman, 2000), psychology (Cornelius, 1996; Strongman, 1987), sociology (Hochschild, 1975, 1979; Kemper, 1990; Smith-Lovin, 1995) and management (Jordan and Troth, 2002; Bolton, 2005). There has also been a rise in interest in studying

emotions in marketing research (Bagozzi *et al*., 1999), mostly relating to consumer behaviours (Havlena and Holbrook, 1986; Chaudhuri, 2012). Bagozzi *et al*., (1999) define emotion as 'a mental state of readiness that arises from cognitive appraisals of events or thoughts; has a phenomenological tone; is accompanied by a physiological process; is often expressed physically; and results in specific actors to affirm or cope with'. The definition of Bagozzi *et al*. (1999) indicates that personal interactions and cognitions exist in association with events and business activities. Emotions are also aligned with goals and reflect actors' ability or inability to achieve their goals (Lazarus, 1991) and shared interests. Emotions may be perceived in the context of business interactions, where actors care about their duties and obligations in connection with their goals (Roseman, 1991).

Simpson *et al*. (2015) point out that 'social constructionists see emotions as part of social practice and interpersonal work-managed and drawn on as interactional repertoires in embodied expressions and social performances'. According to Fineman (2008), emotions are overwritten by social and moral discourses. Therefore, 'emotion is acted out via vocal and bodily posture as part of a micro-structural performance' (Simpson *et al*., 2013). From the psychological point of view, emotions are produced from inner, cognitive processes based on experiences and responses to specific events and situations (Fineman, 2008). Conflicts are emotionally manifested from latent, and actors in conflicts further manage perceived emotions into other manifestations in dynamics.

4.5.2 Conflict as contest

Because of the slow moving nature of conflicts, tools, techniques and rankings almost become rules of the contest, which more or less equals the conflict. From this perspective, it is important to recognize how this knowledge of conflicts is conveyed, i.e. through producing event-triggered emotions from experienced conflicts. Tähtinen and Blois (2011) consider emotions as a tool influencing communication efficacy (Andersen, 2001) and shaping actors' behaviours to direct activities (Carnevale and Isen, 1986), a view which can extend to such strategic issues as the development of alliances (Kumar, 2008).

There also appears to be an overlap in market studies research. In terms of considering market performance, Çalışkan and Callon (2010) stress the concept that emotions build trust in markets. They point out that emotions and moral competencies concern 'not only so-called individual agencies and the *agencements* which make them effective; … [they

apply] equally to collective agencies (like firms)', and cannot be carried out 'as coordinated projects on a wide scale without the aid of material apparatuses.' The socio-material arrangement of emotion-transformed events covers 'not only so-called individual agencies and the *agencements* which make them effective; it applies equally to collective agencies (like firms)'. The arrangement cannot be carried out 'as coordinated projects on a wide scale without the aid of material apparatuses' (Çalışkan and Callon, 2010, p. 21). Transformed events, in the framework of performed emotions, are calculative devices through which process conflict plays the roles of helping to establish rules for contesting, and making exchange happen.

Tähtinen and Blois (2011) argue that emotions are triggered by events and shaped by affective activities. Actors have affective reactions (Weiss and Cropanzano, 1996) towards events, aligning with pervasive conflict in markets. Each goal and plan has a monitoring mechanism that evaluates events relevant to the value (Vargo and Lusch, 2011) actors have created and contest for. When a substantial change in probability occurs related to the contesting of an important goal or sub-goal, the monitoring mechanism broadcasts to the whole cognitive system a signal that can prepare it to respond to this change. Humans experience these signals, and the states of readiness they induce, as emotions (Oatley 1992, p.50). Emotions affect actors' own behaviours and responses to other actors, while at the same time affecting relationships and the atmosphere around relationships (Gergen, 1997). Emotions associated with actors' attitudes towards one another can create bonds or drive disaffection between actors in the process of the interactions during which behaviours are shaped (Ben-Ze'Ev, 2001), influence interactions and business behaviours (Ben-Ze'ev, 2001) or involve the actor in market shaping. Emotions are produced from the interaction of individuals who represent their organizations. In other words, emotion is examined in the condition of individual interactions but is highly influenced by organizational interests and tasks, though not determined by them. Andersen and Kumar (2006) show that emotions emerge in a buyer–seller relationship and point out that they can have a forceful role in constructing market relationships. In organizational terms, the emotions of key personnel can become increasingly influential in developing inter-organizational relationships (Gould *et al.*, 1999). Furthermore, emotions make business relationships more complex where actors take on boundary-spanning roles and represent their organizations (Ryan and Blois, 2010). Actors construct personal ties with others because emotions can undermine relationships. During such construction, emotions from conflicts

are interpreted, transformed, and managed in a dynamic context (Bodtker and Jameson, 2001).

As contests, conflicts and the emotions they trigger have an impact on market practices. To examine emotions and emotion transformation in interactions, I focus on two cognitive variables – knowledge and appraisal (Lazarus and Smith, 1988) – which contribute to an understanding of the process of emotion and the way that actors' reactions create dynamics in relationships. Lazarus and Smith (1988) indicate that knowledge is a distal variable requiring an additional process to produce an emotion and its development, while appraisal is proximal and directly influences a produced emotion. 'Knowledge' refers to concrete or abstract cognitions about the way things are and how they work, including technological capability, problem-solving ability, and industrial background knowledge. 'Appraisal' means creating a form of personal meaning (Lazarus and Folkman, 1984) consisting reflecting context, evaluations of existing knowledge, a retrospective view of experience and even agreed goals.

The literature is particularly concerned with the functions of actors' emotions. The functions of emotions usually have three characteristics. First, emotion can be cognitive in linking together actors' experiences and goals (Lazarus, 1991). Actors communicate, interact with and form views about their counterparts, including the interpretation of positive or negative emotions. Actors can form divergent understandings in interpreting events within highly interdependent relationships, and these are often influenced by their goals, plans or expectations. Second, emotion is influential because of actors' responses to events or changes which they deem to be significant (Bodtker and Jameson, 2001). Third, emotion has consequences with a sequenced feature. Positive emotions promote relationship development into functional outcomes. Negative emotions exist in problematic relationships (Tähtinen and Blois, 2011). Negative emotions must be managed because they can potentially escalate into a conflict (George *et al.*, 1998), thereby threatening business relationships (Halinen and Tähtinen, 2002; Mele, 2011). Actors are required to take transformative actions so as to make relationship dynamics functional.

As a mediator, emotion has a sequenced feature, connecting actors, events and activities in the network. Lawler (2001) argues that emotions are mediators for the process of interpersonal interactions, and especially use means of cognition in relation to personal trust. Relationships do not exist in the absence of emotion. An appraisal of the level of

personal trust or commitment affects the stability, durability and effectiveness of a business relationship. Andersen and Kumar (2006) state that emotions (positive or negative) influence relationship dynamics, with trust influencing subsequent interactions (Larzelere and Huston, 1980). The crucial impact emotions have on business interactions is on relationship dynamics. Emotion works on relationship dynamics using a foundation of actors' knowledge and their appraisal of the cognition of an event. Some business actors specialize in spanning the boundaries within an industry (Geiger and Finch, 2009). Actors can establish mutual commitment with their partners in knowledge-intensive alliances (Cohen and Levinthal, 1990). In these alliances, market actors often seek to mobilize resources and participate in the development of relationships in order to contest for their shared desired goals. According to Cauley de la Sierra (1995), alliances can be broken up by negative emotions and be enhanced by positive emotions. Actors become involved in mutual trust-building activities and mutual adaptation (Wicks *et al*., 1999), both of which make contributions and react differently depending on the different emotions, thereby influencing the performance of relationships (Geyskens *et al*., 1998) and relationship dynamics.

4.5.3   Conflict as practice and performance

From the socio-psychological perspective, perceived conflicts, tasks and relationships are implicated in how conflicts are experienced and performed by actors. The performance involves tasks and/or events, and triggered emotions, manifested in interactions and further dynamics in relationships. Where markets are in the making, conflicts are regarded as practices and performances by which emotions are transformed and managed at the same time (Araujo *et al*., 2010). Emotions, especially negative emotions, are both triggered by events and in a state of transformation into practices which themselves make events. These events are sequenced, and function not only in shaping and causing markets to perform but also in developing business relationships at their initiation, development, voluntary termination, forced termination and re-establishment stages (Andersen and Kumar, 2006) where conflicts pervasively exist. Nutt (2002) has six stages of decision-making in his transactional model: signals, intentions, concept, development, detailing and installation. Each stage of the process is performed by pervasive conflicts, conflict-aligned events and the triggered emotions of actors. Actors make conflicts while transforming triggered emotions into sequenced events. At the same time, actors both deliver their emotions through practices, and show conflicts and emotions through market shaping events.

However, emotions influence actors' abilities to cope with events. This situation can trigger new emotions in networks, sequenced by new events where actors are involved in managing and transforming emotions. Managing emotions is not the ultimate goal but is a means of maintaining stable and long-term business relationships. Actors consider the management of emotions as a process (Akgün *et al*., 2003), because of the succession of events and emotions which are distributed in networks, unfold over time, involve other actors and are embedded in routines. Both negative emotions and positive emotions, as temporary states of the human condition, can be transformed into conflicts and sequenced events through which emotion and conflict are performed. Actors perform emotions by utilizing, mobilizing or investing in resources so as to render emotions manageable (Baraldi *et al*., 2012; Finch *et al*., 2012; Streukens *et al*., 2011). In the practice of transforming emotions, rational analysis learning from emotion-filled events will definitely direct market-shaping activities in order to reduce negative emotions and gain temporary or long-term collaborations (Ryan *et al*., 2012) based on the roles of actors and their objectives. These collaborations, as performative powers, draw actors as a cluster to adapt to make markets work (Kjellberg *et al*., 2012).

4.6   Conclusions

The affectiveness of conflict is a suitable subject for research, and emotional conflicts and sequences of conflicts in industrial markets are of great interest for this thesis. Jehn and Mannix (2001) categorize conflict as having three aspects – relational, task and process – and point out that conflicts emerge and develop within small groups and teams, where affect personal and emotional conflicts are manifested and perceived by actors. I have reviewed a practice approach to markets, proposing that markets are always in the making, calculable and inevitably bound up with material entities. Çalışkan and Callon (2010) set up a research agenda on the study of emotions as an interesting topic for market studies approaches. Organization conflict and its emotional dimensions can be explored in market studies research. Conflicts, as contests, are conveyed to the actors involved as emotions. Emotions, triggered by events, develop into affective reactions. Thus, conflicts and the emotions they trigger function in shaping markets, in which process conflicts are practices and performances of emotions (either positive or negative) and transformations of emotions into events which make markets.

Conflict is under-researched in business-to-business marketing, and it is mainly its dysfunctional impact on business relationships – such as relationships breaking up and ending – that is covered. The behavioural approaches on conflict have influenced IMP research, which has covered questions about existing relationships and how the emotions they trigger influence the trajectory that a relationship takes in a dynamic context. IMP research has also covered resource mobilization in terms of managing (in) conflicts in a distributed context with more structural qualities. In this thesis, I develop a resource-based view of conflict and propose that conflict is a pervasive condition for business activities.

The conclusion to be drawn from this review (Chapters 2, 3 and 4), which has not been fully developed in industrial marketing research, is that conflict is likely to be a pervasive condition of business activity, encompassing relationships and resources which are experienced by actors as emotions and events in the course of their business activities or tasks, and are embedded in materials. By reviewing the behavioural and socio-psychological theories, and developing the two approaches, the conceptual framework develops and leaves the research interest in conflict in Business-to-business marketing research, especially the IMP and market studies traditions, for industrial marketing research, I have concluded that there are some gaps in industrial marketing research in the two approaches on conflicts (see Figure 4-3 below), between researches focused on how conflict is a pervasive condition of organizing, and how actors come to experience and manage particular episodes of conflicts; how conflict becomes manifested as emotions and how the perceived emotions are managed in relationship dynamics; how actors adapt in conflict and undertake incremental innovation.
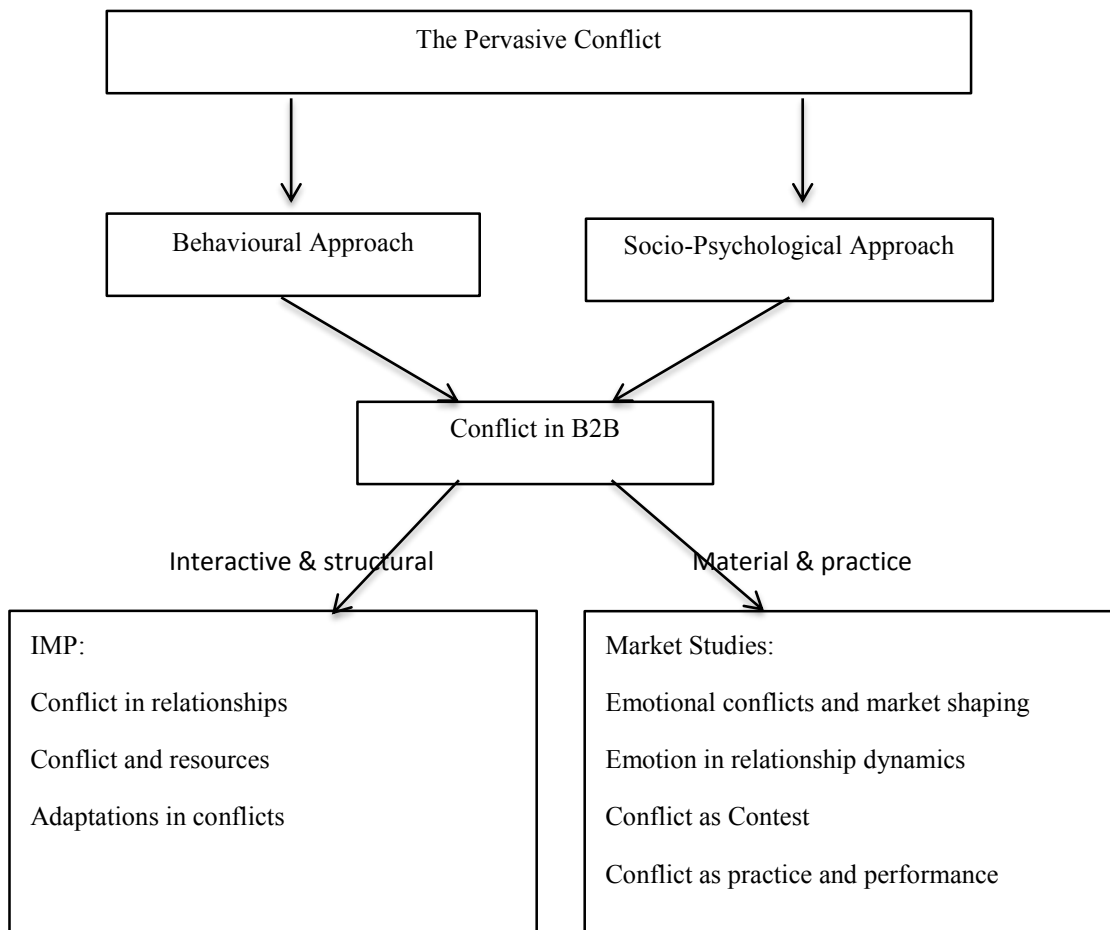
Figure 4-3: A diagram of conceptual framework of the thesis

I address these gaps by investigating the research aim of how actors manage, and mange in conflict, within relationships and networks, by looking into questions of conflicts in relationships, their emotional dimensions and actors' adaptations to them in industrial markets.

I address these research gaps by examining conflicts from perspectives of relationships and resources as well as personal interactions. IMP researchers work on conflict is with structural and interactive features, while market studies tradition focuses more on the material and practice dimension of conflicts, such as conflict in market shaping, conflict and individual perceived emotions. Three questions guide the investigation:

Question 1: How does conflict function as a pervasive condition experienced and managed in business relationships?

In terms of answering the Question 1, I look into resources and individual experience from conflicts into actors' relationships and interactions context. Three sub-questions are answered in Chapter 6, e.g. how do actors draw resources into their relationships and interactions during conflict? How do actors experience and make sense of conflict as part of their business activities? And how do actors manage conflict in relationships?

Question 2: How do actors understand, transform and manage perceived emotions in business relationship dynamics?

This research question focuses on individual perceived emotions of conflicts, which not only have impact on relationships but also on market shaping. The question is investigated by answering questions of how emotions are produced and transformed in the interactions, how emotions function in relationship dynamics, and how actors manage and resource emotions in networks.

Question 3: How do actors adapt to establish incremental innovation in conflicts?

The third research question of the thesis demonstrates the processes of incremental innovation, where activities related to adaptations take place. In answering the third research question, I look into three sub-questions of how actors adapt and establish incremental innovation, how incremental innovations take place and what makes incremental innovation successful in the network.

To address these research questions, and before any discussion on empirical findings, it is necessary to consider the philosophical underpinnings and reasoning approaches which will guide the research design and data analysis (see chapter 5)

Chapter 5.   Research Methodology

5.1   Introduction

The direction of a research study is influenced by its philosophical position, which needs to be identified in the process of research design (Creswell, 2009). Identifying and positioning philosophical issues is important in the process of research design (Esterby-Smith *et al.*, (2008), because (1) philosophical approaches are usually linked with research designs and suggest particular research methods; (2) philosophical approaches help with judging whether the designs are successful or not; and (3) philosophical approaches may assist by suggesting designs used in past research. Therefore, researchers should decide on their philosophical stance to ensure a better justification of their research designs.

The aim of this chapter is to set out the research philosophy which guides the research design for the argument and analysis of the data of the thesis. This chapter consists of four sections covering the philosophical positions of the research, the reasoning approaches, the research methods adopted and the data collection and analysis process. Four questions will be answered in this chapter:

(1) What epistemology have I adopted to inform the theoretical perspective?
(2) What theoretical perspective have I taken to direct me in my choice of methodology?
(3) What methodology and research methods are used to address the research questions?
(4) How are the data collected and analysed?

The four basic concepts referred to in these questions are defined by Crotty (1998, p. 3) as follows: epistemology means 'the theory of knowledge embedded in the theoretical perspective and thereby in the methodology'; the theoretical perspective means 'the philosophical stance informing the methodology and thus providing a context for the process and grounding its logic and criteria'; methodology means 'the strategy, plan of action, process or design lying behind the choice and used of particular methods and linking the choices and use of methods to the desired outcomes'; and methods mean 'the techniques or procedures used to gather and analyse data related to some research questions or hypothesis'.

The philosophical paradigm chosen influences the practice and direction of the research, as 'a basic set of belief that guide action' (Guba, 1990, p. 17). 'Paradigm' can be understood as a worldview, a 'general orientation about the world and the nature of the research that a researcher holds' (Creswell, 2009, p. 5). These are shaped 'by the discipline area of the student, the beliefs of advisers and faculty in a student's area, and past research experiences' (p. 6). Researchers make choices among philosophical paradigms – mostly between postpositivist and constructivist – to determine the approaches for their research projects. Guba and Lincoln (1994) are often credited with the development of a system for comparing the different philosophical positions through the concepts of ontology, epistemology and methodology shown in the table below.

Philosophical Term	Explanation
Ontology	Philosophical assumptions about the nature of reality
Epistemology	General set of assumptions about the best ways of inquiring into the nature of the world
Methodology	Combination of techniques used to enquire into a specific situation

Table 5-1: Ontology, epistemology, and methodology

(Easterby-Smith *et al*., 2008, p. 60)

After reviewing what the established researchers in the area have done so far and comparing the paradigms of post-positivism and social-constructivism, I find that these approaches do not fully fit or address my research aim and questions. I then explain why a pragmatism approach is suitable for this research. This is a philosophical approach which was developed from around 1870 in America and refers to a reasonable and logical way of thinking about problems that is based on dealing with specific situations instead of on ideas and theories.

The thesis takes abduction as the reasoning approach, one which moves between an inductive and a deductive approach. Abduction is considered the essence of pragmatism. It

accepts the existing theory and thus enables me to take a mid-range research approach to the research aim and questions.

The overall research method adopted is the case study, as it examines 'the context and other complex conditions related to the case(s) being studied, which are integral to understanding the case(s)' (Yin, 2011, p. 4). The case study research method in this research is appropriate for the analysis of processes of conflict, emotions and the changes in the actors involved.

Data were collected through a combination of methods, including through research interviews, observation, attending industry conferences and exhibitions, reading industry and company reports and documents.

In terms of analysing the data, a cross-case comparison method was adopted and the data were coded using QSR Nvivo, version 10, which provides ways to organize unstructured data by themes, people or places.

From the next section to the end of this chapter, I explain in detail the research philosophy, reasoning process, research methods and methods of data analysis used in this research.

5.2   Philosophical Paradigm-Pragmatism Approach

5.2.1   Contrasting paradigms

Corley and Gioia (2011) draw a simple definition of theory from Gioia and Pitre (1990): 'Theory is a statement of concepts and their interrelationships that shows how and/or why a phenomenon occurs'. In deciding on the philosophic position of this thesis, I reviewed and compared three general philosophical paradigms commonly used in business marketing research, i.e. postpositivism, social-constructivism and pragmatism.

Postpositivism refers to the thinking following positivism, challenging the traditional notion of the absolute truth of knowledge. Postpositivism recognizes 'that we cannot be positive about our claims of knowledge when studying the behaviour and actions of humans' (Creswell, 2013, p. 7). Postpositivism represents a deterministic philosophy in which causes determine effects or outcomes and a reductionist approach in that the intent is to reduce an idea to a small discrete set of ideas to test, such as the variables constituting

hypotheses and research questions. The knowledge that is obtained through a postpositivist lens is based on careful observation and measurement of the objective reality that exists 'out there' in the world. A researcher, holding a position of postpositivism, usually follows the research procedure of establishing a theory, collecting data that either supports or refutes that theory, and then making necessary revisions and conducting additional tests. The characteristics of postpositivism are outlined by Burbules and Phillips (2000): knowledge is conjectural (and antifoundational) – absolute truth can never be found; research is regarded as the process of making claims or tests of a theory; data evidence and rational considerations shape knowledge; research seeks to develop true statements that help to explain the situation; and researchers must make sure that there is validity and reliability in qualitative research.

Social-constructivism is a very different approach to qualitative research. Social-constructivism takes an interpretive approach to humans and society. Social-constructivism holds that 'individuals seek understandings of the world in which they live and work. Individuals develop subjective meaning of their experiences–meanings directed toward certain objects or things; these meanings are varied and multiple, leading the researcher to look for the complexity of views rather than narrowing meaning into a few categories or ideas' (Creswell, 2013, p. 8). Therefore, social-constructivism often addresses 'the processes of interactions among individuals', and focuses on 'the specific contexts in which people live and work in order to understand the historical and cultural setting of the participants' (p. 8). According to Crotty (1998), social-constructivism explains that human beings construct meanings as they engage with the world; they are interpreting based on their historical and social perspectives, where the context or setting of the participants is important. The basic generation of meaning is always social, arising in and out of interaction with a human community. The process of qualitative research is largely inductive; the inquirer generates meaning from the data collected in the field.

I contrast postpositivism and constructivism and summarise the key differences between the two paradigms in Table 5-2:

Research Assumptions	Post-positivism	Constructivism
Ontology	Researcher observes reality, which is objective	Researcher interprets reality, which is subjective
Epistemology	Researcher is independent	Researcher engages and interprets
Explanations	Causality	Further understand the situation
Research progresses	Hypotheses and deduction	Gathering data and induction
Concepts	Need to be operationalized so that they can be measured	Should incorporate stakeholder perspectives
Units of analysis	Should be reduced to the simplest terms	May include the complexity of 'whole situations'
Generalization	Statistical probability	Theoretical abstraction
Sampling requirements	Large number, randomly selected	Small number, selected for specific reasons

Table 5-2: Contrasting Postpositivism and Constructivism

In recent years, organization studies and marketing researchers have been interested in investigating 'action patterns' (Cohen, 2007), or 'routines' (Feldman and Pentland, 2003; Feldman and Orlikowski, 2011; Nelson and Winter, 1982; Lillrank, 2003), and the concept of 'practices' (Orlikowski, 2002, 2007; Kjellberg and Helgesson, 2006; Feldman and Orlikowski, 2011; Azimont and Araujo, 2007; Araujo *et al*., 2008) and 'performances' (Hagberg and Kjellberg, 2010; Çalışkan and Callon, 2009). These topics are slowly developed from modern organization theory, such as 'routines' in Simon's *Administrative*

Behavior, 'programs' in March and Simon's *Organizations*, and 'standard operating procedures' in Cyert and March's *Behavioral Theory of the Firm* (Cohen, 2007).

However, researchers, holding the views of postpositivism or constructivism, face challenges in investigating problems relating to real-time dynamics, routines and practices which are usually normal and too difficult to make assumptions about. In this thesis, in terms of addressing the research aim and questions, I rely as much as possible on the participants' views of the situation about relationships among individual actors. Kjellberg and Helgesson (2006) propose that market actors engage with and perform representational practices, such as conflict in this research, which often refer to images of what markets and exchanges 'should be like'. The crucial dimension is how participants adapt to manage (in) conflicts, which help actors envisage what the future could be like. Such research usually addresses the processes of interaction among individuals in the industry. This thesis investigates actors and actors' interactions in managing (in) conflicts based on their experience, affectiveness, activities, indicating interpretations and practices.

Learning lessons from the established researchers in this field, it seems that neither social-constructivism nor postpositivism much address the above-mentioned issues. What this research required was more than social-constructivism or postpositivism can provide. For instance, the context for the research is real-time dynamics (both interpersonal and interorganizational) rather than an existing context which had already been researched; the research focuses more on individual emotions, actions, situations and consequences rather than existing conditions; the research concentrates more on real practices and performances in relation to problems as they are encountered and solutions as they are found rather than just the interpretations of previous experiences; and the research focuses more on the intertwining of social and material entities rather than just individual interactions.

Another paradigm can be used which will address these issues, i.e. pragmatism, which is problem-centred, pluralistic, concentrates on the consequences of actions and is oriented on real-world practice. American pragmatist John Dewey suggests that the pragmatism paradigm has a strong emphasis 'on the human faculties of habit and emotions' (Cohen, 2007), and has great influence on organizational research on the topics of action patterns, routines and practices. In industrial marketing research, research procedures based on pragmatism are regarded as interplaying theory and empirical phenomena and setting the

general terms for case studies (Dubois and Gibbert, 2010; Dubois and Araujo, 2007) which contributes to developing theories by explaining phenomena and the adopted research methods (Van Maanen *et al.*, 2007). I therefore adopt pragmatism as my philosophical stance for this research; I explain how pragmatism guides me in developing the research in the following sections in this chapter.

5.2.2   Pragmatism

The overall philosophical position of this thesis is pragmatism, which derives from the work of Peirce, James and Dewey (Peirce 1878, 1986; James 1907; Dewey, 1922), and takes a middle ground in relation to research design and methodological approaches. Pragmatism originated in the United States during the late nineteenth century and has had a significant impact on social science research. It is a philosophy that believes that itself with a scientific idea is true when it works sufficiently and meets people's requirements. Pragmatism develops around the idea that the function of thought is as an instrument or tool for prediction, action, and problem solving. Pragmatism can refer to the idea of practicality and getting things done. It is a theory for a society that does not believe that much in theory, which is practical, down to earth. Pragmatism does not have a single set of methods; it is a movement rather than a unified school. The three most important classical pragmatists are Charles Sander Peirce on contemporary critical theory, Williams James on psychology, and John Dewey on educational and learning theory.

 'The classical pragmatists sought to naturalize the concept of experience – to demystify and domesticate it'. That is, 'believing that things are thus-and-so is to be understood in terms of practical abilities to do something' (Brandom, 2011. p. 9). 'Since our limited human efforts at inquiry can never achieve totality, we must settle for sufficiency, which is ultimately a practical rather than a theoretical matter, so that prioritizing practical over theoretical reason is an inescapable part of the human condition' (Honderich, 2005, p. 747). Pragmatists take a consequential and practical approach to knowledge as a device based on the cognition of experiences (Audi, 1999).

Peirce (1878) writes of doubt being parasitic on belief, with belief being something like a practical habit or local practical theory, but includes a higher-level theory too that individuals adjust, adapt, and learn so that our knowledge is always provisional, with truth being only for the time being, locally, and Truth being a possibility but difficult to attain.

Truth, as the dictionaries tell us, is an attribute or agreement of certain of our ideas. It is a property of the best beliefs that we can have. Truth can also be broadened to morals. Pragmatism is a kind of cognitivism, which claims that 'epistemological and moral theory should try to preserve our deeply held convictions and our ways of inquiring into various subject matters' (Misak, 1999, p. 6).

Pragmatism is a philosophy that proceeds from an idea of truth or knowledge in the vision of the universe, and works down from there to the theory of human nature, ethics, politics, social relations, economics, etc. True beliefs are defined as those that prove useful and practical, and are demonstrated by the outcome of putting a proposition or theory into actual practice (James 1907) as well as guiding that practice. Pragmatism is interested in technology, in the facts of the world. It is also a philosophy of optimism. Pragmatism is a theory of meaning, with the meaning of any concept that has application in the real world being created in the relationship of 'experiential conditions of application with observable results' (Honderich, 2005, p. 748). In the views of pragmatists, theories must be related to experience and practice, and a methodology can be used to prove a truth to be right. Practical results can help to judge the appropriateness of beliefs (Peirce 1986). In pragmatism, truth is justified by the consequences of putting one's view and general notion into real practice. Beliefs are also considered as habits and routines of action by pragmatists. Mautner (2005, p. 485) says that 'beliefs are habits of acting rather than representations of reality'.

Peirce (1878) proposes that the 'essence of belief is the establishment of habit'. Dewey (1922) defines habits as 'an acquired predisposition to ways or modes of response'. He views human beings as having three faculties, i.e. habitual, cognitive and emotional, and proposes that habits work as the disposition of action rather than 'as the observable behaviour to which it might give rise' (Cohen, 2007). From this perspective, all thoughts and behaviour within individuals are held to be habits. And habits are intertwined with cognition and emotions and become adaptable to real practices. John Dewey also places a strong emphasis on the human faculties of habit and emotion. According to Dewey, action, either individual or collective, takes place through 'a biological system in which habit is integral' (Cohen, 2007).

According to Cherryholmes (1992) and Morgan (2007), pragmatism allows multiple approaches. Researchers holding pragmatist views can engage with either qualitative or

quantitative research, or combine both. They are free to choose methods (multiple if necessary), different worldviews, and different assumptions, as well as different forms of data collection and analysis, techniques and research procedures to meet their research requirements occurring in social, historical, political, and other contexts. They can regard truth as what works at the time rather than something based on an objective or subjective perspective.

Pragmatism provides an alternative to dualistic research philosophies which address 'getting things right' (Cherryholmes, 1992, p. 13) and insist on following strict ontological and epistemological guidelines when reporting past experiences. In pragmatism, knowledge is considered as a device for perceiving experience as individual actors, and the habits and beliefs or norms that direct our actions (Audi, 1999). Research results which have used the pragmatism approach, with an instrument or tool for prediction, action, and problem-solving, contribute to 'the basis for organizing future observations and experiences' (Cherryholmes, 1992, p. 14).

The term pragmatism could be defined as practicality. It proceeds from a sense of freedom and the idea that the world can be improved. But it is far more impressive than just the idea of doing what is practical. Truth, practice, habits and routines can be a kind of mode by which ideas, theories and beliefs, and learning can be shared, referring to 'what works out most effectively in practice' (Honderich, 2005, p. 747). Pragmatism has had a clear influence on modern research, drawing upon practice and practices. Schatzki (2001) defines practices as human activities organized and performed around a shared practical understanding. While habits focus more on individuals, routines are vital to organizations. Routines can be regarded as the capacities or potentiality rather than behaviour; they rely on knowledge and memories, working within approved procedures or regulations (Cohen *et al.*, 1996). The concept of 'routine' (Feldman and Pentland 2003; Nelson and Winter, 1982) can be understood alongside other closely related concepts, such as 'practice' (Orlikowski, 2002), 'program' in March and Simon's *Organizations*, and 'standard operating procedures' in Cyert and March's *Behavioural Theory of the Firm*. Cohen (2007) considers that routines seems to come with fundamental intellectual difficulties; the development of useful shared understandings and knowledge is inhibited because routines are taken to be rigid in execution, mundane in content, mindless in feeling or reflection, and explicitly suffocate action.

In market studies approaches, practices are recognized repertoires, where actors have some expectations of performance and outcome, some reference points, and some sense of self-accountability and of being held accountable locally or in context. Practices differ from routines in that they are often fragmented, require assembling in context and can be augmented. For instance, a practice remembered or represented from some previous performance might not fit a present setting, but might be augmented to do so from any number of sources (Orlikowski, 2007). Çalışkan and Callon (2009) also suggest that pragmatism has strong advantages in explaining 'the conditions of complexity and mobility in the relations between things, people and their contexts', and in particular the 'attentiveness to things and materialities'. In the IMP tradition, researchers holding a pragmatist viewpoint take resources into account in certain contexts. In industrial marketing research, pragmatism provides a strong justification for the use of the case studies method, which 'offers the possibility of studying a problem defined situation in great detail' (Easton, 2010).

This thesis draws on pragmatism as a philosophical underpinning, which directs us mid-range in choosing reasoning approaches, designing research, and selecting research methods (Morgan, 2007). Peters *et al*., (2013) point out that 'Holt (2011) reviewed thirty-one organization theories that could provide mid-range theoretical support for the study of marketing organizations, which lends further support to the importance and interest in the growth of industrial marketing as a discipline'. They also indicate that mid-range theories seek to provide a bridge between empirical findings and general theory; this makes them more easily applicable to empirical investigation, whereas empiricism privileges direct experience (particularly sensory perception) in the formulation of our ideas.

In Table 5-3 below, Morgan proposes an alternative view to the traditional quantitative and qualitative approach to research.

	Qualitative	Quantitative	Pragmatic approach
Connection of theory and data	Induction	Deduction	Abduction
Relationship to research process	Subjectivity	Objectivity	Intersubjectivity
Inference from data	Context	Generality	Transferability

Table 5-3: A pragmatic alternative to the key issues in social science research methodology

(Morgan, 2007, p. 71)

5.3   Abductive reasoning

In terms of connecting theory and data, a pragmatist approach relies on a form of abductive reasoning, which shifts between inductive and deductive approaches (Coffey and Atkinson, 1996). Abductive reasoning converts observation to theory and then assesses through action (Morgan, 2007). Burks (1946) concludes by drawing from Peirce's view of pragmatism, indicating that pragmatism:

> is nothing else than ... the logic of abduction. That is, pragmatism proposes a certain maxim which, if sound, must render needless any further rule as to the admissibility of hypotheses to rank as hypotheses, that is to say, as explanations of phenomena held as hopeful suggestions; and, furthermore, this is all that the maxim of pragmatism really pretends to do, at least so far as it is confined to logic, and is not understood as a proposition in psychology.

I have briefly examined the nature and uses of theory and required data in our project and concluded that abduction can be a proper reasoning process comparable with deduction and induction. Peirce (1931) considers that 'abduction is the process of forming an explanatory hypothesis. It is the only logical operation which introduces any new ideas; for

induction does nothing but determine a value, and deduction merely evolves the necessary consequences of a pure hypothesis'. Traditionally, the 'process of abduction has been modelled by appeal to some sort of deductive relation between the *explanandum* (or fact to be explained) and the *explanation* (the fact that renders the explanandum plausible)' (Boutilier and Beche, 1995).

Abduction has an important role in representation and reasoning. Abduction moves from 'effect' to 'cause', and is thus based on a type of deductive process of finding explanations. In this respect it has a close and significant connection with practice. 'A practice view of theoretical knowledge also connotes a significant shift because focusing on theoretical knowledge as somehow independent of its pragmatics overlooks the processes through which knowledge, use, value, and utility emerge' (Corley and Gioia, 2011). Corley and Gioia propose two notions in relation to adopting a practice view of knowledge, i.e. '(1) that knowledge should be treated as process and (2) that the production of knowledge should be treated as a recursive dialogue between theorists and reflective practitioner' (2011).

Relying on abduction, the original framework is modified and theoretical insights are gained during the process (Dubois and Gadde 2002). 'Unlike induction, abduction accepts existing theory, which might improve the theoretical strength of case analysis. Abduction also allows for a less theory-driven research process than deduction, thereby enabling data-driven theory generation' (Järvensivu and Törnroos, 2010). I adopt abduction as the reasoning approach in this thesis in order to help explain the interplay between theory, method and empirical phenomena. Abduction is 'a process during which the theoretical framework, empirical fieldwork and case analysis evolve simultaneously' (Borghini *et al.*, 2010). These processes affect and are affected by 'what happens in reality, the available theories, the case that gradually evolves, and the analytical framework (Dubois and Gadde, 2002). 'Abduction merely states that theoretical frameworks evolve simultaneously with empirical observation' (Dubois and Gibbert 2010) and 'based on true dialogue between empirical and conceptual inquiry' (Dubois and Gibbert 2010), through which the theoretical structures and empirical observation develop interactively. Thus, the abductive approach takes advantage of the flexibility of the case study method to build theories (Dubois and Gibbert 2010; Eisenhardt, 1989; Eisenhardt and Graebner, 2007; Dubois and Araujo, 2007). Dubois and Araujo (2004) highlight the contribution of case studies to the development of the IMP tradition, covering interaction, relationship and network

approaches (Anderson *et al.*, 1994; Chang and Gotcher, 2010; Cheng and Sheu, 2010, 2012; Mele, 2011; Plank *et al.*, 2006; Jehn and Mannix, 2001; Tähtinen and Blois, 2011). This helps to deal with temporal and boundary challenges that other methods face (Geiger and Finch, 2009). The Market Studies approach regards markets as lively spaces and places to contest and organize activities, allowing a set of practices that contribute to construct markets and other economic orders (Araujo and Kjellberg, 2009). Pragmatism has been a useful approach for dealing with problems of practices and in considering issues such as market making (Araujo and Kjellberg, 2009). And case study methods are commonly adopted in market studies research (Araujo and Spring, 2006; Kjellberg and Helgesson, 2006; Rinallo and Golfetto, 2006; Çalışkan and Callon, 2010; Azimont and Araujo, 2010) which is 'typically carried out in close interaction with practitioners and they deal with real management situations' (Gibbert *et al.*, 2008).

In this thesis, I consider the case study method to be the most appropriate technique (Dubois and Gibbert 2010) to investigate the three 'how'-led research questions covering the topics of pervasive conflicts, actors in these conflicts addressing affective emotions and incremental innovation.

5.4 Research design

5.4.1 Case study methods

In applying and developing the concepts discussed in Chapters 2, 3 and 4, I recognize that, while identifiable as constructs, some have meanings that are ambiguous or refer to processes that are likely to emerge over time. Research methods are determined after researchers have made explicit their philosophical underpinnings and reasoning approaches. Thus, in this research, I take the case study as the overall research design. Case study methods are used for a wide variety of research questions, such as questions on organizational performance, project design, policy making and analysis, business relationships and behaviours. The term 'case' is used in many different ways. 'It is used to refer to data categories, theoretical categories, historically specific categories, substantive categories, and so on' (Ragin, 1992, p. 217). According to Ragin, 'making something into a case or "casing" it can bring operational closure to some problematic relationship between ideas and evidence, between theory and data'(1992, p. 218). Bromley (1986) addresses the features of case study research, indicating that they include the desire to

derive a close or otherwise in-depth understanding of a single or small number of 'cases', set in their real-world context. Yin (2009) proposes an abbreviated definition of case study, as 'an empirical inquiry about a contemporary phenomenon (e.g. a "case"), set within its real-world context – especially when the boundaries between phenomenon and context are not clearly evident'.

Compared with other research methods, case study research contributes to 'examining the context and other complex conditions related to the case(s) being studied, which are integral to understanding the case(s)' (Yin, 2011, p. 4). Yin also summarizes three research situations in which the case study method can be adopted, i.e. (1) addressing descriptive or explanatory questions; (2) emphasizing the study of a phenomenon within its real-world context; and (3) conducting evaluations (2011). Four types of case study research designs are described by Yin (2011) (as illustrated in Figure 5-1). Based on the number of cases being studied, case study research can be labelled as single- or multiple-case study. Both single-case studies and multiple-case studies can be categorized as holistic or include embedded subcases within an overall holistic case, producing four types of case study design.

Yin (2011, p. 28) draws on Chen (1990), Chen and Rossi (1989) and Sutton and Staw (1995) to address the important roles theory plays in case studies, such as 'specifying what is being explored when you are doing exploratory case studies; defining the nature of the "case(s)" to be part of your case study; defining a complete and appropriate description when you are doing descriptive case studies; and stipulating rival theories when you are doing explanatory case studies.' Case study research also has a role to play in contributing to building and refining theories (Eisenhardt, 1989; Eisenhardt and Graebner, 2007; Woodside and Wilson, 2003; Corley and Gioia, 2011) by utilizing in-depth insights on empirical phenomena and their contexts (Dubois and Gadde, 2002). Case studies can be considered as both a methodological 'product' and as a 'tool' (Gibbert *et al.*, 2008), through which theory and empirical phenomena interplay (Dubois and Gadde, 2002).
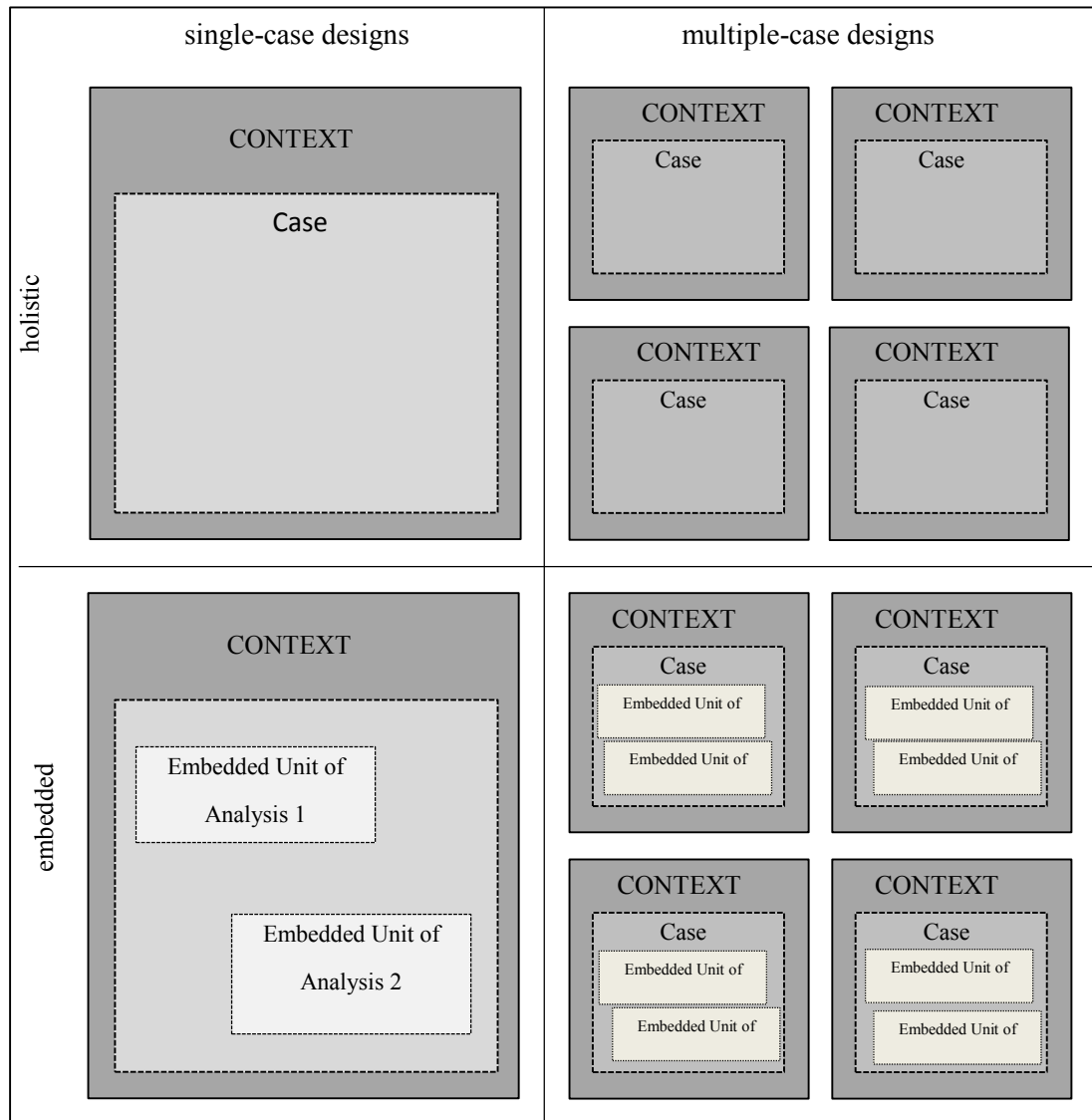
Figure 5-1: Basic types of design for case studies

(adopted from Yin, 2011, p. 8)

According to Gibbert *et al*., (2008), a case study is carried out in close interaction with practitioners who are engaged with the real situation, so that it is considered an ideal methodology for 'creating managerially relevant knowledge'. Van Maanen *et al*., (2007, p. 1146) state that 'method can generate and shape theory, just as theory can generate and shape method.' Replication logic is usually considered as central to building theory from case studies (Eisenhardt, 1989) as 'each case serves as a distinct experiment that stands on its own as an analytic unit' and even multiple cases are 'discrete experiments that serve as replications, contrasts, and extensions to the emerging theory' (Eisenhardt and Graebner,

2007). Single-case studies describe the existence of a phenomenon while multiple-case studies can provide a strong base for theory building because multiple cases enable comparisons that 'clarify whether an emergent finding is simply idiosyncratic to a single case or consistently replicated by several cases' (Eisenhardt and Graebner, 2007). Multiple cases seem to help develop better theory. But theoretical sampling is much more complicated, which should concern more on the contribution to the theory development within the set of cases. Eisenhardt (1989) indicates that the resultant theory built from case study research can be novel, testable and empirically valid. She also proposes a process for building theory through within-case and cross-case analysis (see Table 5-4, which has guided this research). The theory-building process 'occurs via recursive cycling among the case data, emerging theory, and later, extant literature' (Eisenhardt and Graebner, 2007), and is embedded in rich empirical data (Yin, 1994).

Dubois and Gibbert (2010) studied the interplay between theory, method and empirical phenomena when particularly considering case study research in the context of industrial markets. According to Dubois and Gibert (2010), 'the links between theory, empirical phenomena and method is crucial in all methodological approaches, they seem to be of particular importance in case research owing to variety of ways in which case research can be conducted.' Case study research is commonly adopted in business-to-business marketing research (Easton, 1995; Dubois and Gadde, 2002; Halinen and Törnroos, 2005; Borghini *et al.*, 2010; Dubois and Araujo, 2004; Ford and Redwood, 2005). Easton (1995) concludes that case study methods have a powerful role, and one particularly suited to industrial networks research. 'Case studies in industrial marketing are typically negotiated and carried out in close interactions with practitioners and as they deal with real management situations, they have potential to create knowledge that practitioners will consider useful' (Dubois and Gibbert, 2010). Comparing with deductive (theory-empirical phenomena) and inductive approaches (empirical phenomena-theory), Dubois and Gibbert (2010) point that 'abductive approaches take advantage of the flexibility of the case method by permitting reconsideration in both the theoretical and empirical domains, and consequently by allowing changes of the boundaries of the case based on theoretical and/or empirical choices.' According to Woodside and Wilson (2003), industrial marketing substantially focuses on 'the decisions and behaviours by individuals and groups within and between organizations'. Individual responders can retrieve information and be willing to report his/her experience or perceived information, usually followed by a *post hoc* sequence of events that happens over several days, weeks, months or even years. Woodside

and Wilson (2003) stress the importance of research focused on the cognition of individual market actors, such as 'what they perceive', 'framing what they perceive' and 'interpreting what they have done including how they go about solving problems and the results of their enactments – including the nuances, contingencies, in automatic and controlled thinking processes'. They conclude that case study research can contribute to a deep understanding of the actors, interactions, sentiments and behaviours occurring for specific processes through time'.

Case study research can also contribute to analysing processes of conflict, emotion and its transformation (Greer *et al*., 2008; Bodtker and Jameson, 2001; Sloan and Oliver, 2013). For instance, Sloan and Oliver (2013) examine events and emotional sequences in which individual actors participate and transform the emotions. They establish an in-depth, longitudinal investigation of interactions between partners within multi-stakeholder partnerships, so as to theorize about how critical emotional incidents and emotional engagement practices influence the building of trust in the multi-stakeholder partnerships. Another example is the longitudinal study by Greer *et al*., (2008) on conflict and its transformation. Greer *et al*., (2008) examine the relationships between task, relationship and process conflict over time in small groups by focusing on the inter-relationships among different types of conflicts and investigate the resolution of conflicts through the conflict transformation process.

Because of the nature of phenomena in industrial marketing, a case study established in this area is different (Piekkari *et al*., 2010). The industrial networks present researchers with challenges 'since they do not constitute closed, bounded or clearly defined systems' (Dubois and Gibbert, 2010). In terms of addressing the interplay between theory, method and empirical phenomena, Dubois and Gibbert (2010) compare two reasoning approaches (deductive and abductive) and propose that the abduction approach helps researchers travel 'back and forth' between theory and phenomenon so that a general theory builds from 'dynamically combining multiple steps of induction and deduction that often involves re-interviewing and revising sense-making views of executives participating in implemented strategies', based on how informants interpret investigators' interpretations of antecedents, actions, and outcomes (Dubois and Gibbert 2010).

5.4.2 Research settings

5.4.2.1 The structure of the oilfield chemical market

The oilfield chemical market has serious concerns about issues relating to environmental and safety regulations. Regulators require eco-toxicological tests on all components of oilfield chemistry used in the North Sea area. The three main sectors of the chemistry market – chemical suppliers, chemistry service companies and oil and gas operators – operate their businesses in accordance with environmental regulations laid down in the OSPAR, and some regional, guidelines. Production chemistry problems occur during the process of developing oil and gas in the field by large oil and gas operators. They consult chemical service companies to find solutions to resolve these problems. Chemical service companies work between the chemical suppliers and the oil and gas operators. They provide chemical service solutions to their oil and gas operator customers, and purchase raw chemistry materials from chemical supply companies or from their own dedicated production departments. Chemical service companies conduct a direct dialogue between chemical suppliers and oil and gas operators. The structure of the oilfield chemical market is illustrated in Figure 5-2.
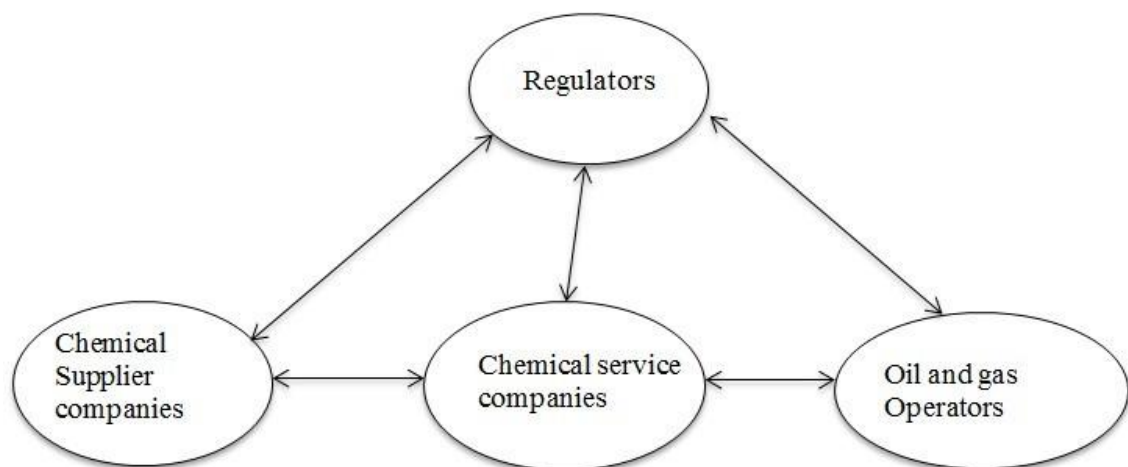
Figure 5-2: Structure of the oilfield chemical market

5.4.2.2 Chemical production problems in oilfields

Chemical production problems relate to 'chemical and physical changes to the well stream fluid, as it is transported from the reservoir though the processing system' (Kelland, 2010,

p. 1) in upstream oil and gas production. 'The well stream fluids may consist of a mixture of liquid hydrocarbon (oil or condensate), gaseous hydrocarbon (raw natural gas), and associated water. This mixture passes from the reservoir, through the tubular string and wellhead, then along flowlines to the processing plant where the various phases are separated.'(Kelland, 2010, p. 1).

Kelland points out that chemistry service companies provide solutions to oil and gas operators in four areas: (1) Problems caused by fouling, which is related to the deposition of any unwanted matter in system, including scale, corrosion products, wax, asphaltenes, biofouling, and gas hydrates; (2) Problems caused by the physical properties of the fluid, such as foams, emulsions and viscous flow; (3) Problems that affect the structural integrity of the facilities and the safety of the workforce, such as matters relating to corrosion; and (4) Problems that are environmental or economic. Oily water discharge can damage the environment, and the presence of sulphur compounds, which as environmental and economic consequences, such as produced water, which are governed by regulations and product registration.

5.4.2.3 Green chemistry

Chemistry improves our quality of life, but these improvements are achieved at a price that could be hazardous to the environment and pose threats to human health. Great attention has been paid to protecting humans and the environment from hazards produced by the use of chemicals and chemistry services in industry. Green chemistry in this thesis is not a scientific concept. It is a general concept indicating an approach to the design, manufacture and use of chemicals and chemistry services, both of which have acceptable and manageable hazards for the environment and human health. The goal of green chemistry is to create better, safer chemicals and to reduce discharges of waste. In the oilfield chemical industry, green chemistry is also called 'sustainable chemistry', 'chemistry with a lower impact on the environment', or 'environmentally acceptable chemistry' (Kellan, 2010).

5.4.2.4 Environmental regulations for oilfield chemicals

Upstream oil and gas production is highly regulated in the North Sea. The chemical service companies are usually charged with responsibility for producing and using chemicals and chemical services in the oilfield. There is an increasing demand for less hazardous chemicals to be used in oilfields. Regulations are created to promote 'greener' chemicals

and reduce the discharge of environmentally unacceptable chemicals, such as those in produced water. Chemicals cause pollution to produced water as they go through well streams. Furthermore, waste materials such as residual oil and production chemicals are left in produced water. The discharge of such water causes environmental pollution and creates a threat to human health and safety. In the North Sea area, the regulations regarding discharged water which contains production chemicals vary from region to region, and have different standards and levels of restriction.

5.4.2.5   OSPAR regulations for oilfield chemicals

OSPAR works as a convention to protect the marine environment of the North-East Atlantic, and comprised 15 contracting parties until 2013. It started in 1972 with the Oslo Convention against dumping, and became involved with the offshore industry in 1974. The main role of OSPAR is to harmonise policies and strategies for protecting the marine environment. OSPAR establishes rules to regulate the hazardous substances discharged within the North Sea offshore oil and gas sectors. The OSPAR guidelines of 2001 state that all components of production chemicals should first pass eco-toxicological tests. Only then can they be used in the North Sea offshore area as directed by the Harmonised Mandatory Control System (HMCS). Chemistry, physical and eco-toxicological testing data are evaluated by the authorised department. Operators need to obtain licences from the regulators of the chemicals for a permitted operating period. Production chemicals are required to pass the following three categories of assessment: (1) toxicity, (2) bioaccumulation, and (3) biodegradation in seawater (from the OSPAR website: http://www.ospar.org). OSPAR sets substitution orders for all contracting countries and operators so that chemical users have to adapt and develop alternatives.

5.4.2.6   REACH regulations

Chemical use in the North Sea area is subject to the most complex environmental regulations in the world. REACH deals with the registration, evaluation, authorisation, and restriction of chemical substances. It came into effect on 1 June, 2007 (http://ec.europa.eu/environment/chemicals/reach/reach_intro.htm). The aim of REACH is to improve the protection of human health and the environment through the better and earlier identification of the intrinsic properties of chemical substances and to enhance the innovation and competitiveness of the EU chemicals industry. Before they can begin legal production, chemical supply companies have their products screened under the HMCS and

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the HOCNF (Harmonised Offshore Chemical Notification Format). This creates further harmonisation with the REACH registration requirements. REACH regulations have a significant impact on chemical service companies and chemical suppliers regarding the choice of chemical products and services. REACH regulations require registration of substances in phases. Registered substances are published on SIEF (Substance Information Exchange Forum). REACH registration requires chemical manufacturers and importers to obtain information about their substances and to use the data to manage them safely. Chemical users need to consider the cost by comparing existing chemicals and innovative alternatives. There is a strict rule regarding enforcement which affects the industry: 'If you do not register your substances, then the data on them will not be available and as a result, you will no longer be able to manufacture or supply them legally', i.e., no data, no market! (http://www.hse.gov.uk/reach/).

5.4.2.7   North Sea regulations of the United Kingdom and the Netherlands

The operation and use of offshore chemicals in the UK and the Netherlands are guided by the Offshore Chemical Notification Scheme (OCNS), which is administered by CEFAS (Centre for Environment, Fisheries and Aquaculture Science), a UK executive agency of the Department of Environment, Food and Rural Affairs (DEFRA). From 2007, the Netherlands started to use CEFAS to administer their OCNS. CEFAS administers the registration of offshore chemicals for contracted regulators through the appraisal of data in HOCNF, and the hazard assessment of chemicals. Each component placed in the market must pass CEFAS testing in third party laboratories. The UK is also obliged to replace hazardous chemicals with substitutes and to replace components identified for substitution by OSPAR (http://www.cefas.defra.gov.uk/).

5.4.2.8   Norwegian regulations

The system of assessment in Norway is different from that used in the other North Sea regions such as the UK, Denmark and the Netherlands. For example, produced water must be assessed regularly for toxic components found in oil. In Norway, chemicals are labelled using four colour categories: green, yellow, red and black in increasing order of danger to the environment. Chemicals labelled yellow are considered to be the most environmentally acceptable and can be subdivided into yellow 1, yellow 2 and yellow 3. Green labelled chemicals are on OSPAR's PLONOR (Pose Little or No Risk) list and are allowed to be used offshore in Norway. Green and yellow chemicals can be used without any approval in

Norway. Red chemicals are regarded as hazardous to the environment and should be prioritised for replacement if in use, but could be used in other regions of the North Sea. Black labelled chemicals are strictly forbidden to be used in Norway.

The intention of designing 'greener' offshore production chemicals for the North Sea with a higher rate of biodegradation, a lower bioaccumulation potential and a lower toxicity prompts business actors to participate in business interactions and commercial exchanges. Individuals or groups become involved in conflicts stemming from the regulation of operating regions, the cost of product development, and innovation and technology capability. Actors experience such conflicts during the process of market exchanges, business interactions and technology innovations.

5.4.3 Identifying cases in settings

Dubois and Araujo (2007) propose 'the selection of cases and the very process of declaring "what a case is" are driven by theoretical aims and criteria.' Thus, I select five cases of relationship in normal business rather than an individual company or a project in the industry. Due to the research aim of the thesis, which investigates actors, and their relationships in conflict conditions and in networks. It would be difficult to evaluate the relationships just within a single project or company as the cases are taken in a network condition and in different business sectors.

The cases of the research are drawn from the industry settings, which are five cases of relationships in the North Sea oilfield chemical industry, regarding the entities of regulators, oil and gas chemistry service companies, chemical suppliers and large oil and gas operators. Relationship is the unit of analysis of the research. I draw five cases of relationship in normal business (described and listed in Table 5-4): (1) an oilfield chemical service company in a relationship with regulator and addressing problems caused by environmental regulations; (2) a chemical supplier company in a relationship with an international chemistry service company dealing with regional regulations; (3) an oil field chemistry service company working between chemical suppliers and oil and gas operators to resolve technical problems; (4) an oilfield chemistry service company in a relationship with other actors investing in research organizations; and (5) a chemistry service company in a relationship with their supplier to test and feedback on product performance. These relationships are lifted out of the data set by drawing from the particular interactions

between/among actors, who participate in normal business of chemical production and services.

Case	Description
Relationship 1	Relationship between a chemical supply company with regulators in producing alternatives to a regulation. In this case, an example of NAWO (a chemical supply company) is in the relationship with regulators in modifying an alternative demulsifier, which is used in processing and separation of oil and water. The relationship involves two entities, e.g. NAWO and regulators. Regulator (REACH) plays the role of proposing substitution orders, which promote a certain kind of interaction of NAWO with its partners.
Relationship 2	Incremental innovation relationship between/among a chemical supply company, an international oilfield service company and Norwegian regulators. The relationship involves chemical companies and regional regulators. Chemical companies under pressures of different standards of regulations when they provide solution and services to their customers.
Relationship 3	Relationship involves an oilfield service company, supply companies and oil and gas operating company in a project to resolve chemical problems. An oilfield service company works in-between its supply companies and an oil and gas operating company. Solutions of chemical problems are provided in the process of interactions of these entities under CMS contracts and supplying contracts.
Relationship 4	Multi-site relationship among an oilfield service company, a chemical supply company, an oil and gas operating company, and a research organization to develop products ahead of need. This relationship involves three or even more partners in the industry where a certain kind of collaboration takes place across sectors of the industry within and/or beyond CMS contracts.

Case	Description
Relationship 5	Relationship of normal interaction between a chemical supply company and a service company on the evaluation and testing of a new product. This is a normal incremental innovation relationship between chemical suppler companies and a service company, where other actors in the industry also get involved and interact.

Table 5-4: Overview of the five identified cases of relationships

The research setting in this thesis has been introduced in previous section. I begin by conceptualizing the business setting as different regimes or configuration of a network: normal business, conflict of interest, and adaptations in conflicts. All three regimes occur simultaneously among the overlapping groups of companies, regulators and other organizations. In the case of the oilfield chemical industry, normal business has systemic qualities, which are identified, formalized and made stable by Chemical Management Service (CMS) contracts and by the processes of regulation. Large oil operating companies with groups of production facilities (or assets) offer Chemical Management Service contracts for four or five years, and oilfield chemical service companies tender for these. In one of our interviews, Malcolm, a sales manager at ProChemicals, describes the process in this way:

> The driver from the oil and gas companies has been to move towards longer-term contracts with single sourcing or dual sourcing because they believe that they get a better price by doing that. We certainly reduce the pricing to gain those longer-term contracts because it gets us a bigger market share. If we don't win contracts, there will be no chance for us to have a business.

CMSs provide incentives for aligning the interests of oilfield chemical service companies and oil companies in normal business relationships. In part, they allow incumbent chemists to undertake product development, as a form of adaptation, helped by a greater familiarity with an oil company's production facilities.

This thesis is interested in conflicts, events, and cognitive emotions in and around normal business relationships and interactions. Based on the five cases of relationships within

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normal business embedded with CMS contracts in the oilfield chemical industry, the thesis develops three empirical study chapters (Chapters 6, 7, 8). Business as normal is disturbed through a combination of regulatory change, chemical costs exceeding norms, and the presentation of novel technical problems at the production facilities of oil companies (Geiger and Finch, 2009, 2011). These departures do not have ready-made products, services or organization procedures to manage them. Rather, these tend to bring conflicts into existence and challenge established interests.

I identified added relationships of conflicts as sub-cases in the various disruptions to normal business which came into existence within the selected relationships cases, and which became the subject of managerial attention. In the absence of established ways of addressing breakdowns in normal business relationships, I observed a number of ad hoc initiatives that featured different actors taking the role of the adaptive actor. The analysis is situated between different versions of conflict in relationships (sub-cases), of interests, as experienced and made sense of by actors with a view to managing, or managing in, them. I sought conflicts, events and cognitive emotions empirically in this 'in between state', as a sequence of activities in managing which can alter a business network by means of its relationships and resources. Relationships in mature industrial settings can develop multiple and overlapping roles, as resources for establishing and organizing exchanges, marketing, developing products and services, and as a means to acquire new resources.

Our case studies are instances of cases within a case, allowing cross-case comparison (Eisenhardt, 1989; Ragin, 1992; Yin, 2009). I expect the construct of a relationship to be a vital unit of analysis, made durable through being a means of combining resources and being a form of connection and governance over resources and their combination. Relationships show patterns and are means of connection through repeated and multiple interactions in the combination and mobilization of resources, not just personal and social bonds. Similarly, resource as a construct refers to entities formed and made durable as a result of business plans for particular events or activities, and is malleable in business interactions.

Conflict	Description
Conflict of regulation	Conflicts are caused from environmental regulation (or regional regulation), under which chemicals and chemical services are used in producing oil and gas, such as, a. Chemical supplier company modifies its demulsifier due to the OSPAR regulation (in case 1). b. Oilfield service companies and oil and gas companies require a biocide due to regional regulation (Norwegian) (in case 2). c. Product performance testing under regulations in terms of getting licenses (in case 5).
Conflict of cost	Conflicts are caused from seeking for lower cost product, such as, a. Product development takes place within industrial organizations or university-led research centre beyond CMS contracts in terms of lower the cost of innovation (in case 4). b. Innovation takes place in terms of getting lower cost products (in case 5).
Conflict of technology	Conflicts are caused from technology innovation and improvement in the industry, such as, a. The urge of regulations in new product development and R&D (in case 1). b. Regional regulation becomes a factor make innovation take place (in case 2). c. Problems under CMS contracts accelerate technology improvement (in case 3). d. Innovation projects across industry involve more expertise in product and solution development (in case 4). e. Innovating product with better performance under regulations (in case 5).

Table 5-5: Identifying conflicts from selected cases

The literature review and overview of the industry provide a basis for deciding what counts as a case (Duboi and Gibbert, 2010; Gibbert *et al.* 2008) and how to analyse sub-cases within a case. In study 1 (Chapter 6), I draw on ideas about three types of conflict (sub-cases), distinguished by their causes within the five cases of relationships (shown in Table 5-6). These are also broad categorizations of the ways in which actors make sense of the

conflicts they experience, and prepare for managing, or managing in, these conflicts. Jehn and Mannix (2001) propose a typology of relational (or emotional or affective), task (cognitive, factual) and process (norms-based) conflicts.

March and Simon (1958, pp. 149–150) suggest broadly comparable categories of problem-solving (factual), persuasion (norm-based), bargaining and political ways of addressing conflict. Given the durability of resources and relationships, I expect conflicts to be characterized by a cluster or sequence of events. And given the understanding of the business setting, I expect conflict to involve some combination of regulation, costs and technical challenges. An empirical chapter (Chapter 6) is developed to address **Question 1: How does conflict function as a pervasive condition experienced and managed in business relationships?**

I take resources to be fundamental in making relationships durable, interactive and requiring negotiated forms of governance. By tracing the events that caused conflicts of interest within business-to-business relationships, I identified the emotions in the business relationship dynamics, which consist of material substances or events in time and space (Van de Ven and Poole, 2005). Conceptually, I expected the events to occupy the ground in between conflicts of interest and conflict as experienced by actors, i.e. with conflicts being cognitive and emotional, and events sequenced with emotions.

The events which then qualify as being of interest are those at or beyond the bounds of normal business, as anticipated for example in CMS agreements, since these trigger emotions. Conversely, emotions can make events take place. In the industry, personal emotions, trust, communication, negotiation, and business commitment play crucial roles in the relationship dynamics involved in developing and marketing green chemicals among chemical suppliers, and in chemical service companies and oil and gas operators operating under a regime of environmental regulation.

The North Sea oil industry is mature. The development of the oilfield chemical service sector has been shaped strongly by environmental regulations, such as the framework of the OSPAR Convention as enacted by its contracting parties in 2001. Additionally, the European Community now regulates the safe use of chemicals through REACH. Regulations develop to meet the changing agenda, and will influence the trajectory of relationship changes.

Regulators are involved in the development of the industry's chemical services, so that chemical companies and oil companies are held responsible for the qualities of their products, as these are deemed potentially harmful to the marine environment. Perceived 'conflict' is the most significant context in which industrial events and interactions happen. Therefore, I selected nine events from the three types of conflicts referred to above and looked at the process of addressing conflicts in order to identify the cognitive emotions around them (see Figure 5-3). In study 2 (Chapter 7), I investigate emotion in industrial events and interactions, which influence the trajectory a relationship takes, so as to address **Question 2: How do actors understand, transform and manage perceived emotions in business relationship dynamics?**
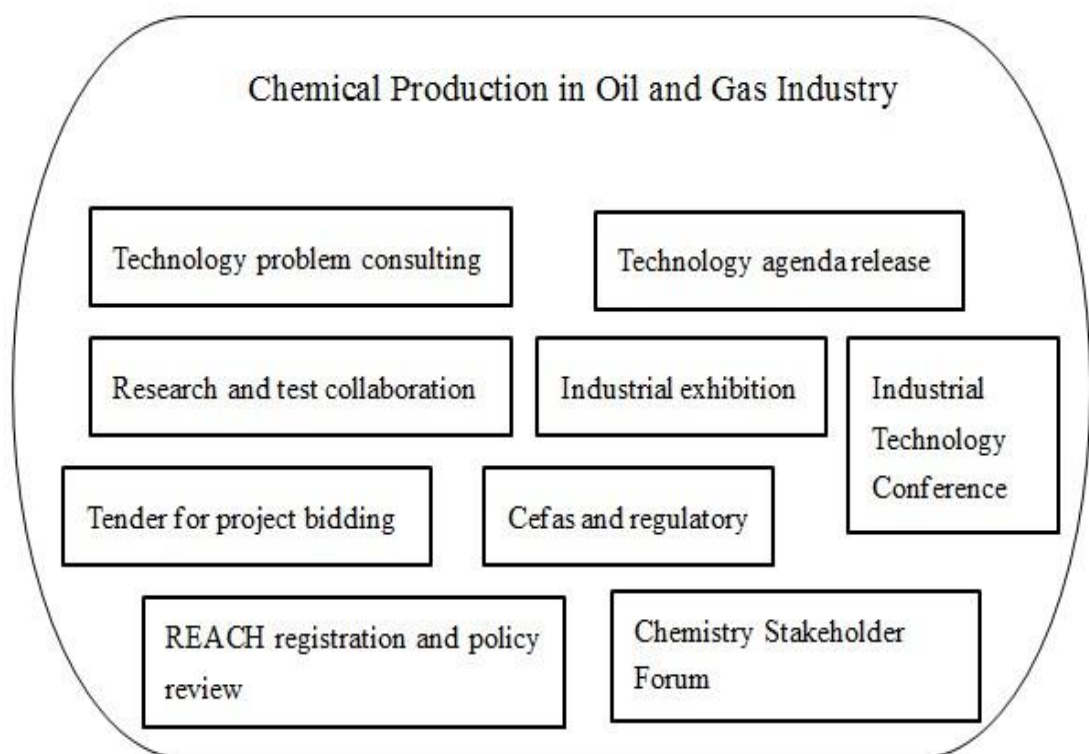
Figure 5-3: Selected events in/across conflicts

In terms of making exchanges, actors take adaptive roles to make events happen, to even temporally or partially resolve the encountered conflicts. Adaptations may be required, for example, because economies of scale are important to chemical companies in producing near-commodity products (chemical bases); economies of re-use are important to oilfield service companies as a basis for incremental innovation in adapting established solutions; and flow assurance and assets-integrity are vital to oil companies, along with overall cost

control across the cluster of the assets that form business units. Regulators can require the withdrawal from use of particular chemicals through substitution orders, which can be disruptive, even with a two-year notice period. Adaptations to conflicts of interest and conflicts are always required due to changes in regulatory requirements, the pursuit of lower cost products and the demand for better performing products. In study 3 (Chapter 8), the thesis is concerned with actors' adaptations, and researches incremental innovation activities to address **Question 3: How do actors adapt to establish incremental innovation in conflicts?**

I adopt the approach of comparing multiple cases, taken from a theoretical sample of conflicts and events within the five cases of relationships and understood as processes (Dubois and Gadde, 2002; Eisenhardt, 1989; Yin, 2009). The aim is to identify the way in which conflict is constructed and the connections between conflict and the tasks or projects, and even between other conflicts. Through comparing cases of conflict, I am aiming to assess conflict as one consequence of interactions occurring in business-to-business relationships and relationship dynamics so as to get a 'deep understanding of the actors, interactions, sentiments, and behaviours occurring for a specific process through time' (Brodie *et al.*, 1997). I selected the sample of cases from a broader study of the supply, exchange and use of oilfield chemicals, guided by the idea of theoretical sampling (Glaser and Strauss, 1967; Suddaby, 2006), rather than grounded theory. Although grounded theory is 'founded as a pragmatism approach to help researchers to understand complex relationships among social actors and is considered to be a particularly useful method to capture fundamental changes in how firms operate', because of the specific research context, I found it difficult to ground it because the pattern produced from the researched data source could not easily be corroborated by the evidence from another (Eisenhardt, 1989). Glaser's (1978) view is that in theoretical sampling 'the analyst jointly collects, codes, and analyses his data and decides which data to collect next and where to find them, in order to develop his theory as it emerges'.

In developing the sample of cases and subcases, I sought instances of conflict becoming manifest – as events and experiences that interviewees could recall and discuss in common – in different areas of the network, for instance in research and development, business exchange, and regulation. These areas included chemical suppliers, chemical service companies, oil companies and regulators. The cases qualified as such by providing instances that reflected the conceptual qualities discussed above (Klag and Langley, 2013;

Sigglekow, 2007). Each captures a relationship which contained clusters, often series, of conflicts of interest, which were events which could be described by two or more interviewees from across the industry, and their personal experiences and cognitive emotions towards those events. Conflict is a pervasive condition of business relationships and is experienced by actors. I examine a conflict within each relationship case in terms of the parties directly involved, and also capture the development of the conflict, involving the events and interactions. Conflicts in the sample are difficult to contain within a dyadic relationship because their causes and resolutions often involve other parties. These others can include chemical suppliers, chemical service companies, oil companies and regulators, all of which are involved in innovating, developing, marketing, exchanging, and using chemicals and chemistry services to enhance oil and gas production, but on the basis of differing goals or tasks.

Events (Simpson *et al.*, 2015; Sloan and Oliver, 2013) are a manifestation of a conflict of interest and can be a combination of novel solutions, the management of conflict and management in conflict, the management of cognitive emotions in conflicts and a type of adaptation that departs from normal business as recognized by the interviewees. Events are investigated in longitudinal qualitative research through sequenced features (Sloan and Oliver, 2013; Jehn and Mannix, 2001). Each relationship case in this research contains at least one of the three conflicts of interest (shown in Table 5-6), events in/across the conflicts and emotions triggered by those events, allowing me to address the three research questions. I face the limitations inherent in case study research of a limited number of observations. However, I am assisted by a particular focus of theoretical generalization, in which the cases are controlled by the absence of the more dramatic relationship dynamics and conflicts associated with relationship ending and attendant efforts at recovery. Rather, the cases allow us to focus on (1) relationships between conflicts of interest and conflict as experienced in stable and mature business-to-business relationships; (2) personal interactions and cognitive emotions in relationship dynamics; and (3) the adaptations that actors make in terms of managing in conflicts.

I traced the identified conflicts in the cases, classifying the conflict of interests causing the conflicts into those of regulation, cost, and technology, which helped identify the way conflicts are formed and distributed. By observing and interviewing the actors involved in and coming across conflicts, I identified events and their triggered emotions as the

manifestations of conflict, and examined how these conflicts are materially manifested and emotionally expressed.

5.4.4 Data and data collection

Data in the case study method can be collected by multiple means of qualitative research techniques, such as 'interviews, document analysis and various modes of observation, which blurs the boundaries between context and phenomenon and enables a research obtain data in a real-life setting' (Dubois and Gibbert, 2010). This process of data collection is controlled by the emerging theory, whether substantive or formal. Initially, researchers will

> go to the groups which they believe will maximize the possibilities of obtaining data and leads for more data on their question. They will also begin by talking to the most knowledgeable people to get a line on relevancies and leads to track down more data and where and how to locate oneself for a rich supply of data.

> (Glaser, 1978, p. 45)

Purposeful sampling (Patton, 1990) is adopted as selecting rich cases from the perspective of a particular research aim. In this research, cases are selected from the in-depth understandings and insights can be gleaned rather than simple empirical generalisations from the industry. Established theory has led to an understanding of categories before I began analysis of the data. Based on the organizational theories adopted and the research questions, I identified relationships as a sampling dimension to examine actors' interactions across the industry network. I then chose five relationship cases and began to trace them.

Within the five cases, I captured 'conflict' as a prominent topic in business relationships and relationship dynamics. I selected cases of conflicts within the five relationship cases (as described in Table 5-6) by tracing industrial actors and their interactions crossing industrial boundaries based on the principle of theoretical sampling from a larger data set of industrial events and personal emotions related to the interactions of producing and delivering green chemicals and services in oil and gas industry.

Conflicts are inherent in relationships. In study 1, five conflicts are captured from relationship cases, which are either latent or manifest, and have emerged as consequence of interaction. They are experienced by actors in different areas of the industry in the process of green chemical development and exchange, in which chemical service companies interact with both oil and gas operators on products as solutions to the problems of asset integrity and product assurance, and chemical suppliers on purchasing and innovating with chemicals. Both chemical service companies and chemical suppliers interact with regulators to demonstrate their compliance with environmental regulations. Conflicts varied across these cases in terms of the participants in the relationship, the patterns of interaction, the duration of the task or project, and the ways in which the conflicts were partially resolved. A notable feature of the research, which is in part attributed to our research approach and Study 2, is examining the connection and successions between cases, as well as comparing the emotional dimensions of the conflicts by analysing the events and their triggered emotions 'side-by-side' or 'cross-case'. Study 3 is developed based on the data from studies 1 and 2.

For this research, I gathered a primary dataset through a combination of research interviews, observation, attending industry conferences and industry exhibitions, and reading industry and company reports and documents.

Observation is a set of complex arrangements of feelings and perception rather than just looking at something and searching for the facts. Observation takes place where actors are involved in the behaviours under study. Observation provides an opportunity to get beyond people's opinions and self-interpretations of their attitudes and behaviours towards an evaluation of their actions in practice.

Interviews are usually held without close observation (Watson, 2011). Watson indicated that what distinguishes the ethnographic interview from other types of interview is that it is one in which the subject feels confident to challenge the researcher and contribute to shaping the conversation, and avoids falling into line with the interviewer's priorities and preconceptions. Interviewees are normally made up of people of a particular background, or who share a particular experience. Although a set of questions is usually designed structurally before the interview, it will be adjusted during the interview as a result of the human interaction between the researcher and the interviewees.

In this research interview plays a vital role in the process of collecting data. Interviews are taken place around questions of product, technology development, adaptations, customer, relationships, industry settings and networks, and events based on the research aims and questions (See Appendix 9). Questions are outlined before interviews as semi-structured, and are modified and added during conversations.

Observation and interviews help us to understand the practices of actors and their interactions. Data analysis focuses on significant relationships, interactions and important events (Sloan and Oliver, 2013; Ashkanasy, 2003; Vaaland and Håkansson, 2003; Mele, 2011; Plank and Newell, 2007; Thomas, 1992; Tähtinen and Blois, 2011; Jehn *et al.*, 2008). As the main theoretical basis of the research was developed to examine an industrial network rather than a particular company or organisation, I observed and interviewed people at industrial events where networks were manifested, i.e. industrial conferences and exhibitions. I attended relevant regulatory events open to the public, such as the UK chemical stakeholders' forum, and also selected some industrial technology events which allow researchers to get involved. Most of the industrial exhibitions were free and open to the public. Since the research focused on relationships and relationship dynamics across networks, the interviews did not just focus on internal company or organisational matters but also on the interactions and relationships between individuals and organisations. Interviewees were selected through individual approaches at the industrial and regulatory conferences who were experienced industry experts, i.e. independent applied scientists, chemists, engineers. Interviewees were contacted through either personal referral or by speaking to them at the conferences or exhibitions. Interviews were conducted during and after the industrial events. These interviewees had the role of representing companies or organisations in the industrial network, such as chemical supply companies, chemical services companies, oil and gas operating companies and regulators. They happened to work for companies or organisations, but not necessarily the companies or organisations being researched.

An observation proforma (Appendix 8) was designed to record data, e.g. who was observed, what was observed and what happened during the observation. Each proforma includes the information to be filled out with, e.g. date and time of observation, events or project being observed, roles and positions of participants and their key interactions and activities.

I began fieldwork in early 2011, identifying the five cases describe above and in Table 5-5 based on data from the interviews and observations. I faced three challenges in the process of fieldwork data collection: (1) the difficulty of getting access to the researched companies because of the confidentiality agreements between them; (2) the fact that most of the interviewees were too busy to be interviewed; and (3) the fact that industrial conferences are mainly open to registered company members. I made efforts to overcome these challenges, including: (1) adopting a variety of methods to contact relevant people in the industry (Arnould and Wallendorf, 1994; Piekkari *et al*., 2010; Sloan and Oliver, 2013), such as searching from LinkedIn.com and sending emails, meeting people at industry conferences or workshops, and recommendations from interviewees; (2) contacting regulatory or industry conference organisers for permission to attend as a non-participating observer; and (3) trying to get someone who had just retired from the industry or worked as consultant to agree to be interviewed. The process of the fieldwork is briefly described in Table 5-6.

I undertook and recorded 42 semi-structured interviews and 12 non-participant observations in three rounds, which included 22 face-to-face interviews and another 20 over Skype or telephone. The first round of data collection was from January 2011 to February 2013 (as set out in Appendix 4: Fieldwork log 1), which covered issues on the interactions within the industry, product and service development and delivery, and personal experiences of the interactions. Based on the data collected from the first round of fieldwork, the second round was conducted from March 2013 to June 2013 (in Appendix 5: Fieldwork log 2), mainly focused on industrial events, and the actors' experiences and cognitions towards the specific events mentioned in the first round of data collection. The third round was from July 2013 to September 2013 (in Appendix 6: Fieldwork log 3), and aimed at compensating for anything missing. Observations were taken place during the whole fieldwork process (in Appendix 7).

As set out in Appendices 4, 5, 6 and 7, showing the fieldwork of the research. I transcribed and coded the interviews, observed laboratories, companies, industrial and regulatory conferences, workshops, web events organized by SPE (Society of Petroleum Engineers) and EOSCA (European Oilfield Speciality Chemicals Association), reviewed regulatory documents on green chemistry, industry newsletters, and the minutes of meetings, covering Cefas (http://cefas.defra.gov.uk/), REACH (http://www.hse.gov.uk/reach/), OSPAR (http://www.ospar.org/) and ECHA (http://echa.europa.eu/). Interview transcriptions and

recordings, observation notes and proformas, industrial documents and reports and other data (like photos, pictures, etc.) were imported into QSR Nvivo 10 software of coding and storing. Due to the highly confidential nature of the researched industry, all the collected data on the names of the interviewees, companies and productions will be presented with pseudonyms, as required by the participants.

Step	Activity
Preparation	Define research questions
	Search and classify relevant industry documents
	Design interview questions and observation proforma
	Search for relevant companies or organizations
	Search for people to contact and gather contact information (from company website, industry forum, Linkedin, and etc.)
	Ethic application and approval
Early development	Contact and get permission for access and empirical research
	Acquire documentary information on the fieldwork companies
	Confirm questions and methods
	Confirm key sources and what help the companies can provide
Involvement	Undertake initial interviews and observation
	Second and third rounds of interviews for more detailed data

Step	Activity
Analysing Data	Overlap data collection and analysis, including field notes
	Identify cases and sub-cases within them for analysing
Analysing Data	Coding with Nvivo 10
	Cross-case pattern search using divergent techniques

Table 5-6: Brief description of fieldwork

5.4.5   Coding and analysing data

In terms of analysing conflict in the cases in study 1, a cross-case comparison of conflicts established as a consequence of the interactions allowed me to develop an understanding of how conflict was distributed in the industrial network, how conflicts connected, the characteristics of conflicts, and the way they are transformed into being more functional as part of the process of being resolved.

In study 2, I identified events and drew together multiple sources across the five cases to analyse process (Van de Ven and Poole, 1990, 2005; Makkonen *et al*., 2012; Langley, 1999). I encountered what is a typical problem in fieldwork and observational research, that of the action being elsewhere, perhaps taking place at the same time, perhaps having taken place prior to the start of this research. A multi-site approach (Marcus, 1995) was adopted in order to track a subject across boundaries and follow actors to different locations. There was thus more than one field-site, and my interviewees and I moved through and between different field-events. I aimed at identifying and transcending the limits of understanding of a set of events, even though no individual (research or industry participant) could possibly observe or be present at them all.

Because the phenomena of interest cannot talk for itself, embedded as it is in a network of events which I expect to exhibit a sequence (Marcus, 1995), I gathered data by following people through conversations, discussion, and opinions. The material 'things' that I was following were the chemical problems, chemical products and services which the actors bought and sold. For instance, I followed the events from the buyers' viewpoint, looking at

the problems they met and examining the trigged emotions and the trajectory of the events. Emotions were identified in two ways. One was from the second round of interviews I undertook, and following some up for a third time to gain more detailed information on their experiences and cognition of the events. The other was from tracing and analysing the sequenced events. The consequences link the triggered emotions with the selected events and help identify how the actors and events are distributed in the industrial network. I gained access to emotions, which seem to be personal and tacit rather than being explicit and articulated, and began to label personal experiences of identified events by analysing conversations, expressions, and gestures, guided by classifications of emotional content in the empirical data (Roseman, 1996), and relating sequences of emotions in emotional episodes (Waldron and Krone, 1991).

In study 3, I drew data from studies 1 and 2, focusing on the roles and activities (i.e. incremental innovation) actors undertook in adapting to cost, regulation, and technology in order to address how the actors adapted to establish incremental innovation in conflicts.

5.4.6 Coding with QSR Nvivo 10

I organized and analysed the data by using QSR Nvivo, version 10. Cases were captured from the empirical database (Eisenhardt, 1989), each of which showed similar practical dimensions that I drew upon in presenting the findings in Chapters 6, 7, and 8.

I coded the transcriptions and recordings by proposing common nodes in the data relating to the manifestations of conflict in the cases, the events and activities around conflicts, and the triggered emotions. The cases were than examined by looking at the actors and their relationships, the activities of product development and marketing, the project and tasks, and the impact of environmental regulation. The common unit of analysis was the relationships in which the conflict became manifest and experienced by actors and the triggered emotions were transformed. However, the boundaries of these units proved blurred and unstable empirically, in part because of the expectation that conflicts of interest would be important, and in part because of the ways in which the actors managed the conflicts by changing the nature of the tasks over time; the triggered emotions and events. Given the multiple qualities of relationships as identified, I anticipated that comparing case studies offered a way of organizing and analysing the dataset, especially of identifying the qualities that cross cases (Järvensivu and Törnroos, 2010) or are in process.

Nvivo provides ways to organize data by themes, people or places, which is known as coding. Nvivo 10 is used to analyse different forms of unstructured data. A node in Nvivo is a container to gather ideas, thoughts and definitions about the data and selected texts in the data sources.

The broader set of the empirical data are drawn from the interactions of industrial actors. In terms of combining these distant forms of data into my data set, I identify events, and relationships in normal businesses, which provides structural parts of my analysis so that I can triangulate. I transcribe the interviews and imported the transcriptions into Nvivo as sources. Audio recordings are also imported as sources into the software. Besides the interview data, observation proforma and observation notes, industrial documents and reports, photos from fieldwork are imported into the software for coding.

I established a project in Nvivo 10 and imported the collected industrial documents and reports, interview audios and transcripts, observation notes and photos into Nvivo as sources for coding. I chose a way of organizing material into themes through coding. By organizing the data in this way, I identified themes based on the research aim and questions. Nine main themes were identified as nodes for coding the imported data. The nine themes were activities, adaptations, experienced conflicts, triggered emotions, events, interactions between actors, products, relationships, and resources. The nine themes were then broken into sub-themes as part of the hierarchy in the process of coding data (see Appendix 11) in and across the five relationship cases. In Appendix 11, the column on sources shows the number of source materials that were coded at each node. The reference column shows how many references were coded at each node. Details of the percentage of sources could be derived from this.

Nodes on coding themes can be connected as 'relationships'. Relationships of nodes are statements that describe how themes are linked across the five selected relationship cases. I linked the nine main codes with 'relationships', which both helped me to gain an overview of how each of the main examined nodes and sub nodes associated with other in each of the cases and contributed to making cross-case comparisons around the themes. A model was captured from Nvivo 10 to show the overview relationships of the nine themes (as set out in Appendix 10) and how they connected, including conflicts, resources, interactions, events, relationships, adaptive activities, triggered emotions, and products.

Coding the sources is a way of gathering all the references to a theme. The process of coding generates ideas and helps to identify patterns and theories for the thesis. I adopted manual coding for the interview and observation data. In terms of coding the documentary data, I used a combination of query-based and manual methods.
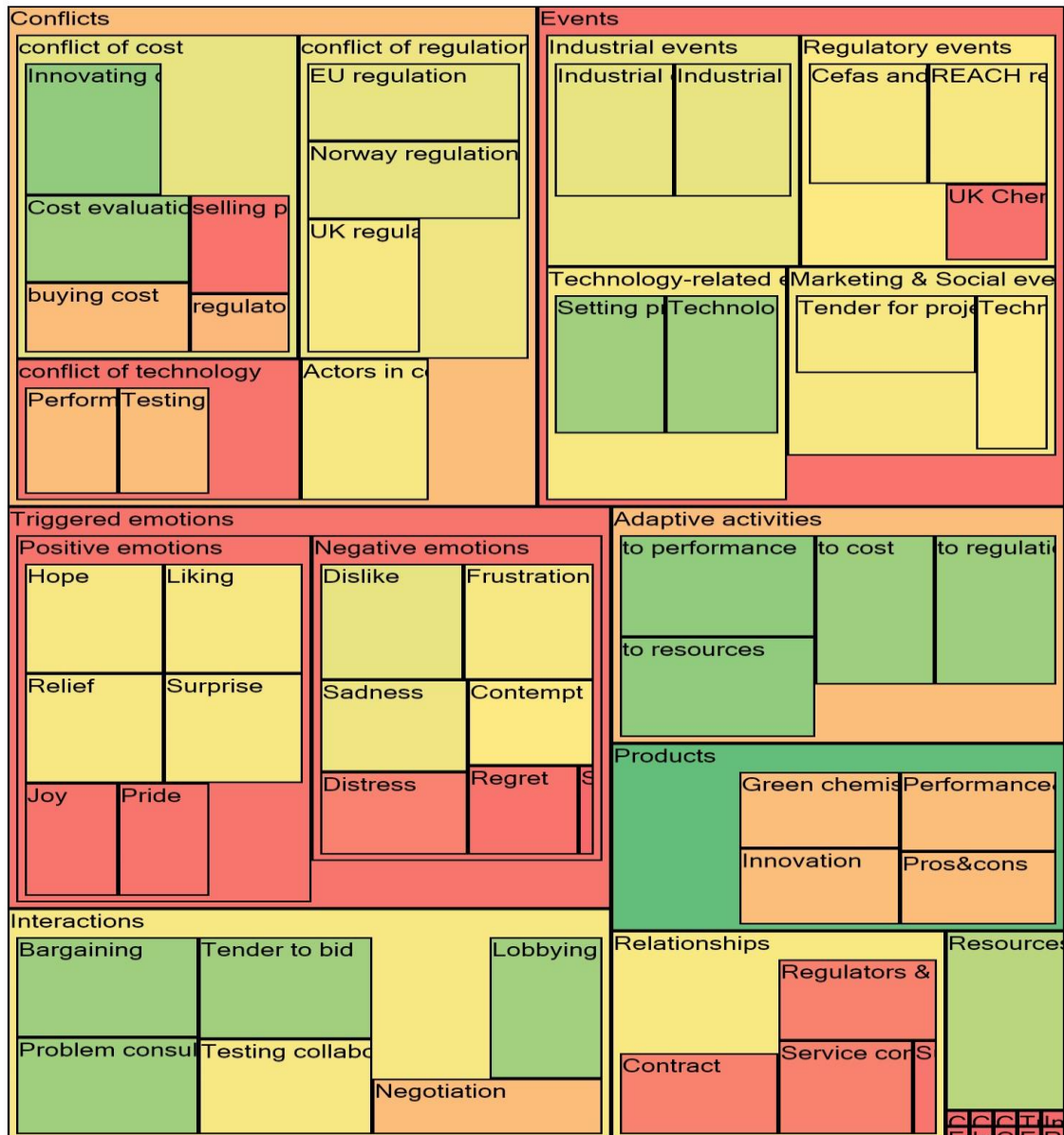
Figure 5-4: Tree map of Nvivo nodes comparison

The research developed a 'tree map' of nodes (see Figure 5-3). A tree map is a diagram that presents hierarchical data as a set of nested rectangles of different sizes. Developing a tree map is a way to compare the number of coding references, which enables us to

compare the amount of coding at the nodes, visualize prominent themes in the research, and identify areas that need further investigation or research.

Based on Figure 5-4, I coded nodes in each relationship case and investigated the four significant themes of this research for each, i.e. conflict, events, triggered emotions and adaptations.

5.5   Conclusions

In this chapter, I started with questions about how the thesis is philosophically positioned, which indicated the philosophical paradigm adopted to influence the direction of the research. By comparing the three approaches of postpositivism, social-constructivism and pragmatism, I found pragmatism to be the most suitable for this research as this thesis focuses on real-time dynamics in both interpersonal and interorganizational relationships, on real practices of encountered problems and solutions, and on the intertwining of social and material entities. Thus, I draw on pragmatism as the philosophical underpinning for the thesis. After examining the nature of the reviewed theories and required data, I adopt an abductive reasoning approach, shifting between inductive and deductive (Coffey and Atkinson, 1996). On the one hand, abduction accepts existing theories more than induction; on the other hand, it is less theory-driven than deduction. This contributes to addressing the leading research questions of 'how' and explaining the interplay between theory, method and empirical phenomena.

In terms of research design, the case study is chosen as the overall research method. The case study method can be used to address descriptive and explanatory questions and investigate phenomena in real-world settings. The research uses multiple case studies and subcases embedded within holistic cases, building theories through cross-case analysis (Eisenhardt, 1989; Eisenhardt and Graebner, 2007). The thesis looks into five cases of relationships in the normal business of the oil and gas chemical markets, and further investigates the conflict experienced and the conflict-aligned events, personal cognitive emotions and actors' adaptations by comparing and analysing the five relationship cases and the sub-cases within them.

Data in the cases studies were collected through a combination of research interviews, observations and reading documents in three rounds from early 2011 to October 2013.

Data were organized and coded with the software QSR Nvivo version 10 by coding nodes of identified themes and generating patterns. The captured cases and other empirical data showing the practical dimensions of conflicts, events and emotions, and adaptations will be presented in the next three empirical chapters (Chapters 6, 7 and 8).

Chapter 6.   Study 1: Managing in conflict in an industrial network

6.1   Introduction

From this point, the researcher develops three empirical chapters (Chapters 6, 7 and 8) to address the three research questions and the research gaps set out in the previous chapters. Study 1 (Chapter 6) is developed to address the first research question, i.e. how does conflict function as a pervasive condition experienced and managed in business relationships? I draw on March's definition of conflict (1999, p. 217) as a fundamental problem of organizing business activities, emerging as: 'confronting multiple nested time perspectives with preferences and identities that are inconsistent across individuals and across time'. As mentioned in Chapter 3, conflicts among actors' interests are a pervasive condition of organizations and are experienced by actors, typically working on specific tasks in small groups. In this chapter, I compare five conflicts within or across the selected relationship cases and examine conflicts from the perspectives of relationships and resources as well as interactions between individuals. In terms of addressing the first research question of the thesis, I propose three sub-questions to guide the investigation:

> **1.** How do actors draw resources into their relationships and interactions during conflict?
>
> **2.** How do actors experience and make sense of conflict as part of their business activities?
>
> **3.** How do actors manage conflict in relationships?

Five conflicts are identified in the selected relationship cases in the international oil and gas industry's chemical services sector. I focus on the supply of oilfield chemicals, which is a mature sector delivering products and services to oil and gas companies to secure asset integrity and flow assurance across production facilities. It is found that conflict in these cases is less dramatic than considered by researchers to date, with actors showing a capacity to 'manage in' conflict, including by distributing conflicts functionally in a network. Actors understand conflict as being pervasive, experience and cope with conflict, have prominent concerns as to a relationship's durability, performance and value, but

without the immediate concern that conflicts will lead to the relationship's end or require substantial efforts at recovery.

6.2   Conflict in Cases

As stated by March (1999, p.217), conflict emerges as 'multiple nested actors confronting multiple nested time perspectives with reference and identities that are inconsistent across individuals and across time', which is as a pervasive condition of organizations among actors' interests (March and Simon, 1958; Cyert and March, 1963; March, 1999, 2008). By investigating the five cases of relationships, I also noticed that actors in relationships experienced conflicts and interacts in a condition of conflict, causing from regulation, technology and cost matters, which pervasively exist in different ways, in all five selected cases of relationship. After looking into the cases of relationships, the five conflicts are drawn as conditions of interactions and activities of actors in the process of the normal business in oil and gas chemical production and chemical services.

Five kinds of conflicts in the relationship cases in this study include: (1) an oilfield chemical company encountering environmental regulation; (2) a chemical company undertaking product development inhibited by regulations that differ across countries; (3) an oilfield chemical company requiring the technical capabilities of its chemical supplier in order to resolve a technical problem for its oil-company customer; (4) an oilfield chemical company undertaking product development ahead of an established user requirement; and (5) a chemical company seeking a way of achieving coordination with users and economies of scale in product development. The findings are summarized in Table 6-1.

Table 6-1: Cross-case comparison

Summary (Conflict in/across cases)	Actors	Resources	Management activities
Conflict in Case 1 (Conflict related to regulations and technology): Chemical supplier experience conflicts of regulation and modifies its demulsifier to be regulation-compliant under OSPAR. Oilfield Chemist modifies scale and corrosion treatment, adapting to chemical company's modified demulsifier. Oil company aware of inferior performance across chemical treatments as administered by Oilfield Chemist now compliant with regulation. Oilfield Chemist concerned about disclosing formulation for proprietary scale and corrosion treatment under REACH.	NAWO (Chemical company), ProChemicals (Oilfield Chemist), Large Oil (Oil Company), OSPAR and REACH (regulators).	• Regulation standards, testing, licensing and product registration processes • Labs of NAWO and ProChemicals • CMS contract between ProChemicals and Large Oil • Trading relationship between NAWO and ProChemicals • NAWO's demulsifier • ProChemical's scale and corrosion treatment.	• NAWO markets its new demulsifier to all Oilfield Chemists in North Sea region • ProChemicals adapts by modifying its scale and corrosion treatment • ProChemicals and Large Oil bargain, within scope of the CMS contract, over costs of product development and reduced performance of regulatory-compliant treatments • Lobbying OSPAR and REACH through Industry Association and at UK Chemical Stakeholders' Forum.

Summary (Conflict in/across cases)	Actors	Resources	Management activities
Conflict in Case 2 (Conflict related to regulations and technology): Oilfield Services and Oil Companies require a biocide, compliant with Norwegian regulations. Norwegian regulations within OSPAR, but set at higher levels of environmental sensitivity. Chemical company bears burden of adaptation.	KTI Chemicals, ChemSolve, ColdOil, Norwegian testing agencies, within OSPAR.	• Norwegian testing standards and licensing procedure • KTI's labs • Triadic relationship between KTI, ChemSolve and ColdOil • ColdOil's production facility.	• Chemical company developed an adapted solution for use in the Norwegian sector of the North Sea. Frustrating economies of scale, but respecting long-standing relationships and growth prospects in that sector. • Costs passed to ChemSolve and ColdOil, limited lobbying of regulator.

Summary (Conflict in/across cases)	Actors	Resources	Management activities
Conflict in Case 3 (Conflict related to cost and technology): Oil Company experiences unexpected complications in deliquification at gas field, requires flow-assurance. Problem is beyond bounds of CMS agreement of Oilfield Service and Oil companies. Technical solution enhanced and accelerated by contracting chemical company in to a special project.	GD Solutions (Oilfield Services Company), FALSpecialist (Chemical company), MatureOil (Oil Company).	• CMS contract • Relationship of FALSpecialist and GD Solutions • Labs of FALSpecialist and GD Solutions • MatureOil's production facility.	• MatureOil and GD Solutions allow extension to CMS for short development project to develop and adapt a technical solution for MatureOil. • Additional costs to ensure the continuation of production, cost-based trade-off and bargaining among MatureOil, GD Solutions and, through additional tendered for project, FALSpecialist.

Summary (Conflict in/across cases)	Actors	Resources	Management activities
Conflict in Case 4 (Conflict related to cost and technology): Due to high cost and technology driven features of the industry, oilfield Services company encounters conflict of cost and technology and develops technical capability in advance of demand, and for the market per se. Innovation project is speculative, medium-term and beyond current CMS agreements. Cannot justify devoting own lab space to it.	MIC Chemicals, Other market participants, chemical companies, other oilfield companies and oil companies, University group undertaking applied research, funded by a club of market participants.	- Lab space dedicated to medium-term projects and capabilities - University-led club allows market requirements to be articulated - Non-disclosure agreements, norms of the work programme.	- University-led club allows broad and narrow networking and assurance that participants are acquiring new capabilities - Allows applied chemists to specialize in solving current problems within CMSs, and work on medium-projects, so shaping market demand.

Summary (Conflict in/across cases)	Actors	Resources	Management activities
Conflict in Case 5 (Conflict related to regulation, cost and technology): Enhanced regulation and additional technical problems for the industry working with mature facilities places increasing demands on chemical companies to develop effective 'green chemistry'. Chemical companies usually unwilling to invest in innovations for their oilfield services markets, but develop a coordinated approach to gain market share and scale.	SurChem (Chemical company), number of oilfield service companies and their oil company clients, independent labs undertaking tests using UK and Norwegian standards.	• SurChem's relationships with Oilfield Chemistry companies • Oilfield Chemistry companies' relationships with their oil company customers • SurChem labs • Independent labs • Norwegian environmental standards • Non-disclosure agreements.	• Green chemistry marketed as composite packs of solutions • Persuasion for risk-averse end users through comprehensive test data • Bargaining with Oilfield Chemists and Oil Companies to undertake field trials, and provide richer feedback on early commercial uses.

6.3 Comparing the Conflict in Cases

By drawing three sources of conflicts, which are embedded to the five cases of relationships, I found five conflicts in Cases across the oil and gas industry. These cases show mainly conflict as a pervasive condition of the relationships, manifesting often in normal business activities in a low-level sense, experienced through as series of events over time within relationships, and rarely being resolved. The entities in the conflict in Cases refer to actors in markets, including regulators (e.g. REACH, OSPAR, other regional regulators and etc.), large oil and gas operators, oilfield chemists, and chemical supplier companies.

In Case 1, an oilfield chemical company (NAWO) experiences conflict with the regulator (REACH) when producing demulsifier, which is used to treat scale and corrosion problems. NAWO adapts to modify their product to the change of regulation. The conflict in Case 2 describes a chemical company (KTI) faces higher-levels of regional regulation of Norway in use of a biocide. The conflict in Case 3 addresses an oilfield chemist (GD Solutions) experiences a conflict while resolving the problems with their oil and gas operator customers (Mature Oil) under CMS contracts. The conflict in Case 4 describes a conflict of cost experienced by oilfield chemists (MIC Chemicals), in which joint-industry innovation projects are established across the industry. The conflict in Case 5 describes a conflict of technology experienced by a chemical company (SurChem) in a general product development process. The five conflicts are conflict in cases of relationships (labelled as Conflict in Case) related to regulation, cost, and technology in the process of developing and marketing green (greener) chemicals. The findings are conducted by comparing the five conflicts in Cases.

The conflict in Case 1 is a case where a change in regulation uncovered conflicts of interest, and a sequence of technical changes led by a chemical company, and drew an oilfield chemistry company into multiple conflicts. It shows how oilfield chemists (oilfield service companies), in adapting to regulators' requirements, face multiple conflicts simultaneously, and develop in response a combination of bargaining with customers regarding tasks and projects, lobbying regulators over processes and technical incremental innovation. NAWO, a chemical company, produces a demulsifier as a commodity product, which is sold in different markets including that of oilfield chemicals for the oil and gas industry. This usually requires little adaptation, and oilfield chemists order and apply the product on

behalf of their oil-company customers and monitor its use. Demulsifier is used in the processing and separation of oil and water. It is both oil- and water-soluble. It is necessary in particular in offshore environments to aid oil and water processing. The demulsifier became subject to a substitution order through the regulatory process of OSPAR. Tony, NAWO's product manager, set out the themes of the conflict:

> After we identify the needs from our customers, we look at the type of products working as demulsifiers being sold in the market area. We will evaluate our suitable products and our capability to produce. If we have, we will do the validation testing on our applications laboratories or we will try to develop new molecules to fit that application. In the North Sea demulsifiers are highly regulated. We need products that will work more efficiently and effectively than our current products. We would work on molecules to do the application test accordingly. In our product portfolio, the most effective demulsifiers are the so-called alkyl phenyl ethoxylate resins, which have been discontinued from use in the North Sea basin. The demulsifier (APER) ... is presumed to be endocrine disrupting, despite the lack of a good body of scientific evidence to support this. This has meant that less efficient demulsifiers are used and this can lead to difficulties with oil and water separation and the discharge of oil above regulatory limits into the marine environment, a far greater environmental impact than the alkyl phenyl ethoxylate demulsifiers…

At the same time, the REACH regulations brought the chemical under additional scrutiny. The chemical company changed the formulation of the demulsifier so that it satisfied OSPAR's revised regulatory standards. Since 2001, the regulation of chemicals for offshore use by the oil and gas industry in the North Sea for discharge of produced water has been through the framework of the OSPAR Convention and national adherence to it by its contracting parties (briefly, those member states of the EU with direct access to or significant contributory rivers flowing into the North Sea). Regulation is through a Harmonized Mandatory Control Scheme (HMCS), which approves the use of chemicals, and which applies to all chemicals used in connection with offshore exploration and production activities in the OSPAR maritime area, focusing directly on promoting and enforcing the use of non-hazardous chemicals to the benefit of public safety and environmental acceptability.

The conflict arose in a material sense as the new demulsifier interacted with ProChemicals (an oilfield chemist) 's proprietary scale and corrosion treatment, which in line with the industry's usual business practice had been adapted for an oil company (Large Oil), given its unique problem of scaling on a particular production facility. ProChemicals is a world leading chemical company, involved in manufacturing chemicals, plastics, performance products and functional solutions, and, with others, providing chemical services to oil and gas operators. ProChemicals specializes and is a leader in anti-corrosion products to help with problems of internal and external corrosion of tubing, equipment, pipelines and tanks in oil and gas production. The interaction of different chemical treatments is well known and makes oil companies risk-averse to proposals for change to individual chemical treatments, in case of adverse interactions with other established treatments. In this case, the oilfield chemist, ProChemicals, absorbed the conflict, needing to develop another proprietary treatment to fit in with NAWO's now regulatory-compliant commodity demulsifier. David, ProChemicals's oilfield chemist, discussed the need in this case to bargain with his counterpart at Large Oil:

> The significant challenge lies between the regulations and us. The use of corrosion inhibitors is highly regulated in the North Sea, which produces conflicts with the regulators like OSPAR, prior to those that are caused by technical problems… Therefore, we will negotiate with our customers and they will understand. We have a range of good products with corrosion management, but we can only use the products that meet the environmental requirements of the North Sea. What we usually use as a scale and corrosion inhibitor is polyaspartate. Polyaspartate scale and corrosion inhibitors are designated as environmentally acceptable products in all North Sea waters. However, technically they are rather poor compared to other chemicals. We have to use them because of the requirements of North Sea regulations. To be honest, due to the poor performance of [the base chemical], larger dose rates have to be used. Therefore, in looking at risk, they may be equivalent to or even more hazardous than less environmentally acceptable products. Innovation never stops. We will continually establish research projects looking for better performing products to cope with updated regulations.

The conflict continues to develop. The EU's REACH regulation requires chemical suppliers – NAWO and ProChemicals – to disclose the formulation of their chemical

products. Keith, from REACH, presented the progress and the benefits of REACH at a meeting of the UK Chemical Stakeholders Forum in February 2013:

> REACH became law in the UK and started to affect chemical manufacturers and users on 1 June, 2007. Pre-registration happened after 1 December, 2008, and is free and fairly simple. There are 2892 substances to be registered by June 2013 for the next deadline. Our aim is to improve the protection of human health and the environment through the better and earlier identification of the intrinsic properties of chemical substances. Meanwhile, we are hoping to manage risks from chemicals through providing safety information on the substances, such as Safety Data Sheets. If you do not register your substances, then the data on them will not be available and as a result you will no longer be able to manufacture or supply them legally, i.e. no data, no market.

Both chemical supplier companies and oilfield chemists (service companies) encounter conflicts of regulation, which result in other manifestations of conflict in the form of events or tasks. For NAWO, its new demulsifier remained a near-commodity produced at large scale. For ProChemicals, its scale and corrosion treatment was a specialist formulation of proprietary value, capturing in material form its specialist service offered to oil companies. ProChemicals supplied both products to Large Oil under the terms of a CMS contract, earning a small mark-up on the demulsifier and charging an additional developmental mark-up for the proprietary scale and corrosion treatment. ProChemicals undertook further developmental work, adapting its scale and corrosion treatment for Large Oil so that it was compatible with the new emulsifier. It made additional resources available in order to make the CMS and its underlying relationship with Large Oil work effectively. It also had to bargain with Large Oil in terms of recovering some of the additional developmental costs for the scale and corrosion treatment, while also making the case for adopting NAWO's new – regulation-compliant – demulsifier, and having to update substance information on SIEF. Both NAWO and ProChemicals had indirect ways of lobbying the two regulatory bodies, but these were in terms of overall processes, with little practical bearing on the two chemical treatments in this case. A general structure of interactions in this case is set out in Figure 6-1.
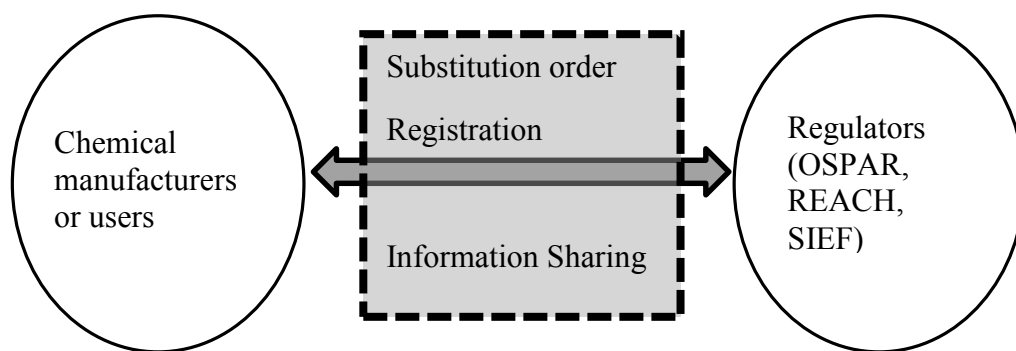
Figure 6-1: Interactions in Case 1

The conflict in Case 2 also raises the question of which actor should adapt. The case emerges from a question of regulation, but surprisingly the chemical company, KTI, bore the cost of the adaptation, leaving the oilfield chemical company and oil company relatively unaffected. The case shows how norms can be mobilized in an industry against long-term business trends. Despite OSPAR having achieved a high degree of harmonization across its signatory countries, Norway has in many instances adopted standards that only accept lower levels of bio-accumulation, persistence and toxicity. This is frustrating for chemical companies as it is in conflict with a business model based on economies of scale in production and distribution. It can lead to conflicts between oilfield chemists and oil companies, both of which accept the need for adaptions in chemical treatments, but raise suspicions of adaptations leading to higher costs. In this case, an oilfield chemist at ChemSolve proposed a biocide treatment used successfully elsewhere in the North Sea as a treatment for use in the Norwegian sector for its customer Cold Oil, but the biocide did not achieve the regulatory standards. Tao, KTI's marketing manager, explained:

> …We have been under a great pressure from different standards of regulation when we provide solutions to our clients, which means that we are facing a challenge to invest more in our technologies and assets to keep up with the disparity in regional regulations. One of our products is the Biocide Tetrakis Hydroxymethyl Phosphonium Sulfate (THPS). The biocide performs excellent activity against problem of microorganisms and is also extremely effective against sulphate reducing bacteria, a major cause of hydrogen sulphide souring and corrosion. We use THPS for formulations which are used in many applications for problems of microbiological contamination. Moreover, they have extensive use in enhanced oil recovery, injection water systems, topside

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recovery systems, pipeline protection and storage. We are facing the problem that such a well-performing product cannot be used in Norway. …

Eco-toxicological tests of oilfield chemicals are requested in North Sea offshore oil and gas production under the OSPAR environmental regulations (www.ospar.org). For toxicity tests, four test periods are used, varying for different type of chemicals. The bioaccumulation is determined by high-performance liquid chromatography and the biodegradability is used to evaluate new chemicals. In the UK, the Centre for Environment, Fisheries and Aquaculture Science administers the Offshore Chemical Notification Scheme (OCNS), which undertakes hazard assessments on chemical products. But in Norway, chemicals are more strictly controlled and are categorized into four colours – black, red, yellow and green – in increasing order of environmental acceptability. Chemicals rated green and yellow (with yellow 1, yellow 2 and yellow 3 levels) are environmental acceptable. Those rated green and yellow are also allowed to be used in Norway. Red chemicals are considered to be hazardous and should be rated for replacing. Chemicals rated black are prohibited from use.

THPS is classified for environmental use and discharge as Gold with no substitution warnings in the UK sector; it is therefore seen by the regulator as environmentally acceptable. In Norway, it is deemed to be highly hazardous and not allowed to be used. It is used though in Denmark and Holland. The reason that KTI Chemicals' THPS cannot be sold in Norway is because a different testing process is in operation, which picks up longer-term biodegradation. The minimum standard for products which can be sold is yellow, which means the product is within satisfactory parameters of bioaccumulation and biodegradation, and is acceptable in toxicity according to an approved test. More importantly, Norwegian regulations tend towards more stringent requirements in terms of more biodegradable, less bio accumulating, and less toxic chemicals; THPS cannot meet these. But in the UK, the regulator requires a set of testing data to show the products' biodegradation, bioaccumulation and toxicity and applies a pre-screening process to determine whether a chemical component goes to next testing stage.

Similar conflicts between regional regulatory standards and testing techniques also emerge for other products in KTI. Roy, the UK Business Manager of KTI, explained:

We produce and sell Imidzoline and Quaternary ammonium salts extensively worldwide, but we have to invest in alternatives to use in controlled areas such as the North Sea and Alaska, because they are deemed to be environmentally unacceptable in North Sea waters. Corrosion Inhibitors are used in the fluids to prevent corrosion failures in transportation pipelines and processing plant. Imidazoline and Quaternary ammonium salts are excellent film forming corrosion inhibitors. The outcome of a leak caused by corrosion is catastrophic for the environment and yet this is not looked at when evaluating 'green' corrosion inhibitors that are less efficient than Imidazolines and Quaternary salts.

There are strong resource and material bases in this case. ChemSolve recommended KTI's biocide treatment, which protects gas production against microbial infection (or 'souring'), with the formulation to be applied being close to KTI's base chemical. The Norwegian industry is also developing, with activities moving close to the Arctic Circle and thus requiring greater environmental sensitivity. A norm of sorts has been established in the Norwegian sector, where chemical companies, oilfield chemists and oil companies accept greater environmental sensitivity and the associated higher costs, supported by the industry-wide understanding of long-term growth prospects and the technical challenges that lie ahead. In this case, KTI provided additional resources even with limited current prospects for benefitting from economies of scale in producing a version of the biocide for the Norwegian sector. Moreover KTI had to compromise in using less efficient products in regulated areas. This could in principle be used elsewhere. In contrast to Case 1, there is little additional activity around the regulatory network, or making broadly political representation to OSPAR in support of closer harmonization. A general structure of interactions in this case is set out in Figure 6-2.
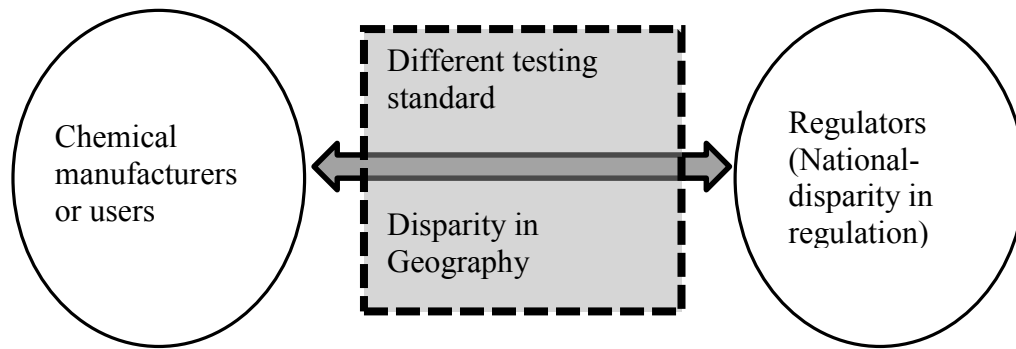
Figure 6-2: Interactions in Case 2

The conflict in Case 3 is primarily a technology case, involving GD Solutions – an oilfield chemist – requiring to be more innovative than in its usual adaptive business model in order to solve a long-standing problem for Mature Oil. The case shows how a chemical company and an oilfield chemist required ad hoc organizing to resolve an oil company's technical problem quickly. The problem was about the deliquification of a gas reservoir and a technique that had become established of foam-assisted lifting. Monjit, GD Solutions' R&D manager, discussed the technical problem, which began in a straightforward manner:

> Once a problem appears, we first define which type of chemistry problem it is so that we can easily find the right supplier involved, based on the segmentation of the chemical market. …[about a specific problem].

> …It was problem of gas well deliquification; we diagnosed it as problem to do with the properties of fluid. We have experience of such problems. It was caused by a loss in reservoir pressure from the long-term use of gas wells. We turned to our suppliers to order products to resolve the problem. What we chose was a chemical treatment known as Foam Assisted Lift (FAL). We had to make sure we were compliant with the regulations about operating FAL. Then we found a FAL with good performance and environmental benefits. After that, it was about the price …

However, gas reservoirs and their associated production facilities present unique chemical regimes to oilfield chemists, which is why these companies specialize in adaptation. In Case 3, the problem required greater collaboration between GD Solutions, FAL Specialist (its chemical supplier) and Mature Oil, a little more innovative effort – not radical innovation, as the technique was established – and greater commitment from Mature Oil in

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allowing field trials and gathering of more extensive data as GD Solutions used the treatment. Time became crucial, with the deliquification problem being resolved by GD Solutions recruiting additional assistance from FAL Specialist in a project group. The case is an instance of additional technical resources being acquired by extending a network and altering the nature of the exchanges therein. GD Solutions encountered a conflict with Mature Oil in terms of the timing of its solution to secure flow-assurance in production, with GD Solution's reputation over its normal adaptive role being at stake. Resolving the case by developing a distinct project required the cost of additional resources and the limited collaboration of Mature Oil in taking an interest in the incremental innovation by allowing field trials, additional gathering of data at trials and additional monitoring in use. A general structure of interactions in this case is set out in Figure 6-3.
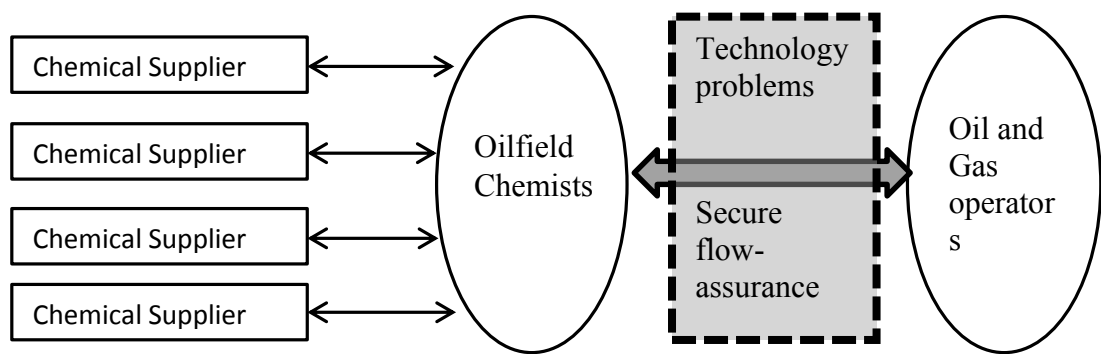
Figure 6-3: Interactions in Case 3

The conflict in Case 4 also captures the adaption role of oilfield chemists, undertaking incremental innovation on behalf of their oil company customers. It shows how resources can be shaped organizationally rather than technically, and how development projects can be effective in marketing and lobbying as well as in resolving technical questions. Unlike the conflict in Case 3, the required incremental innovation did not fit into the CMS contract. Rather, MIC Chemicals (an oilfield chemist) perceived a need from its understanding across a number of facilities and from participating in regulatory and applied chemistry workshops. But its chemists could not justify using the company's lab for a speculative activity to establish a product type ahead of customer requirements and outside the requirements of any CMS contract. The arbitrage of oilfield chemists is clear, between buying from chemistry companies and supplying solutions to oil companies, but this also requires investment in applied chemistry techniques and expertise, and ways of demonstrating these to potential customers. This way of being innovative and demonstrating one's capacity to be innovative has no clear resource base prior to or

unrelated to a CMS contract. To lower the cost, MIC Chemicals invested in working with an external research alliance in the industry and undertaking research and development to develop effective products that were compliant with regulation. MIC Chemicals' oilfield chemists were able to participate in a joint-industry project, run as a club by the chemical engineering department of a University. MIC joined and invested in FAST (Flow Assurance & Scale Team) as sponsors. FAST works as a research group of 60 people with years of experience dealing with oilfield scale and related flow assurance matters. Michael, the production manager from MIC Chemicals, explained:

> We invested money to sponsor FAST from April 2001. Their research results are disclosed to sponsor members. We are interested in their innovative areas of 'scale inhibitor bulk and porous media interactions' and 'scale and scale inhibitor deposition on metal and other surfaces', which our business benefits from. In FAST, most of the research projects are many-to-many but we can also invest on one-to one-research projects, which requires specific non-disclosure agreements and additional investment.

This specific investment was to be part of a project group, with over 20 members from chemistry, oilfield chemistry and oil companies, that ran programmes over three years to be agreed across the membership, and reported on a six-monthly basis. The programme aimed to accelerate the application of research, and the broad membership allowed oilfield chemists to meet with their suppliers and customers, demonstrating their commitment to incremental innovation. A general structure of interactions in this case is set out in Figure 6-4.
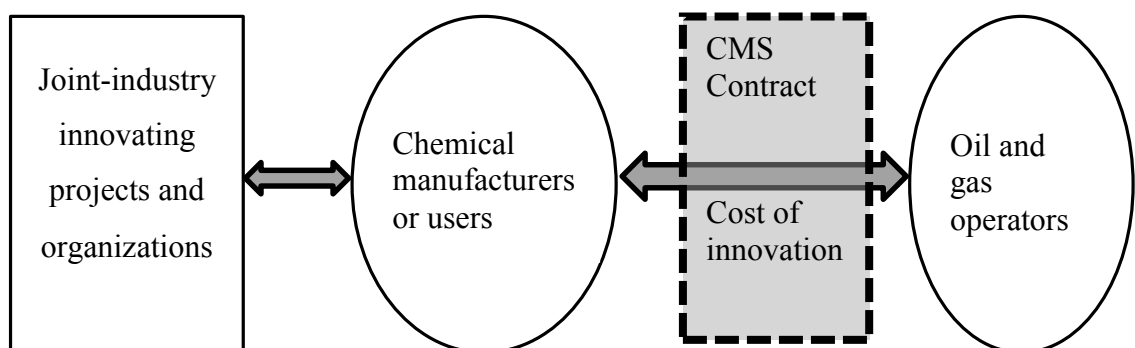
Figure 6-4: Interactions in Case 4

The conflict in Case 5 features some of the qualities found in the conflicts in Cases 1 and 2, in that a chemical company, SurChem, became involved in adaptive activities. SurChem responded to the trend in regulation by embracing what is termed in the industry as green chemistry. The case addresses overlapping conflicts of interest across cost, regulation and technology, which together formulate the bounds of adaptation. It is a regular interaction between actors in conflict, through which actors address how best they can meet the regulators' concern, enhance product performance and reduce product prices. Chemical companies contact oilfield service customers regularly to identify market requirements. Once the requirements have been confirmed and evaluated, chemical companies invest in materials and facilities to develop chemicals, but the cost of this spread across the range of their customers and end users. Conflicts of interest surround green chemistry as oilfield chemists encounter resistance from chemicals companies in investing in new chemical bases specifically for the upstream petroleum industry. In broad terms, such investments do not offer economies of scale and can appear unattractive to chemical companies. Rather than responding to oilfield chemists on a piecemeal basis, SurChem developed an approach that tried to capture economies of scale by developing and marketing a range of regulation-compliant – or green – chemicals. Claire works as SurChem's product manager, and described the process of developing 'green chemistry kits':

> When I got the product requirements from our service company customer, I discussed it with my product team. Most of their needs were gleaned from our sales people, who visited our customers regularly. In terms of our products, we needed to fulfil regulatory requirements at better performance and lower cost. We evaluated our existing products, and then decided to develop a new product. …

She added:

> We made around twenty products, named 'green chemical kits for demulsification' in our product portfolio, and tested them to make sure they worked with a satisfactory lab performance, at least better than our existing products. We then came out with a range of seven products. We were not sure whether they could be sold in the North Sea until they passed the test for North Sea regulation, with regard to toxicity, bioaccumulation and biodegradation. We had all seven products tested 'yellow' under the Norwegian regulations, so

they proved available to sell in the North Sea. I contacted our customer

companies to have them tested for application in real field sites under a non-

disclosure agreement and they provided a feedback performance report to us.

After that, we found the one with the best performance and comparable price,

then put it into production based on our evaluation and our customers' reports.

SurChem anticipated the adaptive requirements of the oilfield chemists and the requirements for improved performance among oil companies for green chemistry. It marketed beta-version 'packs' of seven green chemicals, ready for field trials at oil companies' facilities, as arranged by oilfield chemists. Recognizing too that oil companies are risk averse, SurChem organized tests and trials at independent labs covering regulatory compliance and the effectiveness of the products.
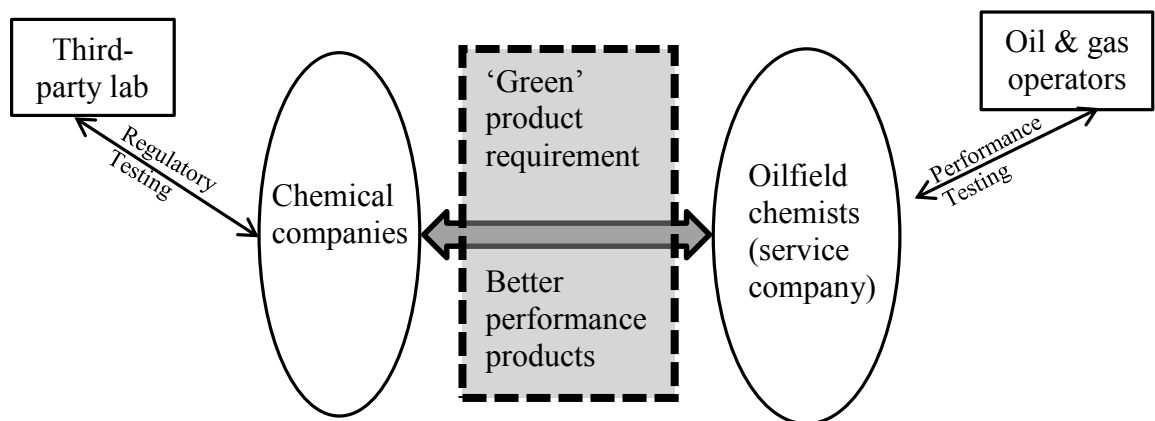
Figure 6-5: Interactions in Case 5

6.4 Answering the proposed questions

I illustrate the answers to the research questions in Figure 6-6 (below). It shows a process in which actors generally experience conflicts of interest as specific events, as captured in the five cases presented above. Actors combine ways of interpreting and acting upon the conflicts as sequences of events, reconfiguring the resources in the business network
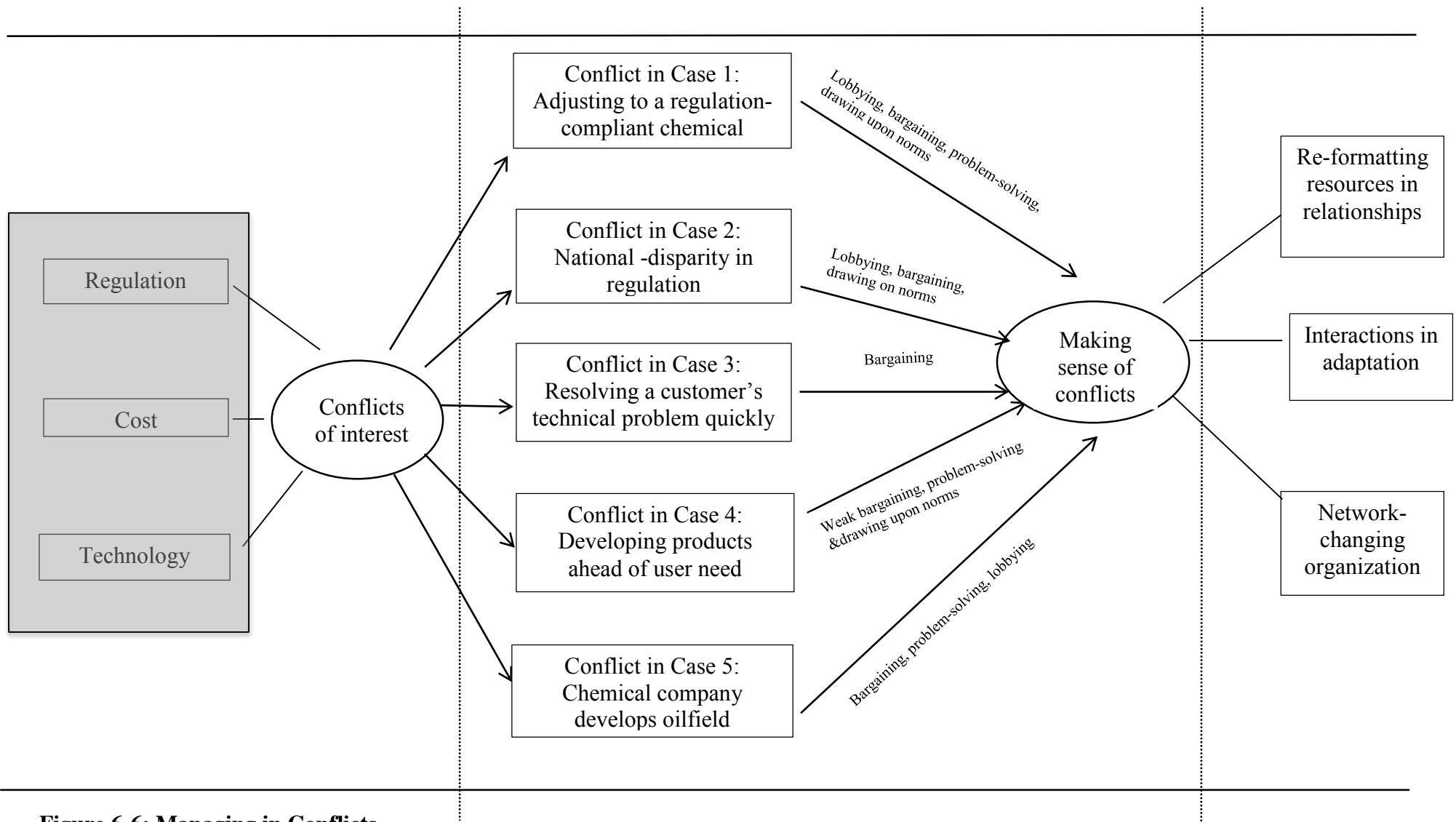
Figure 6-6: Managing in Conflicts

6.4.1 How do actors draw resources into their relationships during conflict?

In all cases, the conflicts were experienced because they were associated with activities that were not anticipated in the way of normal business. In normal business, oilfield chemists act as adaptive agents, acquiring chemical bases from chemical companies and applying these through a combination of services and proprietary products for their oil-company customers. In the five cases, additional non-standard adaptations were accompanied by business cases that fitted closely with at least one actor's interests, and with norms developed in relationships as to the overall value of oilfield chemistry, and the professionalism of chemists. Chemical companies do not usually make products for the oil and gas industry only as they cannot achieve economies of scale in that way. The conflict in Case 5 shows a way in which the conditions for economies of scale could be at least approximated and realized. The conflict in Case 1 shows the chemical company confronted with a fait accompli, through regulation and regulation changing, and the conflict in Case 2 fits with the norms of the expanding Norwegian sector. Oilfield chemists normally undertake adaptations, but within the provisions of a CMS. The conflict in Case 4 shows oilfield chemists seeking additional lab capacity, as theirs was committed to contracted work, adapting current products to user needs and not developing new products ahead of need. Relationships across all parties were strengthened in the conflict in Case 2, 4 and 5 as different ways of undertaking product development were arranged. The conflict in Case 1 shows relationships placed under strain, although the commercial actors could point to regulation as the cause. In these cases, conflicts normally become manifest through interactions around projects, which are interactively drawing upon the resources of their networks to reformulate conflicts as events and technical tasks. These require significant investment, for instance in labs, in tendering processes for longer-term contracts, in employing scientists, in R&D projects with chemical suppliers or joint-industry projects, in working with independent labs, or in forming an industry association.

6.4.2 How do actors experience and make sense of conflict as part of their business activities?

In answering this question, I set out and draw upon the mature organizational conditions of the oilfield chemistry sector as it serves the oil industry. Controversies and conflicts emerged relatively slowly and departures from normal activities were assessed against those normal roles and activities. Hence, in the three cases (Conflict in Case 1, 2 and 5) in which chemical companies undertook product development, judgments as to economies of

scale remained pertinent. Oilfield chemists remain specialists in adaptation, with their labs being dedicated to supporting adaptation work, adjusting and testing chemical treatments rather than developing new chemical bases. Oil companies remain concerned with asset integrity and flow assurance across their production facilities. While emotion and affectiveness were observed in events associated with conflict (to be discussed in Chapter 7), these had little consequence in terms of threats of the ending of relationships. Rather, conflicts of interest and conflict as experienced featured novel and adaptive tasks, problem-solving and processes for organizing those tasks. Norms were prominent in Cases 2 and 4. Bargaining was prominent in case 1, 3 and 5. Lobbying had some role in the conflict in Case 1 and was implied in case 2. In all cases, the actor that took on the role of lead adaptive agent demonstrated capacity in applied science and in mobilizing labs and expertise, but required a means of persuasion in drawing on additional resources, whether from within the actor's own organization, or drawn in from elsewhere.

6.4.3 How do actors manage conflict in relationships?

Process – in Jehn and Mannix's (2001) sense of ways of allocating resources to tasks – was important in allowing an actor to become an adaptive agent with respect to a particular conflict. In all cases, the actor taking on the role of leading adaptive agent required additional resources and a means of persuading others to make those resources available for that ad hoc adaptive activity. In Case 1 and 2 were consistent with the behavioural approach of the oilfield chemist having to make resources available internally, from what would otherwise be 'organizational slack'. In Case 1, the oilfield chemist had to justify to the customer why the new demulsifier supplied in base form by the chemical company to meet the new regulation showed lower levels of performance and why a new scale and corrosion treatment was also required. In this sense, the oil company also contributed further resource. In Case 3, 4 and 5, the lead adaptive agent acquired resources from elsewhere in the industry, expanding the networks around specific ad hoc projects. In all cases, the process of acquiring additional resources combined commercial compensation (a combination of problem-solving and bargaining) and appeals to norms and politics. These required a thorough and mature knowledge of the potential resources available in an industry, a willingness to becoming part of a network, including a university-led applied research programme, and the willingness of oil companies to participate in field trials and to provide additional feedback on the performance of products in beta version.

6.5   Discussion

6.5.1   Relationships are made durable and valuable

The mature state of the industry provides an unusual setting to understand how resources and relationships interact, allowing actors to manage conflicts of interest as these become experienced in adaptive events. Relationship-ending forms part of the CMS agreements between oil companies and oilfield chemists, but oil companies, oilfield chemists and chemical companies, as well as regulators, independent labs and university research groups, form a stable and well-connected network featuring personal and social bonds and professional associations as well as commercial relationships. Instead of ending, relationships become durable and valuable, in some instances over 30 years, providing a basis for a system of normal business and allowing actors to take on the role of lead adaptive actor for ad hoc projects. In cases of conflict, relationships provide the grounding for norms. They also allow for some instances of lobbying through industry associations and professional societies, as ad hoc processes of adapting, as the need for such processes are not anticipated by pre-negotiated CMSs or norms in contracting for the supply of base chemicals. In support of Håkansson and Waluszewski (2002), relationships became a resource in allowing adaptive agents to acquire the use of additional resources or different uses of established resources.

To date, more has been made in the behavioural literature of actors' bounded cognition in making decisions, and the malleability of their aspiration levels in anticipating consequences or outcomes of business activities (March, 1999; Håkansson and Waluszewski, 2002). Following Jehn and Mannix (2001), actors could manage many problems without recourse to experiences of conflict through task management, the shared cognitive resources afforded by applied chemistry, as anticipated in CMS agreements and in the configurations of oilfield chemists' labs. Where actors did experience conflict, it was in cases where the issue was greater than the usual array of tasks, and the normal business practices, including specialism in adaptation, and the attendant configuration of resources in these tightly defined nets of actors could not cope.

6.5.2   Agents format rather than resolve conflicts

The five conflicts in Cases presented in Section 6.2 and Section 6.3 (above) imply these norms by being situated at or beyond the bounds of normal business, requiring ad hoc

adaptation in the face of conflict. Action is required, but the process of justifying action is part of normal business. Pondy (1967) established a strong theme in conflict research as to sequences of events in which actors' interactions become dysfunctional, threatening what had been valuable relationships within organizations, or functional, enabling actors to adapt through relationship dynamics, which can be generalized as dyadic and triadic relationships of exchange in industrial and business-to-business settings. The dilemma of function and dysfunction has proved harder to grasp, although Vaaland and Håkansson (2003) and Mele (2011) both show that conflicts can have both these qualities and that they can be managed around task-related conflicts. Instances of task and process are seen in all five cases (Jehn and Mannix, 2001), but these are also instances of problem-solving, persuasion and norms, bargaining and politics, as suggested by March and Simon (1958). The sequence of events as actors come to experience and make sense of conflicts is significant. Sequence implies that actors interpret and pass on a conflict, through combining tasks and a process. But as seen clearly in the conflict in Case 1, and to an extent in the conflict in Case 4 and 5, managers distribute and format conflicts and do not guarantee a resolution. Events are important in bringing action, dynamism and specificity to a conflict, but sequence is important too, and can be elaborate where there is little expectation of a clear-cut resolution.

It can be questioned how antecedents and consequences have been theorized in conflict research. At the very least, this introduces a bias in conflict to feature 'as experienced' and to affect emotion or, in Jehn and Mannix's (2001) typology, relationship. I found little evidence of conflicts being played out only in terms of emotions and critical threats to the continuation of business relationships (Halinen and Tähtinen, 2002; Mele, 2011; Ryan and Blois, 2010; Salo *et al.*, 2009). In terms of Jehn and Mannix's (2001) typology, I saw a greater concentration on process conflict, on how to re-organize tasks or introduce new tasks, involving a change in roles for one or more established actors, or the recruitment of actors to a task. I observed actors' responses in meetings, and interviewees recounted these in relation to experiments and field trials that had not gone well. But actors were working in a setting of multiple and durable relationships, in connection with long-lived production facilities and with a proportion of business being tied in to medium-term contracts (Nordin, 2006). Tasks can augment relationships and resources, akin to a standard operating procedure or multi-partner project (Mele, 2011; Vaaland and Håkansson, 2003), as can processes for organizing tasks (Nelson and Winter, 1982). The cases draw attention not only to conflicts of interest, in providing focused circumstances for conflicts as

experienced by business actors, but also to ways of understanding how relationships are maintained in the face of conflicts, as these feature ways of re-arranging tasks.

6.5.3 Conflicts configure networks

Bargaining and the ending of relationships have been strong features in established research into conflict (Harrison, 2004; Salo *et al*., 2009; Ryan and Blois, 2010; Tähtinen and Blois, 2011). In our setting of a network with a small number of actors, it is hard to escape or end relationships. Indeed, ending a relationship commercially does not mean that the company or key personnel will go away. That company will still supply some chemistry products as a third party, and personnel will still meet at industry conferences or change their jobs to other companies across the industry. On the other hand, the network for oilfield chemistry features resources that can be made available for extending or transforming tasks in response to conflicts. These resources include tangible material factors (such as production facilities, equipment and products), intangible factors (such as industrial experiences, relationships, capability for R&D, technology and network labs) and even common interests in the relationships between oilfield chemists and oil companies (such as industry associations and conferences, providing regular meeting spaces around technical questions in applied chemistry). The problems encountered at oil companies' production facilities are heterogeneous, but oilfield chemists have acquired a high degree of accumulated experience in coping with these varied tasks. The shared expertise in chemistry also allows networks to be extended and adjusted among chemical, oilfield chemistry and oil companies, as partial resolutions to conflicts focus on technical and analytical questions. The question of environmental hazard is a source of conflict, but OSPAR's response to this, while causing frustration, also narrows the scope of the argument, focusing on measurable levels set for maximum acceptable hazards and defined in standard tests.

6.6 Conclusions

I conclude that actors experience conflicts in durable relationships and resources. These qualities are highlighted in behavioural research through its argument that organizations are coalitions of actors with conflicting interests, seeking to pursue entrepreneurial business plans, having discretion over a limited set of resources and requiring collaboration with others in order to draw together a wider array of resources. Business as normal often

satisfies actors' aspirations for product and service performance, and as a system, a set of durable relationships, operating procedures, routines and perhaps truces. However, these valuable and useful entities and artefacts are vulnerable to the adaptive pressures of enhanced regulation, new business plans and difficult technical challenges at oil companies' production facilities. Research into conflict has featured actors' negative emotions and the potential for the ending of relationships, but suggests that the resource-dimension of conflict draws attention to durability, and shows it as a pervasive condition. Conflict can develop relatively slowly as experienced by actors, threatening the relationships which are of value to two or more parties as a resource and as a way of managing and gaining value from a set of resources.

This leads to a second conclusion that relationships are valuable not only as a set of practices and norms that make repeated exchanges (for instance, at lower governance cost or with greater developing trust), and mutual adaptions of resources easier, but also as a way of enabling actors to reconfigure their resources (for instance, by providing a test site or additional test data, seeking mutual interest in some lobbying activities, or accepting technical data in applied chemistry as a basis for bargaining). Resources can play a role in conflict research analogous to 'antecedents'. However, a resolution to a particular conflict will not necessarily address the pervasive conflict of interest, and the pervasiveness of a conflict of interest contributes to the partial or intermittent resolution of conflict as experienced in managerial practice.

The managerial implications reinforce and help us reflect further on our conceptual contribution. The industry setting of oilfield chemistry is mature, in terms of its small number of actors, production facilities, geological conditions, chemical regimes and regulation. Our findings are conditioned by the setting of oilfield chemistry, providing insight into a middle ground between conflicts of interest and conflicts as experienced, with there being few dramatic turns to the ending of relationships and attendant relationship recovery. Empirically, and drawing from managerial practice, I identified three overlapping regimes – normal business, ad hoc adaptation, and managing in conflict. The first has systemic qualities, whereas the second and third implied processes arranged around incremental innovation, requiring managers to devise tasks and processes, and manage the overlaps across regimes. Adaptive tasks within normal business provide a benchmark for our analysis; they do not lead to conflicts as experienced by managers, and are anticipated as tasks and processes in contracts. CMS contracts between oilfield

chemists and oil companies are important in capturing and making stable normal business, performed mainly by oilfield chemists in their normal specialist roles as adaptive agents.

Actors experience conflicts of interest in cases where adaptations are not anticipated in normal business processes. These are caused occasionally, for example, by regulators making substitution orders to withdraw particular chemicals; by actors – typically oil companies – becoming sensitive to costs or performance; and by oil companies presenting novel problems or combinations of problems in the chemicals regime and treatment of their production facilities. These problems might involve innovative chemistry, but this is not usually the decisive factor. That is, rather, the way of organizing the incremental innovation, the need to work faster than normal, and the need to instigate rapid data acquisition and testing.

Relationship-ending is rare, and relationships rarely reach crises that require substantial recovery strategies. Industrial concentration among chemical and oilfield chemical companies has run alongside the mature state of the industry. CMSs add considerable stability for their four- or five-year terms and then end and are re-tendered, but this is not synonymous with relationship ending. Even where an oilfield chemistry company has a CMS with an oil company, it will supply a proposition for treatment derived from other oilfield chemistry companies as well as from chemical companies, and CMS contracts commonly make provision for oil companies to buy 'best in class' (good performance and low cost) even if this is not from the CMS contractor. In other words, the relationships are multi-dimensional, people establish strong bonds even when moving between companies, and business development and sales personnel remain in contact with companies that they are not currently selling to or buying from. Instead, in these ad hoc adaptive cases, an actor whose interests are especially germane needs to become the lead adaptive agent and, as I have seen in these cases, it is not always the oilfield chemist who does so even though he or she specializes in the analogous role for normal business.

The managerial work in adaptations in the ad hoc cases involves intervening in the network organization or over resources, including relationships, and acquiring and reconnecting these, often for defined and relatively short periods of time (a matter of months). The managerial challenge in adaption is to persuade others that the benefits exceed the costs, and to recruit them to undertake different activities, such as participating in more data-intensive field trials. These look like ways of organizing to solve problems, but require

additional reference to industry norms, – perhaps bargaining and political activity – for instance, in lobbying regulators.

In the cases in this thesis, conflicts have strong structural and material bases in chemicals and infrastructure. The material manifestation raises a continual stream of problems, again drawing conflict towards tasks, projects and events. Chemical supply companies are encouraged to invest money in building labs, employing chemists, and developing a capability to be innovative and produce new chemical solutions. Material conditions also affect the duration and resourcing of conflicts, and thereby also trigger cognitive emotions and the emotional responses of actors. The emotional dimension of conflict plays an important role in market shaping and relationship dynamics. In the next chapter, I will focus on emotion and its embeddedness to address **Research Question 2:**

> **RQ 2:** How do actors understand, transform and manage perceived emotions in business relationship dynamics?

Chapter 7. Study 2: Managing Emotions in Relationship Dynamics

7.1 Introduction

In the previous chapter, conflicts in five cases were compared, indicating that conflict is a pervasive condition in business relationships. Conflict, as perceived and experienced by actors, and manifested as events, triggers emotions between individuals. The question of emotions is under researched in business-to-business marketing research. Instead, this has focused on relationship dynamics in the guise of trust building, shared commitment and decision-making. Recent research in management studies, along with some among IMP researchers, has shown how emotions are triggered by business events, mediating between and among sets of events and business activities. In this chapter, I examine a series of events, across the five selected cases, through which chemists have developed and exchanged green chemistry in the upstream oil and gas industry. In particular, I also examine the interactions between business actors and trace the consequences and relationships between events, emotions and other activities, to address the second research question:

> **RQ 2: How do actors understand, transform and manage perceived emotions in business relationship dynamics?**

Three sub-questions are proposed to guide the investigation in this chapter:

1. How are emotions produced and transformed in the interactions?
2. How do emotions function in relationship dynamics?
3. How do actors manage and resource emotions in networks?

The relationship cases show the stable and long-term features of relationships in the mature oil and gas chemistry market. These relationships are dynamic rather than static, so that conflict is pervasively experienced by actors and manifested in events. Actors in these conflicts are rationally guided by 'best practices' (Bryson *et al*., 2006), routines, and learning to manage triggered emotions. Actors adapt to the formalized practices related to realizing the long-term and temporary interests of organizations, such as negotiating on contracts for Chemical Management Service or Chemical Solution Projects, and the

involvement of industrial lobbies and regulators. In this chapter, nine events are captured across five selected cases of relationships in normal business to analyse the cognitive emotions between actors. I focus on individual experiences and collective decision-making in business interactions. The novel aspect of the research is the role of critical emotional events, the emotion-sequenced events in relationships and relationship dynamics in the context of a network.

7.2   Critical Emotional Events in/across Cases

In the mature oil and gas chemical market, the relationships of actors are stable but in a condition of conflict and dynamics, influenced by emotionally laden events. These identified events contributed to shaping and reshaping the structure of relationships in networks. Nine events were identified within and/or across the five cases of relationships, within the network of regulators, chemical services companies, oil and gas operators and chemical suppliers in the upstream oil and gas industry in the North Sea area. Each of the nine was illustrated by the interviewed actors as a key turning point, critical to maintaining or adapting the relationships. These events were referred to as 'critical emotional events' (CEE), and emotions were cognitively triggered from them. The emotions triggered by CEEs were not in the same forms. The CEEs can unexpectedly punctuate the relationship and relationship dynamics, and serve as essential turning points in the development of trust.

They were sequenced and had impact in other forms as 'emotional-sequenced events' (ESE) with which emotions were embedded. The CEEs work as turning points in the trajectory of relationship development, both personally and collectively at the organizational level. The criticality of these events can be analysed by tracing their consequences. I illustrate the criticality and emotionality of the nine identified CEEs/ESEs across the network of the oil and gas chemical industry. Each CEE was identified as critical by two or more of those interviewed and observed in the process of data collection. One of our interviewees, Claire from SurChem, said: 'although the mentioned events are planned, the consequences are not. They do influence our behaviours and production strategies onto the next stage'.

I developed the process analysis empirically and with reference to sequences and consequences in events, which are ways of (1) identifying sequences of events describing how things change over time and why they change this way; (2) explaining a causal relationship in a variance theory; and (3) understanding a concept that refers to activities of

individuals or organizations (Van de Ven and Poole, 1990). In terms of supplementing the missing information or scenes, I undertook the third round of interviews with key people in order to discuss their experiences and feelings (emotions), either positive or negative (Roseman, 1996), occurring in a sequence over time. I sought to establish that something had happened, that it had happened located in and bounded by space and time, and had involved multiple actors, with consequences extending over time and space. The focal point was to know how particular events were related to other events, and then propose relations among these events so as to detect patterns among them. In this research, interviewees helped to tie events together and combine them in a network.

Based on Roseman (1996), positive emotions are, for example, hope, joy, liking, pride, relief and surprise, while the negative emotions are anger, contempt, disgust, dislike, distress, frustration, guilt, regret, sadness, shame and surprise. I paid more attention to the activities actors took based on negative emotions so as to identify the differences with those based on positive emotions. The indirect expressions of the critical events were categorized from the interviews and observations where emotional information was identified. Emotion nodes not only referred to the identified emotional expressions in the quotations but also referred to emotional experience of the selected events in the relationship. First, I assigned nodes to the materials related to the industrial and business events, categorizing events according to characteristics, organizers and participants. Second, I aligned the interview transcripts and observation interpretation notes to the events and coded the emotion and emotional experience and their consequences as nodes. Then, I mapped these critical emotional events, categorized and labelled the emotions, and traced their development, succession and consequences so as to examine the emotions through relationship dynamics.

The events commonly happened in normal business and were planning, regulatory, industrial, technology and social and networking related (set out in Table 7-1). They drew the actors' attention, functioning as turning points in their behaviours, and being highly emotionally intensive.

The theoretical sampling involved in selection of events from the five cases of relationships and the conflicts in cases was informed by three main considerations. Firstly, the events in which multiple actors with differing interests perceive emotional conflicts, e.g. of technology, cost or/and regulation. Secondly, the events become turning points in

relationship dynamics and development of trust. Thirdly, actors in these events navigate and make these events in ways that transform negative emotions into positive ones.

Based on my coding and triangulation of the data set (Appendix 10 and 11), event seems to be significant and heightened, generating overlapping observation. Each event has its sequences with episodic quality. Within the observation data, there is an observed beginning, middle and end sequence with enhanced emotional involvement. By tracing actors in events, interviews are undertaken on the connections with stronger emotions linked with events. The approach of combining data is pragmatic, and driven inductively, which connects empirical findings with general theory and makes them easily applicable to empirical investigations.

In terms of selecting events, the first phase involved using the interview data to connect actors in relationships, identifying key activities, events, and milestones. I found there were opportunities that actors meet and interact. The second phase is narrow interview questions and start observations focusing on the affectiveness and interact to others in event and over time. The third phase is to follow up the sequences of the events triggered emotions by a more targeted interviews and observations (Appendix 6 and 7). By analysing the data, four categories of events became a focal points. Drawing together relevant non-participant observation field notes along with the interview transcript and recordings, I developed a detailed narrative construction to chronicle each of the nine events. Observations provided data relating to the substantive issues and physical behaviours being addressed in events, which are associated with emotions.

A significant feature of the research is to address the connections between personal emotions and the identified events, as well as their influences on business relationships and particular business activities. As set out in Section 7.3 and in data from Appendices 5, 6, and 7, the research describes the nine identified CEEs and their criticality and initially triggered participants' emotions, with some immediate consequences feeding back into their employing organizations and impacting on relationship dynamics.

Regulatory Events	Industrial Events	Technology-related Events	Marketing & Network Events
UK Chemistry Stakeholder Forum	Industrial Technology Conference/workshop	Technology problem consulting	Technology Information and Agenda Release
REACH registration and policy review	Industrial exhibition	Research and test collaboration	Tender for project bidding
Cefas and regulatory testing			

Table 7-1: Identified critical emotional events

7.3 Emotions as Mediators between Events

The critical emotional events in this research were categorized into four contexts. The events bonded actors in relationships through their interactions. Actors who had participated in these events had experiences from the events and the conflicts hidden behind them which produced, developed and transformed personal emotions. Four categories of events are explained in detail, with the criticality and emotionality also examined by developing sequences and consequences.

7.3.1 Regulatory events

Actors in regulatory events reflect upon the restrictive effects of the transactions on the development of their network relationships. Regulatory events are planned and organized by regulators to release updated information on regulation to industrial actors, or by industrial actors to review or test how their products cope with the updated regulations. Regulatory events happen in and across the five cases of relationships, and are critical in enabling actors to adapt. Table 7-2 illustrates the relationship of regulatory events, triggered emotions and emotion-sequenced events.

Both chemical service companies and chemical supplier companies in the markets needed to have their products registered in REACH and reviewed their products regularly to avoid any punishment from misusing products or services. As in Case 1, NAWO and ProChem operate in the North Sea area, review their existing products quarterly in terms of coping

with the registration agenda and made sure their new products are registered as 'new' chemicals in REACH.

REACH registration has been a matter of some controversy and concern among chemical companies and users of chemicals products. As a legislative framework for chemical substances, it has had different rules for 'existing' and 'new' chemicals, and so far has mainly addressed existing chemicals and their impacts on human health and the environment. REACH now created a single system for both 'existing' and 'new' substances, described as non-phase-in substances (produced or marketed prior to the entry into force of REACH) and phase-in substances (have been manufactured in the Community, but not yet placed on the Community market). REACH registration provoked concerns among chemical suppliers companies and chemical companies about their products. These mainly negative emotions can be associated with a lack of understanding about the new regulations. In Case 1, ProChemicals offered sustainable chemistry, technology and services to Large Oil. Their product stewardship manager, David, expressed worries (coded negative and dislike) about REACH's registration phase and whether the company's processes for product development could adapt to the change in regulations. There would also be an impact on their use and production of chemicals. David said:

> The legislation has changed. The EU legislation is now overlapping and REACH is an example. REACH guidance is very broad and influential. We were concerned, actually worried, about REACH's influence on our products before the REACH regulations came out in 2006. The first REACH registration deadline is December 1, 2010. We reviewed our products and found it had had not that big an influence on our chemical uses at that stage. The requirement to register will not come into force till 2013. There is likely to be a much greater impact on us in the lead up to the next REACH registration deadline in June 2013 (expression observed as fear or dislike, coded as negative). That will have a direct impact on our products. There are two substances we had to register in 2010, which we are using a lot. But for 2013, we must get fifteen substances registered, which will have a significant impact (observed as fear or dislike). REACH provides guidance to the chemical industry. Over the whole chemical industry, there is high concern over a lot of substances from chemical service companies which affect the end users. That requires restrictions for chemical

companies to use. If we don't get our substances registered, we will lose our market (observed as distress). If that happen we will stop using or replacing them.

The key objectives in REACH are to obtain and share information on the Substance Information Exchange Forum (SIEF) about the properties of substances being manufactured, supplied and used in the EU. The SIEF participants including all relevant producers and users should submit information to the agency on the substances. REACH regulation requires the members of SIEF to communicate with each other, pool the existing information available to them and decide on how to fill any information gaps. This caused more worries to the market actors.

In Case 2, ChemSolve provided a biocide treatment to oilfield operators in the North Sea and faced uncertainties concerning the impact of REACH. Their product manager, Gordon, explained their uncertainties on the effect information sharing on SIEF would have in REACH's registration process:

> Our concern leads us to find way out of the uncertainties we met (coded as dislike and negative). On the whole REACH registration process, because everybody in the industry will get the substance information together in SIEF where we share data on the intrinsic properties of the substance to avoid the duplication of studies and have an obligation to share all data on vertebrate animal testing and the classification and labelling of the substance, we and other people are now in competition with each other in the SIEF (observed and coded as dislike and negative). That's fine if there are a thousand members in the SIEF, but it is not like that. There are only fifteen companies in the substances group. We went along to those meetings and found the other fourteen companies were our competitors (observed and coded as fear and negative). …We don't like to meet our competitors (coded as dislike). …

Emotions were cognitively experienced before, during and after the event depending on the levels of understandings of policies and the knowledge from reviewing their products. Negative emotions were produced by the actors in the CEEs as a result of the uncertainties over the regulations, the adaptive capabilities of their products and technologies, and their competitors. Based on the REACH registration agenda, the regulatory departments in both

chemical supply and chemical service companies evaluated the changes of regulations and requirements and reviewed their products far ahead of the deadline. In 2010, David had started to prepare for the 2013 registration matters for ProChemicals. He set up a regular project meeting in their working system and invited colleagues from relevant departments. A project team was established to review the existing substances in the products being used and the substances which would be used in the near future.

After reviewing the products, the project team got the substances that fitted the requirements registered according to the REACH registration guidance. For the substances that could no longer be used, negative emotions were caused in the interviewed actors, such as fear, dislike, distress, or sadness. Actors adopted two routines to transform the triggered negative emotions into positive ones. One way was to adapt to establish incremental innovation to produce alternatives that fitted the regulation requirements, where a new products regulatory test would be required, and the other was to participate in the interactions with the regulations in regulatory forums (i.e. the UK Chemical Stakeholders Forum), where industrial associations interacted with the regulators on behalf of their members.

The UK chemical stakeholder forum (UKCSF) is organized by Defra. The UKCSF advises government on risks from hazardous chemicals to the environment. It is a place where not only can industrial actors express their negative emotions on regulations and the regulatory agenda, but they can also negotiate some adjustments before the regulations come into force. Industry actors are glad to be involved in the stakeholder forum because they benefit from engaging in dialogue to reflect the stakeholder views and concerns, from reviewing policy and looking forward, from innovating, promoting linkages, industrial collaboration etc. It is a forum in which their negative emotions can be expressed and partially transformed into other sequences. I undertook non-participant observation at the three UKCSF meetings from February 2013 to July 2013, during which the REACH agenda and policy was reviewed and looked forward to by the regulators, the NGOs and industrial representatives. Chemical stakeholders participated in the forum and discussed the REACH agenda and registration policy as the forum worked to enable industrial actors to express their negative emotions and concerns to the regulators. It was observed that industry representatives could be directly involved in presenting and arguing their views at the forum. Sceptical voices on the benefits of REACH were heard at the meeting from industrial representatives (coded as negative).

Bud, from KIT, said that '… 300-page Safety Data Sheets as REACH guidance were unhelpful' (observed as dislike).

Colin, from GD Solutions, said that 'REACH was driving innovation and sustainability but more needed to be done to bring more positive stories' (coded as negative).

Gary, from FAST, argued that '300-page Safety Data Sheets were an exception and that compared with what was available before REACH, it was difficult to argue that the situation was better in the past (coded as like).

In the end, Keith, from the REACH team, indicated their appreciation of the views from industrial actors on the REACH guidance and promised that they would pay great attention to the comments made at the meeting. He also emphasized the promising role of REACH in the protection of human health and the environment (coded as hope and positive).

Negative emotions could be expressed in order to address the experienced conflicts of interest, caused by the regulations. These emotions were directly triggered by regulatory events and transformed into sequenced forms. Besides bargaining with the regulators on regulatory matters, actors also established incremental innovation in terms of adapting their products to the updated regulations in the North Sea, which require Cefas or other regulation testing for product licenses. Oilfield chemists who encounter licenses usually experienced further negative emotions in adapting to the regulations. Cefas administers the OCNS, requiring hazard assessments for chemical products in the UK and the Netherlands North Sea. Any actor who wants to produce and use chemistry products in these areas needs to have its products pass Cefas testing to determine toxicity, bioaccumulation and biodegradation in seawater.

For example, in Case 3, GD Solutions provided technology solutions to Mature Oil. After evaluating the technology performance of FAL001 (product name) on the problem of the gas well deliquification of Mature Oil, GD Solutions faced uncertainty over whether FAL001 could pass Cefas testing. Monjit discussed their concerns:

> We have never used it before. It was a new way of treating deliquification, but it tested well in our laboratories for the requirements on acceptable parameters of bioaccumulation and biodegradation, and for toxicity. I was a bit worried

(coded as distressed and negative) about the Cefas testing as it was just on acceptable parameters and not quite satisfactory. Therefore, the results might vary in other laboratories.

GD worried about FAL001 meeting the regulations so as to avoid penalty. They produced products that met market needs and worried more about getting their products past the test rather than whether the products were truly green. Catherine worked with Monjit in the product development department of GD Solutions, taking charge of the Cefas sample testing and making sure all products used in the North Sea could pass the Cefas testing in the licensed laboratory. The product FAL001 failed to pass the testing in biodegradation. Negative emotions were produced by Catherine and her team. She commented:

> It means we have to undertake further research and development to find alternatives. Even worse (observed as distressed and negative), we don't have that much time on the contract to develop something new. …We don't want to let our customer down. It's not just a matter of money, but trust. …

Then Catherine reported the results to Monjit. A project meeting was launched to discuss solutions. The final decision was made. Monjit explained: 'We decided to adjust the formula of FAL001 and retest it in two other different laboratories. … Succeeded!' (coded as joy and positive)

GD valued the relationships with their customers so they invested in research and development alternatives that could pass the Cefas testing and used those chemicals and services in environmentally controlled areas such as the North Sea. A new product, FAL 002, was developed based on FAL001 in ten days and was sent to be tested in two different Cefas licensed laboratories. Finally FAL002 was proved to be 'environmental acceptable' and used for gas well deliquification by Mature Oil.

Negative emotions triggered by criticalities in the events influence the behaviours and decision-making of actors. These emotions are sequenced with projects and tasks relating to the experienced conflicts over technology and cost. The criticality plays a key role in the process of triggering cognitive emotions, reflecting conflicts of interest and organizational goals. Interactions through regulatory events shape emotions and also trigger negative emotions following the trajectory of triggering events–emotional response–consequences

(Fineman, 2000, 2004), in which process and emotions are sequenced with other events or activities in networks (such as industrial events, technology-related events, and marketing and networking events) as adaptations to the regulation changes.

7.3.2 Marketing and network events and emotions

Actors attended marketing and network events, which placed an emphasis on actors' social activities, and in which they discussed market information and intelligence informally, leading to business projects that changed the nature of their relationship dynamics and addressed conflicts of technology and cost. Marketing and network events are held to find a better or cheaper solution for a chemical service problem, such as releasing technology information and agenda, or tendering for project contracts (in Cases 1, 2, and 3).

A service company in the oilfield chemical industry is positioned between chemical suppliers and oil and gas companies, so supplies products and services and also buys chemical supplies. As a service company, oilfield chemists acquire the role of an intermediary in what would otherwise be a direct dialogue between chemical suppliers and oil and gas companies. As the product manager in SurChem, Claire, said, 'Oilfield service companies cut the dialogue between oil and gas operators with us. … They dominate the market once they get the contract'.

The tendering of a CMS contract is initiated by the oil and gas operators who find new oil and gas fields or encounter chemical problems. In Case 3, in the face of a specific chemical problem in a new gas well belonging to Mature Oil (oil company), negative emotions (i.e. dislike and sadness) were triggered in their assets manager, which provoked relationship changes as he needed to find solutions. He initiated a relationship to create an event to release technology information to the markets, especially to oilfield chemists. On the other side, the event triggered positive emotions for the lead chemist at GD Solutions and at other service companies because he – along with his colleagues – considered it as a business opportunity. Monjit said:

> We get information from our account manager or sales team, who visit our customers regularly. … We hope (coded as positive) to win the project. … It's a big deal (observed as joy, liking and positive). … A longer term of contract is definitely important to us. We certainly try to reduce the pricing to gain those

longer-term contracts because it gets us a bigger market share. If we don't win contracts, there will be no chance for us to have a business. …

Mature Oil's asset manager, Luis, led discussion within the organization and then a tender workshop, as the problems required solving. After three weeks of releasing information, they offered a tender and invited GD and another four service companies to attend an event. The project put out to tender concerned the combined problems of hydrate, scale, wax and asphaltene management. The positive emotions of Luis were passed on to his team and directed them to prepare for the bidding. Mature Oil assessed the four participating service companies by technology capability, reputation, price and trust from former collaborating experiences. Robert, the sales manager of GD, added: 'It was a five-year contract package, a five-year long business' (coded as relief and positive). …

Finally, GD won the contract and further enhanced the relationship for the longer term with Mature Oil. Further GD appointed an account manager and some specialists to follow up projects with Mature Oil.

Negative emotions can be functionally changed through adaptation. But positive emotions can also be developed and influenced temporarily by experienced conflict into negative ones, being healed into positive emotions again after the conflicts are partially resolved.

In Case 2, Matthew, the sales manager at KTI, expressed his happiness (coded as pride and positive) on winning a five-year CMS contract with Cold Oil. As Cold Oil was operating in Norway, the level of the environmental regulations was higher than in other areas in the North Sea. The triggered positive emotions from successfully tendering and winning the CMS contract turned out to be negative when Matthew and his team experienced the conflict of cost in negotiating the details of the contract. Matthew explained:

> A mismatch of goals is obvious as we are working as a selling organization, wanting to maximize the profitability. The receiving organizations of that service, the oil and gas operators, they do not care whether I maximize profitability. They want the cheapest price and good performance. On the other side, we buy chemicals from our suppliers. We concentrate on product performance and our cost to buy it. The cost is much higher because of the Norwegian regulations (observed and coded as negative).

Negative emotions were produced as a result of actors experiencing conflict, and influence the behaviours of actors in conflicts. Negative emotions tended to be transformed. KTI negotiated with Cold Oil on addressing the conflict by establishing open-book accounting and mark-ups. Matthew further explained:

> In terms of that, they require us to keep open book accounts in this case. They want to know our costs of producing and supplying the chemicals. We interact and negotiate on an acceptable margin. That's the margin, not profit, a particular percentage. We are also glad and benefit from it because we don't need to care too much about prices from our suppliers (coded as joy, relief and positive).

The contractual arrangement produces positive emotions in actors, occasionally with some temporary negative emotions as part of critical events. Actors experiment with different ways of transforming these negative emotions by resolving or at least partially resolving the source of conflict in them. Along with pricing and technology, other factors also play important roles in terms of winning CMS contracts for business, such as personal relationships, reputation, experiences and trust. Raymond, the sales representative in ProChemicals, commented (Case 1):

> It does not mean you will get the customers if you have only products with a good performance and comparable prices. Personal trust and relationships are really important in this industry in business decision-making. Most people buy products from those they are familiar with. Industrial technology conferences and exhibitions are your chance to achieve that (coded pride and positive).

7.3.3 Industrial events and emotions

Actors engage in formulating industrial events involving oil and gas companies, chemical service companies, and chemical suppliers in trust-building activities, so as to construct or reconstruct a more complex relationship than a dyadic one. In the upstream oil and gas chemical industry, industrial conferences are held by different organizations. For instance, the Society of Petroleum Engineers organizes conferences, web events and workshops worldwide for disciplines related to drilling and completions, health and safety, security, environmental and social responsibility, production and operations, and reservoir description and dynamics; the Royal Society of Chemistry organizes events particularly

addressing chemistry problems in the North Sea area, and covering topics such as fine and performance, product development, application and use, and regulatory issues. Such industrial events provide opportunities for serving managers, engineers, scientists, chemists and other professionals across the upstream oil and gas industry to communicate, present ideas and research, introduce technology and products and socialize in an industrial network.

As a chemist in NAWO (Case 1), Johnathan participates in industrial and technology conferences regularly, at which he feels both his personal and organizational trust are built up by presenting the R&D outcomes of new products with lower costs, better performance or more adaptability to regulations. He said:

> I presented a paper on the 'Development of High Performance Environmentally Acceptable Corrosion Inhibitors for use in the UK and Norwegian Sector' at the Chemicals in the Oil Industry Symposium. The paper reviewed the testing standards of the HMCS of the OSPAR Convention and presented our work on identifying environmentally acceptable corrosion inhibitor components, as well as our testing results based on UK and Norwegian environmental standards, showing that our product provides enhanced protection when compared to traditional chemistries. It was promising (coded as pride and positive) that some of our potential customers became interested in the inhibitors and requested detailed information. We were keen on (coded as hope, liking and positive) joining our marketing team in showing the brochures and presenting our products in the exhibition, usually held after the main conference.

Most of the industrial conferences are followed by an exhibition, which allows marketing departments to promote their products to their customers and get product information from their suppliers. Industrial actors, such as chemical services companies, suppliers and oil and gas operators, participate and exhibit their products for marketing purposes. They benefit from coming together to learn about technology releases, and from sharing, networking, exhibiting and branding (observed as joy, pride and positive), as shown in the pictures below (companies in pictures are not relevant to the cases in this research).

Figure 7-1: SPE Exhibition 2013, Aberdeen

7.3.4 Technology-related events and emotions

The personnel of chemical service and chemical supply companies participate and invest in technology activities in order to establish their market positions by means of technical advantage. Specifically, the personnel of chemical service companies and their chemical suppliers became involved in the resolution of technical problems (in Cases 1, 2, 3, 4, and 5) under CMS contracts, in which process the actors addressed the experienced conflicts of interest arising from regulation, cost or technology.

For example, in Case 1, ProChemicals and Large Oil were under a five-year CMS contract. Interactions involving consulting and resolving took place during the process of oil and gas production in three of Large Oil's gas wells, namely Jasmine, Elgin and Erskine (pseudonyms). One of the chemical problems involved the development of microorganisms and bacteria, which caused the formation of hydrogen sulphide, and the souring of the gas being produced and corrosion of the production infrastructure. It was a complex chemical problem because of its multiple dimensions. The problem first caused negative emotions for ProChemicals' assets manager, Taylor, because he needed to diagnose accurately what the chemical problem was. In other words, it caused Taylor a high level of uncertainty (coded as negative), and highlighted his lack of technical knowledge about chemical processes. Once ProChemicals's chemist identified the problem categories, the negative emotions (felt 'worried' in interview, coded as fear and negative) experienced by Large Oil's asset manager influenced the decision-making activities. ProChemicals' chemist found that the company had no established product which would perform well in solving the problem as identified with the customer, which triggered a further negative emotion (felt 'upset' in interview, coded as frustrated and negative), leading to a decision between two options: one was to continue engaging with the problem and develop a product in-house for the application; the other was to broaden the network and buy the product from another company. The former required resources including investment, technology, lab and chemists, while the latter would change the relationship dynamics by involving other actors. They evaluated the two options and decided to choose the former. ProChemicals established an R&D project, and the chemist's negative emotion was then gradually transformed into a positive one through the process of resolving the problem. Further, interaction with the customer's company was established. In terms of developing a new product, ProChemicals invested in the project, undertook development and testing in-house, sent samples to test for performance and got feedback reports under a confidentiality agreement with the customer. The transformed positive emotions (coded joy, hope and positive) enhanced ProChemicals' relationship with its customer. Finally, ProChemicals needed to choose samples of the product based on the cost and performance to test for acquiring licenses so that they could be used in the real field, which established a new relationship with third parties, the testing lab and regulators.

Events	Description	Actors	Criticality	Triggered Emotions	Emotion-sequenced events
UK Chemistry Stakeholder Forum	UKCSF advises government on how the industry should reduce the risk from hazardous chemicals to the environment and to human health through the environment. Chemical stakeholders participate in the forum, engaging in dialogue with regulators, and expressing their views and concerns.	Chemical industry representatives Regulators	Bargain with regulator before regulation in force Adapt to regulation	Dislike Worries (Negative)	Review policy (REACH and others) Adapt to regulation

Events	Description	Actors	Criticality	Triggered Emotions	Emotion-sequenced events
REACH registration and policy review	A new set of regulations aimed at improving the protection of human health and the environment from the risks of chemicals while enhancing the competitiveness of the EU chemicals industry. It deals with the registration, evaluation, authorization and restriction of chemical substances.	Oilfield chemists	Register product or lose market Share data and information with competitors	Dislike Distress Fear Sadness (Negative)	Bargain at UKCSF Review registration agenda and adapt products to it Register products Incremental innovation for alternatives

Events	Description	Actors	Criticality	Triggered Emotions	Emotion-sequenced events
Cefas and regulatory testing	Chemical service companies and chemical suppliers have their products pass Cefas testing in order to get production licenses. Three factors to improve greener chemicals: the rate of biodegradation, the lower bioaccumulation potential and a lower toxicity.	Oilfield chemists	Obtain the license to produce Stop developing if products fail to pass	Distress, fear (before testing) Concerned Distress, surprise (testing failed) Joy (testing passed)	R&D to pass the regulatory test Provide suitable chemical solutions to customers

Events	Description	Actors	Criticality	Triggered Emotions	Emotion-sequenced events
Industrial Technology Conference/ workshop	Chemical service companies and their suppliers present their technology and new products at Chemistry in the Oil Industry symposium.	Oilfield chemists		Pride Liking (Positive)	Research and development products Consult on technology problems Adopting new technologies or products

Events	Description	Actors	Criticality	Triggered Emotions	Emotion-sequenced events
Industrial exhibition	Chemical services companies and suppliers participate in the conference to share and receive technology information, and exhibit their products for marketing purposes. They benefit from coming together on technology releases and sharing, networking, exhibiting and branding.	Oilfield chemists Marketing team	Involvement in and broadening of industrial network	Pride Liking Hope Joy (Positive)	Promote product and technology Technology information release

Events	Description	Actors	Criticality	Triggered Emotions	Emotion-sequenced events
Technology problem consultation	Oil and gas operators consult on technology solutions for chemical problems encountered, such as problems of fouling, physical properties, the structural integrity of the facilities and operating safety, and environmental and economic problems under the CMS contracts.	Oilfield chemists Chemical suppliers	Resolve problems Change partners	Fear Frustrated (Negative)	Set technology requirements agenda Interact with customers Involve chemical suppliers

Events	Description	Actors	Criticality	Triggered Emotions	Emotion-sequenced events
Research and test collaboration	Research and development activities. Service companies develop their products and services to resolve the chemical problems of their oil and gas customers. Oilfield chemists both develop in-house research to fit customers' requirements, and also give projects to suppliers to research for them.	Oilfield chemists Chemical suppliers Oil and gas operators	Research and development with customers	Joy Hope (Positive)	Set up CMS contracts Incremental innovation

Events	Description	Actors	Criticality	Triggered Emotions	Emotion-sequenced events
Technology Information and Agenda Release	An oil and gas operator sets their development agenda for service companies once they encounter technical problems and new oil and gas wells to operate. Meanwhile oilfield chemists organize to participate in CMS contract bidding.	Sales team Product team Oilfield chemists	Get prepared for contract bidding	Joy Liking (Positive)	Set up contract bidding Send information to chemical service companies

Events	Description	Actors	Criticality	Triggered Emotions	Emotion-sequenced events
Tendering for projects	Oil and gas operators release tenders to chemistry service companies once they meet new chemical problems that their current partners cannot resolve or they need to change partners.	Sales team Product team Oilfield chemists	Extend the duration of existing collaborations Involve new customers	Relief Joy (Positive)	Open book accounts Product and service development under CMS contracts

Table 7-2: Critical events and emotionality

7.4 Transforming Emotions

In the industrial market of oil and gas chemicals, actors value relationships, both personal and organizational. Emotion is difficult to manage but easily transformed into material-based tasks, and projects are manageable and controllable. Actors cannot prevent negative emotions from being triggered but can positively transform them by resourcing them, to avoid damaging or terminating a relationship. Both negative and positive emotions were triggered by CEEs and acted as mediators directing actors' decisions in order to shape an anticipated path for future events, including, crucially, being able to work with the customer in rich interactions. Positive emotions have positive effects on relationships and relationship dynamics, such as initiating further development, enhancing and building shared commitment and maintaining the relationship (Andersen and Kumar, 2006). Actors regard relationships as vital because there are only a few large operators in the oil and gas industry. Once negative emotions are triggered, actors rationally appraise the negative emotions and try to transform them functionally into ESEs (as set out in Table 7-3 below), usually through interactions, adaptation activities, paying extra costs and bringing resources in. The ESEs have particular functions in structuring and restructuring relationships in networks.

Emotion-sequenced events	Subsequent emotions	Illustrative Quotes	Impacts	Illustrative Quotes
Review policy and adapt to regulation	positive	'…we have an obligation to share all data on vertebrate animal testing and the classification and labelling of the substance…'; '… as the principle is no registration, no markets, we adapt to maintain our markets. …'	Enhance moral competencies and trust	'…They contribute to the safe operating of chemicals to some extent. … '; 'more importantly, we adapt to innovate. …'
Bargain with regulators	positive	'… regulators may compromise, although it's a tough process. …'	Promote innovation and adaptation in networks	'… once a regulation has settled down, we organize projects to evaluate it and our competitors. …'

Emotion-sequenced events	Subsequent emotions	Illustrative Quotes	Impacts	Illustrative Quotes
Establish incremental innovation	positive	'… hope to enhance innovation and competitiveness. …'; '… besides the in-house experiment, we also buy products or technologies from others. …'; 'set up big budgets on innovation…'	Promote innovation Enhance relationships Broaden networks	'… one of our strategies involves investing in new R&D projects to gain market shares…'; '… some of the R&D work can be implemented by our suppliers under a secrecy agreement…'
R&D for products to pass regulatory test	positive	' "passing the test" means a permit to produce in the market. … '	Increase market competiveness	'… competitors are in the same boat. …'; '…we are competing to obtain licenses. …'

Emotion-sequenced events	Subsequent emotions	Illustrative Quotes	Impacts	Illustrative Quotes
seek suitable chemistry solutions to oil and gas operators	positive	'… our objective is to find solutions in time…'	Maintain trust	'… in terms of satisfying our customers…'; '… act quickly to win trust…'
Consult on chemical problems	positive	'… we provide them with professional advice on our technology and products'	Maintain trust	'…Consulting capability arms a good sales team. … '; '… a good sales team is able to act as a doctor to their patients. …'

Emotion-sequenced events	Subsequent emotions	Illustrative Quotes	Impacts	Illustrative Quotes
Set up CMS contracts	positive	'… a CMS contract provides four to five years of business'; 'The long-term contract is considered a win–win situation for the actors involved.'	Mutual trust development	'…the driver has been from the oil and gas industry to move towards longer term contracts with single or dual sourcing because they believe they will get better processes by doing that. …'
Set up open-book accounts	positive	'…We interact and negotiate on an acceptable margin…'; 'it has been a successful experiment … '	develop mutual trust Maintain relationships	'… that's the margin, operators care about. It's beneficial to us. …'; '… we get products from suppliers, considering performance rather than price. …'

Emotion-sequenced events	Subsequent emotions	Illustrative Quotes	Impacts	Illustrative Quotes
Set up and release technology requirement agenda	positive	'… chemical service companies and their suppliers invest in R&D based on our agenda…'	Shared commitment	'… keep our business on-going…'; '… setting up an agenda enables problems to be solved accordingly. …'

Table 7-3: Emotion-sequenced events impact on the transforming of emotions and relationships

In summary, nine emotionally critical industry events were analysed, covering regulatory, industrial, technology-related, and marketing and networking events. These events usually took place in succession. The triggered emotions, either positive or negative, acted as mediators between these events, with sequenced features and impacts. The emotions had their effect on relationship dynamics and transformed themselves into emotion-sequenced events as sub sequences. Actors resourced emotions with investment, information, technology, and even other events to maintain the outcome of positive emotions and functionally transform negative ones into emotion-sequenced events with positive emotions.

7.5 Discussions

The research identifies that the development of critical events and event-triggered emotions are sequenced, rather than being restricted to dyadic and triadic relationships, and that their influence on the dynamics of relationships can extend across different sectors relating to chemical development in the oil and gas industry. I analyse the consequences of the transformation of emotions in projects and across particular business activities, showing the sequences among the identified events, leading on to some and referring back to others. I examine the emotions that were triggered by critical events, and notice the different outcomes relating to actors' positive and negative emotions. The actors in events and the sequences of triggered emotions were taken into account so as to examine how actors manage their business relationships by managing their emotions as triggered by critical events.

7.5.1 The Impact of Emotions on Relationship Dynamics

Andersen and Kumar (2006) propose that emotions emerge in business relationships and have an impact on relationship development. In the data from this research, I find that emotions are produced from the cognition of actors towards a particular experience of a critical event, with interactions based on their knowledge and evaluation of it. The cognition of events creates different emotions, categorized broadly as either positive or negative. In this way, emotions work as mediators between events and contribute to making sequenced events, which are distributed in the network. The critical event-

triggered emotions influence actors' decision making. Positive emotions imply decisions that preserve the status quo, while negative emotions lead to some degree of change, especially in the manifestations of relationship and partnership changes in markets. Thus, emotions are triggered by these critical events and directly act on relationships, causing relationship dynamics.

Events that are congruent with and so help actors realize their goals tend to produce positive emotions. These emotions are usually pursued by means of intensive interactions as part of marketing practice, managed and drawn on as an interactions process embedded with personal cognition and positive practice in relationship development. These positive emotions usually contribute to partially resolving the encountered conflicts, whether arising from regulations, technology or costs. In terms of sequences, positive emotions assist in events or activities that relate to technology or product improvement, compromises with regulators, cost reductions and increasing market shares. Collaborations under CMS contracts and other project agreements are also encouraged and supported by positive emotions. They emerge initially interpersonally and are then discussed and taken further within organizations. In terms of enhancing relationships between service companies and their suppliers, and between service companies and their oil and gas customers, innovations take place to meet the regulation requirements, produce products with better performance and lower cost, and address experienced conflicts of interest.

Negative emotions are triggered from events with uncertain features and low control potential (Roseman, 1991), and lead to further events that on occasion produce positive emotions, or at least a fundamental questioning of how to address a set of conflicts experienced in the network. There are few examples of actors terminating relationships, as actors highly value their relationships. Uncertainties in the oilfield chemical industry are caused by a lack of information on how regulations are changing and being updated, the mismatching of business goals, new product performances, the cost of innovation, and the market shares of new products. Actors experience negative emotions in connection with events relating to these uncertainties. Actors evaluate the negative emotions they experience so as not to disturb decision-making.

Both positive and negative emotions directly act on relationship dynamics, but with different consequences. Emotions frame interpersonal relationships in a network context, and further collectively influence the structures of relationships at the level of

organizations. Interactions, dialogues, adaptations and even competitions are used to persuade others or even actors themselves to particular conflict-aligned events, so as to transform negative emotions into functional ones.

Actors tend to direct relationship dynamics in a promising way which indicates emotions to be transformed through adapting, paying extra cost and resourcing in order to shape actors' behaviour attributing to the appraisal of maintaining and further development of relationship in a healthy direction, embedded with sequenced features. The ESEs interpret emotions and evaluate emotional actors, producing activities which shape markets.

7.5.2   Emotion-sequenced Events Shape Markets

Actors are positively involved in critical events as it is rare to see them escape from or end relationships because the network is with only a small number of actors who value the mature relationships. The ESEs operate as relational market practices, with which actors transform triggered emotions. The identified ESEs are categorized into four market practices, addressing the aim of each sequenced event (set out in Table 7-4): adaptations, providing solutions, opening the agenda, and broadening networks.

Adaptations happen through transforming negative emotions, and can be regarded as normalizing practices, such as a change of regulations and the regulatory impact on chemical use and operation. Providing solutions is considered as an exchange practice when actors perceived negative emotions from conflicts over technologies and cost. Opening up the agenda and broadening networks, which come from the positive emotions of actors, are part of the normal shaping of market activities, and are recognized as representational practices. These practices interlink, addressing issues of norms and rules of the oil and gas chemical industry, the operational routines that actors follow, and the innovative activities required in production.

Adaptations	Providing solutions	Opening up the agenda	Broadening networks
Review policy and adapt to regulation	Establish incremental innovation	Set and release the technology requirement agenda	Set up CMS contracts
Bargain with regulators	R&D for product to pass regulatory test		Set up open-book accounts
	Seek suitable chemical solutions		
	Consult on chemical problems		

Table 7-4: Relational market practices of emotional-sequenced events

The practices of ESEs are made through a combination of activities relating to material arrangements, such as investing in R&D into greener chemicals, establishing research projects, signing CMS contracts and so on, which contribute to making markets calculable over time. The oilfield chemists are not just the participants in events but also participate in making such events through interactions with both sides of their supply chain (i.e. with oil and gas operators as suppliers, and with chemical suppliers as purchasers), and with their regulators. A market can be described as a collective device enabled by calculative agencies. Oilfield chemists can rationalize their perceived emotions and further collective decision-making by calculating the ESEs needed to shape markets. In this way, projects and tasks are configured as calculative agencies to realise economic exchanges. The ESEs are made to shape the market, which enables actors to (1) identify and meet the new chemical requirements of customers; (2) reflect existing norms and changes to them; (3) adapt products to address perceived conflicts in the network; (4) improve technologies so that they are more competitive in the network; and (5) be rational in decision-making on relationship dynamics. The stabilization of relationships is always interrupted by the conflicts encountered, influencing the way that actors perform in the market through a series of market practices.

7.5.3 Emotions, Emotion Transforming and Trust Building

The role of practices (as mentioned in Section 7.5.2) stimulates the impact of emotions (positive and negative) on further business relationship development. Lawler (2001) indicates that the emotions work as mediators in the dynamics of interaction and relationships. The identified critical events in the green chemical industry are successional and connected within the network. Actors' emotions, both positive and negative, towards these events tend to be developed into functional outcomes because negative emotion has to be transformed in the process of relationship development. Actors tend to transform negative emotions by means of established business processes, typically deliberative periods of review either within companies, or in groups of companies, or joint-industry projects, or involving the industry association. The service companies, in face of new regulations, devised additional activities to address and resolve the settings within which the negative emotions were arising, indicating a transformation within the network through a series of events.

The whole process of emotion transformation associates social entities with material entities through socio-technical *agencements*, combining actors' cognition and distributed action across entities. In this research, the actors' cognitively perceived emotions from critical events, such as regulatory events, industrial events, technology-related events or social and networking events, were transformed through distributed action carried out according to the manifestations of socio-technical arrangements as ESEs and activities. The STAs of emotion transforming begins with the individual and are finally realized through collective action, indicating the making of events by oilfield chemists and other actors. As discussed, the perceived emotions, especially the negative ones, are positively transformed by actors into events and activities with positive emotions and material features, which are more manageable.

Transforming emotions has a strong material basis in the infrastructure for chemical research and development. The material dimension refers to the tasks and projects of investing in lab building, employing technical engineers and chemists, technology development and product innovation. The emotional content of critical events acts as a turning point around which the triggered emotions tend to be transformed. The emotion transforming process is constituted by combining actors' cognitive emotions with their material interests, which provide guidance enabling actors to manage emotions into

functional consequences. The consequences of the transforming, i.e. the STAs of ESEs, have direct impacts on building up trust in both cognitive and affective dimensions, in a dynamic process from the individual to the collective. This could be enhancing moral competencies (e.g. green chemicals and safety to the public), promoting innovation and adaptation capabilities (e.g. better performance of chemicals with lower costs), broadening networks by involving other actors (e.g. looking for partners to develop alternatives with), increasing market competitiveness (e.g. better technologies), maintaining relationships (e.g. extending or bidding for new CMS contracts), and sharing commitment development (e.g. agreeing on open book accounts).

7.5.4 Managing Emotions in Networks

Actors manage emotions, both positive and negative, especially through transforming negative emotions. Resources are taken into account in the process of emotion transformation. Resources are allocated to events and event-triggered emotions, and used to transform emotions. In the chemistry market, resources are considered as tangible materials factors, such as laboratories, oil and gas fields, in-house research and development centres, and third party research organization facilities, and intangible factors, such as technology, relationships, capability of innovation, industrial experiences, networks, and industrial information.

Chemical service companies, chemical suppliers and oil and gas operators transform emotions by resourcing them with material-based events and activities, such as by setting up a research project, setting up an innovation project, investing in facilities, investing in in-house development, and collaborating in third party or partner research and development. Regulators also resource emotions with events and tasks, such as organizing stakeholder forums, interacting with industrial representatives, investing in laboratories for regulatory testing and providing agenda and advice to industrial actors. In the process of resourcing emotions, relationships change and develop with events and create ESEs, which transform emotions into functional outcomes and direct future activities.

Critical events are turning points for the embeddedness of social relation structures, material entities and interests as full service exchanges (Kjellberg and Helgesson, 2007b), requiring a process of reconfiguring calculative ESEs created by actors in the oil and gas industry. The oilfield green chemistry industry is highly regulation driven, with

technologies intertwining with market practices. The market practices transforming emotions and shaping markets are socio-material. The materialities, i.e. oilfield chemists' innovation and production assets (laboratories, producing licenses, and so on), perform like business relationships in establishing market practices to develop and produce chemicals and chemical services to customers across boundaries.

7.6 Conclusions

In this chapter, an empirical study (Study 2) is established to investigate cognitive emotions that are triggered by critical events in the oilfield chemical industry and their sequences and impacts. Critical emotional events are identified as important turning points by which personal emotions are initially triggered. The triggered emotions develop and form a sequence in a trajectory of emotion-sequenced events, which are produced to describe the process of transforming emotions by actors such as oilfield chemists, marketers and even regulators. Four categories of critical event are identified in the oilfield chemical industry: regulatory events, marketing and networking events, industrial events and technology-related events. Actors in these critical events perceive different emotions (positive or/and negative) as mediators, which influence decision-making and relationship development. Positive emotions have functional impacts on relationships and relationship dynamics. Negative emotions, always caused by some degree of uncertainty, may have dysfunctional outcomes in relation to actors' decision-making. But actors seem to be more rational than I expected. Actors cannot prevent negative emotions from being triggered but can transform them rationally into ESEs, which are more calculable and manageable than the emotions themselves.

Conceptually, I have shown in Study 2 that emotions functioning in relationship dynamics across business networks acquire material consequences, in that actors manage emotions by resourcing and transforming them. Business relationships have a successional quality and develop as processes. The emotional dimension is used to investigate relationship dynamics. The dimension and quality of relationships are also related to industrial events and tend to be transformed in the process of developing chemicals and services, during which relationships change. The event-triggered emotions have an impact on business relationships and interactions. The cognition of actors produces emotion and the emotions direct the decision-making.

The transformed emotions, regarded as emotion-sequenced events, combine socio- and material entities together. The ESEs contribute to making emotions calculable, and shape markets. Transforming emotions, embedding materialities with social relationships, takes place from the individual to the collective level and is understood as market practices, indicating the process of making ESEs. The market practices contribute to shaping markets, making ESEs, exchange practices providing and delivering solutions, and normalizing practices of any change or norms and rules for an industry.

In terms of the managerial implications of Study 2, I examine the consequences of emotion transformation in order to identify the actors' relationship and its dynamics. In the oilfield chemical industry, with its small number of actors, individual actors in key positions, such as chemists and experienced experts, and their personal reputations are highly influential in business relationships and relationship dynamics. The findings are conditioned by the setting of the oilfield chemical industry, providing a research perspective for examining the cognitive emotions of individual actors and their development into collective outcomes. Actors cognitively experience specific emotions (negative or positive) towards critical events and tend to avoid dysfunctional consequences. They benefit from managing their triggered emotions through transforming them into ESEs routinely by allocating resources to them. The sequenced events of triggered emotions provide opportunities for actors to manage relationship dynamics by means of building and enhancing trust, making a shared commitment to costs and performances of chemicals and chemical services, and making adaptations.

In the next chapter, another empirical study (Study 3) is developed to examine the actors' adaptive role in developing incremental innovation to address the experienced conflicts of interest, i.e. of regulation, cost and technology. The study is conducted by drawing on the data from Studies 1 and 2, to address the third research question:

RQ 3: How do actors adapt to establish incremental innovation in conflicts?

Chapter 8.   Study 3: Incremental Innovation Green Chemistry

8.1   Introduction

As discussed in Study 1, actors in the chemical industry experience conflict as a pervasive condition in business relationships. In terms of managing the pervasively perceived conflicts (e.g. of cost, regulation, and technology), actors take on a role of adaptation, creating and participating in certain conflict-aligned events in order to re-stabilize their relationships and maintain their value. In Study 2, I draw on CEEs across the oilfield chemical industry, in which event-triggered emotions are identified and examined and are then transformed into ESEs. These events embed actors' cognitive emotions with their material interests and the adaptations they have made. The transforming process consists of a series of sequences of critical events, triggered cognitive emotions and ESEs, requiring socio-material configurations in adaptations. Two types of adaptation exist in organizations: 'experiential learning, the idea that organizations and the people in them modify their actions on the basis of an evaluation of their experiences' (Denrell & March, 2001); and competitive 'selection and reproduction, the idea that organizations and the people in them are essentially unchanging, but survive and reproduce at different rates depending on their performance' (Denrell & March, 2001). Both forms of adaptation perform as devices for improving the fit between/within organizations and their business environments, requiring incremental innovation.

In this chapter, I revisit the five cases of relationships, which also demonstrate processes of innovation. Looking at them from the point of view of innovation means looking at slightly different details of these cases. I focus on the adaptive role of the actors in establishing incremental innovation in relation to green chemicals and chemical services in the five selected cases and, using data presented in Study 1 and Study 2, investigate the third research question of this thesis:

RQ 3: How do actors adapt to establish incremental innovation in conflicts?

In the mature industry of oilfield chemicals, most innovations take place incrementally. This Study is developed to examine the role of actors' adaptations by examining the

drivers of incremental innovation, green chemistry products and service development, and relationships in a network consisting of oilfield services companies, oil and gas operators, chemical suppliers and regulators. Three sub questions are to be answered in this chapter:

1. How do actors adapt in terms of establishing incremental innovation?
2. How does incremental innovation take place?
3. What makes incremental innovation successful in the network?

8.2 Adaptation and Innovation

In terms of answering the third research question, I review the roles of actors and their activities within the five identified cases of conflicts in the previous chapters. There seem to be some kind of adaptation behind these relationships. As stated in Chapter 6, wherever interactions and relationships take place, actors work in a pervasive condition of conflict. Conflicts are experienced because they are associated with what was not anticipated in the way of normal business. The oilfield chemists, along with other actors in the oil field industry, take an adaptive role to make exchanges happen by means of providing and exchanging chemicals and chemical services for their oil company customers, while facing and experiencing conflicts with their particular interests. In the oilfield chemical industry, adaptations take place in the process of interaction, either within or between organizations. Such adaptations function not only through buyer–seller relationships, but also through involving other actors. In this section, I draw out the adaptive role of the actors within the interactions in the five identified relationship cases, and further illustrate why and how incremental innovation takes place within the oilfield chemical production network.

8.2.1 Adaptive interactions

In normal business relationships in the North Sea oilfield chemicals industry, the actors – oilfield chemists, oilfield service companies, large oil and gas operators, regulators and others – maintain relatively stable and long-term relationships but with a dynamism within networks. As Augier & March (2008, p. 3) state, a firm is 'an adaptive, a coalition between different individuals and groups of individuals in the firm, each having different goals and hence possibly in conflict'. The dynamics of the business environment motivate the adaptive interactions of actors, which can be dyadic, sometimes triadic and even multi-

sited. Looking at the identified cases of conflicts from the perspective of interactions, each case contains adaptive interactions by which actors manage (in) conflicts (see Table 8-1).

Case	Adaptive interactions	Consequences
	● Chemical supplier companies interact with their oilfield chemical customers with a regulatory (OSPAR) impact on demulsifier production.	• Substitution & regulatory agenda • Long term & short term planning • Incremental innovation • Changing CMS contract • Negotiation under contract • Licensing • Cost added
Case 1	● Oilfield chemical companies interact with their large oil company customers by using less efficient chemicals.	• Long term & short term planning • Incremental innovation • Negotiation under contract • Licensing
	● Interaction between oilfield chemical company and regulators over concerns about the disclosure of formulations.	• Substitution & regulatory agenda • Long term & short term planning • Incremental innovation • Changing CMS contract • Negotiation under contract • Licensing • Cost added

Case	Adaptive interactions	Consequences
Case 2	● Oilfield service companies interact with oil&gas companies with products which need testing and use in particular regulatory regions.	• Regional standard regulatory testing • Bargaining with regulators • Industry collaboration for incremental innovation • Cost added
	● Interactions also exist between chemical companies and regional testing agencies.	• Regional standard regulatory testing • Industry collaboration for incremental innovation • Cost added
Case 3	● Interactions between oilfield service companies and oil companies over particular technical problems.	• CMS contracts • New projects for incremental innovation • Cost added • Assessing portfolio
	● Companies interact over CMS contract.	• CMS contracts • New projects for incremental innovation • Cost added • Assessing portfolio
Case 4	● Beyond CMS contract, oilfield service company interacts within network and with universities in terms of taking their current or future research.	• Project agenda • Incremental innovation • Cost • Assessing portfolio

Case	Adaptive interactions	Consequences
Case 5	● Interactions for establishing more effective 'green chemistry' between chemical companies.	• Incremental innovation • Cost added • Contest

Table 8-1: Adaptive interactions within the cases

Within the five relationship case studies, interactions (see Table 8-1) take place adaptively with the purpose of establishing and marketing 'green' chemistry. For instance, actors participate in (1) the rearrangement of relationships in business interactions as a result of the impacts of new regulations; (2) new forms of resource interactions and technical problem solutions from the technology updates in the industry; and (3) seeking for lower cost, which becomes a main issue in terms of maintaining long-term business relationships.

8.2.2 Innovation as adaptation

Table 8-1 summarizes actors' interactions and their consequences in the five relationship case studies. The interactions in Case 1 and Case 2 were usually triadic among an oilfield chemical service company, chemical suppliers and regulators. As NAWO cannot provide sufficient evidence for their demulsifier (alkyl phenyl ethoxylate resins) to prove that the product is suitable to meet the OSPAR regulations, NAWO has to make adaptations so that they adopt other less efficient demulsifiers to use in the North Sea. Tony, the NAWO's product manager, said:

> We have no choice but have to adapt to the regulation standard and change formulation, which means a new round of R&D will be established.

As illustrated in Section 6.3, not only does a chemical supplier company face regulatory adaptations but a chemical service company also meets the same need for regulatory adaptations. In the same case study, ProChemicals provides scale and corrosion treatment to Large Oil, under the long-term CMS contract. Although the CMS contract maintains stable relationships between ProChemicals and Large Oil, negotiations take place in terms of adapting to seek better treatments for corrosion problems under the North Sea environmental regulation requirements. As David said:

We never stop innovating over new corrosion inhibitors for corrosion problems because our current product, polyaspartate, performs so poorly in operation.

ProChemcials also makes adaptations to product performance for the purpose of making profits while operating under the regulations. It also invests money in researching and developing products with better performance with a view, on the one hand, to replacing polyaspartate, and on the other hand to avoiding the risk of the regulations changing to regulate the quantities of product used rather than the substances themselves. There is cost involved in developing new environmentally acceptable products with good performance to gain market share. David, ProChemicals' oilfield chemist, stated:

> …We are aiming to get market share in this segment of market. We launched a project to develop alternatives to our current corrosion inhibitors. We made remarkable progress but we cannot use our newly developed products. APGs [the product in question] can be used in a number of applications as corrosion inhibitors. They can be classed as truly green, having low environmental impact, being fully biodegradable and being derived from sustainable natural rather than synthetic sources; however their uptake is limited as their comparative unit costs are much more than other chemicals. In term of this, we prefer to use alternatives that are cheaper but not as green as APGs…

As explained by David, innovation projects to produce better performing corrosion inhibitors are set up under or beyond the CMS contract. Whether the product can be used on not is determined by the unit cost of the products rather than just by regulatory pressure.

Adaptation to regulations also emerges in Case 2, where a chemical company invests and adds cost to their products in response to due to regional regulations. The situation that KTI faces, which is that the well-performing biocide, Tetrakis Hydroxymethyl Phosphonium Sulfate (THPS), cannot meet the Norwegian environmental regulations, drives them to invest to find alternatives which are more biodegradable, less bio-accumulating, and less toxic than the chemicals that can be used in other areas of North Sea so that they can pass the Norwegian regulatory testing process. Tao, from KTI, commented:

> …THPS will not be acceptable to Norwegian regulation although it performs
> well in other areas. Within KTI, we set up meetings for the project of funding
> R&D into alternatives with better or at least the same performance as THPS
> but which can be used in Norway…

The adaptations to regulations in Case 1 and Case 2, which bring about cause incremental innovations in alternative chemicals, require the capability of actors to manage risks and plan for changes of norms. Both chemical suppliers companies and chemical service companies tend to minimise the uncertainties caused by changes of regulation or new regulatory impacts.

Adaptations in Case 3 and Case 5 focus on technology and technical solutions to chemistry problems, where chemical services companies work between chemical suppliers and large oilfield operators. An oilfield chemist in Case 3 took on an adaptive role of innovation within the long-standing relationships in order to solve technical problems. The process of solving technical problems requires collaboration within the industry. Case 3 also illustrates the process of incremental innovation in relation to products to deal with particular chemical problems faced by an oilfield chemist: (1) getting the idea and concept of the innovation (from a problem); (2) evaluating resources; (3) research and development; (4) trialling; and (5) launch/use the product. Monjit, GD Solutions' R&D manager, described it in this way:

> Problems need to be solved under the CMS contract, which can be a five year
> collaboration or even longer. We face the difficulty that we cannot always deal
> with the same problem with the same formulations because of regulatory or
> technology issues. We hold the CMS contract, which means we have an
> obligation to balance both the long-term and short-term benefits in the way we
> tackle this:

Balancing long-term and short-term benefits requires actors to be able to react to market needs and to forecast the risks of using chemical products under regulations. This requires a long-term or short-term innovation project to evaluate and address problems by optimizing the current product portfolio. Monjit added:

Short-term innovation projects were also established under the contract with the oil and gas operators. Most of the innovation took place in-house. We set up a group to evaluate and establish R&D to solve the chemical problem in oil and gas production.

Case 5 describes another method of adaptive innovation, which broadens the network of actors in chemical production. In the face of enhanced regulation and technical problems going beyond CMS contracts, innovation takes place incrementally as the actors are usually unwilling to add the costs necessary to innovate. Collaborations across the industry are one approach to getting problems solved. These can involve a series of adaptive activities, such as developing alternative solutions for chemical problems, environmental regulatory testing, interacting with Oilfield Chemical Companies and Oil Companies, tests and feedback trials before launching the products, etc. As Claire stated in Case 5:

…Product portfolio decides the direction of our R&D, whether to go forward or to stop it. Having a longer-term perspective of the entire product portfolio usually encourages more effective use of time, money and other resources. Thus, a well-scheduled R&D agenda makes for successful R&D projects…

The adaptive interactions take place over several sites in Case 4, where oilfield services companies which were encountering cost issues adaptively aligned with other research organizations to increase their technical capability ahead of demand. Adaptations in the green chemistry market are multi-sited, and involve a range of actors who are allocated different segments of the markets. To resolve the conflicts between regulations and product performance, actors choose to adapt product performance. This results in other adaptations or projects with significant material and technological consequences, leading to innovations. Multi-sitedness is a feature of this incremental innovation as the network widens across the industry. Service companies also interact with their suppliers on innovations in relation to problems of meeting the regulations, getting better performance or/and reducing cost. There are also a few industry-wide organizations where oil companies and chemical suppliers meet, often as joint-industry applied research projects which function similarly to a research organization. Oil companies require products that satisfy the regulatory requirements and these can be too expensive or complex for a single chemical services company or chemicals supplier to develop. Suppliers and operators construct alliances over research interests and market needs. Any chemical supplier,

chemistry service company, or oil company can join and get research commissioned conditional upon sharing the results.

A common feature across the case studies and across the ways in which adaptations are formulated and take place is how chemical service companies, working between chemical suppliers and oil companies, make interactive innovations happen to meet the changing business environment and environmental changes. Actors have to make adaptations to balance meeting the regulations and the pressures of their cost base, prior to any adaptations as a result of other factors. The adaptations result in innovations which link actors through the process of getting technical problems solved within the CMS contract. These innovations require significant incremental investment, for instance in labs, in tendering processes for longer-term contracts, in employing scientists, in R&D projects with chemical suppliers or in joint-industry projects, in working with independent labs, in forming an industry association. Innovations in the case studies have social characteristics embedded with materialities which would develop incrementally in their normal business relationships, usually driven by CMS contract and cost issues.

8.3   Drivers of incremental innovation

8.3.1   CMS contract and innovation

> …If you look at the last 50 or so years in the North Sea, the driver has been from the oil and gas industry to move towards longer-term contracts with single or dual sourcing because they believe that they get a better process by doing that. ...

(Commented by Monjit, chemist from GD Solutions)

Monjit stressed how important a CMS contract is to a chemical service company. Large oil and gas operators who find new oil and gas fields or technical problems in their fields usually start a CMS contract. CMS contracts are the normal way of working and connect actors in making interactions. Due to the confidentialities, I found it hard to get into details of any CMS contracts in the industry, but can luckily interviewed some independent consultant who had been dealing with CMS for chemical service companies or large oil and gas operators. I identify the importance of CMS contract in researching actors'

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interactions and consequences by examining business activities associated with the CMS contracts in our five selected cases.

By revising the Case 1, ProChemicals interacts with Large Oil under a five-year CMS contract. The interactions not only refer to normal activities of chemical problemsolving and consulting, but also include some additional innovations to address specific problems encountered. Malcolm said:

> …Long-term contracts are considered by actors to be a win-win situation. Oil and gas companies will reward service companies if the service companies help them to solve particular problems. But a reward only really exists for us if we get the contract. That does encourage incremental innovation. …

For a service company, tendering for a CMS contract is their main business strategy in terms of getting market share. In the upstream oil and gas chemicals industry, it is vital for service companies, who work between chemical suppliers and large oil and gas operators, to plan for long-term incremental innovation as well as for their short-term innovation strategy, i.e. their core portfolio strategy. These can help them in tendering for CMS contracts by reducing the bidding price. Malcolm added:

> …We certainly try to optimize the product portfolio in terms of reducing the pricing to gain those longer-term contracts because it gets us a bigger market share. If we don't win contracts, there will be no chance for us to have a business. We innovate for contracts and services required in existing contracts, requiring investment in techniques and expertise. Also, we innovate for potential customers if we think it's necessary. …

Not all incremental innovations take place under the CMS contract. For instance, MIC Chemicals in Case 4 invest in and develop products beyond the requirements of any of their current contracts. Such innovations are established in advance of market demand and for the market per se, requiring enhanced forecasting capability for their R&D strategy. It results in a change of relationships through the adoption of other resources in networks. MIC Chemicals in Case 4 invests in an industrial research organization dealing with a problem of scale and flow assurance. They have had great success in containing costs

through this way of making incremental innovations. The project they invested in, along with the other products in their portfolio, helped them to achieve four five-year contracts.

Tendering for CMS contracts integrates planning capability and the mobilizing of resources such as capital, chemists, current products and product portfolios, regulations, etc., as well as an incremental innovation team tasked by the CMS contract or a CMS contract tendering project.

As Norway operates to a higher regulatory standard, Tetrakis Hydroxymethyl Phosphonium Sulfate (THPS), the biocide that KTI uses in other countries, cannot be used there. Under a five year CMS contract with Cold Oil, KTI has to provide products from their portfolio which perform more or less the same as THPS. But the alternatives they find are much more expensive than THPS. As Matthew stated in Case 2, KTI has conflicting goals, working as both a selling and a buying organization. As a selling organization, KTI aims to maximize its profitability. But on the other side, the large oil and gas operators, as the receiving organizations, are keen on securing the cheapest price and best product performance. Thus, KIT has to invest in innovation to find alternatives at a lower cost so that they can sell them and increase their profits.

CMS contracts encourage not only the chemical service companies but also their suppliers to innovate, pushed by the chemical services companies. Malcolm explained:

> … We also require our suppliers to R&D products for us for special use with their technology when we get a contract. It usually comes with projects. We only fund projects for products that the companies do not often use or they will invest in facilities and technologies by themselves. They invest in building laboratories to undertake experiments and tests, and having their products tested in third party labs in order to acquire licenses to use these as products with their customers. We help them to test under the confidentiality agreement. …

A CMS contract connects chemical services companies and oil and gas operators with technical and chemical services problems. Under CMS contracts, a service company invests or requires their chemical suppliers to invest in incremental innovations to optimize their product portfolios, on the one hand to meet the technical requirements from their

customers, and on the other hand to meet their own demand for products at lower cost, which becomes another driver of incremental innovation.

8.3.2 Cost and innovation

8.3.2.1 Cost

After making a cross-comparison of the five case studies of relationships (Table 8-1), it is clear that all of them are related to product research and development in terms of seeking lower cost products with the same or better performance. As Malcolm stated:

> …We make every effort to reduce the cost as much as possible. It continuously reduces the cost from the chemical suppliers sides. We have to do a lot to justify the price. …

Actors in the oil and gas chemical companies minimise uncertainty by providing stakeholders with the benefits they are looking for, whether those be financial, social or regulatory. In the process, reducing and balancing costs in delivering and exchanging chemicals and chemical services, enabling product portfolio management and the execution of incremental innovation projects in a more adaptive and collaborative way all become effective ways to reach their business goals.

Containing costs gives a competitive advantage to actors in terms of winning a long-term business contract development, and this also directly drives incremental innovation. Cost-driven innovation exhibits a processual quality, developing over a long timeframe, and becoming seen as the normal way of doing business. Actors contain costs through identifying and allocating specific resources to projects, calculating materialities, optimising the product portfolio and deciding on the style of incremental innovation (Figure 8-1).

8.3.2.2 Evaluation

In relation to long-term planning, actors in the upstream oil and gas chemical industry evaluate and forecast the technical needs of their customers and changing regulatory requirements. Incremental innovation plays a role that runs across siloed product and portfolio planning as well as short-term planning for a particular chemical problem or long-term for business planning. Once a decision to go for incremental innovation has been

made, actors tend to evaluate their entire portfolio and R&D capability. Evaluations can take several forms:

(1) Self-evaluation: chemical service companies evaluate their own R&D capability, including capital, current product portfolios, labs, chemists, time, etc.;

(2) Market evaluation: evaluations being made in relation to market actors, including business partners and competitors. Actors planning innovation evaluate the market's needs and potential market shares, their competitors' and their own product portfolios, and their current and potential customers;

(3) Regulatory evaluation: actors assess environmental regulation, regional regulations, and industrial regulation. Incremental innovation is highly influenced by the regulation agenda and substitution orders for particular chemicals or formulations.

In facing chemical problems, chemical service companies, chemical suppliers and oil and gas operators become connected in projects to innovate and test for solutions as routine. Claire from SurChem in Case 5 briefly described their R&D evaluation:

(1) Looking into the product requirements from the point of view of a service company customer;

(2) Discussing ideas and concepts for incremental innovation;

(3) Assessing the (regional) regulatory requirements, cost and product performance within their current product portfolio;

(4) Evaluating the market and talking to customers about their potential needs;

(5) Decision being made to innovate or not.

The cost and the outcome of the evaluation become main issues in deciding the future of the R&D process and helping actors choose the style of innovation project – i.e. in-house, through a bilateral relationship, or through a cross-industry project.
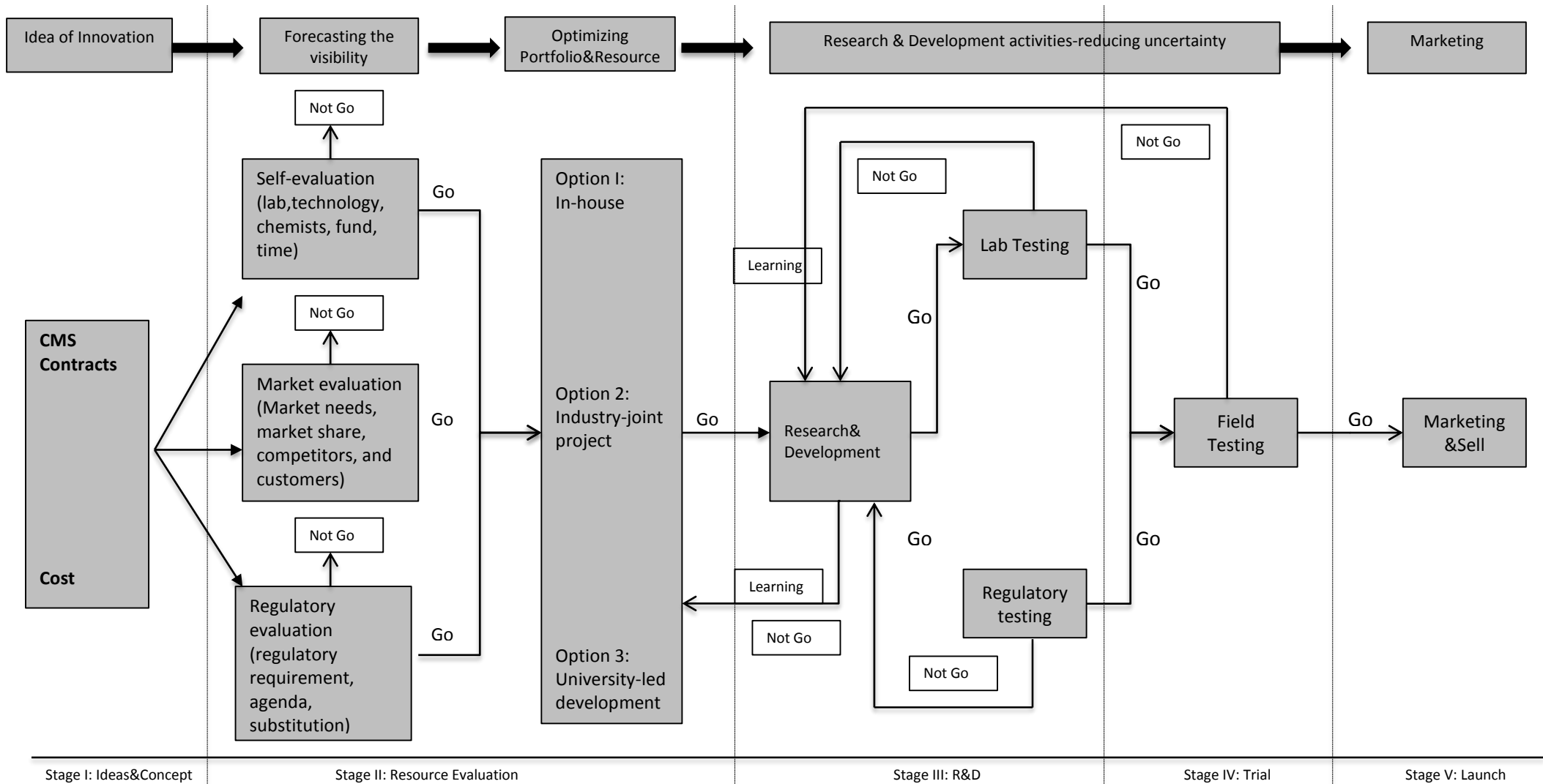
Figure 8-1: Incremental innovation model

8.4 Incremental innovation in normal business

8.4.1 Innovation process model

Incremental innovation for product development is the dominant form of adaptation in the oil and gas chemical industry as conflicts are experienced pervasively by actors and need to be resolved. Based on the five case studies of relationships in this research, an incremental innovation process model is developed in this section (Figure 8-1).

The upstream oil and gas chemical markets are mature. Most innovations are undertaken incrementally as part of normal business in a highly regulated and cost-driven context. The framework of the process model of incremental innovation for 'green chemicals' is to enable us to understand the interactions and resources in a processual way.

8.4.1.1 Ideas and concept

An idea and concept for innovation starts from lessons learned from the industry and customers either under or beyond the CMS contract. An innovative idea for chemicals develops from encountering a chemical problem (as in Case 1, Case 2, Case 3 and Case 5), regulation requirements (as in Case 1 and Case 2) and cost issues (as in Case 4). Ideas are also formed as a result of critical events (mentioned in Study 2, Chapter 7), where industrial technology conferences and workshops are held for the exchange of information. Once established, the idea has to be evaluated to decide whether resources should be committed to it.

Product ideas commonly spring from a number of sources, such as encountered technical problems, drivers of innovation (CMS contracts or cost), regulation, etc. The concept is a more detailed stage to better define exactly what the product is to be in relation to markets or customer needs. For example, in Case 2, Biocide Tetrakis Hydroxymethyl Phosphonium Sulfate (THPS) is no longer to be used due to the higher hazardous standard in Norway. KTI plans to develop alternatives with the concept of longer-term biodegradation to meet Norway's standards. The process of forming a concept for innovation is a process of making markets and evaluating the resources that can be adopted. As Roy said (in Case 2):

> …Meetings are held with more frequency than usual to discuss ideas and concepts before establishing a new innovation process, which is mainly cross-departmental within our firm, and sometimes with our customers. …

> … We also face challenges at this point, such as enabling the planning process to take place among the different functional areas such as operations, R&D, marketing and finance, reducing long-term planning and forecasting errors, increasing visibility and collaborations with partners, suppliers and customers.

In the stage of idea and concept, transparency and visibility among executive planning groups makes for a less error-prone and more robust planning process. Following this stage, a detailed portfolio and resources evaluation takes place.

8.4.1.2 Evaluation portfolio and resources

The initial evaluation is a process of reviewing the current portfolio to see whether there is any product or chemical which would provide a solution to the problem. Then this is followed up with the three evaluations explained in section 8.3.2.2, i.e. self-evaluation, market evaluation and regulatory evaluation.

Time and cost are crucial in terms of deciding whether to innovate themselves or buy products from the market. In Case 3, GD Solutions encountered the problem of gas well deliquification. Based on the portfolio and resources evaluation, GD Solutions decided to involve their suppliers to provide FAL rather than make incremental innovations by themselves. This required a broader industry collaboration involving GD Solutions, FAL (supplier) and Mature Oil (customer).

In contrast, in Case 4, MIC Chemicals evaluated and decided to invest in incremental innovation as a result of its forecasting of the market potential. Driven by cost, MIC Chemicals chose to collaborate in a joint-industry project led by a university research centre. Evaluations help develop ideas and concepts into projects, requiring the optimization of internal and external resources for technical appraisal. If the business decides to go ahead, it must then decide on which style of incremental innovation to use. The R&D is then established. Three styles of incremental innovation are undertaken in the oil and gas chemical industry, i.e. in-house (as in Case 1 and 2), industrial-joint project (as in Case 3 and 5), and university-led development (as in Case 4).

8.4.1.3 R&D

The research and development is the main stage of incremental innovation and requires interactions and allocating resources between actors in the industry. Product research and development is considered as an important activity in obtaining CMS contracts and leading to a stable market position for actors. In Case 1, the R&D is established by an oilfield chemist, who develops a new alternative demulsifier to meet the regulatory requirements. In Cases 3, 4, and 5, resources and interactions across the industry become vital to make innovation happen. The R&D projects take place by means of in-house projects, industrial collaboration projects and science-to-business (led by research organizations). The testing stage is the validation of the technical and regulatory performance in use. For oil and gas chemistry product innovation, because of its hazardous nature, lab testing and regulatory testing is undertaken before sending the product to trial.

8.4.1.4 Trial and launch

The trial stage refers to 'sample testing' in real sites, allowing chemical service companies to put samples of their own or samples from their chemical suppliers to be tested in field under a secrecy agreement. The trialling is undertaken to reduce the uncertainties of R&D. Testing encourages collaborative interactions within networks, such as field testing, producing feedback reports, further discussing the R&D and innovation agenda, etc. If all the testing goes well, the products will be produced for commercial use and launched into the market.

The incremental innovation model (Figure 8-1) not only illustrates the process of chemical product innovation but also shows the key issues for innovating successfully: the actors' assessment of their core product portfolio strategies, their capabilities in the market and in market-shaping.

8.5 Cost Containment in incremental innovation

8.5.1 Optimizing portfolio and resources

In deciding whether to go forward with any incremental innovation project, it is important for actors to undertake evaluations and have a long-term perspective of the entire product portfolio and sufficient capability to allocate resources within networks. For example, in

some of the cases (Cases 1, 2 and 5) in this thesis, one incremental project might work for a serious of chemical problems and efficiencies could be gained while innovating for a particular problem or environmental requirement. A cluster of innovation projects for particular areas is a more sufficient way of dealing with projects in a timely fashion, rather than spreading those projects out over years of individual research and development, by which time they may be out of date and have lost competiveness. Combining resources for agreed R&D projects also makes sense.

Another round of evaluation takes place in terms of deciding on the innovation style. A process model is a useful approach to organizing and controlling the various activities involved in the development of a new product, and provides a skeleton around which each project manager can built his/her own path for any R&D project. In the whole process of innovation, actors in networks optimise their product portfolio and decide on a suitable style of innovation so that they can resolve or at least partially resolve the experienced conflicts in producing and exchanging chemicals. A failure to optimize portfolios leads to challenges in long-term business development, sub-optimal use of resources, extended project timeframes and cost escalation.

Therefore, actors need to achieve enterprise visibility for all innovation projects under CMS contracts across their product portfolio and achieve optimal use of resources by getting the right people, on the right stage of the project, at the right time; combine and/or align similar projects; and choose innovation styles to more effectively manage in conflicts, in relation to actors' experience of regulation, technology and cost.

8.5.2 Forecasting and innovation agenda

The ability to forecast accurately is important for any actors involved in innovation projects, as this optimises resource allocation, cost arrangements, and the project timeline in relation to the technology capability and regulation agendas. This is essential for the planning process of any project and also for the integration between the planners and the technical experts. The ability to enhance visibility and collaboration among the members of a disparate planning team is required in order to streamline the innovation process and make decisions more quickly and accurately, mainly according to cost and practicality. This allows calculative arrangements of material objects and devices. Based on the innovation process, actors are positioned within temporal frames (Araujo and Kjellberg,

2009) in which interactions between entities encourage each project to keep going. For instance, operation leaders will have certain criteria that need to be met, while the finance team, innovation chemists, and regulatory department will seek other objectives. This process will evolve in a socio-technical *agencement* requiring material, textual and other financial investment (Callon and Çalışkan, 2005). Due to the incremental feature of innovation, transparency and visibility among the planning stakeholders makes for fewer errors and a more healthy process.

Through the integration of portfolio management and agenda arrangement capabilities, actors pay more attention to demand forecasting and providing extended stakeholder interactions and collaborations. A major issue of aligning interaction and discussion is creating solid integration and collaboration between those tasked with incremental innovation projects and those executing the projects. Having the ideas and concepts of innovation without rationally evaluating resources and portfolios leads to misinformation and costly mistakes in the later process of innovation. Product development teams (small-groups) in organizations overcome these issues by (1) creating a truly collaborative environment, in which it is easier for the innovation team to share information through certain interactions; (2) ensuring that every one involved in the innovation project has complete visibility of the R&D and execution phase, and is fully aware of the abilities of the technology that is ready in place, and the environmental regulation requirements; and (3) by optimising the available capabilities and allocating all data and resources to make sure everyone in the team is working from the same information at the same time towards the same goal under the CMS contract or the innovation project agreement.

8.5.3 Reducing uncertainties in network

Actors that consistently achieve R&D goals and deliver on the innovation requirements have two practices in common – they carefully make evaluations and effectively assess the innovation risks of projects and, therefore, invest time, resources and technology in successful endeavours that further the company's strategic objectives. Risk assessment should permeate the whole process of innovation, and be manifested as tasks and activities embedded with materialities. Successful innovation project leaders are also very aware that identifying risk is not an intuitive process and that no individual can accurately identify the innumerable contingencies that can, and do, arise. Without assessing these risks and understanding effective collaboration many projects will fail or, at best, encounter large

costs through missed deadlines and poor resource and budgetary management in the R&D process. For these reasons, it is extremely important to ensure that capital projects and maintenance investments are used effectively. And technologies exist that provide this assurance. These solutions enable project managers to conduct comprehensive and rigorous risk assessments and provide all involved in the decision-making process – from those in the field to those in the boardroom – with the information they need to draw sound conclusions.

With an enterprising innovation project and portfolio such as SurChem Solutions had in Case 3, project leaders can collect and analyze the necessary information to successfully manage risk and persuade risk-averse end users through comprehensive test data. In the case of the technology for demulsifiers, those tasked with organizing the right people and the assets they need can successfully manage and complete complex innovation projects. As a result, these project managers and the organizations they serve realized a significant and proven advantage in their efforts to identify, select and execute the best project opportunities through testing 'green chemical kits for demulsification' for their portfolio. In addition, they improved their ability to coordinate existing resources and regulations, to invest in new projects with better performance and comparable cost that further the company's goals, and to establish better solutions in networks.

8.6   Conclusions

This section summarizes the main theoretical and managerial implication of the third empirical study. The research question of this chapter has been:

RQ 3: How do actors adapt to establish incremental innovation in conflicts?

I drew on cases from Study 1 and Study 2 from the perspective of actors' normal business activities in chemical and chemical service development and found that 'adaptive' is the main feature of actors' roles in dealing with the pervasive conflicts they experienced in their networks. As I re-illustrated the cases in a different way, by drawing on actors' adaptive interactions and their consequences from the perspective of relationships, I found that product innovations are undertaken as adaptive activities and interactions, mainly incrementally, driven by CMS contracts and cost issues in either long- or short-term planning.

I developed a theoretical incremental innovation process model based on the cases selected from the oil and gas chemical industry. Many of the insights have been integrated into the five-stage process model presented in Section 8.4.1, i.e. getting the ideas and concepts, portfolio and resources evaluation, establishing R&D, and trial and launch to markets. In the process of incremental innovation, most decisions are made based on a review of experiences and learnings from the markets and past R&D products. There are some implications from the model. One is that the process can be multi-dimensional: it not only shows the process of incremental innovation from decision-making to outcome, but also illustrates how the R&D team are required to contain costs in terms of managing risks, which is more calculable. The second implication is it shows that the interactions of actors can both internal and external to the organization.

Incremental innovation will always be a high-risk undertaking. Managerially, this chapter focuses on small group decisions, providing some guidance for incremental innovation project teams to manage evaluation and costs to decrease risks (combining the capabilities of the innovation project team and executives), and for tasks such as optimizing portfolio and resources, forecasting and agenda setting, and methods to reduce uncertainties across the network.

Although risk assessment and management can never be an exact science, experience and various techniques enable innovation team members to construct risk scenarios and establish where the risks could be, balance long- and short- term planning, and pay attention to forecasting and managing the portfolio to make the costs containable.

Chapter 9.   Conclusions

9.1 Introduction

In this final chapter, I will set out the conclusions of the thesis by summarizing the key empirical findings and present the theoretical and managerial contributions of my research. I will also discuss the major limitations and future research agenda.

The research is set in the context of the 'green chemicals and chemical service' markets in the North Sea upstream oil and gas industry. The industry is mature but dynamic because of business influences from changes in environmental regulations, developments in technology, and cost issues in chemical production and uses in the North Sea areas. With the development of the oil and gas chemistry industry, actors (chemical service companies, chemical supplier companies, oil and gas operators, and regulators) take the role of being responsible for ecosystem problems caused by the use of chemicals. In the industrial market of oil and gas chemical production, actors maintain long-term business relationships under CMS contracts, or other project development agreements.

Research into relationships has been a long-standing topic in business-to-business research, focusing mainly on relationship building, relationship change/dynamics, and even sometimes on relationship ending. However, if you look deeper inside the markets, you will find that relationships are not as stable as expected, but affected by many factors. Conflict, which is the perspective I chose to study, seems to contradict the concept of long-standing relationships, but plays a key role in showing relationships in a slow-moving and dynamic condition.

The research is set up to examine business relationships by analyzing conflict theories in organization studies, taking a mid-range perspective and further developing it in business-to-business marketing research. Thus the aim of the thesis has been focused on **investigate how actors manage, and manage in, conflict within relationships and networks.** In terms of reaching the aim, research questions are designed to address (1) conflicts in relationships, (2) emotional conflicts in relationship dynamics, and (3) actors' innovating activities in terms of managing conflicts.

I have drawn on and developed March's definition (1999, p. 217) of conflict as 'multiple nested actors confronting multiple nested time perspectives with references and identities that are inconsistent across individuals and across time'. I have reviewed the behavioural approaches (March and Simon, 1958; Cyert and March, 1963; March 1999, 2008) to conclude that conflict is a pervasive condition in organizations, and to contrast them with the social-psychological approach that conflict is as experienced by actors with affective emotions. The feature of a firm is adaptive and a coalition between different individuals and groups with different goals and hence in conflict.

Thus, I develop the thesis to analyze the tension and interplay between the conditions in which conflict is embedded and inherent, and the emotional experience and sequences. These theories remain an important but slow-moving influence in the field, but notably influence business-to-business marketing. By reviewing the behavioral theories of conflict study, I note there seems something overlapped with social psychology. I develop the theories by combining the understandings of the behavioral approach and socio-psychology approach, both of which regard conflict as a pervasive condition, and as experienced in and translated through emotions.

The conceptual framework leaves the research interest in conflict in Business-to-business marketing research, covering questions of relationships, resources, and individual or small group experiences as emotions in networks. In terms of developing the research, I try to contribute theoretical thinking by developing the organization conflict theories and small group studies into industrial marketing research, especially in relation to the IMP and Market Studies approaches. Chapter 3 reviews how conflict theories are developed from the perspective of IMP, which is regarded as with more structural, interactive, resource-based and adaptive features. Chapter 4 investigates the emotional dimension of conflicts from the perspective of Market Studies tradition, where markets are in the making. Conflicts are regarded as practice and performances by which emotions are transformed and managed.

The research is philosophically positioned as pragmatism, using a mid-range approach and abductive reasoning approach, which shifts between the inductive and deductive. Abduction not only takes the advantage of the flexibility of the case study method to build theory, but also helps researchers move 'back and forth' between theory and phenomenon.

In terms of addressing the research questions proposed in Chapter 1, I chose case study method as the overall methodology choice in this research.

Three empirical studies are developed around the research questions by identifying and analyzing five case studies of relationships in the normal business of the North Sea oil and gas chemical industry. The three research questions have been addressed in the empirical studies chapters. The empirical studies of the research started by comparing conflicts within the five relationship case studies (Study 1), focusing on the conflicts, the actors involved, the resources being allocated, the interactions, and the actors' management activities. Study 2 addressed the emotional result of conflicts and relationship dynamics, by analyzing consequences from critical events, triggered emotions and other activities. Study 3 focuses on actors' activities in terms of 'managing in' conflicts by evaluating their adaptive interactions in undertaking incremental innovation.

Before presenting the contributions of the research, the limitations and the future research agenda, I will summarize the empirical findings in the next section.

9.2   Empirical findings

Study 1 (Chapter 6) compares five conflicts in Cases of relationships drawn from the selected relationship case studies, in relation to the conflicts the actors experienced as they encountered regulation, technical problems and cost issues in terms of chasing economies of scale in chemical product development. The five cases explain how conflicts are experienced in durable relationships and resources, as they are associated with activities and manifested as events and technical tasks requiring resource allocation and certain adaptations in interactions. The cases provide focused circumstances for conflict as experienced by actors and illustrate how relationships are maintained in the face of conflict. By adopting the behavioural perspective, I identify that actors who are tasked with resolving the situation experience conflicts associated with affective emotions. Conflict, as perceived and experienced, has its manifestations. Relationships become a resource to allow an adaptive agent to acquire the use of additional resources or re-allocate resources. In all five cases of conflict, the process of adaptation is undertaken through acquiring additional resources combined with commercial compensation, whereas incremental innovations take place in a variety of ways, i.e. in-house, joint industry project and university-led project (Study 3).

Study 2 (Chapter 7) is based on the material condition of conflicts and their alignment with industry events, which affect the duration and resourcing of conflicts, sequentially triggering cognitive emotions. The Study analyzes the emotional dimension of conflicts in their role of shaping markets and relationship dynamics. Within the cases, a series of events at which chemists have developed and exchanged green chemistry in the North Sea oil and gas industry, are traced and examined. By following the consequences of each event and the actors' interactions during them, I identify that the triggered emotions are difficult to manage, but are transformed into material-based tasks and projects, which are more manageable and controllable.

Study 3 (Chapter 8) demonstrates the process of innovation. Due to the pervasive nature of conflict in a network, actors take adaptive roles in terms of undertaking incremental innovation. I draw out the adaptive interactions from the selected relationship case studies and examine the consequences of each interaction. I identify three main types of adaptive interaction: pursuing the rearrangement of relationships as a result of regulation change, new forms of resource interactions to find better solutions for chemical problems, and lower cost aspirations. The consequences are manifested as innovation driven by the long-term CMS contract and cost. I design an incremental innovation model, which not only illustrates the process of incremental innovation in 'green chemistry', but also identifies evaluation and cost containment as important factors in risk management for project teams, in optimizing portfolio and resources, in forecasting and agenda setting, and in reducing uncertainty across the network.

By undertaking cross-case comparisons, in all my cases, conflicts are experienced because they are associated with tasks and events that are not anticipated by normal business. Oilfield chemists act as agents in normal business, work in-between chemical suppliers and large oil and gas operators. Conflicts are experienced at and manifested as events, which develops conflicts emotional embedded with materialities. The adaptations in Case 1 and Case 2 are to regulations. Oilfield chemists modify their product to meet environmental regulations or regional regulation standard, mainly under the CMS contracts of providing chemical products and services. The adaptations in Case 1 and Case 2 requires additional regulatory testing for product development. Actors in Case 3 and Case 4 experience conflicts of technology, as finding solutions under CMS contracts. But Case 5 shows a different relationships in a broadened network of actors, which allocating resources more sufficiently. Cost, as a vital factor dominants market activities, exists in all cases in terms

of achieving economies of scale or cost containment. Actors in all five cases, taking adaptive roles of experiencing conflict of regulation, technology or/and cost, draw on additional resources within (Case 1 and Case 2) or outside (Case 3, Case 4 and Case 5) their own organizations, through which incremental innovation takes place.

In process of acquiring resources, actors are tasked in critical events aligned with conflicts. Actors in conflicts, make sense from them from fitting with norms, interactive bargaining and lobbying regulators, as affective emotions. After analyzing the critical events, their emotionality and the sequences of the triggered emotions, there seems something sequenced in the events and affective emotions. I follow the emotion-sequenced events and their impact on transforming emotions in the network. Negative emotions are inevitably triggered, but can be transformed positively by resourcing them. Actors should pay attention to critical emotional events, which are regarded as important turning points by which personal emotions are initially triggered. Actors experience, interpret and develop different emotions in relation to their experiences of events, broadly categorized as either positive or negative. Emotions work as mediators between events and contribute to making sequenced events, distributed through networks. Positive or negative emotions have an impact on relationship dynamics, and negative emotions encourage some degree of change. The emotion-sequenced events, are translated into market practices as adaptations, by which incremental innovation takes place. These practices are undertaken through a range of activities with material arrangements in making markets calculable. Actors manage emotions by transforming negative emotions. The transformation of emotions is usually associated with entities with materialities through socio-technical *agencement*, which is manifested in trust building activities with a strong material basis, textual and investments.

The empirical studies of the thesis start with looking into the cases of relationships in the North Sea oil and gas industry, then develop by comparing sub-cases of conflicts within the cases of relationships. In all the five conflicts in Cases, conflicts are experienced because they are associated with activities of adaptations in the way of normal business. The adaptations are taken place as additional non-standard which are accompanied by business interests of actors under or beyond the CMS contracts. Actors in the cases take the role of adaptive agent in mobilizing resources either in their own organization or from elsewhere across networks. The experienced conflicts, are manifested as affect emotions. The emotions and emotion-sequenced events are investigated in succession, which have impacts on relationship dynamics, make shaping and trust building. The five cases of

relationships also demonstrate processes of innovation, which are mainly incremental. In the final empirical chapter, by investigating the adaptive role in incremental innovation, an incremental model of green chemistry is designed as one of the contribution of the research.

9.3   Theoretical Contributions and Implications

I developed the research by reviewing the theories on organizational conflict and contributed by identifying the meanings and functions of conflict in industrial marketing, and by developing the theories more deeply along the lines of the approaches of IMP and the Market Studies tradition. I theoretically further developed conflict studies (March and Simon, 1958; March, 1962, 1972, 1999; Pondy, 1967; Cyert and March, 1963; Thompson, 1967; Jehn and Mannix, 2001) into business-to-business marketing studies, which is with slow-moving nature, more about conflict being pervasive, to be managed in relationships and in networks, giving rise to events, but rarely of themselves events. The contributions fulfilled the proposed research gap of between researches focused on how conflict is a pervasive condition of organizing, and how actors come to experience and manage particular episodes of conflicts; how conflict becomes manifested as emotions and how the perceived emotions are managed in relationship dynamics; how actors adapt in conflict and undertake incremental innovation. I summarize some contributions to the research as follows:

9.3.1   Conflict as a structural condition

Conflict research, has been an enormously fruitful approach in organizational studies; it has addressed, for example, the structural qualities of conflicts, the impact of functional and dysfunctional conflicts, inter-and intra-organizational conflicts, conflict outcomes and strategic behaviors in conflicts.

The first theoretical contribution of this thesis is the insights, which have emerged through the adoption of the perspective of the behavioural approaches to conflicts in relation to industrial marketing. The behavioural approach is slow moving but with great impact on organizational relationships and interactions of actors in/between organizations. The behavioural approach addresses the point that conflict is a pervasive condition of organizations since they involve actors identified with different interests and in different combinations. This holds true between as well as within organizations. The approach

focuses on the processual and structural relationships of the actors and refers to the actors' multiple perspectives, identities and time frames. It therefore helps to ensure a deep and multi-faceted approach to the analysis of conflict in organizations. As the behavioural approach has matured, a great dynamics has emerged within it (Thompson, 1967; Nelson and Winter, 1982; Cyert and March, 1992; March 1999; March, 2008).

The research takes a mid-range perspective on the behavioural approach to conflict studies in organization research, as this is appropriate to such a pervasive, structural and relatively unchanging condition of organizations. It has also had a great impact on other disciplines over the years, such as business-to-business marketing research. I reconcile the behavioural approach to conflict with the socio-psychological approach, which studies conflict in teams and groups in organizations (Jehn, 1997; Jehn and Mannix, 2001) and focuses on emotions. This approach suggests that conflict emerges within small groups and teams, addressing questions of personal affectiveness, emotional conflicts, cognition, the performance of tasks, and how to manage tasks within groups (Jehn, 1997; Jehn *et al*., 2008). There seems much in common between March (1999) and Jehn and Mannix (2001) in their combination of affective and cognitive ways of deciding on plans in conflicts. I conclude that both approaches feature conflict as a pervasive condition, experienced and translated as emotional. I found that the fact that conflict seems to be a pervasive condition of business activities and interactions, which is structural, including relationships and resources in the course of their business activities or tasks is not well addressed in business-to-business research.

In the IMP tradition, conflicts are experienced in durable relationships and resources, as they are associated with activities and manifested as events and technical tasks requiring resource allocation and adaptations in interactions. Relationships are valuable as a set of practices and norms to enable actors to configure their resources in conflict conditions. Relationships are bounded by CMS contracts, which provide considerable stability for four to five years. Relationship ending is rare. This emphasis on the value of long-standing relationships not in preventing conflict but in helping actors to handle conflict is an interesting insight for industries where the actors tend to be well known to each other and relationships are often of considerable duration. It provides a different perspective to the usual one of long-standing relationships helping in themselves to reduce the potential for conflict.

Conflict provides dynamics in business-to-business relationships, even though the relationships are somehow stable. The relationships in the industry are more than just trust or good will. Adaptations are undertaken as prompted by substitution orders from regulators, cost or performance issues. There is a lot of resource and investment that people commit to relationships. Thus, the study of conflict provides a new perspective to see relationships. In this research, I provide a specific model by which actors manage or handle conflict in a more mature setting, rather than solve it. In terms of managing in conflict, incremental innovation should be seen as the normal activity of actors, requiring them to break a conflict into tasks, projects, and events. Actors then resource these as a way of handling the negative effects of conflict. Actors manage (in) conflicts by distributing them and generating short medium term projects. It is a working model for managing conflicts by using networks, i.e. re-configuring the network, bringing other people in the network (broadening the network), making events or innovating projects, which also guides the second contribution of how innovating project take place. As pervasive condition, conflict can be investigated through a series of events rather than a decisive event of and in itself. Hence, conflicts are to be resolved as far as possible in order to protect the importance of the parts of an ARA model and maintain the structural condition of relationships, which addressed the Research Question 1: **How does conflict function as a pervasive condition experienced and managed in business relationships?**

9.3.2   Emotion motivates incremental innovation

My second theoretical implication builds on Çalışkan and Callon (2010). They argue that there is a role for emotion in market shaping and maintenance and also point out that emotion can help to resolve conflict. Çalışkan and Callon (2010) propose a research plan: 'it would be useful to develop further studies of market emotions that grant a key role to materialities in the production of these very emotions. It is important to recognize that the notion of STA [socio-technical arrangement] is designed to encompass the emotional, corporal, textual and technical elements that contribute to the maintenance of markets'.

I conclude that emotions function in relationship dynamics, and acquire material consequences. Actors manage emotions by resourcing and transforming them. By drawing on Roseman's (1991) appraisal theories, I identify and label actors' emotions as triggered by events, and trace the transforming of the emotion. The process of transformation

combines socio- and material entities together. The emotion-sequenced events, transformed from emotions, make emotions calculable, and help shape markets.

The affectiveness of conflicts is further investigated in this research, as part of the emotional dimensions of conflict. The research undertakes a practice approach to conflict and emotions and examines emotions through the market studies approach. The research brings to light a deeper understanding of the practices that make relationships more effective, drawing attention to the importance of emotional conflicts and triggered events in market shaping, which also explains how innovating projects happen. The need of chemicals emerges through actors' interactions in events, i.e. discussions with regulators or users. Actors' affective emotions from critical events and tend to avoid the dysfunctional consequences by transforming them into ESEs by resourcing them. Emotion-sequenced events help actors manage relationship dynamics by building trust, making a shared commitment to costs and performances, and adapting.

Emotions are, counter to expectations, not about decisive conflicts, which are regarded as motivation and commitment of innovating projects in terms of managing the experienced conflicts. The study of emotional dimension of conflicts answers the second research question of '**how do actors understand, transform and manage perceived emotions in business relationship dynamics?'** By drawing emotional elements with multiple references (e.g. actors' roles, expertise, good will of plans, and etc.), actors come up with best solutions at the time based on their roles with existing solutions. Managing emotions is the process of taking motivation and adaptation in order to make a commitment between actors. Therefore, to study emotion in a material and calculable perspective by resourcing and transforming it into material entities is manageable comparing with managing relationships in dynamics.

9.4   Managerial Implications-Incremental innovation model

The theory that emotions have a considerable role to play in change and development in, for example, a long-standing industry such as North Sea oil and gas – which has tended hitherto to be regarded as relatively macho and fuelled by logic and science – is an interesting one with considerable implications for how companies in the sector can be best managed to give themselves a competitive edge.

The industry setting of the North Sea oil and gas chemical sector is mature in terms of its small number of actors, production facilities, geological conditions, chemical regimes and regulation. The mature state of the industry provides an unusual setting in which to investigate and understand how resources and relationships interact, and how to allow actors to manage conflicts of interest as these become experienced in adaptive incremental innovation. The main managerial implication of the research is the design of incremental innovation model in Chapter 8.

The incremental innovation model not only illustrates a general process of incremental innovation for 'green chemicals' at lower risks, but also addresses CMS contract and cost are main drivers of incremental innovation. The model is designed based on the interactive adaptations between/among actors, describing the process of incremental innovation process in five key stages, e.g. idea and concept, resource evaluation, R&D, Trial, and launch to market.

Incremental innovation is always a high-risk undertaking. Comparing with other innovation models in existing research, this model managerially provides some guidance for incremental innovation project teams to lower innovating risks by investigating the drivers of green chemical innovation, e.g. CMS contract and cost. The model contributes in proposing cost containment as the main factor to reduce innovating risk, by means of optimizing portfolio and resources, forecasting and setting innovation agenda, and using network to reduce uncertainties. This addresses the third research question: **How do actors adapt to establish incremental innovation in conflicts?**

9.5 Limitations

This research is of limited generalizability due to the particular characteristics of the industry researched, although I stand by the general claim that it has identified ways in which conflicts are experienced and managed through breaking them down into tasks or projects which can be distributed across networks. Because the industry operates on a highly confidential basis, some of interviewees were reluctant to provide detailed information on products and product development, which sometimes produced hold ups in the research.

A further limitation lies in the incremental innovation model. This model is designed to illustrate the general 'green chemical' innovation process. No specific innovation project will necessarily follow the model religiously as there might be unexpected events or other factors dictating additional stages or suggesting that the project should go forward in a different direction.

9.6   Suggestions for Future Research

Conflict has turned out to be a way of investigating conflict and interactions. The notion of conflict as a pervasive condition of business activities with emotional and structural dimensions, has drawn attention of this research. A promising avenue for future research would be carry on current research in the following areas:

The first research area lies on actors in conflicts. As discussed in this thesis, actors invest and allocating addition resources in terms of managing 'in' conflict. Future research would focus on how the decisions are made in investing in conflict resolution, anticipating how it can be made functional or in some cases allowing them to be dysfunctional and therefore resolved quickly through dissolution.

The second research area focuses on conflict in network. This thesis has discussed about conflict and its emotional dimensions, and their influence on relationship dynamics, but little has been investigated on the influences of network change. Future research will fill the gap to investigate conflict and network change of industries with a small number of actors like oil and gas chemicals industry.

The third research interest will be on innovation. I have investigated the general process of how 'green chemicals' are incremental innovated. This research pays attention to the divers of innovation, styles of innovation and the way actors contain cost. There is still room for improving the model in the aspect of investigating risk and risk controls in the innovating process. Furthermore, according to the existing data, innovations in green chemical industry are not just incremental. I would also concentrate on other ways of innovations which are also undertaken in this industry, like radical innovation.

Appendix 1: Consent Form

University of Glasgow | College of Social Sciences

Consent Form

Title of Project: Managing in Conflict: How Actors Collaborate in Marketing Green Chemistry

Name of Researcher: Shiming Zhang

1. I confirm that I have read and understand the Plain Language Statement for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason.

3.

- *consent to interviews being audio-taped,*
- *consent to observations at industrial conferences being taken photos,*
- *acknowledgement that copies of transcripts will be returned to participant for verification,*
- *participants to be referred to by pseudonym in any publications arising from the research,*

4. I agree / do not agree (delete as applicable) to take part in the above study.

Name of Participant	Date	Signature

Researcher	Date	Signature

Appendix 2: Ethics application approval form

University of Glasgow | College of Social Sciences

Ethics Committee for Non-Clinical Research Involving Human Subjects

Staff Research Ethics Application Outcome ☐

Postgraduate Student Research Ethics Application Outcome ☐

Application Details

Application Number: 400120065

Application Type   New ☐   Resubmission ☒

Applicant's Name   Shiming Zhang

Project Title   Managing in Conflict: How Actors Collaborate in Marketing Green Chemistry

Date application reviewed *(d.m.yr)*   21/08/2013

Application Outcome   **Approved**

Start Date of Approval *(d.m.yr)*   30/08/2013

(blank of if not approved)

End Date of Approval   *(d.m.yr)*   01/12/2013

If the applicant has been given approval this means they can proceed with their data collection with effect from the date of approval.

Recommendations (where application is Not Approved)

Please note the comments below and provide further information where requested. All resubmitted application documents should then be uploaded. You must include a covering letter in a separate document (uploaded as the **Resubmission Document** online) to explain the changes you have made to the application.

Major

Minor

Comments *(other than specific recommendations)*

Please retain this notification for future reference. If you have any queries please do not hesitate to contact Terri Hume, Ethics Administrator.

End of Notification.

Appendix 3: Participant information

University | College of
of Glasgow | Social Sciences

Plain Language Statement

1. Study title and Researcher Details

Sorting Goods from Bads: How Actors Collaborate in Marketing Green Chemistry

Researcher: Shiming Zhang, PhD research student

Adam Smith Business School, University of Glasgow

Supervisor: Prof. John Finch Email: john.finch@glasgow.ac.uk

Dr. Susi Geiger (External) Email: susi.geiger@ucd.ie

2. Invitation paragraph

'You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

Thank you for reading this'.

3. What is the purpose of the study?

The purpose of the study is examining the interactions and relationships among a network of market actors in oil and gas industry of the North Sea in the process of developing and exchanging chemical and chemistry services. The focused market

actors indicate regulators, oil and gas operators, chemical service companies and chemical suppliers. The project is expected to be ended by 10/01/2014.

4. Why have I been chosen?

The research is focusing on actors involved in producing and marketing green chemistry and chemical services in the oil and gas industry. Participants are chosen from industrial specialists and employees with relevant working experiences in chemical suppliers companies, chemistry service companies, oil and gas operators and from regulation organizations.

5. Do I have to take part?

It is up to you to decide whether or not to take part. If you decide to take part, you are still free to withdraw at any time and without giving a reason.

6. What will happen to me if I take part?

Participants will be interviewed during the process of our data collection. The interview questions will cover the industrial and working experiences of product development and industrial events. The interview process will take about 60 minutes each time. Interviews will be recorded and transcribed.

7. Will my taking part in this study be kept confidential?

All information, which is collected about you during the course of the research, will be kept strictly confidential. You will be identified by a pseudonym and any information about you will have your name and address removed so that you cannot

be recognised from it. Data will be securely stored and destroyed at end of the project in January 2014.

8. What will happen to the results of the research study?

The results will help researcher finish his PhD thesis, relevant journal articles and conference papers.

9. Who is organising and funding the research? (If relevant)

The research is funded by Leverhulme Trust

10. Who has reviewed the study?

The project has been reviewed by the College of Social Sciences Research Ethics Committee.

11. Contact for Further Information

If you have any concern regarding the conduct of the research project, please contact the College of social Sciences Ethics Officer, Dr. Valentina Bold at valentina.bold@glasgow.ac.uk .

Appendix 4: Fieldwork log 1

Date	Type	Place or job title	Company or organization	Duration (min)	Purpose
04/01/2011	Interview	Product Stewardship Manager	ProChemicals (Conflict in Case 1)	90	Meeting on impact of REACH registration
04/01/2011	Interview	Executive Secretary	Industry association (all casess)	90	Meeting, role of industrial association interacting with regulators, innovation
10/05/2012	Interview	Consultant	Independent (all casess)	180	Overview of the industrial organization, regulation and product develop
14/05/2012	Interview	Sustainability Manager	KTI Chemicals (Cases 2)	100	REACH registration, technology innovation

Date	Type	Place or job title	Company or organization	Duration (min)	Purpose
15/05/2012	Interview	Managing Director	GD Solutions (Conflict in Case 3)	140	Tendering process, R&D
13/06/2012	Interview	Consultant	Independent (Conflict in Case 2)	150	Industrial collaboration, innovation, national regulation differences
12/07/2012	Interview	Chemist	University (Conflict in Case 4)	75	R&D, technology investment
13/07/2012	Interview	Product Manager	NAWO Chemicals (Conflict in Case 1)	40	R&D project
23/07/2012	Interview	Marketing Manager	KTI Chemicals (Conflict in Case 2)	50	Customers relationships, tendering

Date	Type	Place or job title	Company or organization	Duration (min)	Purpose
30/07/2012	Interview	R&D Manager	GD Solutions (Conflict in Case 3)	60	R&D, technology investment
09/08/2012	Interview	Product Manager	SurChem (Conflict in Case 5)	100	Regulatory testing, OSPAR
10/08/2012	Interview	Sales Manager	ProChemicals (Conflict in Case 1)	70	Customer relationships
16/08/2012	Interview	Chemist	ProChemicals (Conflict in Case 1)	90	R&D project
22/08/2012	Interview	Integrity Management Specialist	KTI Chemicals (Conflict in Case 2)	40	Regional regulation, marketing strategy

Date	Type	Place or job title	Company or organization	Duration (min)	Purpose
30/08/2012	Interview	Product Manager	ProChemicals (Conflict in Case 1)	45	R&D, regulation
02/09/2012	Interview	Senior Drilling Advisor	SL Offshore Solutions (Conflict in Case 4)	40	Technology management
27/09/2012	Interview	Sales	NAWO Chemicals (Conflict in Case 1)	45	Customers relationship management, contracting
05/10/2012	Interview	Product manager	SL Offshore Solutions (Conflict in Case 4)	40	Innovation
15/10/2012	Interview	General Manager	NAWO Chemicals (Conflict in Case 1)	50	R&D investment

Date	Type	Place or job title	Company or organization	Duration (min)	Purpose
13/11/2012	Interview	UK Business Manager	KTI Chemicals (Conflict in Case 2)	30	Relationship maintenance
27/11/2012	Interview	Production manager	MIC Chemicals (Conflict in Case 3)	60	Industrial collaboration

Appendix 5: Fieldwork log 2

Date	Type	Place or job title	Company or organization	Duration (min)	Purpose
05/02/2013	Interview	Chemist	ChemSolve	50	Industrial events
05/02/2013	Interview	Chemist	GD Solutions	50	Industrial events
05/02/2013	Interview	General Manager	FAL Specialist	40	
09/04/2013	Interview	Chemist	FAL Specialist	40	Industrial events, R&D
23/04/2013	Interview	Chemist	FAL Specialist	60	Regulatory events,
23/04/2013	Interview	Consultant	Independent	60	Regulatory events, technology management
23/04/2013	Interview	General Manager		50	Industrial events, R&D
17/05/2013	Interview	Product Manager	SurChem	40	Industrial events, R&D
19/05/2013	Interview	Consultant	Independent	30	Industrial events, R&D

Date	Type	Place or job title	Company or organization	Duration (min)	Purpose
20/05/2013	Interview	Sustainability Manager	ChemSolve	30	Industrial events, R&D
23/07/2013	Interview	Chemist	Society of Petroleum Engineers	50	Industrial events, R&D
23/07/2013	Interview	Chemist	Society of Petroleum Engineers	60	Industrial events, R&D

Appendix 6: Fieldwork log 3

Date	Type	Place or job title	Company or organization	Duration(min)	Purpose
30/07/2013	Interview	Chemist	GD Solutions	50	Discussing R&D
30/07/2013	Interview	Product Manager	FAL Specialist	45	Discussing R&D
10/08/2013	Interview	Consultant	Independent	50	Discussing R&D
11/08/2013	Interview	Product Manager	NAWO Chemicals (Conflict in Case 1)	50	Discussing customers，R&D
05/09/2013	Interview	Sales Manager		30	Bidding process
05/09/2013	Interview	Account Manager	GD Solutions	30	Discussing customers，R&D
05/09/2013	Interview	Marketing Specialist	NAWO Chemicals (Conflict in Case 1)	30	Discussing customers，R&D
20/09/2013	Interview	Consultant	Independent	50	Discussing R&D

Appendix 7: Fieldwork log 4- observations

Date	Type	Place or job title	Company or organization	Duration (min)	Purpose
04/01/2011	Observation	Oilfield chemist	ProChemicals (Conflict in Case 1)	40	Overview of a service company environment and lab
12/07/2012	Observation	Lab	University (Conflict in Case 4)	150	R&D, invest in facilities
09/08/2012	Observation	Lab	SL Offshore Solutions	40	Facilities, R&D
05/02/2013	Observation	51st Chemical Stakeholders Forum	DEFRA, REACH (Conflict in Cases 1 and 5)	420	Stakeholders' interaction with regulators
09/04/2013	Observation	SPE risk management workshop	Society of Petroleum Engineers	120	Industrial events, R&D

Date	Type	Place or job title	Company or organization	Duration (min)	Purpose
23/04/2013	Observation	52nd Chemical Stakeholders Forum	DEFRA, REACH	420	Regulatory events, Policy making
15/05/2013	Observation	Flow assurance web events	Society of Petroleum Engineers	90	Industrial events, R&D
23/07/2013	Observation	53rd Chemical Stakeholders Forum	DEFRA, REACH	60	Regulatory events, Policy making
01/08/2013	Observation	SPE production chemistry and system web workshop	Society of Petroleum Engineers	300	New technology, R&D, incremental innovations
03/09/2013	Observation	Offshore Europe 2013 Conference Day 1	Society of Petroleum Engineers	300	New technology, R&D, regulatory discussions
04/09/2013	Observation	Offshore Europe 2013 Conference Day 2	Society of Petroleum Engineers	300	New technology, R&D, regulatory discussions

Date	Type	Place or job title	Company or organization	Duration (min)	Purpose
05/09/2013	Observation	Offshore Europe 2013 exhibition	Society of Petroleum Engineers	300	New technology, R&D, regulatory discussions

Appendix 8: Observation proforma

Observer:	_____		**Observation Proforma**
Date and Time:	_____		
Place:	_____		

Focus:	Background:

Events/Project	Actors in the events/projects	Activities and interactions
Organiser(s)	Participants:	Activities:
Aim:	Roles and Positions:	Personal interactions:
Description:	Relations:	Key sequences
Others:	Others:	Others:

Form No:

Appendix 9: Outline of semi-structured interview questions

Topics	Questions
Product	Product (green chemicals) develop process
	Could you talk something about your speciality? What kind of chemistry problems can your products specially solve?
	What do you do in case of regulation change?
	What do you usually do to reduce their toxicity and overall environmental impact? (Examples)
	Have you made special adaptations to your products to accommodate requirements from customers?
	How are these adaptations made? (Examples)
Technology Development	How do REACH impact on your product development? Any other impacts? Other regulators like OSPAR? (Examples)
	What are the main concerns about the technology/product development?
	How your customers get involved in the technology development? (Examples)

Topics	Questions
Technology Development	How do you make sure your applications of products meet your customer's requirements?
	Do you develop any specific product for the particular needs? (Examples)
	Investment on incremental innovation? Process of establish incremental innovation? (Examples)
Adaptation	How do you make sure your products meet the regulation requirements? (Examples)
	In terms of regulations or regulation change, do you compromise on product performances? (Examples)
	Regulation influences on cost/products? (Examples)
Customer	The main customers
	Main marketing strategies
	What do you think this customer finds most demanding about you as a supplier?
	What are customers' usual complaints? (Examples)
	Please tell something about the contract between you and your customers? Contract with supplier? Details may further ask. (highly confidential)

Topics	Questions
Customer	Concerning about customer, with whom (individuals, departments etc.) do you have contact? How often? Bidding? Partnership/Strategic agreement/Long-term contract/Short-term contract? (highly confidential)
	Any project involvement? (Examples)
Relationship	How do you involve or interact with your customers? And how example (relationship)
	Who are the typical users? Name some of them
	What are your problems in relation to this customer? How do you know?
	Are there any information exchange do you have with your customer? What kind? How?
	How your customers join in and collaborate to find solutions?
	Have you had any joint development projects with this customer? Example
	Any involvement from your suppliers?
Industry	What efforts do you make to make products sustainable?
	What regulations affect you in the product development and the relations this customer? How?

Topics	Questions
Industry	How do you assess the product/risk with the respect of regulations? Examples
	Can you tell me something about the change you made because of the regulation or regulation change?
	How does company change and cope with regulations?
Events	Please point some of important industry events? regulatory events? technology events? industry events? social and networking events?
	How do you feel on the events? What do they mean to you?

Appendix 10: Relationships of main themes
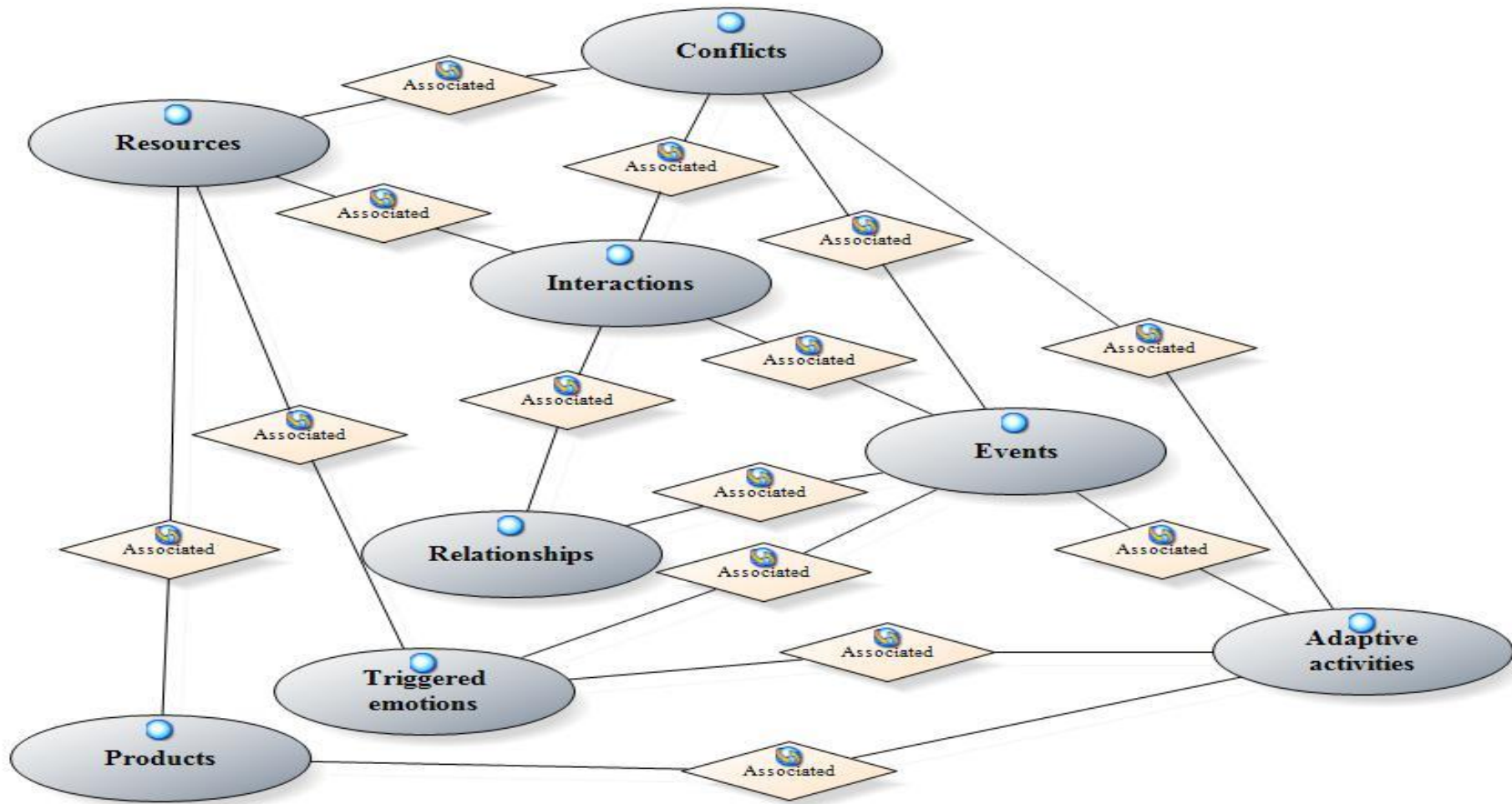
Appendix 11: List of nodes, sources and references in coding

(exported from Nvivo 10)

Nodes	Sources	References
Adaptive activities	101	2017
to cost	62	1098
to performance	68	1160
to regulations	62	1098
to resources	68	1160
Conflicts	44	450
Actors in conflicts	301	715
conflicts of cost	60	777
buying cost	43	445
cost evaluation	54	1080
innovating cost	67	1157

Nodes	Sources	References
regulatory cost	22	411
selling profits	37	62
conflicts of regulation	104	421
EU regulation	63	214
Norway regulation	63	351
UK regulation	57	715
conflicts of technology	39	67
performance	44	450
testing	78	460
Events	97	379
industrial events	60	768
industrial exhibition	63	452
industrial technology conferences and seminars	63	431

Nodes	Sources	References
marketing and social events	57	715
technology information agenda release	45	305
tender for project and contract bidding	57	210
regulatory events	41	90
Cefas and regulatory testing	38	101
REACH registration and policy review	61	715
UK Chemistry Stakeholder Forum	31	49
technology-related events	54	706
setting product development agenda	35	80
technology problem consulting	61	95
Interactions	57	715

Nodes	Sources	References
bargaining	62	1098
lobbying	54	1085
negotiation	43	445
problem consulting and solving	60	1094
tender to bid	60	1091
testing collaboration	57	715
Products	66	1362
Green chemistry	44	450
innovation	44	450
performance and alternatives	44	450
pros and cons	41	443
Relationships	53	705

Nodes	Sources	References
contract	46	134
regulators and chemical companies	46	134
service companies and oil and gas	45	134
suppliers and service companies	20	75
Resources	61	979
Triggered emotions	39	67
Negative emotions	39	67
anger	0	0
contempt	40	280
disgust	0	0
dislike	63	407
distress	46	150

Nodes	Sources	References
frustration	57	715
guilt	0	0
regret	37	62
sadness	15	65
shame	0	0
surprise	5	15
Positive emotions	39	67
hope	67	715
joy	39	90
liking	60	350
pride	39	105
relief	51	401
surprise	30	301

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