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Infusion of information systems in the stockbroking sector

Hosein Gharavi

*Edith Cowan University*
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INFUSION OF INFORMATION SYSTEMS IN THE STOCKBROKING SECTOR

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Bachelor of Science (Honours) Economics and Management
Master of Business Administration

This thesis is presented in fulfilment of the requirements for the degree of Doctor of Philosophy

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USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.
ABSTRACT

The Australian stockbroking sector has been at the forefront of integrating information systems (IS) in its daily operations. Trade and clearance account for a large percentage of processes undertaken in a brokerage house. Upon integration of IS, the trade and clearance processes of the sector were centralised and the institutional arrangements of the sector were transformed. Centralisation also meant that this large percentage of processes was directly controlled by the Australian Stock Exchange (ASX) and the Australian Securities and Investment Commission (ASIC). Although the integration of IS was intended to rationalise the trading regime and make the process of brokerage identical across the industry, there are many types of brokerage houses - each catering to a specific group of customers. This interplay between the intent to homogenise the sector by the regulatory authority and the move by the brokerage houses to strategically differentiate from peers motivated this research to explore the dynamics of the diffusion of IS adoption and its resultant structural changes in the stockbrokerage sector.

To develop a conceptual framework to analyse the change processes in the sector, the diffusion of innovation theory (DOI) was employed. This theory suggests that innovation spreads across a population of organisations beginning with initial awareness of the benefits that innovation may bring. The process of diffusion progresses to formal adoption and full-scale absorption through communication, trial and error and bandwagon pressures. Previous research suggests that the wide use of DOI theory in analysing the spread of innovation across various industry sectors would make it an ideal framework to explore and explain the unique characteristics of the stockbroking sector, which have led to its present form.

To analyse the dynamics of the stockbroking sector a research methodology was needed. Its purpose was to use a formal process model that comprised of three structural components: a conceptual framework; a predefined research cycle; and a literature-based scrutiny of the research findings to assist in the development of a conceptual framework outlining the process of change in the stockbroking sector. The conceptual framework was used to provide the researcher with an aim, understanding and a theoretical foundation to conduct the research. A structured case approach was adopted
because it facilitated the use of an iterative cycle of frameworks to examine the infusion of innovative technologies in the stockbroking sector.

The research tools employed included archival analysis of publications and reports supplied by participating interviewees. Sixty five interviewees with roles ranging from directorship to senior share trade person took part in the interviews. These participants belonged to four brokerage houses, each acting as a case study. The four brokerage houses represented a particular type of brokerage active in the sector. Each case was intended to highlight the factors that result in formation of a specific type of brokerage as opposed to other alternative brokerage types.

The findings pointed to a range of discrepancies between DOI predictions and the dynamics of the stockbroking sector. The DOI-based analysis could not account for some important facts in the adoption of IS technologies in sectors that are highly regulated. The research revealed that the unique characteristics of the stockbroking sector and the influence of its regulatory authority affected the mode of uptake of IS systems. The outcome of the interviews was a framework that highlighted the process of uptake of mandated systems and the brokerage houses’ possible differentiation strategies after strict adherence to the sanctioned systems. A panel of industry representatives validated the framework that was developed from the case study findings. It is suggested that the proposed framework would potentially benefit industry practitioners who are seeking to improve their performance when new IS regulatory measures are imposed.

**Keywords:** Stockbroking, infusion of innovation, diffusion of innovation, back-office, front-office, population ecology, institutionalism, selection, adaptation
DECLARATION

I certify that this thesis entitled

“Infusion of Information Systems in Stockbroking Sector”

Submitted for the degree of

Doctor of Philosophy

does not, to the best of my knowledge and belief:

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Hosein Gharavi

Date: .................................................................
ACKNOWLEDGMENTS

I would like to extend my thanks and gratitude to my supervisor, Professor Peter Love for his generous support and guidance throughout my academic career. He met me consistently, regardless of how much progress I had made. Not only did he help me figure out what to read or what to write, but most importantly, he taught me to be critical of every fact I came across. I am proud to be his student and I will forever cherish my time with him.

This thesis would never have been written if not for my parents, Taj Saadat and Manouchehr. They supported me in every step. Although we have lived apart for many years, their place is and forever will be in my heart. Thank you for being such wonderful people, parents and most of all my best friends.
DEDICATION

This work is dedicated to my parents; Taj Saadat, Manouchehr and my grandmother, Ezat, who have given me much to be thankful for; constant encouragement, the ability to believe in myself and a lifetime of loving support.

Thank you!
PUBLICATIONS RESULTING FROM WORK REPORTED IN THIS THESIS

Peer Reviewed Journal Papers


Conference proceedings


ABBREVIATIONS

The following list of abbreviated terms provides a list of abbreviations that are used extensively in this research.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>DOI</td>
<td>Diffusion of Innovation</td>
</tr>
<tr>
<td>IS</td>
<td>Information Systems</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>IOI</td>
<td>Infusion of Innovation</td>
</tr>
<tr>
<td>ASX</td>
<td>The Australian Stock Exchange</td>
</tr>
<tr>
<td>ASIC</td>
<td>The Australian Securities and Investment Commission</td>
</tr>
<tr>
<td>FRC</td>
<td>Financial Reporting Council</td>
</tr>
<tr>
<td>MPS</td>
<td>Managed Portfolio Services</td>
</tr>
<tr>
<td>CLERP</td>
<td>Corporate Law and Economic Reform Program</td>
</tr>
<tr>
<td>CHESS</td>
<td>ASX's Clearing House Electronic Sub-Register System</td>
</tr>
<tr>
<td>AXISS</td>
<td>Australia's national inward investment agency</td>
</tr>
<tr>
<td>ASIC Act</td>
<td>Australian Securities and Investments Commission Act 2001</td>
</tr>
<tr>
<td>CLERP Act 1999</td>
<td>Corporate Law Economic Reform Program Act 1999</td>
</tr>
<tr>
<td>Corporations Act</td>
<td>Corporations Act 2001</td>
</tr>
<tr>
<td>SEATS</td>
<td>Stock Exchange Automated Trading System</td>
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1.1 BACKGROUND

The decision as to when and how to adopt an innovative information system (IS) requires it to be critically assessed, including its enabling technologies, its reputed advantages and its scope of applicability. Simultaneously, adoption requires managers to assess the organisation in terms of its own needs and readiness (Fichman, 1999). How to innovate with IS, represents an additional issue for decision makers. The challenge of implementation typically presents an array of options and obstacles such as the required knowledge to implement the technology and the perception of individual employees towards the new procedures (Peansupap et al., 2005a).

A sector that assumes an important role in development of the Australian economy is the stockbroking sector (Washington et al., 2005). The Australian stockbroking sector has been at the forefront of IS adoption for almost two decades. Prior to the introduction and use of IS in the stockbroking sector, sales and transactions were conducted face to face and often carried out by designated brokers at the trade floors. The need to carry out transactions on the trading floor limited the access of the brokerage houses to up-to-date information, especially if these brokerage houses were not located near the stock market. However, with the computerisation of the stock market and introduction of ubiquitous IS technologies, the institutional structure of the market was transformed.

The listing, trade and clearance of all the stocks of Australian public companies are carried out in the Australian Stock Exchange (ASX). The introduction of IS technologies in the stockbroking sector occurred through a number of IS-based systems aimed at rationalising trade and customer services. Introduction of the stock exchange’s automated trading system (SEATS) provided the trading of securities at the ASX without the need for floor traders. This meant that brokers who had offices outside Sydney’s financial hub could execute their trades without the need to be physically present in the market.

Computerisation, introduction of Electronic Data Interchange (EDI) and use of the Internet, resulted in the rise of a number of brokers that relied on technology platforms to provide seamless trade and clearance services as opposed to traditional full-service
brokerage houses. Proliferation of these types of brokers was followed by introduction and subsequent upgrades of the stock exchange’s Clearing House Electronic Sub-Register System (CHESS), which provides the central register for electronic transfer of share ownership. These systems centralised trade and clearance via the regulatory authority of the sector.

SEATS and CHESS were the sole listing, trade and clearance platforms available to brokers intending to operate in the sector. Member brokerages were required to pay an annual subscription fee and in return were given access to the ASX’s systems and trading platforms. Due to this additional expense, the composition of the sector greatly changed as a large number of firms amalgamated to form bigger business entities.

As far as regulating the IS-based sales and trading technologies, the market was jointly regulated by the ASX as the market-based supervisor alongside the Australian Securities and Investment Commission (ASIC). Introduction of SEATS and CHESS was complemented with a series of listing and market regulations. ASX listing rules monitored and regulated the supply of information to brokers and potential buyers of stocks. Market rules on the other hand, outlined the standardised operations that had to be followed by every member brokerage. These rules were designed by the ASX and adherence to them was closely monitored by the ASIC.

Although the regulations imposed and monitored by the ASX and the ASIC were intended to standardise the operations of the brokerage houses, there existed a number of different brokerage types. The pattern of IS diffusion in the stockbroking sector consists of the following dimensions:

- the direct interaction between the individual brokers and sector’s governing bodies which are termed as the back-office; and
- the interaction of the brokers with their clients, which is referred to as the front-office.

One popular theory that explains the dynamics of adoption of innovation and predicts the rates of IS innovation adoption is the diffusion of innovation (DOI) theory proposed by Rogers (1995). Peansupap et al. (2005b) have suggested that DOI theory can be used to examine the dynamics of structural change associated with IS technology uptake. The
DOI tradition has sought to explain individual adoption decisions as a direct outcome of communication between the initial adopter and potential adaptor(s). In addition to communication, other factors that influence the rate of adoption are awareness about the IS technology (e.g. its relative advantage and compatibility with the adopters’ present technological platforms), adopter’s characteristics and management support (Fichman et al., 1999). Mustonen-Olila et al. (2003) proposed a conceptual framework based on the DOI theory to view the process of adoption as the outcome of a set of conjectures. These conjectures are:

- technologies are discrete packages developed by independent and neutral innovators;
- technologies diffuse in a homogenous manner;
- adoption decisions are dependent on available information, preference functions and adopter’s characteristics; and
- time scale is relatively short and history is not a significant component of the diffusion process.

The DOI theory has been extensively used in explaining the dynamics associated with the adoption of an innovation and the resultant structural change across a number of industry sectors (Peansupap et al., 2005a). By employing the DOI theory, the manner by which individual brokers appropriated their resources to provide customised services could be explained. This approach, however, cannot fully account for the initial trigger of change and the role that regulatory bodies play in imposing a standard set of technological procedures across the member firms in a sector (Lundblad, 2003). Consequently, to address the dynamics of the stockbroking sector, DOI theory needs to be used as an integral part of an overarching theoretical framework to address the imposition of specific innovative technology systems complemented with brokerage level differentiation.

This research, therefore, proceeded with an exploratory approach to assess the role of the stockbroking sector’s governing bodies introduction and imposition of approved IS systems. Lundblad (2003) and Brown et al. (2002) have argued that majority of the literature on adoption of innovative technologies predominantly focuses on firm-specific (endogenous) factors to explain the “when and how” of the diffusion process. Damsgaard et al. (2001a; 2001b) propose study of adoption of regulated IS technologies
should encompass exogenous, regulatory factors that are imposed by the Government or the institutions authorised by the Government to oversee the regulation.

Because of the similarity between the characteristics of the stockbroking, health and pharmaceutical sectors, a review of literature on the dynamics of IS diffusion in the health and pharmaceutical sectors was carried out (Appendix C). The review encompassed the works by Teplensky et al. (1995), Pearcey et al. (1996), Oldenburg, et al. (1999), Green (2001). Lehoux et al. (2000) suggested that the analysis of IS diffusion should start from the environmental triggers for change, and development of institutional patterns to change. This analysis should later be complemented with firms’ strategic responses to the new mandated technologies.

This proposed approach by Lehoux et al. (2000) was adopted in carrying out the review of the literature and development of constructs for diffusion of IS technologies in stockbroking sector. Constructs from the literature on selection and adaptation were synthesised into a conceptual framework of the factors that influenced the structure and types of the brokerage houses. To drive an appropriate conceptual framework against which to explain the dynamics of the stockbroking sector, the research started with an analysis of population ecology (selectionism) and institutionalism (adaptationsim) theories.

Population ecology adopts a macro view of an industry assuming the principles of variation, selection and retention. In any industry, there is a variety of organisational forms. Under this paradigm, individual organisations acting in their own self-interest, respond to environmental forces (Hannan et al., 1984; 2002). An organisation’s ability to survive or be selected is equivalent to the organisation having a structure that allows it to respond appropriately to the environment or the environment of the industry niche in which it has chosen to operate (Dobrev et al., 2001).

Because population ecology adopts a macro view it does not address the strategic decision making of the individual firms which leads to formation of different brokerage types (Dobrev, 2000). The second filter of institutionalism recognises that management is capable of making strategic choices, even if the industry and other environmental forces bound these choices (Baum et al., 1997). Together these two paradigms provide a filter through which to view the stockbroking sector and address the questions posed above.
Using the population ecology and institutionalism coupled with a review of industry reports and the literature on the diffusion of IS technologies in rule-bound sectors (such as health and pharmaceuticals) assisted in developing a conceptual framework. The usefulness of the initial conceptual framework was examined in a structured multiple case study of four participating brokerage houses. The cases used for the purposes of this study were representative of the types of brokerage houses present in the sector. The conceptual framework was constantly modified by comparing the data from each case with themes that emerged, insights gained from the research and the extant literature. The research culminates in the proposal of a grounded framework that is used to explain the process of change, and the key constructs that influence a firm’s strategic growth trajectory in the stockbroking sector.

1.2 RESEARCH AIM AND OBJECTIVES

The compulsory adoption of the new technologies and regulatory mechanisms resulted in each broker processing transactions and interacting with the ASX in an identical way to other brokers, regardless of their size or the niche they service. While the regulations determined the back-office structure, the brokers were relatively autonomous in choosing a niche to interact with. The interplay between structural determinism (introduction and maintenance of regulatory regime by the ASX and the ASIC) and firm-level strategic choice points to a gap in which the theories on uptake of innovation have not explained the presence of different types of brokerage firms in light of an overwhelming regulatory push intended to standardise operations (Lundblad, 2003). Therefore, the aim of this research is to develop a framework that can be used to examine IS innovation in a rule bound sector. Specific objectives include:

- identify the role of the stockbroking sector’s governing bodies;
- examine the types of IS-technologies that are used in the back-office operations of the stockbrokerage houses;
- examine the role of the customer niches in the brokerage houses’ strategic differentiation; and
- design and develop a framework to be used to examine the IS technology adoption in the stockbroking sector.
1.3 RESEARCH QUESTIONS

In addressing the research aim and objectives, five research questions were put forward. Questions one intended to provide background on the types of technology employed in the sector and provide an understanding about the relationship between the brokerage houses and the regulatory authority. This information can be used to outline the historical paths that have contributed to the imposition of the IS-based regulatory control, and influenced the hierarchical relationships between the participants in the sector.

*Research question 1a* Prior to introduction of IS-enabled sales and clearance platforms, what was the regulatory and governance regime in the sector?

*Research question 1b* What are the justifications for the imposition of regulatory measures by the sectors governing bodies?

*Research question 1c* What forms of regulatory control were imposed on new entrants and incumbents in the brokerage sector?

Based on studies by David (1997) and Granovetter et al. (1999; 2000), the introduction of new technology or a regulatory mechanism is influenced directly by the historical relationships that exist prior to the introduction of the innovation. At times, the influence is so extensive that the introduction of the new system will inevitably reinforce the existing status quo rather than provide an innovative change in the sector (Granovetter et al., 2000).

Questions two, three, four and five explores how the regulatory regimes were enforced in the sector and what role the existing structures played in the imposition of the new regime. These decisions are dependent on the overall dynamics of the sector. However, they indicate different degrees of freedom in different parts of the organisation and the various options might appear viable at different stages in the development/implementation of the mandated changes.

*Research question 2* At which points in the evolution of the sector did brokers aim for change and differentiation?

*Research question 3* What are the resultant structural options as brokers start to differentiate their operations from their peers?
Research question 4  How do the niches present in the sector influence the outcome of the strategic differentiation by individual brokerage houses?

Research Question 5  Does the cycle of change repeat itself when a new wave of change is introduced?

The reason for asking questions two, three, four and five was due to nature of change in the sector. Various environmental factors such as globalisation of the stock market, proliferation of a brokerage type or incidents of mismanagement necessitates introduction of new regulations. This question aims to provide an understanding about the characteristics that necessitates change and in addition make the environment adaptable to change and the imposition of a new framework.

1.4  RESEARCH METHODOLOGY

To explore the nature of the relationships between regulatory bodies, within individual brokerage houses and the inter-firm relationship between brokerage houses, the research needed to employ an exploratory approach in which research was grounded on the responses of the participating firms and their employees that represented the overall population in the sector. Therefore, a structured case approach was employed.

The structured case is grounded in a constant process of comparing qualitative data with the conceptual models that are constructed at each stage of data collection. This approach later resulted in the generation of a framework that is believed to outline the evolutionary changes in an industry once technology or innovative practices are fed through the industry’s hierarchy (Carroll et al., 2000).

The approach in this research is guided by a preliminary conceptual framework that was based on the DOI theory and included elements of population ecology and institutionalism. In search for an alternative conceptual approach to that of DOI, a preliminary conceptual framework is developed and then used to develop formal cycles of evolving conceptual frameworks. This means the initial framework changes as each set of participants is interviewed and responses analysed.

To have a reliable data presented, quality assurance was deemed a critical stage of research methodology development. In line with Guba et al. (1994) the framework that
was developed was validated by inviting a group of participants (who were not involved in this study’s data collection phases) to critically analyse and give feedback on the findings, propositions and the proposed framework (Appendix E). This was intended to guarantee a reliable and rich set of structured cases.

1.5 ETHICAL CONSIDERATIONS

In Australia, this research falls under the ambit of The National Statement on Ethical Conduct in Research Involving Humans (NHMRC, 1999). This entailed the approval of the Information Letters to Participants, Participant Informed Consent forms and the Interview Schedules by the Human Research Ethics Committee (HREC) of the researcher’s university prior to the collection of any primary data. The forms and interview schedules were submitted for approval in December 2003, after the proposal for carrying out the research was accepted by the University Research and Higher Degrees Department. Approval was obtained in early 2004. Primary data collection from Case 1 proceeded in March 2004.

All participants (participants from brokerage houses and the sector’s governing bodies) in face-to-face interviews in this study were given an Information Letter stating the purpose of the research and informing them of their rights. They were given Informed Consent forms to sign, which stated their understanding of their role and their rights as participants. The Informed Consent forms also recorded the participants’ agreement that the research data gathered for this study may be published provided anonymity was preserved or alternatively that such agreement was given with the full understanding that the participants may be identified.

Some of the participants that took part in the research and evaluation were based in New South Wales and Victoria. Therefore, in addition to face-to-face interviews these participants were interviewed by telephone. With telephone interviews, approval was obtained for the recorded agreement to be used to clearly establish participants’ consent. All participants in this study chose to remain anonymous. Pseudonyms were therefore used to identify the participating brokerages and their member employees. Each interview respondent was allocated a research code by which they were referred to throughout the study.
1.6 SIGNIFICANCE OF THE RESEARCH

This study contributes to the field of IS management research by developing a diffusion of IS technologies framework in the stock broking sector.

Finance markets and the quality of their operations is always a sign of economy’s well-being (Aitken et al., 2000). Therefore, when this industry goes through cycles of change, it becomes critical to explore reasons prompting this change and the possible outcomes of the process. Aitken et al. (2000) highlights a worldwide movement towards amalgamating global trade markets via technology. This is further coupled with an ever-increasing intent of the Government in attracting local and foreign investment by providing a safe trade environment. Understanding the impact of regulatory bodies on the adoption of IS innovations is crucial in an increasingly regulated world.

Dynamics of regulation and diffusion of IS technologies in the stockbroking has not been a well-researched area. Many works in the sector have concentrated on the technical and functional aspects of the technology and thus provided simplistic models of benefits (Loh et al., 1998; Shankar, 2002; Wilhelm, 2001; and, Chemmanur et al., 2002). Other studies have used a theoretical lens based on axioms that often focus on one individual firm as the basic unit of analysis whilst neglecting how external structures influence change (Chircu et al., 2000a; 2000b; Kauffman, 2000). Other studies that take onto consideration the role of the regulatory structures in influencing the uptake of technology have been carried out in health and pharmaceutical sectors (Friedman et al., 2000; Baker, 2001). This study therefore presents a valuable opportunity to analyse the longitudinal evolution of the stockbroking sector.

In addition, the findings of this study are used to develop a conceptual framework to explain the dynamics of change in the stockbroking sector. This proposed framework can also be used for future examination of the sector should there be a new technological, economic and/or managerial change. This in the long term should provide an alternative theoretical body of work to the mainstream DOI-inspired approaches when exploring the dynamics of IS-enabled change in rule bound sectors.
1.7 LIMITATIONS OF RESEARCH SIGNIFICANCE

The research presented in this thesis is limited to the stockbroking sector and although the intention is to develop the proposed conceptual model and test it in the context of other sectors with similar characteristics, at this stage it does not apply to them. However, in chapter seven this has been recommended as an area worthy of future research.

During the case study phase of the study the researcher was unable to obtain access to all the brokerage houses and interview them. Due to the importance of time in trading, most of the requests for interview were turned down and ultimately only four brokerage houses agreed to take part in this research. Although in the evaluation phase of the research the brokers who initially declined to take part did participate, it was hoped that a greater number of brokers could have been involved. The analysis of the interviews revealed there were a large number of variables that attributed to dynamics of technology uptake and as such the problem of identifying the causes of specific differentiation strategies would have been more comprehensive if more brokers could have taken part. Nonetheless, this did not dilute the richness of the generic framework that is proposed.

1.8 STRUCTURE OF THE THESIS

Illustrated in Figure 1.1, this thesis comprises seven Chapters. In chapter one, the introduction section provides an overall view of the research. It addresses the research background, the rationale for carrying out the research and the research problem and questions. This section also highlights the evolution of the research, where it started and the intended outcome of the research.

Chapter two begins with a review of literature on DOI theory. Also in this chapter theoretical approaches that assist with developing the infusion of innovation (IOI) conceptual frameworks are reviewed. Chapter Two is broken into two sections: the first section explores the current literature on DOI theory and traces the fundamental assumptions of the theory; and the second section provides the counter argument to the DOI theory. The counter argument is facilitated by proposing an alternative theoretical approach, its basic assumptions, and its main differing points to the DOI theory. In
addition, a set of propositions are provided as the basis for testing the validity of IOI in the discussion in chapters six and seven.

Chapter three provides an account of the research methodology and the rationale behind the use of the specific approach. This chapter also contains a section on the evaluation procedure of the research methodology. This procedure was carried out in all the subsequent chapters to ensure quality.

Chapter four outlines the interaction between the brokerage houses and the sector’s regulatory authorities. This is referred to as the back-office. Chapter five explains the individual firm’s appropriation of available resources in light of the back-office regulations and intense competition from peers.
Chapter five provides a full account of brokers who were involved in the study. It outlines the strategic approaches each broker employed to serve a niche with regard to the overwhelming regulatory structures that were imposed by the sector’s governing bodies. The strategic planning and niche-based differentiation of each broker were tabulated in a framework that provided the basis for approaching the next broker. The final section provides a summary of the actions of the participating brokers and a finalised framework.

Chapter six discusses the findings in the light of the proposed conceptual model. This chapter explains operationalisation of the DOI theory and development of the IOI conceptual framework, as well as discusses why IOI is more relevant to the stockbroking sector. The outcome of this Chapter is a proposed framework that is applied to the stockbroking sector.

In Chapter seven the research findings and individual research questions are summarised and the validity of each research proposition is examined. This chapter also discusses the research contributions made by this work and presents recommendations about possible future research trajectories in line with the proposed IOI conceptual framework.

The chapters of the thesis are complemented with a reference section, which lists all references used in this thesis. In addition, eight appendices are then provided that contain the supporting materials for each of the chapters in this thesis.

1.9 CONCLUSION

The introduction has provided a brief description of the work in this thesis and justification for the area of research. The research methodology, the thesis structure, its limitations and delimitations are identified. This research has expanded knowledge of the dynamics of change in a highly regulated sector when it is required to adopt a number of sanctioned systems. The final conceptual framework that is produced from this thesis could potentially benefit industry practitioners who are seeking to improve their performance when new IS regulatory measures are imposed.
CHAPTER 2 - DIFFUSION OF INNOVATION

2.1 INTRODUCTION

The diffusion of innovation (DOI) theory has been influential since its initial application to rural sociology in the 1940s (Van de Ven et al., 1995). The diffusion model propagated by Rogers (1995) has been used by an array of disciplines such as education, public health, communication, marketing, general sociology and economics to examine the adoption of technology. However, an area in which DOI has not been applied is the examination of information systems (IS) in sectors that are highly regulated by government, such as stockbroking.

This chapter provides a review of the technological and managerial innovation literature. This exercise not only justified the need to examine DOI in highly regulated sectors such as stockbroking, but also revealed the existing paucity of the research in the subject domain. The chapter begins by defining key terms that are used in the innovation literature. Following this is a review of the key elements of DOI theory and constructs. Different innovation theories are also reviewed. The dynamics of the stockbroking sector are examined in the context of IS platforms.

2.2 DEFINITIONS

During the examination of DOI literature, a number of terms were frequently used in reference to diffusion of innovation (Brown et al., 2002). Diffusion of innovation is the “process by which an innovation is communicated through a certain communication channel over time among the members of a social system” (Rogers, 1995, p.5). Diffusion is a special type of communication in which messages concerning new ideas are exchanged (Fichman, 1999).

The DOI process is possible when an innovative idea is communicated between the potential adopter and the current users of the innovative technology. Rogers (1995) differentiates the adoption process from the diffusion process by explaining that the diffusion process occurs within society, as a group process; whereas the adoption process pertains to an individual. Rogers (1995) defines the adoption process as “the
mental process through which an individual passes from first hearing about an innovation to final adoption” (p.5).

Zaltman et al. (1973) define innovation as the idea, practice or material artefact that has been invented or is regarded as novel independent of its adoption or non-adoption. Meyers et al. (1988) define innovation as the process that proceeds from the conceptualisation of a new idea to a solution of the problem and then to the actual utilisation of a new item of economic or social value. Abernathy et al. (1978) explain that innovation is a result of: 1) a shock (a major failure) to the system; 2) random variability in experimentation; 3) a deliberate decision to invest in learning; and 4) a match between a need and ideas that already exist. Rogers (1995) defined innovation as an idea, procedure or a system that is perceived to be new by the entity that is adopting it. The innovation does not need to be new in terms of being recently developed, rather, it only needs to be new to the person or organisation that intends to adopt and implement it (Abernathy et al., 1985; Foo, 1998).

2.3 DIFFUSION OF INNOVATION

Diffusion of innovation theories have typically been used to explain the adoption of technology (Rogers, 1962). Since the initial introduction of DOI, its scope and associated empirical research has expanded (Rogers, 2000). In times of economic uncertainty or intense competition organisations typically seek to distinguish themselves from competitors by a variety of strategic processes.

Carroll (1984) outlines a number of processes that are designed to improve a firm’s competitive edge over its peers. Wilhelm (2001) proposes that among the widely used strategies was the development of an existing customer base via the development of new technologies and processes. Porter (2001) argues that a key aspect of realising a low cost business strategy rests with a firm’s ability to reduce costs through process innovation. Woodside et al. (2005a) suggest that a differentiation strategy, for example, is dependent on a firm's ability to generate new product ideas or new combinations of features in existing products (Woodside et al., 2005a).

Lundblad (2003) suggests that communication is a key feature in transferring successful innovation. Moreover, Woodside et al. (2005b) state that the characteristics of
individuals and teams, and the nature of the relationships between parties involved in the innovation process, contribute to the success or failure of different innovations. Fundamentally, DOI theory seeks to ask the following questions (Gallivan, 2001):

- what types of firms are more receptive to the uptake of innovation, and;
- what factors prompt organisations to adopt an innovation successfully (or unsuccessfully, as the case may be).

According to Leonard-Barton (1988) organisations that adopt an innovation typically share some common organisational characteristics, such as size, history and range of services offered to a similar niche. Identifying factors that facilitate the uptake of innovation can assist those firms that wish to become more innovative themselves (Lekan-Rutledge, 2000). Moreover, firms usually seek to innovate by mimicking the organisational characteristics of successful, innovative firms or firms that are successful in adopting an innovation developed by third parties (Yakel et al., 2005).

The DOI tradition has sought to explain individual adoption decisions or intentions to adopt as a direct outcome of effectiveness of communication between the initial and the potential adopter(s) (Rogers, 1995). In addition to communication, Woodside (2005b) identified a range of factors including the availability of information about the new technology (e.g. relative advantage, compatibility etc.), adopters’ characteristics and management support as factors influencing the outcome of the adoption process. Mustonen-Olila et al. (2003) proposed that a generic approach to the adoption and assimilation of new technologies has some characteristics that are common across all adoption scenarios. From a DOI perspective, these characteristics include:

- technology as discrete packages developed by independent and neutral innovators;
- diffusion in a homogenous process;
- adoption decisions are dependent on available information, preference functions and adopter’s characteristics; and,
- time scale is relatively short and history is not a significant component of the diffusion process.

Figure 2.1 outlines a generic DOI process.
Source: Greenhalgh et al. (2004)

Figure 2.1 Diffusion of innovation process
Abramowitz et al. (2000) reveal that diffusion and assimilation of technology are greatly influenced by the system’s need and readiness to accept technology. System needs refer to characteristics of the decision-making unit (e.g. the senior management), while readiness refers to characteristics that prompt the uptake of innovation. Rogers (1995, p.5) defines the innovation-decision process as the "process through which an individual (or other decision-making unit such as a group, society, economy or country) passes through the innovation-decision process". There are five stages in the innovation-decision process:

1. from first knowledge of innovation,
2. form an attitude toward the innovation,
3. decide to adopt or reject,
4. implementation of the new idea,
5. confirmation of this decision.

The process of diffusion starts with recognition of the need to adopt an innovation. This recognition is motivated by external pressures, such as competition, or by internal needs such as peer pressure and managerial intention. Daft (1993) proposes that the process of diffusion starts from recognising the need to adopt through system antecedents and the ability of the present system to absorb the innovation. If the existing infrastructure within an organisation can absorb an innovation, the innovation is adopted and changes occur incrementally (Fichman, 2003). However, if a new infrastructure is required to absorb the innovation, depending on the capacity of the adopters and the external influencing factors such as regulations and competition, the innovation may or may not be adopted (Appendix B).

2.4 ELEMENTS OF DOI

2.4.1 The Innovation
An innovation is an idea, practice or object that is perceived as new by an individual or other unit of adoption. The perceived characteristics of an innovation determine its rate of adoption (Rogers, 1995).

Abernathy et al. (1975) describes relative advantage as the degree to which an innovation is perceived as better than the idea it supersedes. The degree of relative advantage may be measured in economic terms, but social prestige, convenience and
satisfaction are also important factors. Rogers (1995) emphasises that the objective advantage of an innovation takes a back seat to the perception of the individual adopters. The greater the perceived relative advantage of an innovation, the speedier its rate of adoption will be (Wilhelm, 2001).

*Compatibility* is defined as the degree to which an innovation is perceived as being consistent with the existing values, past experiences and needs of potential adopters. In studying the change in travel agents Chircu *et al.* (2000b) revealed that an idea that is incompatible with the values and norms of a social system (in this case the perception of customers about the types of services they require) would not be adopted as rapidly as the adopters hoped (Davis *et al.*, 1996). The adoption of an incompatible innovation often requires the prior adoption of a new value system, which further slows down the adoption (Dos Santos *et al.*, 1995).

*Complexity* is the degree to which an innovation is perceived as difficult to understand and use. Some innovations are readily understood by most members of a social system; others are more complicated and will be adopted slowly. New ideas that are simpler to understand are adopted more rapidly than innovations that require the adopter to develop new skills and understandings (Dos Santos *et al.*, 1995).

*Trialability* is the degree to which an innovation may be experimented with on a limited basis. New ideas that can be tried on the instalment plan will generally be adopted more quickly than innovations that are not divisible. An innovation that is trialable represents less uncertainty to the individual who is considering it for adoption (Abernathy *et al.*, 1994).

*Observability* is the degree to which the results of an innovation are visible to others. The easier it is for individuals to see the results of an innovation the more likely they are to adopt it (Adrion *et al.*, 1993). Such visibility stimulates peer discussion of a new idea, as friends and peers of the adopter often request innovation-evaluation information about it (Amburgey *et al.*, 1993).

Characteristics identified by Stokes Berry (1994) include appeal to local power holders. Chemmanur *et al.* (2002), in analysing technology innovations in financial services, took into consideration the factors identified by Rogers (1995) and found that the
radical nature of technology change and uncertainty is the main reason why many financial innovations do not deliver what they were intended to do (Tan et al., 2000).

### 2.4.2 Communication

The second element of DOI theory is communication or the process by which people develop and share information with each other to achieve common understanding (Rogers, 1995). In Rogers' DOI theory there is an important relationship between the source of communication and the rate of adoption. Do Santos (1995), when analysing the first mover advantage, and Edelman et al. (1999), when analysing incremental versus radical innovation, give less importance to the scientific or technical merits of the innovation than to the way the potential adopter of the innovation views the change agents. Gefen et al. (2000) concluded that the more similar the source of the information to the potential adopter is, the faster the adoption of the innovation will be. Diffusion of innovation is thus described as a social process, relying on effective communication between two or more individuals who perceive themselves to be similar in terms of beliefs, status and education (Hage, 1999; Hannan et al., 2003).

### 2.4.3 Adopter categories

Adopter categories are a measure of how inclined an individual is to adopt new ideas compared to other members of the social system. Rogers (1995) defines adopter categories as: innovators; early adopters; early majority; late majority; and laggards. Innovators are those people who seek out and embrace innovations, are venturesome and not afraid of risk. Do Santos (1995) pointed out early adopters are open to change but are more closely connected to and respected within the social system. The early majority - usually about one third of the members in a system - tend to adopt innovations prior to the rest of the population. This was also pointed out by Loh et al. (1998) when analysing the adoption of Internet-based stock trading platforms among early users of the Internet.

- **Innovators** are the first 2.5 per cent of the individuals in a system to adopt an innovation (Rogers, 1995). Communication patterns and friendships among a clique of innovators are common, even though the geographical distance between the innovators may be considerable. Barrett et al. (2000), in studying the adoption of electronic trading in global markets, revealed that the majority of early adopters of
e-trading had control of substantial financial resources and therefore could absorb the possible loss from an unprofitable innovation.

- *Early adopters* are the next 13.5 per cent of the individuals in a system to adopt an innovation. Early adopters are a more integrated part of the local system than innovators. This adopter category, more than any other, has the greatest degree of opinion leadership in most systems (Rogers, 1995). Kauffman (2000) in a study of electronic banking found that network externalities linked to effective network size help explain early adoption, while the opportunity costs associated with prior investments in branch networks tend to discourage early adoption. Grover et al. (1998) relate early adoption of information tool to size of the IS unit and the host organisation, the availability of slack resources, the diversity in the IT portfolio, and the professional orientation of the IS unit.

- *Early majority* are the next 34 per cent of the individuals in a system to adopt an innovation. The early majority adopt new ideas just before the average member of a system. The early majority interact frequently with their peers but seldom hold positions of opinion leadership in a system (Rogers, 1995). Yakel et al. (2005) suggested that the early majority's unique position between the very early and the relatively late adopters makes them an important link in the diffusion process.

- *Late majority* are the next 34 per cent of the individuals in a system to adopt an innovation. The late majority adopt new ideas just after the average member of a system. Like the early majority, the late majority make up one-third of the members of a system. Adoption may be the result of increasing network pressures from peers (Boone, 2001).

- *Laggards* are the last 16 per cent of the individuals in a system to adopt an innovation. They possess almost no opinion leadership. Laggards are usually near isolates in the social networks of their system (Caselli et al., 2001).

Each group is ideally targeted with a different diffusion strategy (Grover et al., 1998). Levin (2000) and Singh (2002) proposed that organisations with a long history of success are less likely to adopt new approaches, as adoption may result in breaking a long cycle of success. Organisational factors that are important in explaining the rate
and process of adoption include strategy, structure, resources and politics (Afuah, 2001).

Akel et al. (2001) found that the level of change agent contact with potential adopters is positively related to the decision to adopt. In addition, change agents can exist outside the target social system (for example the regulatory bodies of a sector). However, the most effective persuaders for adoption are similar in status and outlook to potential adopters (Friedman et al., 2000). These types of change agents are referred to as opinion leaders. Kautz et al. (1996), with regard to categorisation of the adopters and role of opinion leaders, proposed that opinion leaders were especially important for interpersonal networks.

2.4.4. Social System

All diffusion occurs within a social system whose members may be individuals, groups, organisations or subsystems but who share a common goal or objective that links them together (Fichman, 1999). Opinion leaders and change agents are the members within a social system who have the ability to influence DOI (Rogers, 1995). Opinion leaders’ influence stems from expertise and competence, accessibility or leadership in conforming to the system's norms. Davis et al. (1996) pointed out that opinion leaders are at the centre of interpersonal communication networks and thus can serve as the model to be imitated when it comes to adopting an innovation (or to opposing an innovation). Change agents, on the other hand, are external to the system but represent change and innovation to the system. They are often not seen as similar to the rest of the members of the system but instead possess some special knowledge or expertise (Economides, 1996a; 1996b). Change agents often use opinion leaders to gain acceptance within a social system to diffuse (or oppose) an innovation (Edelman, 1999).

2.5 DETERMINANTS OF A SUCCESSFUL DIFFUSION OF INNOVATION

Jennings et al. (1998) propose that success in diffusion of IS technologies can be derived if the new technology:

1. affects the benefits received
2. affects the costs of adoption
3. is related to the industry or social environment
4. the advantages of its adoption are visible

Alternatively, using the classification system of Rogers (1995), the first and second identified factors can be combined to yield relative advantage and complexity, the third as compatibility, and the fourth as being determined by trialability and observability (Appendix B).

2.5.1. Benefit received from the new technology
The most important determinant of the benefit that can be derived from adopting a new technology is the amount of improvement it offers (Friedman et al., 2000). Mustonen-Ollila et al. (2003) and Nagamatsu et al. (2006) state that the slowness of technology adoption is attributed to the relative advantage of new technologies being small when they are first introduced. As diffusion proceeds, learning about the technology begins to take place. The innovation is tested by various firms and improved and adapted to different environments, which results in it being more attractive to a wider set of adopters (Poole et al., 2004). The benefits of adoption generally increase over time. If they increase faster than costs, diffusion will appear to be delayed as the number of potential adopters will increase over time, expanding the size of the adopting population (Pitcher et al., 2001).

2.5.2 Network effects
Economides (1996b) found that the value of new technology to the adopting firms depends partly on the extent to which it is adopted by other firms. Likewise, Regan et al. (2000) revealed that the speed of adopting among peers was a primary motivator for adopting an innovation.

Farrell et al. (1992) state that diffusion (relative to the socially optimal rate) can be either too fast (excess momentum) or too slow (excess inertia) depending on the extent to which the innovation is adopted by others. However, there is a need for a critical mass of adopters in order for the innovation to be taken up (Economides, 1996b).

2.5.3 Costs of adopting the new technology
Irani et al. (2001a) suggested adoption of IT/IS provides ubiquitous portfolios of tangible and intangible benefits that need managing to ensure realisation. Organisations
also have to take into account the direct and often larger indirect costs that are typically associated with technology adoption and deployment. Cost of adoption includes not only the price of acquisition but more importantly the cost of the complementary investment and learning required to make use of the technology (Irani et al., 2001b). Aladwani (2002), examining the tools for measuring the usefulness of web-based transaction systems, pointed to investment that included training of workers and the purchase of necessary capital equipment (whose diffusion is therefore affected by the same factors).

Brynjolfsson et al. (1996) suggested that the full cost of adopting new computer information systems based on networked personal computers is about ten times the cost of the hardware. Caselli et al. (2001) compared the rates of computer investment across Organisation for Economic Cooperation and Development (OECD) countries between 1970 and 1990 and highlighted the importance both of worker skill level and of complementary capital investments in determining the rate of purchase of new computing systems. The implication of this work is that the use of new computing technology requires both the training of workers and the installation of related equipment (for example, remodelling expenses for space to install servers).

Barrett (1999) revealed that investment for new technologies has two effects. First, it slows diffusion because of uncertainty and unplanned rework results in an increase in the planned costing (Irani et al., 2001b). Second, some investments need a longer time to be realised and therefore do not attract the critical mass needed to make DOI economically viable (Barrett et al., 2000). This ultimately makes the introduction of innovation economically unviable. Because most of the costs of adoption are fixed, firms’ choice to change or introduce technologies is influenced by their own scale and the market structure of the industry within which they operate (Damanpour, 1996).

### 2.5.4 Information and uncertainty

The choice to adopt an IS-based innovation requires knowledge about how it operates and information about its suitability to the potential adopter’s situation. Therefore, an important determinant of diffusion is information about the new technology, which may be influenced by the actions of the supplier. Uncertainty about benefits, costs or length of life will slow the rate of adoption and may often turn the decision problem into an options-like computation. The latter is a consequence of the fact that, in most cases,
once a new technology has been chosen the costs are sunk and cannot be recovered (Baptista, 1999; 2000). Luque (2002) suggests that plants operating in industries with lower degrees of demand and technological uncertainty and a higher resale market value (higher resale prices for used machinery) are more likely to adopt new technologies.

2.6 THE LIFECYCLE OF INNOVATION

2.6.1 Lifecycle of uptake of adoption

The time element of the diffusion process allows classification of adopter categories. The adoption of an innovation usually follows an S-shaped diffusion curve (Rogers, 1995). The S-shaped adoption distribution curve rises slowly at first when there are only a few adopters in each period. The curve then accelerates to its peak until most of the firms in an industry have taken up the innovation. After the innovation matures, the curve posits a negative growth. This is because most of the users give up the previous innovation and replace it with a newer alternative. Upon the introduction or substitution of the old technology with a new alternative the S-curve and the spread of the adaptors repeats itself.

![S-curve of adoption](Source: Rogers (1995: p.11))

Figure 2.2 S-curve of adoption

Figure 2.2 illustrates an S-curve of technology adoption. The S-curve of technology adoption consists of three distinct phases: emergence (the development of the product of service, its capabilities and its place in the market); growth (where the product family
pervades the market) and maturity (where the market is saturated and growth slows). The S-curve provides an estimate of the rate of adoption throughout the emergence, growth and maturity of an innovative technology (James et al., 2002).

Ryan et al. (1943) were among the early users of the S-curve concept. They published their seminal study, which described the diffusion of the hybrid seed among a group of Iowa farmers. At the time of the study, farms in the United States (US) were slowly becoming business enterprises rather than family subsistence units. As corporations invested in agriculture, so did the concerns of higher productivity, efficiency, competitiveness and agricultural innovations. Ryan et al. (1943) explored the process in which innovations in agriculture were adopted. They discovered that diffusion was “a social process through which subjective evaluations of an innovation spread from earlier to later adopters rather than one of rational, economic decision making” (Ryan et al., 1943 Cited in Strang et al., 2004). At the time, this was a novel perspective on the diffusion process and emphasised the effect of social factors on adoption.

Ryan et al. (1943) also noted that the rate of adoption among those studied followed an S-curve when plotted on a cumulative basis over time. This supported the work of Tarde reported 40 years earlier and renewed interest in diffusion theory (Rogers, 1995). Additionally, Ryan et al. (1943) classified the Iowa farmers into five adopter categories. These categories were innovators; early adopters; early majority; late majority; and laggards. The notion of the S-curve of adoption highlighted that technological change can be characterised as being a socio-cultural evolutionary process of variation, selection and retention. The S-curve has been found to be applicable to all innovation theories that have been propagated regardless of their final propositions (David, 1985; Bijker, 1995; Brown, 2002).

### 2.6.2 Patterns of diffusion

Time influences the patterns of diffusion through the innovation-decision process. Time has a direct influence on the individual’s perception of innovation. For example, David (1990) stated that after the initial introduction of the new technologies by a number of big firms in an industry, more than 50 per cent of the firms had adopted the technology within the first 12 months. Butler (2001) also made a similar conclusion about the cycle of adoption when analysing the dynamics of online structures using a resource-based approach.
Teng et al. (2002) developed a diffusion model that included the internal and external factors influencing the patterns of diffusion. The significance of the study by Teng et al. (2002) revealed different IS innovations provided different patterns of diffusion depending on when, during the timeline, from innovation introduction to maturity, the innovation was adopted. These categories directly influenced the outcome of a diffusion process. Teng et al. (2002) proposed seven factors that influenced the rate of adoption:

1. *Earliness of knowing about innovations:* Addressing the means by which initial knowledge of an innovation is communicated within social systems.
2. *Rate of adoption of different innovations in a social system:* The classic studies aiming to explain patterns of diffusion focused on the nature of the innovation (e.g. seminal studies on the uptake of new agricultural practices).
3. *Innovativeness:* Empirical research that examines the characteristics of individuals or organisations perceived as being innovative.
5. *Diffusion networks:* Exploring the social interconnectedness of the actors in the social system.
6. *Rate of adoption in different social systems:* An extension of the work attempting to explain differing rates of uptake by the characteristics of the social system and the context within which it is embedded.
7. *Communication channels:* Focus on the various communication channels which seem to be most effective either at different times in the diffusion process or with different categories of potential adopters.

Kwon (1987) observed that the perceived value of an innovative technology has a direct influence on further boosting the rate of adoption of the innovation. In addition to critical mass needed to trigger an adoption, Strang et al. (2005) outlined a range of social factors (for example, culture, political and economic stability of the environment and access to technology) influencing the patterns and rate of adoption of new technology.
2.7 DOI CONCEPTUAL FRAMEWORK

Rogers (1962) identified a number of elements such as innovation, communication, adopter categories and social systems as the basic building blocks of DOI theory. A meta-analysis of 75 studies related to innovation implementation by Tornatzky et al. (1982) revealed that three of the most important characteristics influencing innovation adoption and implementation were: relative advantage; compatibility; and complexity.

Fichman (1992) undertook a review of IS technology diffusion and added characteristics of the technology (user interdependencies, knowledge barriers) and the locus of adoption (individual versus organisational) to the elements of DOI. Moreover Grover et al. (1993) suggested that factors such as knowledge and individual perception need to be taken into consideration when analysing the DOI process. Armstrong et al. (1999) revealed that social and managerial factors influence the rate of the IS diffusion. Likewise, Moore et al. (1995) used the DOI theory to develop an assessment tool to measure individual perceptions that affected IT innovation adoption and revealed that the key variables of IS diffusion were: relative advantage; compatibility; ease of use; demonstrability; image trialability; and voluntariness.

The studies undertaken by Fichman (1992), Pfeiffer (1992), Grover et al. (1998) and Moore et al. (1995) confirmed to Rogers (1983) that identified innovation, communication, adopter categories and social systems are the elements that directly influence the trajectory of change in an industry sector.

2.7.1 Key constructs

Empirical research on the diffusion of innovations has generated a wide array of propositions and generalisations about the nature of the diffusion process and the factors that encourage and inhibit the rate of adoption (Appendix B). The key elements of DOI grouped into five specific attributes are described hereafter (Table 2.1).
### Table 2.1 Key constructs of DOI

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<tr>
<th>Key Constructs</th>
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<td>Innovation attributes</td>
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<td>Wolfe (1994)</td>
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<td>Adopter characteristics</td>
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<td>Environmental context</td>
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<td>Communication channels</td>
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1. **Innovation attributes**

Innovation attributes refers to a key construct that is used to test the advantages of having an innovation adopted (Appendix B). An innovation with higher innovation attributes will be adopted more readily than the alternatives. Rogers (1995) proposed five attributes of an innovation that influence its rate of adoption. These five attributes are: *relative advantage; compatibility; complexity; trialability;* and *observability*. Wolfe (1994) outlines six key attributes found to influence adoption. They include: adaptability; *centrality* to the day-to-day work of the organisation; *technical vs. administrative focus; pervasiveness* (the proportion of total behaviours expected to be affected by the innovation); *radicalness;* and *uncertainty* about outcome (Wolfe, 1994). In addition to the mentioned factors, Barnett *et al.* (2001) include appeal to local power holders and little requirement for visible resources as factors influencing the adoption of an innovation.
2. Adopter characteristics

Rogers (1995) categorised adopters according to their tendencies to adopt: innovators; early adopters; early majority; late majority; and laggards. Each group is ideally targeted with a different diffusion strategy (Greenhalgh et al., 2004). Bitchler (1998), Levin (2000) and Barnett et al. (2001) propose that organisations with a long history of success are less likely to adopt new approaches. In addition, Storey et al. (2000) emphasises strategy, structure, resources and politics as additional factors influencing the adaptability of individuals.

3. Environmental / context characteristics

Corbitt (2000) and Peansupap et al. (2005a; 2005b) propose that low environmental uncertainty increases the tendency of organisations to remain stable or avoid change, while high uncertainty or need for legitimacy may encourage imitation in the adoption of innovations.

4. The characteristics of those promoting the innovation

Rogers (1995) propose that the level of change agent contact with potential adopters is positively related to the decision to adopt. Change agents may or may not be members of the target social system, whereas opinion leaders are. The most effective persuaders are similar in status and outlook to potential users (Rogers 1995; Woodside et al., 2005a; 2005b). Opinion leaders are especially important for interpersonal networks whose members differ in many respects (Rogers, 1983; Kautz et al., 1997).

5. Communication channels

Rogers (1995) proposes that mass media communication channels are more effective when there are large numbers of potential adopters and low levels of complexity, and when the goal is awareness raising. Interpersonal and local channels are important in persuading adopters to act upon their awareness and adopt (Kimberly et al., 1981).

The process of diffusion is the outcome of a two-way communication process between the initial adopters and a group of latent adopters. The extent to which an innovation is perceived to be central, radical, compatible, complex, trialable and observable all appear to be more important in influencing uptake (Fichman, 2002). Adopters can be individuals or organisations. When referring to individuals, earlier adopters are said to
have higher socio-economic status than later adopters; they are also characterised by
different personality variables and employ different forms of communication behaviour
(Greenhalgh et al., 2004). The organisational context within which adoption decisions
are made also shapes the rate of adoption – particularly an organisation’s structure,
culture and resources, and its wider institutional setting (Dacin, 1997; D’Aunno et al.,
2000).

Figure 2.3 DOI conceptual framework

Figure 2.3 identifies the facilitators and inhibitors of a DOI process. Each of these
constructs exerts a positive or negative influence on the rate of adoption. The process of
adoption is triggered by a single firm or a number of key firms in the sector. The
process of diffusion is facilitated or inhibited by innovation attributes, environmental
context, promoters of the innovation, adopter characteristics and communication channels. Depending on characteristics of the innovation and timing of the change, each of the key constructs can have a positive or a negative effect on the final diffusion outcome.

Studies by Abrahamson et al. (1996) have broadened the understanding of how administrative innovations are adopted or rejected by organisational groups. They argue that the choice about whether to adopt can relate more to the pressures associated with certain fads or fashions than to evidence in support of their use. While adoption of an innovation may at first relate to the prospect of improved performance, as the innovation gains acceptance others may adopt more in order to seek legitimacy (Bjørn-Andersen, 1984; Boone et al., 2001). This pattern of behaviour is heightened during times of high uncertainty when organisations are more likely to imitate other organisations, especially those deemed to be norm setters (Storey et al., 2000).

2.8 CATEGORISATION OF DOI-BASED STUDIES

Fichman (1992; 1999) developed a four-quadrant model that characterised various DOI studies based on the unit of adoption and the adoption behaviour (Figure 2.4). Individual adoption refers to people who make their own decisions about an innovation adoption while organisational adoption refers to senior managers who make decisions on behalf of the organisation (Gallivan, 2001). An independent adoption decision refers to a situation where the adopter has autonomy to make an innovation uptake judgement, whereas compulsory adoption decisions having already been made by the organisation.

An independent adoption decision refers to a situation where the persons have autonomy to make an innovation judgment, whereas a compulsory adoption decision implies that the person has a limited choice on an adoption decision due the decision having already been made by the organisation (Galvin, 1999).

Figure 2.4 illustrates the innovation diffusion adoption behaviour under four quadrants, namely: individual adoption (I); organisational adoption (II); intra-organisational adoption (III); and inter-organisational adoption (IV).
Rogers (1995) argues that users will accept an innovation based on their general perception of the innovation. Type I innovation diffusion decisions depend upon communication channels through which information about the benefits of adopting the innovation is conveyed to the individuals. Quadrant I illustrates the situation where the unit of adoption is an individual with autonomous decision-making power to either adopt or reject the innovation. Moreover, this type of innovation diffusion may support marketing research in the areas of selling or predicting product adoption by expected customers (Mahajan et al., 1990b).

In this quadrant, studies that can be categorised as having the level of analysis of individuals with autonomous decision making process involve the diffusion of studies in various service sectors including: software (Zmud, 1982); spreadsheets (Brancheau et al., 1990); strategic information systems (Knott et al., 2003); Database Management Systems (DBMS) (Grover et al., 1993); Electronic Data Interchange (EDI) (Premkumar et al., 1994a).

### Figure 2.4 Types of DOI studies

<table>
<thead>
<tr>
<th></th>
<th>Individual</th>
<th>Firm</th>
<th>Unit of adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Autonomous</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compulsory</td>
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<td></td>
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<td>Type III</td>
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<td></td>
<td></td>
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<tr>
<td>Type IV</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Fichman (1999)
et al., 1994; Damsgaard et al., 2001a); telecommunications (Grover et al., 1993); e-mail (Romm et al., 1996; Kettinger et al., 1997); Automated Teller Machines (ATMs) (Dos Santos et al., 1995); expert systems (Shao, 1999); electronic cash (Westland et al., 1998); and the Internet (Agarwal et al., 2002).

Loh et al. (1998) provided a research model for examining the adoption and development of a broad-based Internet stock-trading platform. They proposed that customer perception of Internet-enabled trading was a driving force behind the rate of adoption of Internet-enabled trading in the US.

Foo et al. (1998) proposed a framework that evaluated the functionality of the Internet telephone system. They also suggest a multiplicity of factors that can affect the performance of an Internet telephone system, namely: network performance; computing resource; voice processor; signal acquisition; output transducer; system architecture; and methods to establish connection between users.

Storey et al. (2000) investigated Internet banking services in the United Kingdom (UK) and the United States (US). They argued that to provide better customer-oriented banking services it is necessary to offer Internet banking services such as online mortgages and loans, as well as online credit card applications. However, Storey et al. (2000) note that further empirical study is necessary to investigate more comprehensive factors, especially technical variables related to the diffusion of Internet banking systems.

**Type II**

This quadrant illustrates the scenario in which an organisation primarily adopts innovation and encourages users of the innovation throughout the organisation to adopt it. Individual adoption is therefore dependent on organisational adoption (Gallivan, 2001). Other research studies defined two terms related to behaviour in this quadrant: diffusion and assimilation (Cooper et al., 1990). Agarwal et al. (1999) define assimilation as a combination of adoption and diffusion. Under this quadrant, behaviour circumstances may result in a different outcome from the organisational expectation (Corbitt, 2000). Gallivan (2001) argued that DOI might require modification to explain the diffusion process because it involves adoption from both the primary adopter (organisation) and an individual adopter.
**Type III**
Quadrant III illustrates the situation in which an organisation primarily adopts innovation and encourages users of the innovation throughout the organisation to adopt it. Individual adoption is therefore dependent on organisational adoption (Gallivan, 2001). In this quadrant, the unit of study of adoption and diffusion is individual staff within a specified context. Among the significant themes in recent DOI literature is, first, the importance of understanding the impact that norms and values have on innovation. Authors that provide alternative approaches to DOI usually emphasise the importance of the dynamics of networks in the shaping of change mechanisms (Lundblad, 2003). Zammuto (1988) used social exchange theory and the idea of a norm of reciprocity to explain diffusion of board independence. Zammuto (1988) pointed out that Chief Executive Officers (CEO) feel a sense of common identity.

Therefore, CEO-directors are unlikely to break from focal firm CEOs and demand independence until they lose independence in their own firm – until the reciprocity norm is broken (Zeffane, 1994). Brown *et al.*, (2002) analysed the adoption of mandated office systems in organisations. The research revealed that the choice of systems was sanctioned by the managers and although it became apparent that the systems were not the most efficient and effective tools to use, the management’s choice curbed any possibility of individual employees using systems that they thought would enhance their work. Another major result consistent with the predictions of classical diffusion theory includes Cooper *et al.* (1990) suggesting that two innovation characteristics - technology complexity and task-technology compatibility - were positively associated with adoption of process innovation.

**Type IV**
This quadrant illustrates the situation in which the unit of adoption is an organisation and the adoption decision if primarily made by senior managers (Regan *et al.*, 2000). Senior managers have an independent and significant role in influencing the direction of change process in an organisation. Therefore, the senior managers’ vision would influence the adoption decision.

Corbitt (2000) highlighted factors that have been identified as being important in the diffusion of electronic commerce (EC) architecture. He suggested that success in EC diffusion is attributable to a number of factors, namely: organisational commitment; the
existence of an executive sponsor; and frequent access by users. Corbitt (2000) further suggests that in a stable environment decisions of management tend to be influenced by internal dynamics of the sector as opposed to unstable environments.

2.8.1 Alternative theories on uptake of innovation
Fichman et al. (1999) provided a range of alternative theoretical standpoints on DOI. These approaches presented a departure from standard conceptualisations of DOI research.

Fichman (2003) provided four theoretical frameworks that he proposed as viable alternatives to DOI and its focus on explaining the quantity of IT innovation with economic-rationalistic arguments.

1. Management Fashion: The core argument of this proposed theory emphasises fashionable discourse can create and reinforce institutional forces that result in the adoption of inefficient innovations and the rejection of efficient ones (Abrahamson, 1991; Abrahamson et al., 1997; Barley et al., 1997).

2. Technology Destiny: The central argument of this approach is that destinies that await IS innovations vary dramatically (from universal adoption to total abandonment), and models based on assumptions of normative rationality become problematic in the context of innovations with a poor destiny (Fichman, 2003)

3. Quality of Innovation: The quality of innovation is the extent to which an organisation has adopted the “right” innovation at the “right” time and in the “right” way. The core argument of this approach is that the quality of innovation, rather than the mere quantity of innovation, is the more important determinant of beneficial innovation outcomes (Hage, 1999).

4. Performance Impacts: Performance impacts capture the effect an innovation has on business process measures (e.g., inventory turns), firm level measures (e.g., productivity and accounting profit-based), and market-based measures (e.g., capitalisation) (Irani et al., 2001a; 2001b). Dos Santos et al. (1995) proposed that performance impacts from IS innovation will vary depending on when and how innovations are adopted. In addition, presence or absence of complementary competitive conditions, organisational resources and managerial actions have a direct impact of the innovation’s level of performance (Hitt et al., 2001).
The decision of individual organisations to adopt is dependent on perceived merits of the technology (e.g., potential to improve the organisation versus the costs to adopt). Though the alternative approaches proposed by Fichman (1999) viewed diffusion from different angles, they were grounded in the basic assumptions of DOI as proposed by Foo (1998).

2.8.2. Criticisms of DOI theory
Damsgaard et al. (2001a) questioned the usefulness and application of DOI theory in explaining the diffusion and adoption of complex, standard-based and networked technologies. They found that not all technological change can be analysed using the DOI theory. For example, it could not explain the social contexts influencing the adoption of electronic data interchange (EDI) across business sectors in Hong Kong, Finland and Denmark. According to Damsgaard et al. (2001b) the two most important characteristics of EDI that make the technology adoption process different to the principles of DOI are its transformation of organisational procedures and settings and use based on standards. Therefore, EDI use created a degree of organisational interdependence and necessitated institutional regulations to monitor its effective use (Allen, 2000). Although the introduction, recognition and adoption of EDI were in line with the propositions of DOI theory, the notion of regulatory need and possible initiation of further compulsory change mechanism by the regulatory authority in maintaining the status quo could not be explained by DOI.

Boone et al. (1995), Baum et al. (1994a; 1994b) and Damsgaard et al. (2001a) have all challenged the conjectures of DOI because of the discrepancy between the adoption of mandated and standardised technology and the predictions of the theory. Damsgaard et al. (2001b) revealed the need to develop a separate framework for explaining the dynamics of innovation in highly regulated sectors. They suggested that technology adoption is not always carried out homogenously on a direct path. Therefore, institutional regimes exert external pressures to maintain the status quo. This at times curbs an innovation’s full potential being realised (Brown et al., 2002).

Trajectories of technology adoption
Within the scope of DOI theory, interactions between technology suppliers and adopters are expected to happen in a relatively homogeneous space. With complex technologies like EDI, however, the diffusion arenas are neither fixed nor homogeneous. Instead,
institutional arrangements, the business context and technological and economic constraints reshape these arenas (Damsgaard et al., 2001a). This was similar to three cases examined by Volberda et al. (2001) where three complex regulated systems were analysed. Volberda et al. (2001) revealed that it was necessary to employ institutional concepts to dynamically draw the borders of the diffusion space to understand the dynamics of IS adoption in different industrial contexts. An institutional perspective enables focus on institutional regimes that were involved in defining the scope of diffusion process.

Influence of institutional regimes
Damsgaard et al. (2001a), Van de Ven (1988; 2000) and Van den Bosch et al. (1999) pointed to institutional changes and their effect on the speed and course of any diffusion process by redrawing its boundaries, redefining involved entities and changing incentives. Damsgaard et al., (2001b) revealed collaboration and establishment of an institutional arrangement were used to support diffusion. However, Damsgaard et al. (2001a) stated that the institutional scope and type of regulatory measure can influence the mode of utilisation of innovative technology.

Lundblad (2003) proposed that Rogers’ (1995) DOI theory building and research began with, and still focuses on, diffusion and adoption by individuals rather than within organisations. This meant that in some cases the DOI theory’s approach needs to be extended to take into consideration levels other than “individual” as the sole term of reference. In addition, Lundblad (2003) proposed that there was a need to fully describe the interaction between the innovation, the adopter, the social system and the other influencers of adoption. While the body of research related to innovations within organisations grows, little is said about diffusion across organisations in Rogers’ theory, leaving a gap in an area of much concern and importance in such fields as public health and other rule-bound sectors.

2.9 DIFFUSION IN THE STOCKBROKING SECTOR
Adoption of IS technology in the stockbroking sector involved the development of an automated trading platform known as the Stock Exchange Automated Trading System (SEATS). SEATS allowed member organisations to place buy or sell orders, execute transactions, communicate with other brokers and report any off-market transactions.
The SEATS system was later complemented with the Clearing House Electronic Sub-Register System (CHESS). This system was intended to clear the payments and changes in ownership after the trade was performed by the broker. This system was restricted to brokers that paid for its annual membership (Appendix I).

The adoption of IS in the stockbroking sector involved the introduction of a number of exogenous regulatory systems. This was due to the nature of the sector being governed by deep structures that influenced the direction of change, meaning adoption of the regulatory changes was compulsory for all brokers. Since there was one sanctioned platform from which to operate, the way each broker processes transactions and interacts with the ASX is identical to other brokers, regardless of their size or the niche they provided a service for. While the regulations determined the macro (industry) structure, brokers were free to choose which niche to service, what services to offer, and how (Chemannur et al., 2002).

The DOI theory could not explain the dynamics of exogenous regulatory factors and the presence of different types of brokerage. Authors such as Baum et al. (1996), Haunschild et al. (1997) and Boone et al. (2002) acknowledge that there is a need to propose an approach to explain a situation in which there is an over-arching regulatory push that is independent of all other changes in the sector. The DOI-based approaches (traditional and/or the theories that evolved from the DOI paradigm) have focused on the firm as the unit of analysis. Therefore, DOI theory could only provide a useful analysis of the changes individual brokers deal with.

Rules and regulations play a major part in directing the trajectory of growth in the stockbroking sector. These regulations, although not limited to, tend to focus on areas where brokers are in direct contact with the governing bodies of the sectors i.e. clearance, and the issue of new entitlement to the shares. This is referred to as the back-office and signifies the macro-level of the change process encompassing all the entities in the sector. The second dimension refers to the direct contact of the stockbrokerages with the customer, marketing, customer care and niche-based differentiation is concerned. After abiding by the general trading laws, brokers can place themselves strategically within niches they can serve and thus differentiate themselves from their immediate competitors. This is referred to as the front-office. The front-office also refers
to the micro level changes i.e. changes that are initiated by and at times affect individual brokerage houses (Aitken et al., 2000).

The changes in the back-office were triggered by imposing a series of IS trade and clearance systems by the sector’s regulatory authorities. The choice of system and mode of uptake was predetermined for all brokers regardless of their types. This lack of choice meant that DOI theory could not explain the changes in the back-office and its predetermined outcome. At the front-office, brokerage houses are faced with a niche-based pull mechanism. Brokers are relatively autonomous in the front-office and therefore are allowed to take up various technologies that assist them in serving their specific niche. This is similar to the propositions of the DOI theory and the appropriation of resources by individual brokerage houses in deciding the type of service they offer and the niche they wish to serve (Carroll et al., 1995).

2.9.1 Dynamics of technology adoption at the back and front-office
Introduction of IS-based sales and clearance platforms resulted in changes in two distinct dimensions of the brokerage houses’ operations. In terms of the operations of the back-office, the introduction of the IS platforms were intended to further strengthen the efficiency and monitoring regimes of the sector. This resulted in the setting of regulatory protocols and sanctioned growth paths. The IS-enabled change after the transformation of the back-office dynamics of the sector was carried across to the front-office operations of individual brokers. At the back-office:

- ASX and other regulatory bodies control the quality of service and the composition of the sector. In addition, customer niche acting like a structure acts as a push force controlling the number of the agents.
- Introduction of IS trade and clearance platforms is reinforced through mechanisms intended to control the demographics of the sector and also to act as a crowding mechanism. Each broker is required to become a subscriber to the ASX-approved platforms.
- Brokers had no choice of trade platforms. No matter what type of stockbrokerage they wish to be, in order to be allowed to operate there was no alternative but to subscribe to the trade platforms approved by ASX.
After close adherence to the overall rules and regulations and subscription to the trade and clearance platforms, each of the brokers was allowed limited niche-based change. This means there was a phase where all brokers were essentially similar, followed by the niche-specific transformation as brokers aimed to provide services for niches based on their specific constraints. In the differentiation phase there is a niche-based pull mechanism emanating from customer requirements in which the types and composition of the niche directly influence the types of stockbrokers (Hannan et al., 1984).

The changes in the back-office operations were selected and introduced by the bodies outside the control of the brokers. This characteristic was similar to the propositions of organisational ecology (Hannan et al., 1989). The similarity between the population ecology and the dynamics of the back-office stems from where changes are introduced by forces external to the organisation. The change is exogenous i.e. it was imposed regardless of the characteristics of the firms mandated to adopt it. Changes in the back-office operations were thus the result of a selection of a specific type of system that was determined by regulatory bodies monitoring the sector’s status quo (Knudsen et al., 2002).

The relative autonomy in the front-office meant technological choices were available to the brokerages and they had a choice in experimenting with various dominant designs from among technological opportunities (Irwin et al., 1998). Positively selected variants then evolve through relatively long retention periods marked by incremental technical change and increased interdependence and enhanced competence within and between communities of practitioners. As such, the front-office operations showed characteristics similar to those described by adaptationist theories (Haveman, 2000; 2004; He et al., 2006).

Volberda et al. (2001) assert that integrating the perspectives of population ecology (selectionism) and institutionalism (adaptationism) enables the convergence of selection and adaptation. Population ecology focuses on environmental selection and is applied to address the dynamics of the back-office. While institutional theory focuses on adaptation and managerial intentionality, addresses the adaptation, strategic choice and differentiation in the front-office.
This was similar to Pettigrew (1990) who stated that the uptake of new technologies and the resultant change in an industry is conceptualised as a continuous process involving the mechanisms of emergence and causality, and temporal linkages between context and action are critical to this analysis. Context is seen as a “nested arrangement of structures and processes” which may either act as a constraint or are mobilised and shaped by human action (Pettigrew, 1990: p.270). This view focuses on how change unfolds over time and involves a search for underlying logic and deeper structures (Pettigrew et al., 2001).

2.9.2 Population ecology and environmental selection
Population ecology is defined as a model that outlines selection, growth, maturity and decline of an organisational type in a specific environment condition (Carroll et al., 1989). In times of change, an organisational type that is deemed fit with the new environment is selected while the rest of the organisational types are selected out (Hannan et al., 2003). This change process is predetermined by forces external to organisations. This process is also known as selectionism (Volberda et al., 2001). Selection legitimises an organisational type as a blueprint for all firms in the industry.

The sector’s regulatory bodies prompted the changes in the back-office. ASX selected a range of IS-based platforms, and introduced and forced the adoption of the systems. The nature of this compulsory change and selection of new regulatory structure was similar to the framework advocated by Hannan et al. (1992). Environmental selection refers to imposition of deep governance structures regulating the sector by imposing directives that set the overall regulatory and operational boundaries of firms.

Hannan et al. (1984; 2003) developed a framework that related density of organisational type as the main motivator for introduction of macro change triggers. They suggested that the selection of regulatory mechanisms was a tool in maintaining the status quo of a sector. In particular, this included saving the resources that would otherwise be over exploited should there be a large number of a specific type of firm present. Dobrev (2001) suggested that the density of a specific population of firms generates intense competition or takes for granted the status of a particular type of organisation. Intensity of competition and levels of legitimisation in turn affect founding and failure rates that manifest in a small range of firm types that are allowed to operate at any one time.
The selectionist paradigm is based on a biological evolutionary metaphor and seeks to explain the large variety of types of organisations (Gurbaxani et al., 2000). Boone et al. (1995) asserts that organisations continuously refine strategies and structures to meet changing environmental conditions. However, this refinement is only possible after the initial mandatory adoption sanctions are adhered to, and the new status quo; in this case the compulsory subscription to CHESS. The new entrants in the sector conducted business on a smaller overhead cost than the incumbents did and therefore could easily adapt. Contrary to the new entrants, the incumbents had to endure large investments to address the requirements of CHESS and other sanctioned systems. This further contributed to their vulnerability and many did not survive (Shankar, 2002).

Boone et al. (1995) assert that change in the mode of interaction with the sector’s regulatory bodies resulted in a series of mechanisms that caused the incumbents’ firms to suffer from high levels of structural inertia. As the environment changes, the relative inertness of these organisations inevitably results in deteriorating performance. This structural inertia is difficult to overcome and results in the market eventually selecting out firms whose competencies have become outdated and replace them with sanctioned organisation archetypes (Aldrich, 1994). This is highlighted in the following proposition:

**Proposition 1** After the initial setting of protocols, brokerage houses converge on organisational archetypes because of unification of practice to avoid the wave of competition from new incumbents.

The preliminary outcome of a new regulatory regime was the formation of a specific number of organisational types that all organisations adhere to. This was further pointed out by Dobrev et al. (2001) when studying the effects of economic transition in Europe. Rao et al. (1999), Freeman (1995), Freeman et al. (1995) and Boisot et al. (1999), in their analysis of the adaptability of firms to new industry regimes, outline four organisational forms: (1) no deletion/addition: imitative entrepreneurship; (2) no addition/deletion (the partial contraction of elements); (3) addition/no deletion (partial enlargement); and (4) addition and deletion (radical recombination). In addition, Rao et al. (1999) show that it is useful to ask how selection pressures play out at the level of the entire organisation as a unit versus the organising elements themselves. In the case of the back-office of the stockbrokers, the fourth option, i.e. addition and deletion, was enacted after imposition of a regulatory regime.
Because IS technology was introduced into the sector, the number of online brokers proliferated. In order to maintain the fundamentals of fair and honest financial service, CHESS and SEATS were introduced in the sector to curb the sudden rise of the online brokers. Therefore;

**Proposition 2**  New regulatory regimes are imposed when one type of brokerage proliferates.

From a population ecology perspective, it is proposed that introduction of regulatory systems coincides with abnormal increases in the numbers of a specific type of brokerage. This risks saturation and a rise in competition which may result in misconduct on the part of brokers to attract more clients.

Introduction of regulatory mechanisms resulted in the operations of all brokers to be identical. This means that, in order to survive, brokers need to compete in areas in which they have relative autonomy. The need to compete is highlighted in the following proposition:

**Proposition 3**  The direct regulatory influence of the governing bodies acts as impetus to change.

Therefore, it is proposed that the stronger the regulatory mechanism, in order to remain competitive, there is a strong impetus for brokers to strategically position themselves in areas where they have relative autonomy in attracting and maintaining a client base.

### 2.9.4 Institutional adaptation and firm-level strategic differentiation

Volberda *et al.* (2001) define institutionalism as the process concerned with identifying factors such as the role of externally-induced change and their effect on organisational structures. The institutional change process is the outcome of adaptation to new environmental regimes. Institutionalism is also known as adaptationism (Van de Ven *et al.*, 2000). DiMaggio *et al.* (1983) emphasised that the interconnectedness of organisations within their institutional environment causes some firms to initially become similar in terms of characteristics such as the range of services being offered or size. Dacin (1997) and Haveman *et al.* (2001) assert the role of resources, as well as the institutional norms acting in concert to influence the firm level differentiation.
Adaptationism proposes that introduction of institutional regimes moulds organisations to organisational archetypes (Scott, 1994; Tolbert et al., 1996). However, these archetypes are transformed; niches play a major role in providing an impetus for brokers to differentiate from peers. Boone (2000) emphasises a combination of selectionism and institutionally-enabled adaptation in which organisations adopt initiatives imposed by regulatory regimes while actively experimenting with alternatives within a predefined regulatory boundary.

Haveman (1993a; 1993b), in a series of studies that encompassed a decade of technology change in service sectors, asserted that the strategic choice and intention to differentiate one’s operations from peers is motivated by the need to break out of the generic mould of operations when firms are forced into a regime that controls their operations. Therefore, the higher the scrutiny of the regime, the stronger the intention of the firms in that sector to opt for differentiation in areas in which they enjoy relative autonomy.

Baum et al. (1991) proposed the intent for formation of new organisational forms stems from a demand for a specific resource that the firms possess. As such, the differentiation becomes a pull-force exerted by niches present in the sector. Barrett (2000) further emphasises the direct influence of diversity in niche and its positive influence on the formation of types of a specific business entity. The relationship between diversity in firm types and pull of niches is highlighted in the following proposition:

**Proposition 4** Diversity in brokerage types is directly proportional to diversity in niche.

Carroll (2004) proposed the technology appropriation framework that further developed the notion of strategic choice proposed by Bijker (1995). Technology appropriation examines the way in which different groups of users select, explore and modify aspects of a technology according to their needs. This further development on the notion of strategic choice (Bijker, 1995) resulted in a generic Model of Technology Appropriation (MTA) (Carroll et al., 2003).

After strict adherence to the rules and regulations, stockbrokers were allowed relative autonomy in choosing the type of niche in which to operate. The process of differentiation is a result of a brokerage’s modification of front-office technologies to
comply with the needs of the niche it intends to provide a service to. Therefore, the process by which brokerage houses differentiate is similar to the appropriation model proposed by Carroll et al. (2003).

2.10 CONCEPTUAL FRAMEWORK

The outcome of studies by Loh et al. (1998), Wilhelm (2001) and Chemmanur et al. (2002) on the uptake of Internet-based trading was a series of generic adoption models that were based on the elements of DOI. These models had not considered the role of regulatory bodies and their influence in shaping the growth trajectory of the sector. This was attributed to the studies being undertaken in finance markets of the UK and US, which have different regulatory measures to that of Australia.

The remaining option was to analyse the dynamics of DOI in sectors that are rule-bound and have authorities that monitor the operations of their member firms (Appendix C). Sectors such as health or pharmaceuticals, due to the nature of their operations, are scrutinised closely by various government-sanctioned regulatory bodies (Baker, 2001). Yet after strict adherence to the rules imposed by the regulatory bodies, the commercial entities in the health or pharmaceutical sectors strategically differentiated from their peers and focused on offering specific types of services demanded by their niche (Friedman et al., 2000).

The review of dynamics of technology adoption in rule-bound sectors such as health and pharmaceuticals also pointed to the presence of two dimensions in the uptake of IS innovations (Friedman et al., 2000). One dimension consists of direct interaction with the regulatory authority of the sector. The second dimension consists of the interaction of IS adopters with their clients and how this interaction results in the formation of specific types of firms that are intended to suit the need of a specific niche. This characteristic of the health and pharmaceutical sectors resembled the back-office, front-office dichotomy of the diffusion of IS in the stockbroking sector (Appendix C).
Figure 2.5 Preliminary conceptual framework (CF)

- The introduction of IS-based trade and clearance platforms.
- SEATS and CHESS
- Subscription to IS platforms
- Unified back-office operations
- Generic business model
- Role of niches in differentiation
- Formation of different brokerage types.

Event

External trends
- Social
- Global
- Regulatory mechanism

Competition
- Peers
- Direct competitors
- Cross-niche competition
- New entrants

Key resources
- Clients
- History
- Knowledge
- Areas of specialisation

Legacy systems
- Previous strategies
- Managerial intentions

Nature of regulations
Membership requirements
Globalisation

Population ecology (Selectionism)
Institutionalism (Adaptationism)

Back-office
Front-office
Figure 2.5 suggests the key constructs for the back-office are related to the compulsory regime implemented via the compulsory SEATS and CHESS subscription. The key constructs include the nature of protocols, as proposed by Stevenson et al. (2000), which influence the composition of the sector. Membership and subscription to the regulatory regimes according to Strang et al. (2005) influence the composition of the sectors as many unfit firms decline. Adler (2001) points to new global regimes that are integrated in the sector and further states that IS technologies facilitate formation of global linkages and cross-country stock trading among various national markets. Globalisation results in the imposition of additional regulatory measures that further affect the back and front-office dynamics of the sector.

In the front-office, the key constructs have been identified as external trends (Abrahamson et al., 1997), competition (Singh, 2002), key resources and the legacy systems (Strang, 2005). Each of these key constructs influence the decision of the sector with regard to the specific type of differentiation strategy it should employ. External trends, according to Abrahamson (1991), are influenced by the management fashion, technology fads and collective rationality in an industry. The notion of critical mass influences the choice of technologies for enhancing front-office operations. Similar to DOI theory’s proposition on critical mass (Kwon, 1987), adoption of technologies in the front-office depends on the extent the innovation is adopted by others (Farrell et al., 1992). Competition and key resources influence the range of front-office services offered by brokerage houses. In addition, these two key constructs directly influence the niche the broker intends to interact with. Finally, legacy systems act as historical paths that affect the willingness and speed with which firms (for example, brokerage houses) are willing to adopt new front-office technologies (David, 1992).

2.11 CONCLUSION

The DOI theory suggests that innovation spreads across a population of organisations beginning with initial awareness of the benefits that innovation may bring. The process of diffusion progresses to formal adoption and full-scale absorption through communication, trial and error and bandwagon pressures. Previous research suggest that the wide use of DOI theory in analysing the spread of innovation across various industry sectors would make it an ideal framework to explore and explain the unique characteristics of the stockbroking sector, which have led to its present form. Rogers
(1995) provides a useful firm-level perspective on the underlying process behind improving technology assessment, adoption and implementation.

In explaining the case of the Australian stockbroking sector, the DOI theory could only explain the front-office differentiation when the IS-based regulatory regime at the back-office was intended to standardise all process in the sector. Therefore, a range of publications on diffusion of technology in rule-bound sectors was reviewed to develop a framework that could address the unique characteristics of the stockbroking sector while integrating the DOI theory on an overarching conceptual framework. The dynamics of the stockbroking sector and presence of regulatory control at various levels of operations highlighted a need for a theory that addresses the dynamics of governance and the imposition of rules and regulations by the governing bodies. In addition, this alternative approach should be able to explain the manner by which regulatory systems act as structures selecting a specific business model(s). Under this view a technology-based system can be seen as a particular structure encompassing, not just the hardware, but also the many internal and complex relationships between the external service providers, users, owners and partners etc. This structure can both constrain and enable agency action.

The synthesis of population ecology to address the selection of standardised sales and clearance system in conjunction with institutionalism in addressing firm-level differentiation provides the alternative conceptual approach to that of the DOI theory. This synthesis subsumes the functional specialisation of individual firms based on their competence whilst highlighting the overwhelming influence of regulatory bodies in standardising operations.

The conceptual framework (CF1) was developed based on a combination of selectionist an adaptationist approaches to change. This highlights the dynamics of front and back-office operations of the stockbroking sector. To address the propositions that are put forward in this chapter, case studies are used to examine them. The next chapter presents the research design and methodology adopted for this study.
3.1  INTRODUCTION

The objective of this chapter is to explain the research method and the design process that was applied to conduct this thesis. This chapter contains explanation and justification of the development and use of the research methodology. In addition, the philosophical basis of the methodology adopted for the research, its validity and how the research has built upon the work of others is explained and justified.

In addition to outlining the development stage, the implementation stage of the research methodology, identification of the potential participants, the process of carrying out the research method and the evaluation procedure is explained. Finally, this chapter outlines the limitations of the research methodology.

3.2  METHODOLOGY ADOPTED FOR THE RESEARCH

The selection of a research approach and the methodologies employed to undertake the research are influenced by the phenomenon being investigated (Leonard-Barton, 1990); the place of the research in the context of theory development (Galliers et al., 2000); and the various institutional contexts within which the researcher is trained and works (Orlikowski et al., 2001). The background to the wider context of the phenomenon investigated in this research (diffusion of information systems (IS) technologies in a highly regulated sector) has been discussed in previous chapters, as has been the conceptual framework for the study and the place of this research in relation to theory development. Within the conceptual framework of the study, the front and the back-office operations, technology and the extent of regulatory scrutiny in shaping growth paths in the sector were identified.

The methodology used in this research was developed by carefully considering the data that needed to be collected to support the research objectives identified in Chapter 1. The research approach that was undertaken was similar in nature to Aladwani (2000) and that advocated by Irani et al. (2005). Figure 3.1 shows a summary of the adopted research design.
Figure 3.1 A summary of the research design
The research methodology encompassed the processes of developing a structured case study plan, the use of iterative research tools and the grounded development of conceptual frameworks. Schultz (1962) states that “the most serious question, which the methodology of the social science has, is: How is it possible to form objective concepts and objective verifiable theory of subjective meaning structures” (p.34).

In addressing the point raised by Schultz (1962), a case study approach was used to gain an understanding about ‘how’ IS is adopted across the stockbroking sector and why there are many brokerage types when the imposition of the IS regulations was intended to standardise the operation of the brokerages regardless of their size and the type of service they provided. For this reason, case studies were used to determine the conditions that surround IS adoption. In addition, case study research was used to describe events leading to the diffusion and the outcomes of technology adoption. This assisted in building a plausible explanation of the dynamics of relationships between brokers and the regulatory bodies (Damsgaard et al., 2001b).

3.3 JUSTIFICATION OF THE RESEARCH APPROACH

In a study of the research perspectives employed in the IS discipline between 1983 and 1988, Orlikowski et al. (1991) classified the underlying research epistemologies of 155 articles from the four leading IS journals at the time according to positivist, interpretivist and critical studies. They found that the predominant philosophy was positivism, which accounted for 98.6 per cent of the studies, while interpretive studies comprised only 3.2 per cent and critical studies were not represented at all. In calling for IS researchers to be open to the possibilities of paradigms other than positivism, Orlikowski et al. (1991) demonstrated that interpretive and critical perspectives could also offer valuable insights into phenomena in IS research.

Although progress has been made in the IS research community since then in terms of research diversity and methodological pluralism, Hirschheim (2000) found that a decade later the predominant paradigm was still positivism. They also found that, in particular, journals published in the United States (US) tended to be more positivist, quantitative, cross-sectional and survey oriented. At the same time, however, their study showed that in terms of research design, although surveys still remained the most widely used method, case studies and qualitative methods were gaining recognition.
A comparison of these two paradigms can be seen in Table 3.1.

Table 3.1 Epistemological, ontological and methodological differences between positivism and interpretivism

<table>
<thead>
<tr>
<th>Paradigm</th>
<th>Epistemology</th>
<th>Ontology</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Positivist</strong></td>
<td>Reality exists objectively and independently from human experiences</td>
<td>Hypothetic-deductive testability of theories. Scientific knowledge should allow verification or falsification and seek generalisable results. Causal relationships are usually presented and a tight coupling among explanation, prediction and control is expected</td>
<td>Value-free position and employs objective measurement to collect research evidence. Surveys and case studies.</td>
</tr>
<tr>
<td><strong>Interpretivist</strong></td>
<td>Emphasises the subjective meaning of the reality constructed and reconstructed through a human and social interaction process</td>
<td>Scientific knowledge should be obtained through the understanding of human and social interaction by which the subjective meaning of the reality is constructed</td>
<td>Researchers need to engage in the social setting investigated and learn how the interaction takes place from participants’ perspectives. Field studies and case studies</td>
</tr>
</tbody>
</table>

Criteria for categorising positivist articles: indications of hypotheses; propositions; model formation; quantifiable measures of variables and the inferences drawn from samples to populations

Criteria for categorising interpretive articles: Should not involve any positivist indicators as described above (no deterministic perspectives imposed by researchers). Participants’ perspectives are taken as the primary sources of understanding and investigating the phenomena. The phenomena are examined with respect to cultural or contextual circumstances.

Source: Hirschheim (2000)
Positivism focuses on understanding the world employed in the context of the natural sciences. It places emphasis on facts as distinct from values or meanings, and the use of the scientific method in which theory is deduced as a result of formulating and testing propositions (Plummer, 2001). Popper (1963) states this approach can identify cause and effect through ‘the constant conjunction’ of events, resulting in what has been called the ‘covering law’ orthodoxy. This orthodoxy is essentially devoted to the pursuit of explanations, which take the form of general laws.

The alternative to positivism (deduction) is interpretivism (induction), whereby reasoning proceeds from specific observations (data) to general principles (laws). The observations may suggest generalisations, which if repeatedly tested and confirmed can lead to discovery of a lawful relationship (Eisenhardt, 1989).

The research approach in this study utilises structured case approach. Selection of a method to conduct the research was guided by the literature on research methods, their suitability to the research objectives and underlying philosophies of the research approach as well as the conditions of funding. The choice of suitable research methodology was to address the dynamics of the status quo imposed by the stockbroking sector’s governing bodies. In addition, the research aimed to explore the processes that lead to formation of a diverse range of brokerage types when they are faced with an overwhelming force to standardise their practices. These deep-rooted structures and their influence in growth paths highlight the need for a method that addresses a number of factors. These are:

- use of the case method;
- aimed at an understanding of the context;
- do not (though may) define a priori constructs;
- attempt to contribute to knowledge; and
- relate findings to generalisable theory.

The structured case study is “grounded in social and historical practices” (Chua, 1986: p.620). Since the dynamics of the stockbroking sector is built in a complex web of regulations, a structured case is an ideal method to examine its dynamics. Burawoy (1985) claims “a phenomenon can only be understood if analysed historically” (p.18). Similarly, Hirschheim (2000) proposes a longitudinal analysis of change in facilitating
the contextualising of the phenomenon in a web of relationships that set the present and future growth patterns.

The structured case is well enabled to provide a recount of how participating stockbrokers and other affiliates in the sector perceived, understood and acted towards the introduction of IS based regulatory regimes. In addition, deep analysis afforded by the structured case study method allows critical exploration through a continuous cycle of iterative comparison and modifications of the conceptual approach that is proposed by the research (Locke, 1999).

3.4 CASE STUDY

Case study research is appropriate in situations where the research question involves a how, why or what question and where the investigator has no control over actual behavioural events. A case study is an empirical inquiry that involves data collection from multiple sources to investigate a contemporary (as opposed to historical) phenomenon in a real life setting where the boundaries between phenomenon and context are blurred (Yin, 2003). It is particularly suitable for areas where research and theory are at their early formative stages (Benbasat et al., 1987).

Cavaye’s (1996) overview of case study research in IS showed that it was highly versatile and can be used in the positivist and interpretivist traditions, for testing or building theory, with a single or multiple design and using qualitative or mixed methods. Case studies can be used to investigate a complex phenomenon at a point in time or they may be longitudinal. Lee (1991) demonstrated how positivist and interpretivist epistemologies can be combined in single case studies. Locke (1999) described comparative case study as a way of reconciling the ends of positivist and interpretivist approaches in public policy research.

Leonard-Barton (1990) combined a single longitudinal case study with replicated multiple cases to demonstrate mixed-methods within case research. Case studies have a distinctive place in evaluation studies where they have been used to describe, explore and explain the causal links in real-life interventions that are too complex for survey or experimental strategies (Yin, 2003: p.15).
The common criticisms of the case study approach are the lack of generalisability and rigour (especially if they are interpretive and single cases) and the excessive amounts of data to be collected (Yin, 2003). The lack of generalisability has been defended by Locke (1999) who gives the example of intrinsic case study where the researcher wants a better understanding of the particular case and instrumental case study to provide insight into an issue to redraw a generalisation.

Traditionally, the use of theory in case studies has been associated with the positivist or deductive approach where specific theoretical propositions are constructed based on a theoretical model. Data collection consists of gathering information on the individual variables indicated by the model and analysis would entail testing the conditions and relationships from the data against that of the theoretical model. Thus, the initial theoretical model is tested against the empirical data and may be modified according to the findings.

This approach is evidenced in the work of Yin (2003), Lee (1991) and Benbasat et al. (1987). Eisenhardt (1989) used an inductive approach to theory-building using case studies by starting with a grounded theory approach that had no a priori hypotheses. Eisenhardt’s approach was based on opportunistic data collection that generated concepts such as conceptual framework, propositions or mid-range theory. The conceptual framework was developed and grounded in the data collected, while the emergent theory was formally tested.

The interpretive study explores the causal framework of change and dynamics of strategic choice within regulatory control framework (Eisenhardt, 1991). The dangers of armchair theorising and the lack of external validity have been recognised in the IS change management literature (Walsham, 2005). Van Maanen (1979) explains that the tendency to theorise well in advance of the facts allows for “the possibility that the facts that emerge from our studies are twisted to fit a given theory” (p.37). Spicer (1992) recognises the premature aspect of theorising before studying practice and states “an important reason to study practice is to systematically confront theory or to challenge propositions found in the literature” (p.5).
3.5 STRUCTURED CASE STUDY

The structured case study is an approach designed to improve rigor and build theory (McGrath, 2005). In addition to these goals, the structured case can be used to build a deep understanding of practice within the field of IS (Hirschheim, 2000).

Carroll et al. (2000) used the structured case to examine the cognitive processes associated with problem solving as part of the Requirements Engineering (RE) process. Structured case was used to describe intensive field research that provided rich understanding of the practices of systems analysts. Similarly, Plummer (2001) used the structured case method to investigate two large public sector health care organisations attempting to design and implement enterprise-wide data warehouses to improve organisational performance.

Carroll et al. (2000) developed the structured case methodological framework for theory building. It extended existing research frameworks for building theory from case study (Eisenhardt, 1989; Yin, 2003) by specifically addressing theory-building within the interpretive paradigm. Structured case uses a formal process method comprising a conceptual framework, a pre-defined research cycle and a literature-based scrutiny of the findings. The case may be a person, group of people, organisation and process or information system.

The conceptual framework in structured case is the researcher’s representation of the conceptual structure to be used in the research process. It is formed by broad research themes: existing knowledge from the literature in terms of current knowledge and theories in the area of interest, including the gaps in the literature; researcher’s insights gained from experience, experts and practitioners (from informal and unpublished sources); and researcher’s theoretical foundations (world view comprising beliefs, assumptions and expectations).

The structured case approach has its inductive roots in the grounded theory approach. The grounded theory is at the inductive extreme of the induction-deduction continuum and emphasises generating theory from data alone (Glaser et al., 1967). Grounded theory entails building theory based on inductive reasoning, which is a logical process of establishing a general proposition based on the observation of certain facts. Glaser et al. (1992: p.253) later refined their position and concede that “in practice it is difficult
to ignore the theory accrued in one’s mind before commencing the research process” (p.253). Richards (1983) suggests “both prior theory and theory emerging from data should be involved in the research” (p.30).

Therefore, prior theory can have a pivotal function in the design of the structured case study and analysis of the data. The prior theory when detailed and expanded will progressively traverse the question, propositions, unit of analysis and the logic connecting the data to propositions and criteria for interpreting the findings (Yin, 1989: p.36). Hence, the design incorporates the theory pertinent to the topic under investigation and provides some direction as to what data needs to be gathered as well as the schemes for analysis.

Figure 3.2 displays the structured case methodology framework, which includes the components of the conceptual framework and the attached research cycle. The structured case conceptual framework is a representation of the theoretical foundations, the research propositions and existing knowledge developed from the literature and experience.

Source: (Carroll et al., 1998: p. 241)

Figure 3.2 The structured case research method
The conceptual framework also includes the main research themes and may start out as broad areas of interest and be refined through iterations of the research cycle. The research cycle has been adapted from the action research problem-solving cycle. It is also iterative in nature and builds upon critical reflection. The research cycle includes four elements (Figure 3.2) (1) plan, (2) collect data, (3) analyse, and (4) reflect.

The planning stage includes the development of the first and subsequent iterations of the conceptual frameworks and the data collection protocol. The data collection stage is the process of obtaining the case study information that can include interviews, archival material and observation of the target brokerages. In the analyse stage of the cycle the data is coded for analysis and can include such methods as pattern matching and clustering of responses. Carroll et al. (1998) argue that structure (and so) guides the researcher in the process of building theory by providing a viable recording mechanism that ensures rigour.

The reflection part of the research cycle critically evaluates the process, reviews the data and revises the conceptual framework. Reflection includes asking questions about meaning, alternative explanations and contradictory evidence. Development of conceptual framework (CF$^1$) was initiated after the review of literature on diffusion of IS. The review and the comparative analysis of the original CF$^1$ with the modified CF$^2$-CF$^5$ was carried out in the reflection stage when concepts were clarified and relationships specified. There are three different levels of theory-building, including the development of:

- working relationships, based directly on data (substantive theory);
- theories involving some abstraction, still closely linked to data (formal theory); and
- unifying theories that seek to explain behaviour (formal theory).

The process of the structured case methodology is continuous and uses the research cycle and iteration of the conceptual framework as a spiral towards understanding the dynamics of IS diffusion among the stockbrokerages. This process can go on until saturation is achieved.

The conceptual framework employed by Plummer (2001) and the characteristics of the industry analysed were similar to the case of the stockbrokerage houses in Australia. In
studying a sector that is characterised as highly regulated, the research method comprised three structural components:

(1) conceptual framework based on the review of the literature on diffusion of IS
(2) predefined research cycle (Carroll et al., 2000)
(3) comparative analysis between the literature-base conceptual framework and the frameworks developed as a result of field work

The conceptual framework represents the researcher’s understanding, while the theoretical foundation represents the contextualisation of the theories in the field of innovation adoption. In addition, the research cycle guides data collection, analysis and interpretation (Carroll et al., 2000).

The finalised conceptual framework is the culmination of all the interviews and key constructs identified by participating brokerage houses. In addition to its mode of data collection, the structured case study entails analytical rather than pure statistical generalisations and can be used to capture the complexity and dynamism of organisational settings in the stockbrokerage sector (Chemmanur et al., 2002). Thus, theory or conceptual framework in this instance can be defined as a set of concepts and generalisations about the causal mechanisms of brokerage differentiation in light of IS-based standardisation.

3.6 STRUCTURED CASE PROCESS

Understanding of the research themes expressed in the conceptual framework and further modifications upon integrating the research findings is accumulated through a highly iterative research cycle (Locke, 1999). The iterative nature of structured case facilitated the development of a research cycle that constantly compares and contrasts the statements made by participants during the data collection. Each stage of data collection involves participation of a brokerage with a number of its senior managers, consultants and brokers involved in the interview process. Carroll et al. (2000) proposed that the iterative nature of the research method employed is adapted primarily from the action research model of Susman et al. (1978). The research approach comprises an iterative cycle of planning, collecting data, analysing and reflection (Baskerville et al., 1995).
3.6.1 Planning phase

The dynamics of the stockbroking sector was historically constituted in deep regulatory regimes that influenced the relationships and regulations governing the interaction between brokerage houses and the regulatory bodies, and the brokerage houses and their customers. Diffusion of IS technologies in the stockbroking sector consisted of standardisation of sales and clearance, followed with strategic niche-based differentiation of brokers. These two dimensions of change needed to be studied separately and the findings combined as a finalised conceptual framework.

Therefore, the process of change was broken down into the back and the front-office components. The back-office represents the direct interaction of brokerages with the regulatory bodies. The front-office refers to the interaction between the brokerage houses and their clients. The body of literature comprising the population ecology and institutional approaches to IS technology adoption pointed to presence of an overwhelming regulatory push at the back-office. This regulatory push was followed with individual brokerages’ strategic differentiation moves. The differentiation strategies were directly influenced by the specific type of niche present in the industry.

The stockbroking sector is comprised of a large number of private small-scale operations in conjunction with a handful of larger entities (mostly in strategic alliances with Australian or international banks). The preliminary categorisation of potential participants resulted in placing all the brokers into categories of size and the type of service they offered. After the categorisation, all the brokers in each category were invited to take part in the study. The fact that only a small number of brokers agreed to participate in the study meant that each participating brokerage house constituted a mini-case.

The preliminary conceptual framework (CF\(^1\)) provided the basic theoretical background on diffusion of IS technologies. It explained the process of adoption of IS-based trade and clearance platforms among the stockbrokers. The CF\(^1\) was used to develop a set of interview questions examining the dynamics of the back and the front-office operations. The planning phase of the research is shown in Figure 3.3.
Figure 3.3 Development of conceptual frameworks
Individual brokerage houses participating in the study provided data on their front-office operations (Figure 3.3). The front-office component of CF\(^1\) provided the initial interview protocol for case A. The findings of the interviews resulted in modification of CF\(^1\). The modified conceptual framework (CF\(^2\)) outlined the strategic differentiation responses of firm A to the imposition of IS-based regulations by the Australian Stock Exchange (ASX) and the Australian Securities Investment Commission (ASIC). CF\(^2\) was in turn used to develop the interview protocols and modified interview question for case B.

Due to differences between the operations of firm A and firm B, the findings of the interviews with firm B resulted in modifications in CF\(^2\) and this resulted in development of a new conceptual framework, CF\(^3\): that outlined firm B’s differentiation strategies after the imposition of the Stock Exchange Automated Trading System (SEATS) and the Clearing House Electronic Sub-Register System (CHESS) and introduction of the Internet as a trade platform.

A similar process was repeated for cases C and D resulting in development of CF\(^4\) and CF\(^5\) respectively. After developing of CF\(^5\), key constructs of CF\(^2\), CF\(^3\), CF\(^4\) and CF\(^5\) were compared to the proposed key constructs of CF\(^1\). Areas that needed modification were amended and a new set of key constructs were added to the front-office component of the CF\(^1\). Findings of the interviews with the ASX and ASIC were added to the back-office component of CF\(^1\), resulting in development of the finalised conceptual framework CF\(^6\). CF\(^6\) was the outcome of the research that provided a range of constructs influencing the differentiation outcomes of participating brokerage houses.

3.6.2 Unit of analysis
A case study provides the framework within which the unit of analysis fits (Yin, 2003). McClintock et al. (1979) state that units of analysis may differ on dimensions of scope of activities. In determining what constitutes a unit of analysis, McClintock et al. (1979) further suggest that units of analysis are typically defined as individuals, groups and organisations, and can almost be any activity process or dimension of organisational behaviour.

For this research, the unit of analysis was the brokerage firm. The individual brokerage house’s strategic response to regulatory change was only possible in the context of
predefined growth paths set by the sector’s regulatory bodies. It was thus necessary to include in the decision about the unit of analysis, various regulatory push and niche-pull forces on the individual firm’s decision making process (Chemmanur et al., 2002). The characteristics of participating brokerages such as size, financial resources and legacy were of great importance in the case analyses. They were deemed as factors that directly influenced the front-office dynamics of the participating brokerage firms.

The boundaries for the research were defined as corresponding to the brokerage houses presently operating in the sector. The boundaries of research were also taken to include those individuals who were most directly involved within the front-office changes.

3.6.3 Selection of cases

Eisenhardt (1989) considers both a specified population and theoretical sampling important in selecting cases. He states that selection of an appropriate population controls extraneous variation and helps to define the limits for generalising the findings. Miles et al. (1994a) suggest that several dimensions to case selection need to be considered, such as its conceptual nature, social size, physical location and temporal extent.

Developing rich narratives depended on in-depth analysis of the operations of participating firms. Therefore having a number of firms from various categories of brokerage types was necessary. This assisted in developing specific key constructs that resulted in the formation of a specific brokerage type. Eisenhardt (1989) suggested that between four and ten cases should be used in case study analysis. He further suggested that “with fewer than four cases, it is often difficult to generate theory with much complexity, and its empirical grounding is likely to be unconvincing, unless the case has several mini-cases within it” (p.545).

The choice of cases needed to be representative of the population to produce a result of theoretical and practical value. Therefore the populations of stockbrokers were divided into sub-populations called strata (singular stratum), and brokers within each identified strata were invited to participate. The strati were set based on the classification of the brokers devised by the ASX (2004a). There were two basic types of stockbroker. The main difference between them is whether they offer advice. The major types of brokers are:
• Full-service (advisory) stockbrokers (full-service brokers offer advice on buying and selling shares, make recommendations and provide research. They also offer other investments such as options, debentures and bonds and compile tailored investment plans. As full-service brokers offer advice and other services, a higher brokerage fee to buy and sell shares is usually charged). There are two sub-categories in this group of full-service providers: independent (mostly small) brokerages; and large brokerage houses which are often in strategic alliances with Australian or international banks.

• Non-advisory stockbrokers (as the name suggests, non-advisory brokers offer no recommendations or advice regarding the appropriateness of a client’s decision; consequently their brokerage fees tend to be lower than that of a full service stockbroker). There are two sub-categories in this group of brokerage houses: discount brokerage houses; and online brokers.

The interviewees were selected from each type of broker operating in the sector (Appendix D).

Case A was a traditional brokerage house with a number of offices across Australia. It was one of the oldest brokerage franchises in the country. Case A was also one of the biggest full-service brokerage houses offering a range of financial services to its clients. This brokerage provided face to face services in which each client had an exclusive broker and could meet and discuss future portfolios and seek information about new investment prospects.

Case B was the oldest independent brokerage in Western Australia with an historical presence in the mining and minerals sector. This brokerage had experimented with a diverse range of structural options and when analysed in this research, was in further diversification. This firm also was in the process of becoming a support firm rather than a brokerage. This meant the firm was focusing on one aspect of brokerage process (in this case content providing) and was aiming to become an outsource partner of brokerage firms seeking market data and information trends for their clients.

Case C was the discount broking arm of a major bank in Australia. It started out as a specialist brokerage working in collaboration with a well-known US entity. It catered to customers with high volumes of trading. After the dissolution of the partnership with
the American brokerage, Case C retained a small number of its old customers. However, this brokerage focused on discount brokering and actively pursued clients who used the parent bank of the brokerage for their banking needs. Firm C, in attracting these clients, intended to provide a one-stop solution for its clients.

Finally, Case D was one of the first independent online brokerages in Australia. This firm was at the forefront of technology innovation. Because of intense competition from banks entering into online brokering, Case D had implemented a reverse-strategy of integrating components of traditional brokerage models in its customer care strategies.

The participants from these two brokerage categories would provide the key IS diffusion factors that were dependent on the unique characteristics of participating brokerages, such as size and turnover, while taking into consideration the role of formal structures and environmental regulations.

Sixty participants from four brokerage houses were interviewed (Appendix D). The interviewees comprised directors, senior management, consultants and brokers of firms A, B, C and D. The interviews with these participants provided the key constructs that influenced the front-office strategies of participating brokerages. In addition, five managers in charge of technology management and regulatory audit of the sector’s regulatory bodies were invited to provide information on the dynamics of the back-office regulations and monitoring mechanisms (Appendix D).

3.7 DATA COLLECTION

Data was collected from industry reports and interviews with managers, directors and traders involved in the sector (Appendix D). On three occasions some of the participating brokerages allowed the researcher to observe the sales and clearance operations carried out at the brokerages. The data from these three sources were triangulated in developing the finalised conceptual framework (CF6). The process of compiling research material based on multiple methods is useful whether there is convergence or not (Kirk et al., 1986). Where there is convergence, confidence in the results grows considerably. Findings are no longer attributable to a method artefact. Where divergent results emerge, alternative and probably more complex explanations
are generated. The advantages and disadvantages of using these sources of data are in Table 3.2.

Table 3.2 Data-gathering methods used in the case studies

<table>
<thead>
<tr>
<th>Method</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
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<tbody>
<tr>
<td>Interviews</td>
<td>These were used to cover many topics and features of the front-office management process; were modified between interviews as knowledge of information processes was acquired; were used to convey empathy and build trust</td>
<td>Sampling problems were experienced; respondent and interview bias; difficult to analyse and interpret responses to open-ended questions</td>
</tr>
<tr>
<td>Open-ended based questions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Documentary Sources</td>
<td>Use of documents, files and reports</td>
<td>Access, retrieval, analysis, problems occurred due to time requirements; validity and reliability of sources; needed to analyse the data in context; data was limiting</td>
</tr>
<tr>
<td>Use of documents, files and reports</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>Behavioural data such as attitudes, feelings and situational data were obtained.</td>
<td>Constraints such as timing; access to the site; time consuming; low reliability of the observer; may affect the behaviour of people; and hard to analyse and interpret</td>
</tr>
<tr>
<td>Observations of people and work settings especially at the stage of clearance of sales and transfer of ownership</td>
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Adapted from Miles et al. (1994b).

Interviews ranged from 20 to 90 minutes each. As the research progressed, examination of the data and preliminary coding was carried out immediately after each interview. This was seen as an integral and essential part of the iterative nature of the research as each interview provided the basis for the next interview (Appendix F). At the same time, each of the interview questions needed to be adjusted to “incorporate new themes which have emerged” (Eisenhardt, 1989; p.539).

The interviews started as open-ended, informal conversations (Appendix F). However, as the research progressed and new key constructs were identified, interviews began to have structure and became more formal (Denzin et al., 1994a). After each interview, the
transcripts were checked by participants. The option to remove parts of the transcripts were given to the participants should they not want their statements recorded (Denzin 1989). However, this was rarely required. The interviews were carried out in the brokerage houses and at every interview a series of confidentiality clauses were signed before the participants agreed to be interviewed (Appendix F).

3.7.1 Interview techniques

Interviews were used as a primary and secondary source of data. As a primary source, they were used to determine the key factors influencing the front-office strategies of individual brokerages. As a secondary source, information gathered from documentary sources was confirmed and later the interviews encompassed a series of meetings with a group of participants who were asked to verify the findings of the interviews. Taylor et al. (1984) have clear views and advice about interviewing. In structured interviews they believe that people seldom express their true feelings and views, possibly because the interviewer acts as a disinterested figure. In stark contrast to structured interviews, unstructured interviews are flexible and dynamic, as questions are open-ended. Taylor et al. (1984) state that when adopting unstructured interviews or ‘in-depth interviewing’ the interviewer acts as the research tool not the interview schedule or protocol. In essence, unstructured interviews are useful for learning about matters that cannot be directly observed.

According to Taylor et al. (1984) no other method “can provide the detailed understanding that comes from directly observing people and listening to what they have to say at the scene” (p.79). Thus, unstructured interviews were used throughout the fieldwork. However, before an initial interview was undertaken the aims and objectives of the research were explained to interviewees.

Interview questions moved from general to specific aspects of diffusion of IS technologies which had been previously identified through examining the documentary sources made available to the researcher. The pro-forma used for the interviews can be seen in Appendix F.

As the research placed emphasis on the front-office operations and the firm’s unique differentiation strategies, the senior managers of each participating brokerage house essentially acted as the link between the researcher and other participants involved in
the research. This enabled greater accessibility to middle managers, individual brokers and consultants. The senior management and on three occasions the directors’ responses were analysed to reveal each brokerage’s strategic plan and future strategic intentions. Initial interviews with the middle managers were used to explore how the senior management’s strategic vision is conveyed in the form of front-office strategies.

Interviews with consultants and individual brokers only occurred with the consent of middle management. Almost all the brokers and consultants were involved in several on-going client projects and therefore were extremely busy. Due to the importance of time in trading, many of the requests for interview were turned down. This was mainly due to the time difference with Sydney, which meant the brokers in Perth had to start trading and clearing their day’s trade earlier in the day. Brokers also had to provide three to four hours of customer service and consulting each day.

In clarifying the respondent’s answers, the researcher was careful not to introduce any ideas which could have formed part of the respondent’s subsequent answer. Furthermore, the researcher was also mindful of the feedback respondents gained from their verbal and non-verbal responses. Thus, the researcher avoided giving overt signals such as smiling and nodding approvingly when a respondent failed to answer a question, which could lead to respondents withholding responses to later questions. The interviewees reviewed the notes from the interviews and checked their accuracy.

Another aspect of interviewing is the requirement of tape-recording the interview. Tape-recording interviews can encourage fluency and allows the interviewer to pay close attention to what is being said. It also provides direct quotation for reporting and preserves the tone of the interview. Oppenheim (1992) states that “if the respondent refuses to consent to tape recording, the interview can proceed with ultra-rapid note-taking” (p.71). When appropriate, note-taking is generally used as the medium to record interviews along with tape-recording.

3.7.2 Documentary sources
Documentary sources are commonly referred to as unobtrusive measures (Robson, 1993) and complement the use of other methods. In the case of internal documents, consent from the highest level of authority in the firms was needed (Appendix C). Although the review of documents was allowed in most cases, any type of recording of
the data from the documents was forbidden and a series of agreements was signed to keep the content of the reports confidential.

The analysis of documentary sources is commonly referred to as content analysis, which is non-reactive in nature (Dick, 1990). Krippendorf (1980) defines content analysis as “a research technique for making replicable and valid inferences from data to their context” (p.21). In its simplest format, content analysis is the extraction and categorisation of information from documents. Inferences from the data extracted can only be drawn if the relationships with what the data means can be maintained between their institutional, societal or cultural contexts (Denzin et al., 1994b). Content analysis was used as a supplementary method in conjunction with interviews and observations to quantify and determine the historical progression of regulations and an individual firm’s front-office evolution.

3.7.3 Observation sources

The actions and behaviour of people are a central tenet of any enquiry. A natural and obvious technique is to watch what they do; record what is noticed; and then describe, analyse and interpret what has been observed (Robson, 1993). Observation can be used to comprehend complex issues, as well as ask questions to seek clarification on certain issues (Sekaran, 1992).

Unstructured, non-participant observation (Gold, 1958) was used as a secondary source of data collection to identify diffusion elements at the workforce. On three occasions, the researcher was invited by the senior management of firms A and D to observe the sales and clearance operations of the brokers, which were carried out at the end of every business day in accordance with the ASX’s CHESS requirement.

In addition, the researcher was invited to attend one of the biannual training sessions held for new brokers. These sessions were held to reinforce the core values of the sector and emphasise the required training directive of the ASX. The sessions were later increased to four per year in line with the Corporate Law Economic Reform Program (CLERP) regulations imposed by the ASX. The findings derived from this method of data collection may have lacked reliability, as the researcher may have changed the behaviour of those being observed (Sekaran, 1992). However, the observations and
experiences would further show how each broker assimilated the new requirements in their daily operations.

3.8 DATA ANALYSIS

Qualitative research typically involves vast amounts of raw data (Miles et al., 1994a). Analysis is the process of organising and reducing data in order to find meaning. The most common approach in analysing data from structured cases is the process of coding. Miles et al. (1994b) propose that codes “had some sort of conceptual or structural order, rather than being a random collection of categories” (p.62). The codes at first instance were based on the key words used usually in the DOI literature. As analysis continued, new concepts and themes emerged from the data and were considered by a receptive researcher (Denzin et al., 1994b). The data and reports gathered were maintained, categorised and coded in MindManager database. This database was later used in the coding and development of the conceptual coding diagrams which can be seen in Appendix G.

3.8.1 Open Coding and Initial Category Building

The process of naming or labelling things, categories and properties is known as coding. Coding can be done very formally and systematically or informally. In structured case study, it is normally carried out informally. This involves looking at each line and allocating codes to words or a group of words (Figure 3.4). The goal of this analysis is to generate a set of categories and their properties that fit, work and are related or relevant to introducing the theory. The constant re-examination of the data allowed unbiased and systematic coding of the transcripts which later need to be re-read and at this stage, have a preliminary direction of the interview (Appendix G).

Gathering of the data from interviews was followed with coding and analysis. Initially, the aim was to create basic categories from which to make amendments to the CF\textsuperscript{1}. Coding of the data began as soon as the data was collected (Appendix G). The categories made changes to CF\textsuperscript{1} and this process was repeated in developing CF\textsuperscript{2}, CF\textsuperscript{3} and CF\textsuperscript{6}. As key constructs were created, they were compared to the constructs developed in the preceding interview phases. This constant comparison of constructs started to generate theoretical properties, which were in turn used to further refine interview protocols and preceding conceptual frameworks.
As Figure 3.4 shows, the coding scheme started with a reaction of the brokers to the regulatory change. The coding scheme started with categorising two possible change trajectories. The group that had accepted the regulatory changes (the incumbent brokerage houses) either absorbed the change right away because it fitted within its current business model, or had to change its business model to fit the requirement of the ASX and ASIC. This process was referred to as accommodation.

Accommodation refers to reconciliation of differences by making room for the new practice in the old way of doing things. On the other hand, the newcomers, who mainly consisted of online brokerage houses and discount brokers due to the timing of entry in the sector, could easily absorb the new requirements. Assimilation refers to the process of receiving new facts or of responding to new situations in conformity with what is already available to the individual brokerages. The coding scheme in Figure 3.4 was designed to reflect the multiple level analysis of the research. The coding was based on the complementary relationship between macro and micro levels of analysis. The macro level of analysis denotes a phase where introduction of IS technologies were intended to further strengthen the regulatory regime of the sector. The micro level described the characteristics of the brokers and their unique reaction to the new IS systems. (Miles et al., 1994a).

All artefacts collected from the research (minutes of meetings, financial and other documents, press releases, web pages and interview transcripts) and the researcher’s journal and other notes were maintained in a MindManager database. MindManager is a tool developed initially for project managers. It assists in creating mind maps and coding mechanisms for each of the identified key words. MindManager allows storage and coding of text-based files (text format files without any specific formatting or diagrams were found to be the most suitable for coding) (Appendix G).

MindManager also allows other file formats (web pages, PDF documents, photos, etc.) to be stored and it permits the creation of hyperlinks between passages of text in coded documents and between coded text and stored files in other formats. Coded text can also be linked to short internal memos made by the researcher (Appendix G).
Figure 3.4 - The coding scheme
3.8.2 Saturation

Saturation of a category means that through constant comparison the conceptualisation of each comparison yields properties of the category "until no new properties emerge" (Glaser, 1992: p.191). Glaser (1992) pointed out the “researcher in the course of data collection is sampling for incidents not people and therefore each person can go on at length and be re-interviewed” (p.188). However, a point was reached where the responses of participants were becoming similar as various groups of participants were interviewed. The participants knew nothing in advance about the questions they were asked.

When the replies became similar, interviews were changed to exclude the specific question from the list. This is believed to be a stage at which, to a certain extent, saturation is achieved. Although Glaser (1992) points to the possibility of extending interviews indefinitely until all possible aspects of the phenomenon are studied, time constraint among other influencing factors highlighted the need for a more tangible end to the research. Repetition after five cycles of interviews was the point where the data collection could have stopped (Pandit, 1996).

3.9 CASE STUDY RELIABILITY

Reliability means consistency and is a precondition for validity. Stern (1979) states “for observations to have scientific value, there must be assurance that different observers of the same people or events would use abstractions in the same way” (p.12). This aspect is termed reliability. In any social science type of research such as case studies, reliability becomes an issue in which the assessment of research subjects is carried out with a certain degree of subjectivity by the researchers themselves. Kirk et al. (1986) address this issue by stating that “reliability depends essentially on explicitly described observational procedures” (p. 41).

An integral part of this research was the collection of individual brokerage houses on their unique front-office differentiation strategies. In addition, the collection phases included a series of archival document collection and analysis coupled with three occasions of observation in the brokerage headquarters. A procedure for collecting and dissemination of information was established. Interviews were used to identify the strategic intent of each brokerage with regard to competitive advantage and niche-based differentiation. The reliability of the data obtained from the interviews cannot be
determined as interviews were conducted on a one-to-one basis. However, the findings from interviews were consistent in terms of identifying the dynamics of the front-office change trajectories (Appendix E).

### 3.10 CASE STUDY VALIDITY

The use of multiple sources of data to determine the causal factors of diffusion of IS technologies from the case study addresses two facets of validity – external and internal. Essentially, validity refers to the ‘truthfulness’ of the factors identified and the reasons for their occurrence (Stern 1980). The use of interviews, documentary sources and observations indicates that the internal validity needs to be addressed. As discussed in Chapter 2, previous research has demonstrated the reliability of using triangulated sources to determine the paths of strategic choice and competitive advantage in sectors characterised as highly regulated (Bourgeois et al., 1988; Teplensky, 1995; Irwin et al., 1998; Loh et al., 1998; Baker, 2001; Brown et al., 2002).

Guba et al. (1982; 1994) recommended several techniques inquirers may use to enhance the credibility of their research: prolonged engagement; persistent observation; triangulation; peer debriefing; negative case analysis; progressive subjectivity checks; and member checking (Appendix E).

The underlying philosophy in this research has been identified as interpretive, with nuances of positivism and a critical stance. In attempting to address issues relating to reliability, validity, generalisability, triangulation, relevance and rigor in this study, principles identified in the literature for conducting and evaluating both positivist and interpretivist case or field studies were reviewed and used to guide the research (Lincoln, 1985; Baskerville et al., 1996 and McGrath, 2005). These principles and how they were addressed in the research are based on the framework developed by Klein et al. (1999, p.72). These principles are presented in Table 3.3.

The purpose of presenting findings to participants was to ensure that the understanding that had emerged from the analysis was a valid representation of the participants’ perspective on the diffusion of IS technologies in the stockbroking sector. After each interview, the transcripts were printed immediately (Kirk et al., 1986).
### Table 3.3 Seven principles of interpretivist research applied to this research

<table>
<thead>
<tr>
<th>Principle</th>
<th>How this principle was addressed in this study</th>
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</thead>
<tbody>
<tr>
<td>The Fundamental Principle of the Hermeneutic Circle</td>
<td>By the iterative nature of data collection and analysis, the movement between examination of the micro and macro contexts and the embedded design.</td>
</tr>
<tr>
<td>All human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form.</td>
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<tr>
<td>The Principle of Contextualisation</td>
<td>This has been provided by the discussion of the wider context within which the research phenomenon was situated (diffusion of IS technologies in rule-bound sectors and the dynamics behind the presence of different brokerage types in light of overwhelming regulatory push for standardisation).</td>
</tr>
<tr>
<td>Requires critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged.</td>
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</tr>
<tr>
<td>The Principle of Interaction Between the Researcher and the Subjects</td>
<td>The semi-structured interviews and iterative data collection and analysis allowed for probing behind the interpretations of the participants and those of the researcher.</td>
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<tr>
<td>Requires critical reflection on how the research materials (or &quot;data&quot;) were socially constructed through the interaction between the researcher and participants.</td>
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<tr>
<td>The Principle of Abstraction and Generalisation</td>
<td>The conceptual frameworks for the study were based on a synthesis of constructs of empirically tested theories in the field and related areas, as well as insights from the participant observation. The data were coded and analysed according to these constructs and themes, allowing a deeper understanding of their role in the phenomenon.</td>
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<tr>
<td>Requires relating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action.</td>
<td></td>
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<tr>
<td>The Principle of Dialogical Reasoning</td>
<td>This was addressed by taking a critical stance during the reflection stages of the research and allowing the frameworks to be refined as understanding developed.</td>
</tr>
<tr>
<td>Requires sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings (&quot;the story which the data tell&quot;) with subsequent cycles of revision.</td>
<td></td>
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<tr>
<td>The Principle of Multiple Interpretations</td>
<td>Multiple sources of information were sought using a multiple case design. Perceived anomalies were referred back to participants for further discussion and clarification. The data and analysis were reviewed by another academic.</td>
</tr>
<tr>
<td>Requires sensitivity to possible differences in interpretations among the participants as are typically expressed in multiple narratives or stories of the same sequence of events under study. Similar to multiple witness accounts even if all tell it as they saw it.</td>
<td></td>
</tr>
<tr>
<td>The Principle of Suspicion</td>
<td>Once again the recursive data analysis as new themes emerged, the clarification sought on anomalies, the checking between different sources enabled the biases and distortions to be identified and accounted for.</td>
</tr>
<tr>
<td>Requires sensitivity to possible &quot;biases&quot; and systematic &quot;distortions&quot; in the narratives collected from the participants.</td>
<td></td>
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</table>

Source: Klein et al. (1999, p.72)
During the preparation of the transcripts, all names and reference material that could identify the participants or any brokerage were omitted. The transcripts were given back to the participants. The participant would then check the statement made in the interview. In some cases the participants made minor modifications to their statements. In 14 occasions, the participants who were interviewed added further information to the transcripts.

The feedback from the participants allowed the researcher to re-evaluate the key constructs of the conceptual framework if necessary. By discussing the findings with each of the participants, the researcher was able to ensure that he had correctly identified meaningful and insightful themes in the data and that the relationships between emergent constructs and the participants’ responses were valid (Richards, 1983).

In addition to having the interviewees checking and validating the transcripts, the second phase of the evaluation took place. Similar to the selection of participants - although the choice of evaluators was not as diverse - a group of participants was invited to take part in validating the findings. The participants were from firms that initially did not agree to take part in the study (Klein et al., 2001).

A number of the managers from those firms declining the initial interview agreed to participate as evaluators. During the validation process, the transcripts, interpretations and reports of the inquirer were reviewed by the members or participants who provided the data. Before meeting the evaluators the researcher made certain any reference to a specific firm or person was taken off the findings to maintain the anonymity of the participants (Appendix E).

A total of fifteen participants agreed to take part in validating the findings. These participants were each given a short chart of the findings. They were then asked to validate the following questions and, in cases where further elaboration was needed, were asked to contribute freely (Appendix E).

The validation procedure followed the same principles governing the validity and reliability of the interviews. The findings of the interviews were validated and most of the evaluators were satisfied with the final conceptual framework. Only one of the
evaluators proposed adding information about the new back-office system, which was soon to be implemented within the sector (Klein et al., 2001).

3.10 CASE STUDY LIMITATIONS

In the course of the research, four brokerage houses and a number of participants from the sector’s regulatory bodies participated. The problem this research faced was the authenticity of the claims made by the participants. Although the back-office changes were mandatory and identical across all brokerage houses, the actual costs that occurred in the transition to the sanctioned system may have been far greater than reported. The intensity of competition and the ease with which strategies could be duplicated by peers were key determinants in some of the respondents’ self-censoring.

One of the possible limitations of the structured case study research can be attributed to its exploratory nature. This is emphasised by Guba et al. (1994) who argue that because of the exploratory nature of the research method, investigators at times do not impose any antecedent conditions and therefore such neglect can cause problems with authenticity. The issue of authenticity is concerned with the establishment of a mechanism to persuade a methodologically-sophisticated peer about the authenticity of the information. In order to overcome the authenticity issue, the findings of the research were verified by the interviewees and then evaluated by an independent group of participants.

The main shortcoming of the approach in this research was the relatively small number of participating firms. Due to the refusal of potential participants to be involved, the total number of firms taking part did not exceed four. In most cases time was mentioned as a reason for the brokers refusing to participate in this study. In addition, most of the participants were concerned about the knowledge that could be generated and used by peers as a result of their interviews. Therefore, at times when they referred to some information they believed was critical they asked for the recording to be stopped and the interview was resumed off the record. This was a major issue for firms that were in the midst of developing a new system or implementing a new strategy. The confidentiality clause that the researcher had to sign at times resulted in some of the information not being cited directly. This affected the richness of the findings.
3.11 CONCLUSION

The design and methodology adopted for this research has provided an original approach to identifying the regulatory push and niche-pull determinants of uptake of IS-based trading and clearance platforms among stockbrokers. This chapter provides detailed justification for the philosophical basis of the research approach adopted. The case study approach was described and the processes used to collect data were explained. The reliability, validity and limitations of the case study were also addressed.

The methodological approaches adopted in pursuing this thesis were found to be useful in seeking answers to the aim and objectives of the research. A detailed description of the analysis for the case studies can be found in Chapters 4 and 5. The conceptual framework outlining the dynamics of diffusion of IS in the stockbroking sector is presented in Chapter 6. Chapter 7 will test the propositions and make relevant conclusions about the research findings.
CHAPTER 4 - DYNAMICS OF THE BACK-OFFICE

4.1 INTRODUCTION

Information systems (IS)-enabled rules and regulations play an important role in directing the diffusion of IS in the back-office operations of the stockbroking sector. These regulations tend to focus on areas where brokers are in direct contact with the governing bodies of the sectors. The direct contact between the governing bodies and the brokerage houses concerns areas such as listing, clearance and the issue of new entitlement to the shares. This is referred to as the back-office and signifies the macro-level change processes. The back-office operations are identical across all brokerage houses.

The rationale for dedicating a chapter to the role of the sector’s governing bodies was due to an overt presence of rules and regulations introduced across all the brokerage houses. The introduction of standardised operations triggered a change process across other aspects of brokerage’s operations.

In this chapter, the role of regulatory bodies in introducing and initiating IS-based trade and clearance platforms is discussed. Furthermore, the specific IS technologies that instigate the standardisation of sales and clearance procedures are explored, and the ranges of regulatory mechanisms sanctioned for uptake by the brokerage houses are described (Appendix I). Finally, the process of change and the back-office component of the final conceptual framework are presented.

4.2 PARTICIPANTS

Initially nine participants from the Australian Stock Exchange (ASX) and the Australian Securities and Investment Commission (ASIC) agreed to take part in the research. Only five of the initial nine, however, agreed to be formally interviewed (Appendix D). The remaining four participated in validating the findings in the evaluation phase (Appendix E). In addition to the interviews, eight weeks’ access to the internal documents and reports about the surveillance and trade activities of the ASX was undertaken. During this period, a large number of protocols and industry reports were reviewed (Appendix
C and I). Table 4.1 identifies the participants who took part in the back-office component of the research.

Table 4.1 Back-office participants

<table>
<thead>
<tr>
<th>Department</th>
<th>Role</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regulatory Audit</strong></td>
<td>Monitoring of daily operations of the ASX and member brokerage houses</td>
<td>• Director</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Senior Manager</td>
</tr>
<tr>
<td><strong>Technology Management</strong></td>
<td>Maintenance of technology networks between the ASX and the brokerage houses</td>
<td>• Director</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Senior Manager</td>
</tr>
<tr>
<td><strong>Broker Service Management</strong></td>
<td>Training and certification of individual brokers</td>
<td>Senior Manager</td>
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</table>

Participants from the governing bodies were active in the areas of technology management, regulatory audit and broker service management. The rationale for having participants from these departments was the close interaction of these departments with each of the brokerage houses. Back-office operations were under the direct supervision of these three departments and therefore their participation provided a valuable insight into the dynamics of the regulatory measure introduced in the sector.

The technology management department was in charge of maintenance of the IS network between the brokers and the ASX. It was also accredited with providing a functional server that enabled brokers to back up records and operational invoices. The regulatory audit department was in charge of monitoring the day to day actions of the brokerage houses in the market. Noteworthy, in the event of an illegal or wrongfully executed trade, this department would refer the case to the ASIC for further action.

The broker service management department was in charge of training and certification of brokers. This department also provided the general public with training and administered annual training seminars for individual brokers.
4.3 INTRODUCTION OF IS TECHNOLOGY

The stockbroking sector in Australia was one of the first sectors to adopt computerised sales and clearance systems (ASX, 2005a). The Stock Exchange’s Automated Trading System (SEATS) provides a centralised listing and trading of securities on the ASX. The ASX’s Clearing House Electronic Sub-Register System (CHESS) provides a centralised register for clearance of trade and electronic transfer of share ownership. Following the market crash of 1987, rather than shouting orders and writing on boards, new computerised systems were developed that enabled brokers to enter bids and offers electronically on their clients’ behalf.

The archival data provided by the back-office participants described the initial problems with the computer systems that replaced the traditional trading floors. The documents described that the installation and use of computers in facilitating trade and administrating trading records was expensive and unreliable (ASX, 2003a). In addition, if any of the brokerage houses decided to enter into alliances with other brokerages, any incompatibility of systems resulted in further complications (ASX, 2005a). Locating terminals in traders’ offices required expensive and cumbersome communication links accompanied with complex and expensive technologies. However, as successive versions of trade and clearance systems were introduced - coupled with training provided by the ASX - the issue of interoperability was overcome (ASX, 2005b: 2005c).

Centralising trade and regulation around the ASX was intended to rationalise regulation and control by amalgamating all the monitoring processes. The governing bodies had the support of the government, made the rules, ran the trading, provided settlement and controlled information flows. The regulation and relative stability that the ASX provided has resulted in a high degree of efficiency in Australia’s equity securities and derivative markets (ASX, 2005a). In terms of market capitalisation, the director of regulatory audit stated:

“The reason we had SEATS and CHESS introduced was partly in recognition of the importance of timely, equal and fair access by all investors to material information about companies. This action has positioned our market very well in terms of efficiency and transparency. We have seen quite a change in the profile of our listings over the years. Indeed, the market has changed dramatically and grown in 30 years and I believe it is all due to the stability that our systems have provided.”
### Major Financial Markets in the Asia-Pacific Region

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<td><strong>SHARE MARKETS</strong></td>
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<tr>
<td>Market Capitalisation (US$ Billion, Year-End) FTSE&amp;N</td>
<td>265</td>
<td>518</td>
<td>318</td>
<td>271</td>
<td>93</td>
<td>82</td>
<td>2,403</td>
<td>2,075</td>
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<tr>
<td>Investable Stocks(1)</td>
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<tr>
<td>Total Value of Share Trading (US$ Billion, Jan to Dec) WFE</td>
<td>226</td>
<td>525</td>
<td>377</td>
<td>440</td>
<td>95</td>
<td>107</td>
<td>2,316</td>
<td>3,220</td>
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<td>Domestic &amp; Foreign, including Investment Funds</td>
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<td><strong>SECURITIES MARKETS</strong></td>
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<tr>
<td>International Debt Securities (US$ Billion, Dec Qtr) BIS</td>
<td>128</td>
<td>300</td>
<td>29</td>
<td>49</td>
<td>9</td>
<td>33</td>
<td>105</td>
<td>142</td>
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<td>Amounts Outstanding by Country of Residence</td>
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<tr>
<td>Domestic Debt Securities (US$ Billion, Dec Qtr) BIS</td>
<td>172</td>
<td>358</td>
<td>43</td>
<td>47</td>
<td>42</td>
<td>66</td>
<td>5,702</td>
<td>8,867</td>
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<tr>
<td>Amounts Outstanding by Country of Residence</td>
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<td><strong>FOREIGN EXCHANGE MARKETS</strong></td>
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<tr>
<td>Average Daily Turnover (US$ Billion, Apr) BIS</td>
<td>52</td>
<td>81</td>
<td>67</td>
<td>102</td>
<td>101</td>
<td>125</td>
<td>147</td>
<td>199</td>
</tr>
<tr>
<td>% Share of World Markets</td>
<td>3.2</td>
<td>3.4</td>
<td>4.1</td>
<td>4.2</td>
<td>6.2</td>
<td>5.2</td>
<td>9.1</td>
<td>8.3</td>
</tr>
</tbody>
</table>

(1) The entire range of FTSE indices are fully free float adjusted to reflect availability of stock in the market available for public investment. January 2001 data is used as the year-end figure of 2000 as FTSE International and Nomura did not release 2000 data.

Sources: FTSE International Ltd, Nomura Group (FTSE&N); Bank for International Settlements (BIS), Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity in 2004; BIS, International Financial Statistics June 2005; World Federation of Exchanges (WFE); Axis Australia

The director of regulatory audit further stated:

“The growth from 2000 onwards after the recovery from the Asian financial crisis has been quite strong and our technology has played an important role in maintaining an investment-friendly environment”.

This is elaborated further in Table 4.2, which identifies the market value of the ASX compared to their regional stock markets.

### 4.4 CONTEXTUALISATION OF BACK-OFFICE CHANGE

The changes to the back-office of the stockbrokerage can be categorised into three distinct phases:
• technology-driven change;
• regulatory-driven change; and
• the global forces.

Figure 4.1 outlines the three distinct waves of change that prompted the back-office changes in the stockbroking sector.

![Figure 4.1 Types of change in the back-office](image)

**Technology-driven change**

The technology-driven phase was triggered in 1987 with the introduction of SEATS. SEATS allowed member organisations to place, buy or sell orders, execute transactions, communicate with other brokers and report any off-market transactions via ASX’s local area network (ASXLAN). Introduction of this system was carried out via a three-stage process designed to provide an electronic transfer of title through a central clearing house (Appendix I).
Regulatory-driven change

Imposition of SEATS and standardisation of the back-office was further reinforced by compulsory subscription of CHESS. CHESS is an IS-based clearance platform that standardised the recording of sales and change in stock ownerships.

Globalisation

Globalisation was facilitated by the integration of the Internet in the back-office operations of the stockbrokerage houses (Washington et al., 2005). Although the sales and clearance regulations of the ASX has remained unchanged, membership of the ASX in global institutions will result in more back-office regulations being imposed to satisfy the requirements of finance institutions and governing bodies (ASX, 2005b).

4.5 REGULATORY BODIES

The majority of the brokerages’ operations concern their interactions with the ASX and the ASIC. In addition to these bodies, the brokerages need to comply with the directives of the financial reporting council (FRC) and Australia’s national inward investment agency (AXISS). Figure 4.2 shows the interaction between the regulatory bodies and the individual brokerages.

Figure 4.2 Role of the governing bodies in the back-office operations
The role of the governing bodies in shaping the back-office operations can be summarised as:

- overseeing accounting and auditing standards;
- monitoring audit control;
- monitoring brokerages’ compliance with disclosure requirements;
- monitoring the use and dissemination of the information; and,
- monitoring the use of sanctioned systems.

These regulatory bodies are highly influential in the back-office operations. In addition to the back-office, the ASX and the ASIC continuously monitor the front-office operations. However, brokerage houses are relatively autonomous to devise a unique competitive strategy based on their resources and types of services they offer (Appendix I).

### 4.5.1 ASX

The ASX formed in 1987 through the amalgamation of six independent stock exchanges that formerly operated in the State capital cities (Appendix H). Each of these exchanges had a history of share trading dating back to the 19th century (ASX, 2005c). The ASX was originally a mutual organisation of stockbrokers, like its predecessor State stock exchanges (Appendix H). However, in 1996 its members decided to become a listed company, which required legislation in the Australian parliament.

*The role of the ASX*

The ASX operates Australia’s primary national stock exchange for equities, derivatives and fixed interest securities (ASX, 2005c). The ASX provides comprehensive market data and information to a range of users. All these operations are facilitated by a designated IS-based trade and clearance system (ASX, 2005d).

Figure 4.3 demonstrates the role of the ASX in providing a trade and clearance platform for the member brokerages via a designated network. Brokerages that have subscribed to the ASX’s designated SEATS and CHESS systems are provided full access to the ASX network. The ASX also provides a local area network (ASXLAN) for brokers with multiple branches and trade platforms.
Figure 4.3 ASX services

The ASX ensures compliance of listed brokers with the ASX Listing Rules and the compliance of participating organisations and affiliates with the ASX Market Rules. The senior manager at the audit department further elaborated on the ASX’s regulatory function and stated:

“The Listing Rules are more narrowly focused on behaviour within the market facility that we provide. Specifically, they focus on disclosure.
That is the central organising principle of the Listing Rules – ensuring that the market we provide is informed at all times and that no investor is disadvantaged by a lack of access to material information about an investment decision. The ASX Listing Rules monitors and regulates the supply of information to brokers and potential buyers of stocks. Market Rules on the other hand outline the standardised operations that have to be followed by every member brokerage”.

Regarding the role of regulation, the senior manager of the audit department stated that:

“The system is intended to address the importance of timely and fair access to all. Fair access is only possible by curbing unfair advantage of some players and that is where our work starts.”

As supervisor of the markets, the ASX also works closely with the ASIC to ensure that the highest levels of market integrity are maintained (ASX, 2004e). Table 4.3 outlines the supervisory activities of the ASX:

Table 4.3 ASX supervisory roles (source: ASX, 2003e)

<table>
<thead>
<tr>
<th>Area of supervision</th>
<th>Market integrity activities</th>
</tr>
</thead>
</table>
| Markets             | • Surveillance of market activity  
|                     | • Preliminary investigation of unusual trading and, where necessary, referral to the ASIC or relevant ASX areas |
| Listed Entities     | • Setting standards for listed entities through the ASX Listing Rules and supervising compliance with the ASX Listing Rules |
| Market Participants | • Supervising compliance with the ASX Market Rules and relevant provisions of the Corporations Law  
|                     | • Supervising compliance with the Settlement Rules (the market rules governing the operation of CHESS)  
|                     | • Investigation of breaches and presentation of appropriate cases for disciplinary action |
| Systems             | • Establishing standards for the testing and authorisation of designated trading representatives  
|                     | • Maintaining trading parameter settings and the access passwords  
|                     | • Reporting of "incidents" to relevant ASX areas |
Trading, which takes place first, involves the ASX matching buy and sell orders placed by brokers on behalf of their clients. Three days after these orders are matched, settlement takes place. Since 1998, the ownership of shares has been recorded electronically (ASX, 2005f). An electronic registration consists of a shareholder's name and shareholding recorded in a computer system.

The senior manager of the regulatory audit department further elaborated on the mechanism of settlement on the ASX and explained that:

“Settlement involves the process of exchanging legal ownership titles over securities for funds. Once a trade has been executed, in effect less than half of the procedures associated with the transfer of share ownership have been completed. To conclude the transaction, the seller must then transfer the ownership of the stocks to the buyer. The number of days to settle has been reduced to three days- what we call t+3.

In 1992, the ASX developed a three stage strategy to reform the Australian system of clearance and settlement practices. In stage one, the ASX introduced the system of uncertified holdings via a system called FAST (Flexible Accelerated Security Transfer). The introduction of FAST facilitated the next stage of implementing a t+3. The final stage of clearance involves the introduction of CHESS.

Once the trade is executed through SEATS, it is then locked in and transmitted via the ASX computer network to the Broker Settlement System (BSS). When selling brokers receive confirmation of their trade from the ASX (via trade confirmation receipt from the ASX), the trade is then cleared via CHESS. The process is carried out via our network. The network is very efficient. This is because excluding the initial entry by a SOMA (Survey of Market Activity) officer, there is no interference by anyone on how the process is cleared. This minimises the risk of mistake or intentional tampering of the records”.

To raise the public awareness about the stock market and how it operates, the ASX (the broker customer service department) also offers education and information to assist the general public in understanding the work of the ASX and encourage the public to manage their own investments in the market (ASX, 2005g). This is also designed to promote the stock market as an alternative to family investment options such as property or Government Bonds. The manager of the broker service department further elaborated on this point and stated:
“We operate and develop sophisticated IT systems: trading systems that provide efficient and therefore fair price discovery, clearance and settlement systems that provide reliable and prompt matching of payments against delivery. We also provide educational opportunities for investors, especially retail investors, so that they have the knowledge to participate in the market. Our job is to further promote ASX as an avenue for people to make money safely”.

Ensuring market integrity
A market of high integrity creates an equal level of access for all market users, inspiring confidence among investors, brokers, companies, regulators and the broader community (Aitken, 2001). The director of regulatory audit placed emphasis on the importance of market integrity in running a trouble-free market and explained:

“There is no doubt that today’s market has much greater transparency. There is also a greater demand, indeed a thirst for information. The advent of discount brokers, advances in the Internet technologies and the introduction of open interface trading technology have all created an information flow which is constantly challenging whether the market is fully informed.

With the increase in transparency, we needed to make sure the right information is disseminated to customers. Integrity is one of the cornerstones of our work.

A market that operates with the confidence of its users attracts capital, transfers risk and has the potential to generate wealth across the economy fairly, efficiently and at the lowest cost”.

In pursuing market integrity, the ASX undertakes comprehensive market supervision of companies, stockbrokers, brokerage houses and general trading activity in the market. The ASX has structures and policies in place (including an internal Market Integrity Division and Chief Integrity Officer) to ensure that commercial interests never compromise its regulatory responsibilities. Considering this, the director of the security audit department stated:

“We believe it is only through stability that customers are willing to take part in trade. We as a monitoring body cannot guarantee a risk-free trade, but, we can at least guarantee a delivery system. We assure the public that as far as the sales, exchange of ownership and exchange of funds is concerned, there is no avenue of risk whatsoever.”
Market integrity is bolstered by the ASX Supervisory Review (ASXSR), and by the ASX's close partnership with the ASIC. The director of regulatory audit further elaborated on market integrity and the role of the ASXSR and added:

“ASXSR is specifically tasked with reviewing certain ASX supervisory decisions involving Review Group Entities and Review Participants, who have a special identified conflict with ASX activities. ASIC, the government regulator, actively supervises ASX's activities as a market operator and as a listed company, and may receive referrals from ASX about alleged market rule breaches by users for sanction and prosecution”.

4.5.2 ASIC
The ASIC's role is to protect investors, superannuants, depositors and insurance policy holders and to regulate and enforce laws that promote honesty and fairness in financial markets, products and services and in Australian companies. The ASIC enforces and regulates company and financial services laws to protect consumers, investors and creditors. The director of the security audit department pointed out the role of the ASIC in monitoring the market activities:

“The Australian Securities and Investments Commission Act 2001 requires ASIC to uphold the law uniformly, effectively and quickly, and promote confident and informed participation by investors and consumers in the financial system; make information about companies and other bodies available to the public; and improve the performance of the financial system and the entities within it”.

An independent Australian government body, the ASIC has regulated financial markets, securities, futures and corporations since January 1991. From 1998 the ASIC became responsible for consumer protection in superannuation, insurance, deposit taking and, from 2002, credit. The ASIC reports to the Commonwealth Parliament, the Treasurer and the Parliamentary Secretary to the Treasurer. The ASIC is empowered to regulate securities and investments, enforce the business and listing rules of financial markets (including the ASX), police the Corporations Act and investigate suspicious corporate conduct.

4.5.3 AXISS
The AXISS Australia was established by the Commonwealth Government in 1999 to position Australia as a global financial services centre in the Asian time zone. The
AXISS aims to capture the opportunities for Australia created by globalisation and advances in technology.

The AXISS works closely with the private sector, serving as a vehicle for high-level dialogue between the Government and industry on issues affecting the financial services sector. In July 2003, the AXISS merged with Invest Australia, the national inward investment agency (Washington et. al., 2005). The role of the AXISS was further discussed with the senior manager of the broker customer service:

“The functions of AXISS Australia is to promote awareness and a better understanding of Australia's financial services sector. It also distributes information highlighting Australia's comparative advantages as a venue for global financial services operations. AXISS provides a one-stop reference point for all aspects of Australia's financial services environment and it facilitates high-level dialogue between the government and the private sector on financial services issues”.

4.5.4 Financial Reporting Council (FRC)
Besides adherence to regulations imposed by the ASX and ASIC, brokers are also required to subscribe to the rules and regulation of the FRC. The FRC is a statutory body established under section 225(1) of the Australian Securities and Investment Commission Act 1989 - now re-enacted as the Australian Securities and Investment Commission Act 2001 (ASX, 2005d). Under subsection 225 of the Act, the FRC is responsible for providing broad oversight in the process for setting accounting standards in Australia and giving the Minister reports and advice on that process. Specific matters for which the FRC is responsible for include:

- overseeing the operations of the Australian Accounting Standards Board (AASB), including;
- appointing its members (other than chair, who is appointed by the Treasurer); and
- approving and monitoring its priorities, business plan, budget and staffing arrangements.

The ASX business rules deliberately limit the monitoring of the FRC to back-office accounting practices of brokerage houses.
4.6 BACK-OFFICE TECHNOLOGY

The diffusion of IS technologies in the back-office began after the market crash of 1987. The first phase involved computerisation by listing stocks via SEATS. This system was implemented and upgraded in a number of phases and by late 1990 it was available on the Internet. The computerisation of listing enabled the brokers to have up-to-date information on the types, volume and price of stocks being traded at any given time. This ready-for-use information enabled the proliferation of the brokerage types that relied on Internet technologies as a platform for their clients to submit trade orders and exchange ownership with the brokers. The proliferation was pointed out by the senior manager of the security audit department to be one of the main reasons for repeated mismanagement occurring:

“Proliferation of Internet-based trading further contributed to the intensity of competition between Internet brokers. Falling revenues resulted in mismanagement and insider trading as the Internet brokers were doing everything possible to attract clients from their peers”.

To curb this proliferation and maintain regulatory control of the brokerages, another IS-enabled clearance platform (CHESS) was introduced. Compulsory subscription to CHESS meant that many small online brokerages could not respond to the technological demands being imposed upon them. As a result, many of these smaller firms went out of business. CHESS complemented the regulatory measures of SEATS by centralising the clearance and change of ownership processes.

4.6.1 SEATS

Equities, warrants, company options and interest rate securities are traded on SEATS. These applications were initially built to run on a dedicated terminal. Since 1997 they have been made available as SEATS Trader Workstation software which runs on the terminals at each brokerage’s headquarters. SEATS can also be accessed through its Open Interface via either third party applications linked to a brokers in-house dealing systems, or via an application built in-house by a particular broker. This open interface also allows for non-market participants, such as information vendors, to access market data through the interface (Appendix I).

SEATS allowed member organisations to place, buy or sell orders, execute transactions, communicate with other brokers and report any off-market transactions. This system
was intended to clear the payments and changes in the ownership after the trade is performed by the broker. Also similar to the broker, the said system was restricted to brokers that paid for its annual membership (ASX, 2005g). The ASX SEATS system can be seen in Figure 4.4.

(Source: ASX, 2004a)

Figure 4.4 ASX SEATS System

Illustrated in Figure 4.4, the process of SEATS listing starts with registering a stock through Automated Order Processing (AOP), which allows for orders to be entered without the need for them to be keyed or re-keyed into SEATS by a designated trading
representative. Orders are entered by authorised persons, i.e. brokers representing the trading clients who have on-line trading systems that use AOP. This latter process is called Automated Client Order Processing.

Shares cannot be traded unless they are listed on SEATS. This is intended to provide equal opportunity for every trader in the market and to curb the use of knowledge of public offerings and the possibility of insider trading where broker or trader’s knowledge gives them an unfair advantage over others. Once orders have been placed, SEATS matches buy and sell orders then trades them automatically. If there is more than one order at the same price, then the order that was placed first takes precedence. Large orders have no priority over small orders. The senior manager at the security audit department further described the benefits of SEATS by outlining its trading mechanism;

“Open Interface provides mechanisms required for users to request and receive trade and quote data into their own systems and to provide means for electronic submission of orders and reporting of off-market trades. Network provides high capacity message delivery system between the SEATS trading”.

With regard to the network designed to carry out a SEATS listing process, the senior manager at the security audit department stated:

“ASX provides a central server for the SEATS system. It is a provider of all the functions for active participation in the market such as order entry and amendments, trade generation and reporting of off-market trades”.

Finally, the senior manager at the security audit department pointed out the nature of these systems and their use:

“While SEATS has been in use by the ASX for a while, it is proprietary and therefore only accustomed to the business rules of the ASX Integration with other ASX systems such as CHESS and these systems are compulsory to use should a firm choose to trade in the sector”.

4.6.2 CHESS
CHESS is the system used by the ASX to provide a centralised electronic sub-register for holdings of approved securities and is controlled by the ASX Settlement and Transfer Corporation (ASTC) (ASX, 2005f). Holdings of balances on CHESS are the
record of legal title and are recognised by law as if they are maintained directly by the
issuer (ASX, 2005g). The director of the security audit department explained:

“CHESS maintains connections to a number of external systems including
ASX Securities Administration, SEATS, ASX Finance (for invoicing),
Mail House (for distribution of shareholder notifications), Office of State
Revenue (for taxation purposes) and participants”.

Source: (ASX, 2004b)

Figure 4.5 - The trade process at ASX
Figure 4.5 illustrates the settlement process on CHESS which is described by the senior manager at the security audit department:

“The selling side begins the settlement process by notifying CHESS that they wish to settle and the instructions to settle. CHESS acknowledges this instruction and sends the counterparty a notification. If the counterparty wishes to settle then they send the settlement instructions to CHESS. CHESS then sends a confirmation to both parties”.

When securities are intended to be traded they flow through the SEATS and CHESS process. The main steps in the trading process can be summarised as follows: pre-trade orders contain the processes required to assist in the purchasing or selling of shares such as trend analysis and the range of available prices or the volume of orders in the market for a particular security. The investor is required to inform a broker of their decision to buy or sell.

Figure 4.5 identifies the trading process of trade and settlement. The trading process begins with completing the trade by sending contracts to the buyers and sellers and usually includes the transfer of monetary funds from buyer to seller accounts. There may be some differences in the actions taken in each step depending on the market. Details of orders that have been executed are sent to CHESS which settles the trade and deals with the electronic transfer of registration and funds.

4.7 SURVEILLANCE

The purpose of the market surveillance division is to identify, investigate and, where appropriate, refer unusual trading patterns to the ASIC for investigation. The specific trades that are marked for further investigation may be indicative of a breach of the ASX Business Rules, ASX Listing Rules, ASX Futures Exchange Business Rules or the Corporations Act (Oldfield, 2005b). In particular, market surveillance assists the ASX security audit department by looking for patterns, which may indicate failure to comply with continuous disclosure requirements, insider trading and market manipulation.

The market surveillance division uses electronic means to alert the relevant authorities in the ASIC and the security department of the ASX to unusual trading activity (SOMA – Survey of Market Activity) and to enable it to store large volumes of data as a
The reference base (Oldfield et. al., 2005). The director of the security audit department provided a general description of the ASX’s surveillance system:

“The supervision of the markets is carried out by the ASX Market Surveillance Department, the SEATS Market Control area, the Derivatives Market Control area, the Compliance Services Department, the Risk Management Unit and Investigations and Enforcement”.

ASX Surveillance initiates its investigations by at least three means. One of these is via complaints and information from disadvantaged parties. Another is via reports emanating from the media. These first two avenues account for upwards of 80% of investigations at the time surveillance was first set up”.

SOMA is a customised version of the AMEX Stock Watch system. In essence, it attempts to mimic the information and decisions that would be made by experienced surveillance staff. SOMA registers what are known as primary alerts when the share price or volume resulting from a trade exceeds some specified but flexible limits. Alerts would also occur if the trade breaches the pricing and volume criteria of SOMA or when a sequence of such alerts occurred over several days. The process was further explained by the senior manager of the security audit department, who stated:

“Following the primary alert, two SOMA analysts (one responsible for equities and the other for derivative securities) attempt to explain the alert by reference to available information”.

4.7.1 The objective(s) of surveillance
Surveillance helps in maintaining a fair and efficient market for securities. While definitions of the terms fair and efficient may vary, in this context the director of technology management pointed out:

“A market is fair when all participants face the same conditions of trading. For example, orders are filled according to their time of arrival and/or no party is legitimately able to trade on information that is attained from a position of privilege (e.g. the director, officer or associate thereof of a given body corporate). Where a party does trade on privileged information this is generally described as insider trading.

A market is efficient where one party cannot interfere with the free-market forces of supply and demand such that the price of a given security is not an accurate reflection of the underlying assets (both physical and human) and information pertaining to those assets of a given body corporate.
Where such interference occurs this is generally described as market manipulation”.

To maintain a fair and efficient market, surveillance follows a series of steps. First, it identifies and provides prima-facie evidence of market manipulation and insider trading, as well as breaches of the exchange's listing and business rules. Second, it alerts regulatory authorities for the purpose of investigating and prosecuting current offenders and deterring future offenders. The senior technology manager elaborated on the cost of the surveillance:

“The costs to the exchange of ensuring a fair and efficient market are not trivial. Surveillance itself has a budget of approximately 2.5 to 3 million dollars per annum with a similar amount contributed by companies and membership”.

One objective of surveillance is to provide the foundations to support the industry's desire to maintain self-regulation. Without self-regulation the industry would have far less influence over practices such as suspension from trading and disciplinary action, both of which, if placed in the hands of those outside the industry, may ultimately disadvantage traders and therefore brokers. Another objective of surveillance is to ensure the market is continuously informed about what is happening. When unusual price and volume movements in a security's price are identified, the surveillance division attempts to associate the change with a series of information signals.

4.7.2 Implications of SEATS and CHESS

Computerisation resulted in a reduction in the number of floor traders and staff required to transact and register daily trades. The centralisation of trade further enhanced the regulatory regime and the powers of the ASX. The senior manager of the broker customer service described the implications of SEATS and CHESS and stated:

“At its simplest, we operated and developed sophisticated IT systems: trading systems that provide efficient and therefore fair price discovery and clearing and settlement systems that provide reliable and prompt matching of payments against delivery. We also provide educational opportunities for investors, especially retail investors, so that they have the knowledge to participate intelligently in the markets with an understanding of the appropriate level of risk they are taking on. In fact, all of our main courses are made freely available on-line”.
“A further, and very significant, part of our integrity-building effort is our supervisory role, designed as it is to ensure efficient and orderly market activity and transparent market practices. Our regulation of the issuers who raise capital on ASX markets is expressed in the form of a contract between us – a contract known as the Listing Rules”.

Technology has strengthened the position of structures controlling the operations of the brokers. This was in contrast to the traditional arguments suggesting technology results in breaking down the regulatory paths of the sector (Brown et al., 2003). The technology is far more visible in the front-office operations of the brokerage sector where the Internet is used to provide real-time and up-to-date information for clients.

The back-office operation regulations and the choice of systems imposed obligations on brokers that were not necessarily technology-driven. The rules and regulations were triggered by the introduction of IS technology. However, the principles behind the imposition of the regulatory systems were not necessarily technology-driven. Technology was used as a tool to reinforce the normative paths that initiated the introduction of regulatory regimes.

IS technologies were used by governing bodies to further strengthen their surveillance and scrutiny of brokers’ operations. The customer usually did not see the back-office operations (clearance and transactions) of the brokerage, however the requirements of these back-office systems imposed severe restrictions on participating brokers. The availability of suitable trade platforms is limited and requires strict observance to the ASX guidelines, regardless of the size or the niche brokers serve.

The justification for involvement of the regulatory bodies in the financial system and the resultant regulatory rigidity was considered to be for consumer protection; the promotion of competition; and the protection of the stability and soundness of the financial system. Most importantly, the imposition of strict regulatory control on the extent of change was the opportunity cost of misappropriation and illegal trade. At the macro level, transparency rules impose the correct dissemination of information and equal treatment among market players. Transparent and reliable advertising by financial intermediaries has traditionally been the focus of this type of regulation. At the front-office, regulation aims at non-discrimination in relations between intermediaries and consumers. Business rules are a good example of this aspect of consumer and investor protection regulation.
4.8 GLOBALISATION

Foreign institutions have a major presence in Australia’s financial markets and play an important role by engendering competition, enhancing consumer choice and broadening the base for financial stability. For a variety of practical taxation and regulatory reasons, foreign bank groups have historically conducted their business through a number of separate operating entities. For example, several foreign banks have had a branch operation to conduct corporate banking and treasury business and a subsidiary to conduct their broking business as a member of the ASX, as well as other operating entities.

The requirement for foreign banks and brokers to conduct their broking activities through a subsidiary adversely affects key broker participants on the ASX markets. Foreign owned brokers account for eight of the top 10 brokers in terms of market share of turnover in 2005.

Table 4.4 The brokers associated with international trade

<table>
<thead>
<tr>
<th>Brokerage name</th>
<th>Turnover – Market share %</th>
<th>Brokerage name</th>
<th>Equity Raising A$ mn</th>
</tr>
</thead>
<tbody>
<tr>
<td>UBS Warburg</td>
<td>10.1</td>
<td>UBS Warburg</td>
<td>4,116</td>
</tr>
<tr>
<td>Merrill Lynch</td>
<td>9.4</td>
<td>Macquarie Bank</td>
<td>2,476</td>
</tr>
<tr>
<td>Salomon Smith Barney</td>
<td>9.0</td>
<td>JB Were</td>
<td>1,728</td>
</tr>
<tr>
<td>Deutsche Bank</td>
<td>7.9</td>
<td>Citigroup/Salomon Smith Barney</td>
<td>1,371</td>
</tr>
<tr>
<td>JB Were</td>
<td>7.8</td>
<td>CSFB</td>
<td>1,192</td>
</tr>
<tr>
<td>CSFB</td>
<td>6.8</td>
<td>Merrill Lynch</td>
<td>1,168</td>
</tr>
<tr>
<td>Macquarie Bank</td>
<td>6.6</td>
<td>Deutsche Bank</td>
<td>710</td>
</tr>
<tr>
<td>ABN Amro</td>
<td>5.4</td>
<td>ABN Amro</td>
<td>587</td>
</tr>
<tr>
<td>JP Morgan</td>
<td>5.2</td>
<td>JP Morgan</td>
<td>566</td>
</tr>
<tr>
<td>Morgan Stanley</td>
<td>3.3</td>
<td>Wilson MTH</td>
<td>142</td>
</tr>
</tbody>
</table>


Five of the top ten brokers are associated with a licensed foreign bank branch that operates in Australia, and a licensed domestic investment bank owns another broker.
Reflecting their strong presence in the market, foreign owned brokers also account for the majority of equity raised on the Australian capital market (ASX, 2005d).

The parent entities of these foreign brokers are among the largest financial institutions by market capitalisation in the world. Many of the parent entities are members of stock exchanges in other jurisdictions. This was pointed out by the senior manager at the security audit department, who stated:

“In 2001, the ASX implemented an initiative to remove some regulatory impediments to foreign participating organisations; for example, by permitting supervision and control to be managed by specific senior executives rather than by directors based in Australia. These changes facilitate the participation of foreign organisations from an overseas base”.

The globalisation of financial services has led to increased efforts in the international supervision of financial intermediation and greater international cooperation of financial supervision, to the extent that domestic regulation is directed at reducing threats to the stability of the domestic financial system. The senior broker customer service manager further explained the effects of globalisation on the market:

“The Australian regulatory framework responded to globalisation and the increased need for cooperation between domestic regulators with several initiatives it employed to facilitate its integration in global markets.

Increased co-operation is also developing among market participants. For example, the International Federation of Stock Exchanges, the International Society of Securities Administrators, the International Councils of Securities Dealers and Self-Regulator Organisations, and the International Federation of Accountants are making significant attempts to develop uniform rules in capital markets”.

The senior manager of the security audit department explained the internationalisation of finance markets around the world by giving an example of an incident in the Australian market:

“Following a submission from ASX, the US Securities & Exchange Commission has also granted a no-action relief for initial public offerings of US companies on the ASX market. This means US companies can raise money and list on ASX. This is only the second time that such an exemption has been granted and two companies, Digital Now and Axon, are already listed under these arrangements”.


In March 2000, the ASX entered into a 15-year agreement with Standard & Poor’s (S&P) Index Services under which S&P will assume the management of the ASX index (All Ordinaries and the new benchmarks) business with ASX retaining the rights to share in the gross revenue. The ASX believes that partnering with an internationally renowned company such as S&P will bring longer-term benefits to the ASX in terms of building awareness of our market, attracting investment and facilitating the development of the ASX derivatives and Exchange Traded Fund businesses. The ASX also has a memorandum of understanding with the national exchanges in Hong Kong, Indonesia, Korea, Malaysia, the Philippines, Taiwan, Tokyo, Thailand, China and Singapore. Under the auspices of such memorandum of understanding, the ASX is building closer relationships with exchanges in Australasia and South East Asia with a view to extending its network of market linkages.

4.9 DEVELOPING TRENDS

4.9.1 Regulatory developments

As the research into the back-office operations progressed, two of the participating evaluators pointed out the imposition of new training requirements of the ASX for individual brokers. These measures were originally introduced in 2001 but they were only actively enforced and monitored after 2003. This was because of the global market uncertainties that prompted the ASX to refrain from initiating the new system until the global markets stabilised. Since 2003, Australia has adopted a new financial services regulatory regime known as the Financial Services Requirements (FSR). The new system creates three categories of licence, covering:

- operating a financial market;
- providing clearing and settlement; and,
- advising on and dealing in financial products.

The senior manager of the broker customer service department introduced the FSR and described its primary requirements:

“An Australian Financial Services Licence is required for all firms who provide financial advice or deal in financial products, whether retail or wholesale. The system permits a financial service provider to hold a single licence covering all financial services provided”.

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A licence carries an obligation to ensure staff are properly trained and accredited and compliance programs are in place. Retail customers should be provided with written confirmation of advice given, products offered, commissions earned, business relationships and options for consumer redress - creating extra paperwork for retail brokers who deal with many clients each day. The regulatory trends were further explained by the security audit senior manager who stated:

“The ASX Corporate Governance Council has articulated 10 core principles for appropriate corporate behaviour. The corporate governance principles, while directed at listed companies, have received broader traction and acceptance in the wider community. They are largely common sense. Included among them is: promote ethical and responsible decision making”.

Applying for a licence is a complex and time-consuming process – most banks and securities companies have yet to submit their applications or are taking it in stages. The ASIC anticipates that it will process the vast majority of the 12,000 applications between March 2003 and March 2004, by which time all licensees would be re-issued. The senior manager at the broker customer service department explained the new regulatory mechanisms:

“As part of the ongoing Corporate Law and Economic Reform Program (CLERP 9), it is likely corporate law will soon contain a general requirement for companies to have appropriate corporate governance arrangements in place. The corporate regulator, ASIC, will have responsibility to monitor governance standards”.

In addition, various industry associations are developing corporate governance guidelines. The most relevant will be the new set of principles now being developed by the ASX Corporate Governance Council to apply to companies whose shares are listed on the ASX. This will be a comprehensive statement of best practice drawn from Australia and around the world. It places emphasis on:

- clear definition and separation of the roles of directors and management;
- proper procedures for the selection and appointment of directors;
- independence of the chairman;
- independence of the audit committee;
- disclosure of executive employment terms; and
- better communication with shareholders and other stakeholders.
In addition, the ASX is developing a non-mandatory “guidance note” setting out what it believes is good practice for research independence. Both the ASIC and ASX requirements will supplement the voluntary industry code and the Best Practice Guidelines for Research Integrity. The director of the regulatory audit discussed the new rules intended to curb insider trading and mentioned:

“New insider trading laws came into effect in March 2003 and have had a number of unintended consequences that were not anticipated by the legislators or their adviser – the Australian Treasury. There are significant problems in the new insider trading laws, as they have increased the scope of financial product transactions to include OTC transactions”.

The new laws have also added new “civil offence” provisions to augment the current remedies of criminal prosecution or litigation. The new offence provisions reduce the burden of proof to the civil standard (i.e. likelihood) and similarly remove any requirement on the prosecutor to prove intent, misuse or recklessness.

The transition to the new laws is a primary focus of attention for the firms operating in the Australian financial services sector, their industry associations and self-regulators. All current businesses and new applicants must prove to the ASIC that they have the capacity to operate as a financial service licensee. In most cases this will require the applicant to document and provide evidence to the ASIC of their compliance, risk management, human resources, financial resources and IS capabilities.

4.9.2 Systems development

The technology management director pointed to the intention of the ASX to substitute the CHESS and SEATS system with a new listing, sales and clearance trading platform:

“The Australian Stock Exchange Limited (ASX) and (company name withheld) signed a ten-year agreement for the use of (name of system withheld) as the integrated trading platform for ASX's equity, derivatives and fixed income products. This deal will result in ASX becoming the first top-10 market to offer a fully integrated platform for the trading of all its listed securities. The project involves migration of ASX's equity, warrants and fixed interest products from their existing SEATS platform onto (name of system withheld).

(Name of system withheld) is used by 15 exchanges around the world, including the International Securities Exchange, the American Stock Exchange, the Hong Kong Exchanges, the Korea Futures Exchange and the Stockholm Stock Exchange.
The technology solution provided by the (company name withheld) span the entire transaction chain, enabling exchanges, marketplaces, clearing organisations, central securities depositories and other financial participants to achieve optimum efficiency and innovation”.

The new system was further described by the senior manager at the technology management department, who stated:

“The use of this tool is a far more efficient alternative to the present SEATS and CHESS platforms and the fact that the storage and the operations of the system is totally outsourced to (company name withheld), it means ASX will save a great deal of money in terms of the staff and space it needs to carry on operating.

The new system will allow trading all ASX products on a single, integrated platform offering ASX and its customers compelling financial, functional and strategic benefits. The move is also in keeping with ASX’s strategy of providing the full range of investment services across the trading, clearing, settlement and registry spectrum”.

However, both the director and the senior manager at the technology management department pointed to the fact that imposition of the new system means the whole SEATS and CHESS cycle will be repeated as existing brokerages will need to adopt this compulsory platform.

4.10 THE RESULTANT STRUCTURAL CHANGES AT THE BACK-OFFICE

Organisational ecology theories focus on the selection, variation and retention process to explain the dynamics of change in rule-bound sectors. Hannan et al., (2003) proposed that in sectors where the choice of technological innovation is predetermined by regimes influencing the structure of the sector, firm-level decision making has little or no impact on the final structure of the sector. Dobrev et al., (2003), in analysing government-initiated changes in emerging economies, describes the process of change as a direct outcome of the regulatory bodies selecting the course of change due to resource scarcity, and/or proliferation of a specific structure, and competition.

The adoption of IS technologies in the stockbroking sector were sanctioned by governing bodies that had predefined the type and manner by which IS technologies were to be adopted. The introduction of these regulatory measures resulted in standardisation of all the back-office processes. Back-office processes refer to technologies employed in clearance and transfer of ownership of shares.
The standardisation of the back-office resulted in formation of sanctioned archetypes. Organisational archetypes are defined as sanctioned organisational type(s) that are enforced by the deep structures that create meaning and become the unconscious frameworks. These frameworks in turn determine why organisations should perceive and react to the diffusion of technology (Burrell et al., 1979). The standardisation produced a model of interaction with the sector’s governing bodies that became the sanctioned modus operandi for all the incumbent and new brokerage houses. The formation of a standard operating procedure was pointed out by the director of the regulatory audit department:

“The most effective way to control the market and the activities of the brokers was to have one way of carrying out sales and clearance. If you have a so-called one way of doing things, any shortcomings on behalf of the brokerages stand out and we then can take the necessary action”.

The director also discussed the organisation archetypes in the form of sanctioned platforms and systems that were put in place to monitor brokerages’ adherence to rules and regulations:

“Standardisation was further reinforced by SOMA that picked up unusual trade and clearance practices of the brokers.”

Therefore, the notion that after the setting of regulatory and operational protocols brokerage houses converge to organisational archetypes, can be confirmed with reference to the back-office operations of the stockbrokerages.

4.11 CONCEPTUAL FRAMEWORK DEVELOPMENT

Figure 4.6 shows the back-office component of the proposed conceptual framework. In this figure, the key constructs and their influence on the structure of the back-office is outlined.
Figure 4.6 Back-office component of the proposed conceptual framework

These key constructs coupled with the presence of constant surveillance are intended to maintain efficiency and accountability. The outcome of this process shapes the back-office of the brokers to reflect the intention of the regulatory bodies to maintain a fair and accountable trade mechanism.

Since the back-office operations of all the brokerage houses are identical, the emergent key constructs in the back-office component of the conceptual framework are the same for all the brokerage houses.
4.11.1 Key constructs

The constructs for the back-office are related to the compulsory regime implemented via the compulsory SEATS and CHESS subscription. Based on the interviews with the participating brokerages, a number of key constructs including protocols, membership and subscription to the regulatory regimes and globalisation were identified.

The introduction of the IS technologies is followed with development and implementation of a range of standardised trade and clearance platforms. The SEATS and CHESS are sanctioned as the only sources of back-office operations and should any firm decide to operate in the sector, SEATS and CHESS are the sole options available to them.

The key constructs that introduce, develop and reinforce the back-office operations of the stockbrokerages can be divided into three distinct groups:

- surveillance;
- market elements; and
- globalisation.

Surveillance refers to the continuous process of monitoring the transaction and the manner in which brokers provide services to their clients. Surveillance is further reinforced by SOMA, which monitors the daily trades of member brokerages and reports any discrepancies to the relevant authorities.

Market elements refer to a set of key constructs that reinforce the integration of IS-based regulatory systems in the sector. In the market element group the key constructs include sanctioned technologies, regulatory systems, licensing requirements and the compulsory training. The intended outcome of having these key constructs in the back-office is to reflect the intention of the regulatory bodies in maintaining a fair and accountable trade mechanism. In addition, in order to facilitate the process of regulation and maintain the standard of operations, member brokerages need to attend annual training and licensing sessions. This is a compulsory requirement should the brokers wish to be allowed to operate in the sector. The licensing requirement is a key construct since any mismanagement or deviance from the market rules on the part of the
brokerage houses influences the decision of the regulatory bodies in renewing the license of individual brokers operating in brokerage houses.

Globalisation constitutes the third group of key constructs affecting the back-office operations in the sector. Although only 10 brokers were allowed trading in international markets, since at least two of the participating brokers were from the list in Table 4.2, the entry of international market institutions is seen as a key construct of the back-office component of conceptual framework. International trade will result in the introduction of a series of global regulatory mechanisms. In addition to SEATS, CHESS and other regulations introduced by the ASX and the ASIC, the global regulatory mechanisms must be adhered to should a broker decide to trade across international markets.

Illustrated in Figure 4.6, the emergent key constructs following the interviews with the back-office participants are in addition to the “globalisation” and “licensing requirements” (in grey-coloured boxes) that were found in the review of literature and the industry reports in chapter two.

4.12 CONCLUSION

In the back-office of the brokerage houses, all the operations were forced to be identical. This similarity in composition in turn motivated this research to directly approach the ASX and the ASIC and gather information on the regulatory dynamics of the sector.

This similarity in operations resulted in standardisation of operations and facilitated the surveillance operations of the ASX and the ASIC. IS technologies facilitated the imposition of these standardised regulatory measures. The extensive regulatory measures in the back-office further contributed to the intention of the individual brokerage houses to differentiate their operation in areas where they are afforded relative autonomy. This dimension of diffusion of IS is discussed in length in the succeeding chapter.
CHAPTER 5 - DYNAMICS OF THE FRONT-OFFICE

5.1 INTRODUCTION

The front-office operations of the stockbroking sector involve direct interaction of the stockbroking firms with their respective client bases. This dimension of the brokerage operations proceeds in parallel to the sale and clearance operations of the back office. However, unlike the back office operations where the sector’s regulatory authorities constantly scrutinise the daily operations of the individual brokerage houses, at the front-office, firms are allowed relative autonomy in design and implementation of unique customer service strategies. This process of differentiation can be carried out within a predefined set of rules and regulations maintaining the integrity and quality of services. However, the scope of these regulations is not as comprehensive as that of the back-office regulations.

This chapter presents findings from the front-office phase of the research. In explaining the dynamics of the front-office, an in-depth analysis of the strategies employed by each participating brokerage house is provided.

5.2 PARTICIPANTS

The participating stockbrokerage organisations were selected to represent different types of stockbroking firms operating in the sector. A stratified sampling procedure was used to divide the population into sub-populations called strata (singular stratum) and all brokers in each of the strata were invited to participate (Appendix D). This resulted in two main groups of participating brokerage houses being used in the study: full-service and non-advisory brokerage houses.

There are two sub-categories in the group of full service providers: independent brokerages and large brokerage houses which are often in strategic alliances with Australian or international banks. The non-advisory category of brokers consists of two sub-categories: discount brokerage houses and online brokers.

Each of the individual firms participating in this research constituted a case study. The interviews with each of these mini cases provided a set of key constructs that
contributed to refinement of the proposed conceptual framework. Each of the cases provides a narrative of participating brokerage responses to the external regulatory measures. It should be noted that in line with the ethics requirements governing the conduct of interview-based research, all the identifiable characteristics of the participating firms and their employees were kept confidential and are denoted by A, B, C and D. A brief description of the participating firms is shown in Table 5.1.

Table 5.1 – Brief description of participating brokerage houses

<table>
<thead>
<tr>
<th>Firm</th>
<th>Year of establishment</th>
<th>Type of service</th>
<th>No. of employees</th>
<th>Annual revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1984</td>
<td>Full-service brokerage</td>
<td>220</td>
<td>A$123,500,000</td>
</tr>
<tr>
<td>B</td>
<td>1920</td>
<td>Independent full-service brokerage house</td>
<td>52</td>
<td>A$10,540,000</td>
</tr>
<tr>
<td>C</td>
<td>1987</td>
<td>Discount brokerage</td>
<td>500</td>
<td>A$175,900,000</td>
</tr>
<tr>
<td>D</td>
<td>1997</td>
<td>Online brokerage</td>
<td>350</td>
<td>A$84,579,000</td>
</tr>
</tbody>
</table>

- **Case A** is a traditional brokerage house with a number of brokerage offices all across Australia. It is one of the oldest brokerage franchises in the country. This brokerage house focuses on a full service type of operation and provides a wide range of services to its clients. Although the Internet has been fully integrated within this brokerage, case A focuses on types of front-office operations (e.g. more customised product bundling and more focused customer service strategies) that are not necessarily technology-driven.

- **Case B** is the oldest independent brokerage in Western Australia with expertise in trading shares and stocks in the resources sector. This brokerage has experimented with a diverse range of structural options such as full-service and online brokerages.

- **Case C** is the discount broking arm of a major bank in Australia. It started out as a brokerage providing services only to clients with very high investment margins. The merger with an American clearance bank was unsuccessful and upon dissolution of the partnership, this case organisation started a discount brokerage operation and retained a very small number of its former clients.

- **Case D** is one of the main, independent online brokerage houses that, due to intense competition with banks entering into the online stockbroking sector, has
implemented a reverse strategy. This involves integrating components of the traditional brokerage model in its customer care strategies. The process of providing content is not a service available on default, however the clients of case D can ask for this premium service.

Sixty individuals from the four participating brokerage firms took part in the interviews (Appendix D). Table 5.2 illustrates the composition of participating individuals from the four brokerages involved in this research.

Table 5.2 Composition of the participants

<table>
<thead>
<tr>
<th>Positions</th>
<th>Case A</th>
<th>Case B</th>
<th>Case C</th>
<th>Case D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director</td>
<td>⚫</td>
<td>⚫</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior Trades Manager</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Senior Trader</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Technology Manager</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Audit Manager</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Senior Sales &amp; Customer Services Managers</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Manager</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Broker</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
<tr>
<td>Research Services</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
<td>⚫</td>
</tr>
</tbody>
</table>

The interviewees were selected from a cross section of roles active in managing operations of the stockbrokerage houses (Appendix D). The rationale for selecting these roles was to gather rich narratives from employees involved in strategic, operational and tactical management of the stockbrokerage.

Interviews ranged from 20 to 90 minutes each. As the research progressed, the examination of the data and preliminary coding was carried out immediately after each interview. This was seen as an integral and essential part of the iterative nature of the research as each interview established the basis of the next interview.
5.3 DYNAMICS OF THE FRONT-OFFICE

The scope of rules and regulations was not only limited to the regulatory structures developed at the back-office. The scope of this formal scrutiny was not as overwhelming as that of the back-office. The regulatory bodies maintained close scrutiny of the brokers’ operations and their interactions with clients in order to ensure open and fair disclosure of information to the customers.

Analysis of the front-office strategies employed by the stockbrokerages is of great importance because the evolution and formation of brokerage types occurs in the front-office. The front-office changes are believed to be influenced by the demands of the client bases rather than solely by the sector’s authorities. After adhering to the back-office rules and policies, each firm was in direct contact with the clients. Based on the composition of a client base and the firm’s resources, each case organisation developed a unique front-office strategy. To attract clients, the brokerage houses need to provide the types of service that the specific niche demands. Front-office operations generally include sales, customer service, branding and other customer-focused operations.

![Figure 5.1 The structure of the chapter](image)
The process of exploring the IS-based change in the front-office is shown in Figure 5.1. Here the analysis of the front-office operations (the bottom part of the diagram) starts from the phase where unification of listing, sales and clearance has proceeded to individual firms’ reaction to the new regulations and sanctioned technologies. The influencing factors that prompted individual brokerage houses to differentiate their operations from their peers are:

- niche-pull forces;
- firm resources; and
- effects of electronic trading on market structure.

Niche-pull forces refers to the demands of various customer bases present in the industry. Each of these customer bases has explicit preferences in terms of the volume of trade and customer service it provides.

Introduction of the regulatory and technology-based systems at the firm level results in fragmentation and consolidations of the clearance mechanisms. This is followed by changes in the quality of access and intermediation of the brokers. The extent of change in each of the mentioned aspects of front-office operations depends on the participating brokerage’s unique characteristics.

5.4 CASE STUDY A

Case A is a full service stockbrokerage. This brokerage house was invited to participate in order to determine the factors that influence change among full service brokers. Case A has been active in the Australian finance industry and the brokerage sector since 1937. This case organisation was formed by a merger of (name of company withheld), one of Australia's premier retail brokers, and stockbroking arm of a European bank, (name of company withheld), in October 1984.

The case organisation is a part of prominent banking group with a strong international focus. The group of firms that case A belongs to are leading providers of investment and wholesale banking products. Case A provides funding and strategic advice to corporations, governments and institutions; creates finance service packages tailored to the needs of issuers and investors; underwrites and distributes a comprehensive range of
The case study organisation supports its clients with a broad range of financial services, including estate, retirement and superannuation planning, nominee and custodial services, margin lending and portfolio construction and analysis.

Being a full service brokerage means that the biggest revenue for the company is its content-providing service that includes market forecasts and industry analysis. The research service of case A is intended for both large and small investors. Moreover, clients have the option of receiving information electronically and/or in hard copy. The case organisation has been built on providing sound and objective advice based on comprehensive company knowledge, thorough research and many years of experience in the Australian share market. Advisors can assist with any of the following specialist services:

- Share Investment (Australia and overseas)
- Portfolio Reviews
- Exchange Traded Options and Warrants
- Margin Lending Facilities
- Cash Management Facilities
- Managed Portfolio Service

In addition to the basic stockbrokerage and various types of information services, case A provides a one-stop shop for financial services. This means that the range of finance services provided by case A includes: corporate finance; financial planning; creating cash management trusts; and other portfolio-based services for its corporate and retail clients. The information service is divided into corporate and retail sections. The corporate information services offers a comprehensive range of services to clients seeking independent financial and corporate assistance. Since 1991, the division has been involved in equity capital transactions valued at AU$6 billion on behalf of Australian companies.

In terms of retail information services for private clients, the aim is to provide information specific for clients with either a smaller level of investment or a far less
diverse portfolio compared to corporate investments. Case A helps define investment goals and tailor comprehensive financial solutions for retail clients. However, retail clients can ask for corporate-type information if their annual investment exceeds AU$ 250,000.

Case A’s Cash Management Service (CMS) provides a convenient facility to settle clients’ investment transactions and earn a high rate of interest on their savings. The cash management trust is linked to the clients’ investment account and funds can be automatically debited or credited when a transaction takes place. Dividends can be credited to this account. Easy access is provided via chequebook, electronic transfer facility, dedicated phone link or online account balances.

### 5.4.1 Diffusion of IS technology

Besides the imposition of the regulatory regimes and the compulsory uptake of the Stock Exchange’s Automated Trading System (SEATS) and the Clearing House Electronic Sub-Register System (CHESS), information systems (IS) technologies, and the Internet specifically, have made a significant change in the operations of all brokers. Case A has not been any different from other brokers in this regard. The imposition of a number of legal and professional requirements has blocked the back-office operations of this brokerage. As a result, case A - like all other brokerages in the sector - did not have any influence on the type of system or the manner by which these technologies were utilised in its back-office operations.

The Internet, however, has been utilised to provide a more effective and efficient system of client identification, and development and growth of client bases. The director of case A stated:

“What I believe is that [the] Internet has provided us with a delivery channel that is fast. The information we provide can be updated regularly. However, I have to mention that our clients still prefer the see us in person. Internet has been great in providing them with the type of information they need with a click of a mouse. But our fundamental business strategy i.e. meeting the customers and explaining in detail our perspective on their future portfolio has remained unchanged. I believe this strategy is what attracts our clients to us. Any brokerage can buy and sell shares on your behalf since SEATS and CHESS became the sole platforms for trade and clearance. But not all brokerages sit with you and take you through the process like the way we do”.
The Internet significantly influenced the market’s structure as it made information readily available to clients. The introduction of the Internet resulted in stockbrokerages losing their monopolistic position on market information and forecasts. As a result, clients did not need a broker to search for the best stock option on their behalf. Small trades were therefore executed at a fraction of the cost that was previously charged to customers for similar trades.

In the long term, this has benefited case A because it encourages smaller clients to invest their money in the share market. A senior trades manager stated:

“Internet regardless of its initial problems when it was introduced to us has ultimately resulted in trade and clearance to become cheaper. I believe it is this price factor that has attracted small traders to the market…they can do the trade via an online brokerage without even needing to go and see a broker about it. All you have to do is go down the post office and register first and then you are on your way”.

To overcome the intense competition from other full-service brokers and discount brokerage houses, the management of case A focused on the strengths that had made the brokerage more desirable than its peers. Case A had a good reputation as a brokerage house offering full brokerage services, including face-to-face interaction with personal brokers. The initial loss of clients to online brokerages prompted case A to react to the new competition. There were two options open to the firm. Case A could both diversify its operations and integrate the Internet in its operations to an extent that it became an online brokerage entity. Alternatively, this case organisation could build on its present strengths and provide services in the context of a full-service brokerage with a more client-focused approach. The senior sales and customer service manager of case A outlined the changes brought about by the Internet and other communication technologies, and stated:

“Although losing customers was not something we looked forward to, having lost small time investors to the online brokers in the long-term will not affect us. We are focusing on our reputation and the relationships that we have developed so far”.

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5.4.2 Client types
After the introduction of IS technologies in the front-office, case A initially lost a number of its clients to online brokerage houses. In the long-term, however, this resulted in case A focusing on its remaining customers. It developed strategies to retain its customer base and at the same time attract clients who preferred full-service brokerage to online stockbroking services. A senior trader of case A stated:

“To have the agility to create differentiation through relationships is most critical. We intend to integrate all their information and processes by customer instead of by product or geography. Therefore, what we did was, we sat down and said, we have four groups of clients. Let’s see what is it they need and then let’s plan to address their requirements”.

The majority of the business revenue of case A was derived from full-service brokerage. The management of the company, through a number of strategic studies, concluded that case A should rely on the good reputation it had developed in Australia and remain a full-service brokerage house. Case A’s front-office automation and differentiation of sales and customer service were designed with customer care in mind. For example, the senior trade manager in the case organisation stated:

“Without doubt, service and support will always be the cornerstone of this brokerage operation and as we move toward the future, I think growing emphasis will be placed on the issue of support. Within trader space limited, for example, we currently have six people employed exclusively to operate a Helpdesk. They are not brokers, nor information technology employees - they are Helpdesk staff. They man the Helpdesk, two at a time, twelve hours a day, fielding technology-related calls and provide information to our clients. If they cannot provide the information that customers need they register the customer enquiry and we then call the customer back the next day”.

5.4.3 Range of services
The Internet and imposition of industry protocols made the sector into a level playing field. Imposition of rules acted as unifiers of practice. To further facilitate the process of clearance and change in entitlement, case A provided the option to completely take over the trade on behalf of the customer to further facilitate the operations. The senior trader explained the mechanisms behind sponsorship of the customer:
“Once you sign an agreement with us, we sponsor your portfolio on CHESS. The sponsorship allows you to keep your portfolio under your name and open for trade. When we sponsor a portfolio, the settlements are guaranteed by the ASX National Guarantee Fund. The customer will receive an agreement and all stocks converted to this system are recorded with one number issued by case A. We do this for the client and debit or credit the account they have with us, within 24 hours of clearance, we then send them an email stating the successful transaction. This way your assets are safe and your portfolio’s integrity is guaranteed not only by us but by the National Fund.”.

In regard to the front-office and the actual interaction with clients, the demands placed on the broker became diverse. Customers increasingly demanded trading advice, service, technical support and information at a higher standard than what was available. The case organisation had recently acquired software support, advice and a much higher level of expertise for each of its clients according to their asset liquidity and personalised planned rate of return. As a result, case A could obtain quick results for its clients by formulating investment plans not only in Australia but also in Singapore and the European Union (EU).

Case A also emphasised superiority in quality and service as a way of differentiating itself from its peers. The case organisation developed customer care strategies that were more focused than those offered by off-the-shelf systems. This was backed up with appropriate and reliable information. The senior sales and customer service manager stated:

“A comprehensive network provides access and, as such, is probably the most critical leg of our stool analogy. We exist as part of a broader global community - a global community that extends beyond the realm of derivatives. Networks include access to any and all electronic exchanges - all markets on one screen. Brokers need to offer traders value-added content and the broader the network the more content is available. We have moved towards further development on the customisation and personalisation, whether of the Internet site or the products traded. While charging for such a feature on the Internet can be difficult, it does create a draw card for our site”.

Besides SEATS and CHESS that were meant to be used by all brokerage houses, the participants explained that IS technologies were not being used to their full potential. Traditional modes of communication such as telephone or face-to-face interaction were more popular. A senior trader believed that telephone and face-to-face meetings were preferred by case A’s clients because of their age and level of investments:
“Our clients are usually middle-aged and above. Some of them are not very familiar with the Internet and don’t use computers as much as say a 20 year old would. Also due to their high level of investments, they demand to have face-to-face meetings….it somehow makes them feel safer”.

Despite the technologies that have been developed to assist investors in decision-making, they face increasingly complex requirements for managing and monitoring investments (Chemmanur et al., 2002). These requirements include: calculating investment values; recording income and capital gains/losses; preparing taxation reports; and meeting the compliance needs of investment structures, such as companies, family trusts or superannuation funds. Case A devised a specialised customer service program called Managed Portfolio Services (MPS) that minimised paperwork and provided detailed, easy-to-read reports. In most cases clients received emails notifying them of the firm’s newsletter, or email alerts about a sudden change in the market and how it would affect their shares.

The MPS collects and records all dividends and income distributions, enabling the advisers to monitor investments. If necessary, the advisor recommends changes. This may include taking profits on investments that have out-performed their set objectives. In addition to this, case A, under the MPS plan, provides monthly transaction details and quarterly reports on the progress of the investments.

The MPS operations sees all documentation and record-keeping professionally managed by case A on behalf of the clients. The client’s personal advisor actively monitors all the client’s investments, and transactions are conducted in conjunction with the client’s wishes. Regular reports on the valuation of the client’s investment are provided. In addition to these reports, clients can monitor their portfolio value, transaction history and cash balances on the Internet. All share transactions incur a reduced rate of brokerage. The fees for the service are, in most cases, tax deductible.

Case A uses in-house research as well as several specialist external research companies to provide advice. The client receives a monthly transaction report, quarterly valuation report and detailed half-yearly report on their investments. The rationale for creating this service is to enhance the customer experience at the case organisation. The market
research explained the rationale behind having a system that ties in all the services a client may require from a broker, and stated:

“The retail client will always rely on the broker for advice. The role of the broker becomes more pertinent particularly in stop-loss orders, contingent orders or inter-market spreads in volatile markets. The higher the level of risk specially if the client is trading in high volumes, the higher the demand for broker’s assistance. The broker will always be closer to the market than a client who does not trade futures professionally.

*I think it is this notion of us brokers always being there on the ground that makes clients feel more secure when it comes to investing their money in a market that may change from one minute to the next*”

Having MPS in place not only provided a way for case A to differentiate itself from its competitors, but it also kept the firm’s customers in binding contracts. Having MPS was extremely valuable because it provided a one-stop shop for clients. Binding clients in contracts that tied all their financial needs in the hands of one firm provided a stable client base for case A in the medium term, but it denied clients the ability to choose alternatives for at least two years.

5.4.4 Development of CF²

Figure 5.2 presents the front-office diversification strategy that has been constructed for case A. In the preliminary conceptual framework presented in CF¹ (Figure 2.5) the constructs that were deemed to be influencing the front-office architecture of the brokerage houses included:

- *Competition* - competition from other full-service brokerage houses and online stockbrokers.
- *External trends* – stability of the economy and the social and political forces that may result in the instability of the market, providing an impetus for change.
- *Key resources* – financial resources, economies of scale and expertise that are unique to each of the brokerage houses. Stockbrokerage houses based on these key resources identify and develop relationships with customer bases.
- *Legacy systems* – technologies and procedures that were employed at the front-office of each of the brokerage houses. Depending on these legacy systems, future trajectories of growth and differentiation are influenced.
Figure 5.2 The conceptual approach CF$^2$
The conceptual framework (CF$^3$) (Figure 5.2), identifies the process of change in case A after the introduction of SEATS and CHESS. The development of the front-office framework for case A involved adding the emergent constructs to the preliminary conceptual framework developed after the review of the literature and industry reports. The additional constructs that were developed from the findings were history, client types, services and size.

Case A was traditionally a full-service brokerage house with a long history of offering sound advice and providing a quality service for its clients. The clients of this firm were from two distinct groups: corporate and retail, with both groups having higher than market-average investment portfolios. The services provided by case A included various finance and consultancy services developed for clients with high trading margins.

In addition to the MPS, case A started a new venture which involved providing trade and clearance platforms for brokers located in smaller towns and rural areas. By providing these platforms to brokers, the case organisation had a presence in these areas without needing to open an office and incur further fixed costs. In addition, the rural brokers, through affiliation with case A, provided content for rural clients at their expense. This quasi-franchising model had proved successful in Queensland and Western Australia.

The most important key construct that initiated the front-office changes in case A was competition. This is the only construct that case A’s conceptual framework has in common with the CF$^1$ (Figure 2.5). The other constructs (key resources, legacy systems and external trends) did not emerge from the interviews with participants in case A.

The strong competition from new online stockbroking firms resulted in the initial loss of customers that preferred inexpensive trade and clearance platforms to full-service brokerages. The case organisation reacted to competition by relying on three emergent constructs in devising its front-office strategies:

- **History** – this construct constitutes one of the key factors that resulted in case A remaining a full-service brokerage type. The good history of case A’s service
quality and quality of information it provided to its clients resulted in many clients staying with the case organisation.

- **Client types** – there are two types of clients that employ case A for their brokerage needs, and case A provides a range of services to cater for these clients. The “client type” was deemed as a key construct because, according to the director of the case organisation, key differentiation strategies are directly influenced by the type of client the firm intends to interact with.

- **Range of services** – the range of services constitutes the tools by which individual brokerage houses differentiate themselves from their direct competition. In case A, the aim was to develop a type of service that encompassed all aspects of the financial needs and transactions of the clients. The director of the case organisation stated that the range of services increasingly includes all the financial needs of the clients in addition to the stockbroking needs. In case A, the aim has been to provide a contract-based service that retains a client for a period of two years and within this time all their financial needs are taken care of by the case organisation.

- **Brokage size** and the economies of scale were also a key construct. However, this construct - unlike the above factors - depending on the specific period of time, facilitated and/or impeded the differentiation strategies of the firm. Organisational size and the resultant economies of scale make trade operations cheaper per unit of trade and therefore the savings in cost can be passed on to the client. However, the size also acts as inertia, i.e. relatively big firms tend to be slow to change and at times they avoid large-scale change. This was evident in case A which, due to its large size, could not become fully Internet based. It therefore had to diversify its range of services rather than focus on the means by which its services were being delivered.

In summary, the differentiation of case A and its internal adaptation was based on reinforcing its reputation as full-service brokerage. It did this by providing customised relationships with its clients and implementing the MPS service, in which brokers were made the sole manager of all their clients’ transactions.

Case A also used a hidden tool to lock clients into a contractual agreement with the firm, whereby the broker became the sole undertaker of trade for the client for an agreed period of time. In addition, case A started to form affiliates with brokers operating in
small towns and rural areas. Having affiliates means case A does not need to have an office in those areas. Rather, it relies on its affiliate to find, attract and maintain customer numbers. In return, case A provides technology support and free sales and clearance platforms.

5.5 CASE STUDY B

Case B is one of the oldest independent brokerages in Australia. This case organisation started with full-service brokerage prior to the computerisation of the market. Over the years, due to intense competition from bigger full-service brokerage houses, this brokerage experimented with providing discounted online services and later it focused on market research and providing content to other stockbrokerage houses. The case organisation still carries out a limited-scale full-service brokerage with a focus on the mining and minerals market. Furthermore, case B began a venture involving market research and information for the mining, minerals and energy sector. Case B provides a rich picture of a range of differentiation strategies available to small, independent brokerages in the sector. The case organisation’s area of expertise revolves around a number of Australian major mineral extractors. These are listed below.

- Centennial Coal (CEY) is primarily a producer of domestic thermal coal, but also produces thermal and coking coal for the export markets. CEY has a medium to long-term growth pipeline, which should underpin earnings growth over the next few years. In addition, as a large percentage of its revenue stream is domestic, it has less earnings currency risk compared to its peers.
- Diversified Utility and Energy Trusts (DUE) is a stapled security and is the first pure-play energy utility vehicle in Australia. It has an existing diversified portfolio of gas and electricity distribution assets that currently consist of interests in United Energy Distribution (UED), Multinet and Alinta Networks.
- Arc Energy (ARQ) is a publicly listed Western Australia-based petroleum exploration and production company. ARQ produces gas from the onshore Dongara and Beharra springs and Woodada fields, as well as oil from its Hovea, Eremia and Jingemia fields in the Perth Basin 360km north of Perth.

5.5.1 Areas of expertise

This close identification with the mining and minerals industry facilitated case B’s operations. However, it also resulted in a great liability for the case organisation
because the sole revenue of the firm was generated from trades in the stocks of mining and minerals companies. A fall in demand for primary products would severely reduce the demand for case B’s services. After the introduction of the Internet and the rise in the volume of trading through discount and online brokers, case B lost a large number of its clients. This, coupled with unstable prices in minerals and primary products (especially in the mid 1990s), left the organisation with severe financial problems that ultimately instigated a total change in management and scope of business.

At the same time, online brokerages and a number of competitors were devising new strategies to enlarge their client base. This put more pressure on case B to change. The director of the firm stated:

“When discount brokers first came out like (names withheld) being the main ones, being a full-service broker we were honestly quite petrified, did not know what was going to happen, we were scared of losing clients because it was a substantial discount to what we were offering. We knew we could no longer work solely on the premise of history and with our focus on mining and minerals. Our size simply does not give us any leverage in choosing the best strategy. The next best thing was to use the Internet to serve our customers. Going online meant most of the fixed costs would be eliminated”.

This prompted the management of case B to experiment with various types of brokerage services. The first of these experiments involved integrating the Internet as a platform for trade with the case organisation’s clients. This approach was intended to reach most of the clients that case B lost to competing online brokerage houses. The senior trades manager explained:

“Well I suppose the Internet comes in two places. First you have got the discount brokers that are Internet-based and then you have the client information source which is the Internet race on what we can provide clients with. Looking back, initially there were a large number of e-brokers or small privately owned discounters that grew out of the initial entry of the Internet. We found that to be successful in an emerging e-commerce industry, us incumbents were facing a very serious challenge to our right to operate”.

By relying on its knowledge of the mining and minerals industry, case B developed a specialised niche for traders in primary products stocks. The senior sales and customer service manager stated:
“To overcome the competition of the discounters, we adapted to the demands of the changing environment. This resulted in a strategic shift in our perspective of the market. We began to look at the industry we were operating in as open systems, and so to anticipate environmental turbulence and the need for changing partnerships, we accepted the inevitable need for strategic flexibility to adapt to the demands of environmental turbulence.

Primarily we went for sort of buffering strategies to enable us to temporarily seal off its core rationale from environmental turbulence, thus allowing us to maintain certain norms of rationality while developing bridging strategies. This meant we had to go for a drastic cost cutting”.

In providing an online brokerage service, the role of case B was transformed. The new role of the firm was to carry out trade in the mining and minerals industry. In addition, the firm offered market research for clients interested in content only. This was discussed by the case organisation’s senior technology manager:

“I think one of the ways the Internet has changed the way people are buying or selling stocks online would be that convenience plays a major factor and I think it also provides more time for consumers to really research a product that they are going to buy and in terms of doing the research, there are many more types of stocks they can get and information is easier to get …I mean you can go to the site of more or less any company and get their financial information”.

The senior audit manager added:

“From a cost perspective, distribution of your expertise in terms of keeping your operating costs as low as possible in addition to providing a good service and good deal of information at the lowest price possible is the real problem here.

Brokerage houses basically pay a lot of money annually in expenses and some of our large competitors also pay equal amounts in terms of distribution costs. So distribution is a big area for up site potential in terms of efficiency.

In terms of efficiency in cost management, brokerages, and by that I mean the traditional full information providing houses, are now starting to evolve into an e-servicing mode and in this regard they are evolving into two main camps”.

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5.5.2 Differentiation strategies

To differentiate its full-service operations from its peers, Case B developed two strategies to highlight its specialist knowledge and superior service. These strategies were:

- case organisation as experts; and
- case organisation as information source.

The organisation is a well known brokerage for its specialised knowledge in trading of stocks (mining and primary products). Its expertise was later used to further refine its niche. This strategy was explained by the senior trades manager:

“Our premise was that we were experts in a number of industries. So why not use that expertise that took us nearly 50 years to gain and bring it to the market with technology.

We thought being experts, regardless of being online or not, was a more credible option for a smaller entity like us. We simply cannot afford to be a big brokerage that offers everything”.

The organisation used the doctrine of information source to diversify its core business. Ultimately, the case organisation recognised that it could not compete by being a full-service broker. Its direct competition had a far greater financial resource and branches Australia-wide. The competitors had a better chance of exposure than the case organisation, which focused primarily on the West Australian market.

The management of case B recognised that being an online broker did not fully differentiate them from other online brokers. Both the discount brokerages and the online brokers were focused on transactions and sales rather than market research. In the long term, the overhead costs of being a discount or online brokerage further reduced the gross margin of case B. Going fully online demanded extra skill and training and the hiring of specialists, which the case organisation could not afford. In addition, this organisation was well known in Western Australia and only the clients interested in mining and minerals knew about the firm. This lack of exposure affected its online business. Case B had no choice but to revert to its full-service operations. The directors of the case organisation stated:
“What we have noticed is a trend where brokers are rediscovering their old way of doing things. I suppose once we got burned by the false promises of the Internet, we have become wiser in utilising its potentials. Internet could not help us getting the exposure we needed. We had to go back to our old ways again. There were too many established online brokers and so our entry into the online brokerage meant we had to compete with brokerages that could provide service on a far lower cost base. We simply lacked economies of scale”.

5.5.3 New niche
Another strategy that case B experimented with was focus on content. Here, the firm provided market information as opposed to trade and clearance platforms for clients. More than a century of history and good will in the mining industry and primary products was very bankable. As such, the case organisation dropped its sales arm and focused solely on producing up-to-date information about products in the resource sector.

The firm’s provision of market forecasts and information to clients and/or other brokerage houses was boosted when case B allied itself with an industry leader in market forecasting and research (name withheld). The new partnership meant information and market content could become one of the specialities of the firm. Case B’s partner was a prominent gatherer and provider of up-to-date information. Upon entry into alliance with this firm, case B became one of the prominent providers of information and forecasters of the energy sector and minerals production. The senior market research manager stated:

“I believe one of the reasons that we thought this new venture was a good avenue for us was because we have been providing market research for the past 60 years. We have strong contacts with the mining and minerals and primary industry sectors. With the growth in the mining and minerals sector bolstered as a result of trade with China, I believe at least for the medium term it makes perfect sense for us to focus on our strengths and become information providers. I am not implying that we ought to dump our trading altogether but in the long term if providing content proves to be far more profitable, I don’t see why we should keep our trade section operating at break even”.

The director of case B explained the new move of the brokerage house:
“I believe the market will fragment. Many independent companies like ours cannot survive on their own. You either have to become part of a bigger entity or become specialist or serve a specific niche. We have done the latter. Again, what we are afraid of is the long-term effect of being a specialist firm. Until the mining and minerals market is good, we are good since there is a lot of demand for information on future prospects of our mines and energy sector, but again if anything goes wrong, if something similar to what happened in ASEAN in 1997 occurs again, we may be in trouble”.

In the long-term, an online brokerage was believed not to be a viable option either. Most of the direct competitors of case B were trading arms of Australian banks. Therefore, the issue, size and economies of scale became a liability for case B. From 2006, case B plans to carry on its CHESS membership for a select few corporate clients and high-margin foreign investors in the mining and minerals, primary products, and oil and energy sectors. The range of services offered for these few corporate clients is described by the firm’s senior customer service manager:

“We will use the personal information collected from clients to adequately provide the services that they have requested, including the preparation of their personal investment portfolio, making securities and investment recommendations, reviewing their investment portfolio and reviewing securities and investment recommendations. All the above actions are only taken for a very small few. To be honest with you, we prefer to focus solely on providing information and put our brokerage operation to rest. However, we think it would be better to maintain a very small type of operation because information is becoming a commodity that can be transferred, copied or reproduced far cheaper and faster. So we are not sure whether this ride that we are enjoying as the information provider will last for long”.

5.5.4 Development of CF³

Figure 5.3 presents the front-office diversification strategy that has been constructed for case B. The diversification strategies of this case are the result of strict adherence to the back-office regulations, complemented with relative autonomy in terms of the way a specific niche is being served and developed.

The conceptual framework (CF³, Figure 5.3) identifies the process of change in case B after the introduction of SEATS and CHESS. The development of the front-office framework for case B involved adding the emergent constructs to the conceptual
framework developed after interviews with the participants in case A (CF<sub>2</sub>, Figure 5.2). The emerging key constructs in developing CF<sub>3</sub> were new niche and areas of expertise.

In the conceptual framework from case A (CF<sub>2</sub>, Figure 5.2), the emerging key constructs that were deemed to be influencing the front-office architecture of the brokerage houses included:

- history;
- client type;
- range of services; and
- brokerage type.

In case B these factors also played an important role in the front-office architecture. This case organisation is one of the oldest independent brokerage houses in Western Australia and is active in trading stocks in the primary resources market. In terms of client type, case B also caters for retail and corporate traders within the resources industry. The case organisation started as a full-service brokerage house. It experimented with online brokering and provided market research, though traditional brokerage services formed the basis of its customer service strategies. Case A and case B share common constructs in terms of customer service approach and history.

As illustrated in Figure 5.3, the emerging key constructs of case B are new niche and areas of expertise. These emergent constructs are different from those of case A.

Similar to case A, the most important key construct that initiated the front-office changes in case B was competition. This is one of the only constructs that case B’s conceptual framework has in common with the CF<sub>1</sub> (Figure 2.5) and CF<sub>2</sub> (Figure 5.2). The strong competition from new online stockbroking firms resulted in a great loss of customers who preferred inexpensive trade and clearance platforms to full-service brokerages. The case organisation reacted to competition by relying on areas of expertise and a new niche that came about because of a strategic alliance with a firm that specialised in market research. Case B focused historically on the resource sector and although it provided full-service brokerage, its customer niche was relatively smaller than that of the competition. Consequently, its area of expertise was also limited
to the mining and minerals sector and even though it experimented with various types of brokering activities, its focus on the resource sector did not change.

Figure 5.3 The conceptual approach CF$^3$
In summary, case B was an independent full-service provider that was disadvantaged because of its smaller size. The differentiation of this broker started with its experimentation with online brokerages, however, once this option was seen as unsuccessful, the company went through a radical transformation brought about by changes in its management. This resulted in the planned diversification of the firm with a focus on being an information provider with a very small trading arm, specialising in high margin traders and foreign investors.

5.6 CASE STUDY C

Case C is a discount brokerage formed by a strategic alliance between an Australian and an international bank. This discount arm later entered into a strategic alliance with an American clearance bank offering full-service brokerage in Australia and the opportunity for its clients to trade on stock markets in Europe and New York. This partnership ended when the American clearance bank faced financial problems and dissolved the partnership.

Case C continued its operations, this time focusing on the discount operations it had prior to the partnership with the American brokerage. A recent alliance with a company that specialises in providing information has meant that case C provides market information and forecast to its discount customers. Although the participants in this case organisation pointed out that case C is a discount broker, its operations increasingly resemble that of a full-service brokerage house. Case C, in return for a fee, provides in-depth information for its clients.

Case C was the first brokerage organisation to offer its customers 24 hours a day access to their accounts via telephone, using a paperless office operation. The case organisation’s TeleBroker automated telephone touchpad order entry system, introduced in 1988 and extended later to four languages, is one of several ways in which order entry has been fully automated. Its Equalizer software product enabled personal computer users to trade stocks online, and its StreetSmart software introduced in 1993 was the first Windows-based software to allow online trading of stocks, bonds and mutual funds.
5.6.1 Transaction services

The retail customers of case C can buy and sell exchange-listed and ASX securities, options, mutual funds, variable annuities and fixed income investments, including Australia’s Treasuries, corporate and municipal bonds. Customers can choose from a menu of brokerage accounts with different financial goals. The most basic case C account requires a minimum AU$2,500 deposit and offers money market funds for uninvested assets and access to margin loans.

The services of case C, when it started its strategic partnership, included trading in securities and investment portfolios on behalf of its retail and corporate clients. In addition, case C is an arm of one of Australia’s major banks. This provided the opportunity for clients of the case organisation to include investment banking via securities underwriting as part of their portfolios.

Also, since one of the initial founding partners of case C is a clearing bank, the case organisation carries out securities clearance, settlement and financing services. Case C provides asset management and investment advisory services, wealth management products and services, banking, trust and lending services and securities-based lending.

5.6.2 Range of services

In the year 2000, case C recognised the increasing importance of the online brokerage channel and put together a team to develop a new software-based online trading product called Astro that enabled investors to trade by dialling a toll-free number. It also provided the means for video conferencing, via the toll-free numbers, with clients’ advisory teams to reduce the problems of distance that most regional clients had at the time.

Priced at $29.95 for up to 4,000 shares, Astro was piloted in December 2000. Customers had a separate account opened for them and were allowed four free customer service calls and up to five free trades per month. Once the order was placed, the trading department would then proceed with the back-office operations, which included CHESS and ownership clearance. The sequence of events leading to clearance of ownership was discussed by a senior trades manager in case C, who stated:
“We allowed our customers four free service calls. This was intended to make the trade more attractive to them. We could afford this since the CHESS subscription was used by both the parents of our firm.

So once the orders were put in, we immediately started with registering the trade on CHESS. We then proceeded with the transaction and funds were then transferred upon receiving the CHESS clearance and the new ownership documentation”.

The case organisation took advantage of synergies between the Internet and its traditional channels of adoption. Telephone calls to the branches were directed to the client’s personal advisor based on the advisor’s ability, or an appointment was made for the client. This allowed branch representatives to spend more time helping investors with financial planning and mutual fund selection. Case C also encouraged its representatives to develop a field of expertise, such as retirement planning or insurance. The senior trades manager of case C stated:

“Usually, once a client’s net worth exceeds a six-figure barrier, he starts considering getting advice on how to manage his money due to the potential extent of losses that can be incurred without professional management. Our analysts therefore recommended that for clients that tend to trade at a platinum level, it would be a worthwhile thing for us to provide them information and market forecasts. Of course we did this. But I genuinely thought ordinary clients of ours should have access to this service. Companies like (name withheld) tried to avoid this issue for some time because historically these customers have been devilishly hard to serve without an army of stockbrokers or research staff.

I believe after a long time planning and evaluating the possible problem we may face, we went on with offering the information service regardless of what our clients were up to. Now a customer can buy the information they want. Of course we have discounts if they have a bank account with our parent company but in general the information service tends to be quite inflexible when it comes to pricing options”.

To enhance its advisory capability, in January 2001 case C established a strategic partnership with a firm specialising in providing information, and which offered trust, estate planning and private banking services to wealthy clients. The senior customer service manager of case C explained this strategy:
“Customers who had $150,000 of assets with firm C or executed at least 12 trades a year qualified for Signature Service, which included free access to additional research. Signature Gold Service was available for customers who had at least $500,000 of assets with Firm C; Signature Platinum Services for customers with $1,000,000 of assets with the company; and Signature Pinnacle services for customers with $7,500,000 of assets with us”.

Dedicated account teams offered one-on-one customised services to clients in the platinum and pinnacle tiers. By the end of 2002, case C provided securities brokerage and related financial services to 20,000 active customer accounts with varying trade volumes in Australia.

5.6.3 End of partnership
Prolonged market downfall in the United States after 2001 forced one of the partners of case C to question its overall strategy and re-assess its online strategy. The company exited unprofitable business ventures with a renewed focus on its core operations, i.e. clearance banking.

The second founding partner of case C nonetheless followed with the platform and the system that was in place. It is still offering its gold range services, but with an established Internet trade platform that it had prior to case C. It also offers a limited discount service.

5.6.4 Development of CF\textsuperscript{4}
Figure 5.4 presents the front-office diversification strategy that has been constructed for case C. The diversification strategies of this case are the result of strict adherence to the back-office regulations, complemented with relative autonomy in terms of the way a specific niche is being served and developed.

The conceptual framework CF\textsuperscript{4} (Figure 5.4) identifies the process of change in case C after the introduction of SEATS and CHESS. The development of the front-office framework for case C involved adding the emergent constructs to the conceptual framework developed after interviews with the participants in case A (CF\textsuperscript{2}, Figure 5.2) and case B (CF\textsuperscript{3}, Figure 5.3).
Figure 5.4 The conceptual approach CF$^4$
In the conceptual framework of case B (CF3, Figure 5.3), the emerging key constructs that were deemed to be influencing the front-office architecture of the brokerage houses included:

- new niche; and
- area of expertise.

In case C (Figure 5.4), these factors did not play a major part in the front-office architecture. This is due to the discount operation of case C, in which it provided a general trade and clearance platform, even though the case organisation had introduced market information and trade forecast to its clients.

The key constructs from case B that are in common with the conceptual framework of case C are brokerage size and range of service. Case C is one of the largest discount brokerages in Australia. Its size allows the case organisation to protect itself from direct competitors. In terms of range of services, case C is a discount brokerage house and therefore its main focus is on providing an inexpensive trade and clearance platform for its clients.

The emerging key constructs from the interviews with the management of case C were economies of scale and reverse strategy. The size of case C and its close relationship with one of the largest banks in Australia allows the case organisation to attract clients from the banking sector as well. The size of the organisation has also resulted in a lower cost of trade per unit of transaction than other brokerage houses and, therefore, case C enjoys economies of scale. During interviews with the managers, it emerged that case C was integrating elements of full-service brokerage, such as market information, in its service portfolio. Therefore, in addition to a general sales and clearance platform, market information could be provided to clients for an extra charge.

5.7 CASE STUDY D

Case D is a pioneer in Australian online trading and has been an active participant in the Australian financial markets since the inception of online trading in Australia. It provides clients with access to a range of financial products, including shares, exchange traded options, warrants, initial public offerings (IPO) and managed funds. The rationale for involving this brokerage in the study was that this firm – due to its reputation and
size - was a fair representative of legitimate online brokerages in Australia. The services of this brokerage are exceedingly less expensive than most of its rivals. They include:

- low brokerage rates, where shares could be traded from as little as $19.95 or $27.95 for options; and
- educational resources that increased the client’s knowledge with online demonstrations, tutorials and educational information.

Whether a client trades frequently, moderately or occasionally, case D provides the client with an account that will suit the investment needs of individual clients. A director of case D explained the firm’s intention to become an online brokerage entity:

“Our entry into the online brokerage market was prompted by what we had found in our customer research where people were gravitating toward trading stocks online as one of the very strong categories online because in fact the Web really provides a superior way to buy shares as opposed to the way people purchased it in the past.

In the past you had to deal with the situation where information was filtered through a third party who in fact had interests of their own. You now in fact have enough information available to you immediately to make a decision which is really a profound transformation”.

Case D’s first trade was conducted in July 1997 and two months later it launched its website. It was the first brokerage to provide news relating to market depth, company news and portfolios online, and provided clients with alerts via e-mail, fax and mobile phone.

Case D’s website is one of the most popular websites in Australia and has twice been a finalist in the Telstra/AFR Australian Internet Awards. Case D’s online services were designed to keep the cost of trade down by providing the customers with the incentive to trade in higher volumes in return for lower trade commission. Case D used technologies from Microsoft, Sun and Oracle that gave the case organisation a high degree of reliability and scalability, allowing them to keep their innovative edge. As the senior trade and customer service manager of case D stated:
“Well there’s sort of two points that I wanted to talk about and sort of open things up and these are probably trends that we are finding over all in the world of e-commerce and I think that the brokers as a specific segment within e-commerce really….these two points I think are particularly germane. The first is that one of the significant things that the Web has done is it has moved us from a world where the buyer is in charge to one in which the seller is in charge. So no longer does an individual person really need to rely on the selling entity to be able to be in control of the situation and I think share market is a particular important example here because of the nature of share trading and that gets to my second point”.

5.7.1 First-mover advantage

In May 2003, case D became part of a group specialising in market research, acting as an outsource partner of brokerages involved in market information and forecast. The unification of case D with a new partner that specialised in professional financial advisory software and research, coupled with the case organisation’s specialisation in online stockbroking, allowed case D to provide information and market research and at the same time offer these services online for a lower price. As a result, case D developed three levels of Client Information Services (CIS) to complement its trade platform. Table 5.1 outlines the various niches targeted by case D.

Table 5.1 - Firm D’s niche identification

<table>
<thead>
<tr>
<th>Information Services</th>
<th>Type of Trader</th>
<th>Usage Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional</td>
<td>Frequent Trader</td>
<td>High usage of stock market news and trading tools for monitoring the market on a day-to-day basis</td>
</tr>
<tr>
<td>Premium</td>
<td>Regular Trader</td>
<td>Regular and ongoing monitoring of the stock market</td>
</tr>
<tr>
<td>Casual</td>
<td>Infrequent Trader</td>
<td>Core services to monitor the market when required</td>
</tr>
</tbody>
</table>

The partnership with a group specialising in providing information to the market was beneficial to case D because the firm acquired a recognisable and trusted trade and clearance platform. Case D’s range of services after this merger were:

- **Professional Information Services**: this service is best suited to frequently trading professionals. It provides complete access to case D trading tools, including
dynamic live data, so a client can follow price movements within the market in "real time", removing the need to refresh their web page for a price update. This service is provided free for all clients who trade 30 times or more per month. Otherwise an access fee is charged at $89.90 (incl. GST) per month per user, debited from the client’s account with case C.

- **Premium Information Services**: this service is best suited to the moderate trader. It provides comprehensive market information and tools, including online research, news, quotes, personalised watch-screens, SMS alerts and integrated portfolio services. Clients are also rewarded with frequent trader rebates. This service is provided free for all clients who trade two or more times per month. Otherwise an access fee is charged at $9.95 (incl. GST) per month, debited from the client’s account with case C.

- **Casual Information Services**: this service is best suited to clients who trade occasionally. It provides access to news, research, and charting and market information with 20 minute delayed stock quotes and email alerts. This service is provided free for all clients.

There are four online brokerages in direct competition with the case organisation. Intense competition with these firms, who are in strategic alliance with banks, meant case D in the long term had to assume third position and saw most of its customers pulled away by its two main two rivals. At the same time the two main rivals of case D tied their products to various customer retention schemes such as the Qantas Frequent Flyer© program and the Flyby© program of Coles Myer ©. To compete, case D implemented a new strategy in which elements of full-service brokerage (content and market information) were available at the client’s request. Case D was then able to differentiate itself from its two main competitors. This strategy was explained by the senior manager of case D:

“The company still holds on to this principle; the feature of this company that investors value most is unbiased advice that is free from any potential conflict of interest. We’ve provided a sophisticated technology that is capable of screening stocks and devising filters for suggested portfolios. The availability of this service, however, depends on the client’s willingness to pay for extra commission. If a client still prefers our basic sales and clearance service, they certainly can do so”.
5.7.2 Key constructs and CF\textsuperscript{5}

Figure 5.5 illustrates case D’s front-office diversification strategy. The framework outlines the process of change in case D based on the framework developed after the research for cases A, B and C. The conceptual framework (CF\textsuperscript{5}, Figure 5.5) identifies the process of change in case D after the introduction of SEATS and CHESS. The development of the front-office framework for case D involved adding the emergent constructs to the conceptual framework developed after interviews with the participants in case A (CF\textsuperscript{2}, Figure 5.2), Case B (CF\textsuperscript{3}, Figure 5.3) and case C (CF\textsuperscript{4}, Figure 5.4).

In the conceptual framework of case C (CF\textsuperscript{4}, Figure 5.4), the emerging key constructs that were deemed to influence the front-office architecture of the brokerage houses included:

- economies of scale; and
- reverse strategy.

The reverse strategy played a major role in the front-office architecture of case D. It was due to intense competition that case D, similar to case C, integrated elements of full-service brokerage in its operations, while at the same time maintaining their online processes. The economies of scale also influenced the front-office operations of the brokerages. However the economies of scale was not a reinforcing factor, rather, it was a disadvantage for case D. The case organisation was an independent brokerage house and, therefore, could not compete with competitors that were subsidiaries of Australian banks. Most of the competition’s clients were also clients of the parent company (the banks).

The only emerging key construct in case D is the first mover advantage. This firm was one of the pioneers of the online brokerage houses and set the trend for many online brokerages. Its innovative approach to online brokerage also made it the first online brokerage house in Australia to offer market service and research.
Figure 5.5 The conceptual approach CF^5
Since this case organisation was an independent online brokerage it could not compete with its direct competitors, which were trading arms of two major Australian banks. Therefore, the only option available to case D was to differentiate itself from its peers. This was implemented through a strategic alliance with a firm (name withheld) that was a specialist in providing information and market research to the finance sector. Case D introduced the option of market research and content to its clients for a premium price and outsourced the information component of its operation to its new partner. This was seen as a move to have elements of full-service brokerage in place, however without the incurred overhead costs of employing full-time research staff.

In summary, case D was hit hard by competition and because it had no large strategic partner it had to take a new reverse strategy. This resulted in case D entering into a strategic alliance with a company that specialised in providing market information and research forecasts. Case D kept its identity, name and autonomous operations, however the strategic alliance with (name withheld) allowed the company to act as a full-service brokerage by offering advice. The interactions and customer service were kept online, thus creating a hybrid model of brokerage in Australia.

5.8 DIFFUSION OF IS AND FRONT-OFFICE ARCHITECTURE

The integration of IS technologies divided customers into the following groups:

1. Customers who are well-trained in finding information online, and who choose brokers that offer sales and clearance platforms as their basic range of service. This group of customers are retail traders often with low trade margins.

2. Customers who buy and sell high volumes of stock. Such high level of investment results in a high level of holding turnover. This at times results in high transaction costs.

Due to the proliferation of online stockbrokerages, most online brokerages could not differentiate themselves from their competitors because any innovation was easily adopted by rivals. The lack of differentiation meant that investors often chose their broker based on media reports and the opinions of other investors. This was backed by the senior trader at case D who stated that:
“There are just too many online brokers and I am sure as time goes by our direct competitors and others will swallow most of them up. The interesting thing was the winner in this confusion was and is the old brokerage house….many people are going back to them because they are getting sick of the sub-standard service some online brokers are providing them”.

Because many of the smaller brokerages were not profitable, they were bought by or merged with larger firms. This resulted in domination of the market by a few large stockbrokerage houses. However, there were some smaller brokerages found a niche.

As the e-brokerages grew and attracted customers, full-service traditional investment companies suffered heavy losses. Proliferation of the e-brokerage meant that the competition for clients now shifted to the e-brokers themselves rather than with the traditional brokerages. The director of case B stated:

“The newcomers ruled the financial market for nearly two years: their growth rates were very high, their advertising campaigns tried to reach potential clients through all media available, and they were seemingly on the road to profitability”.

The clients attracted to e-brokerages were interested primarily in short-term investing, frequent trading and independent decision-making. At the same time, full-service brick and mortar competitors, such as cases A and B, focused on their traditional area – managing wealth for the long-term financial security of their clients. This was explained by case A’s senior trader:

“That is why even one high-wealth client returning to them (the full-service brokers) after a disappointing experience elsewhere may be worth ten clients with a lower asset base served by an online brokerage. Consequently, this movement back to the traditional investment companies will facilitate the stabilisation of the traditional investment companies. It also turned the balance of power in their favour”.

The proliferation of online brokerages and competition among these brokerage houses also resulted in some firms reverting to their original business model. Online brokerages put a considerable amount of effort into keeping their client base and reverted to providing services that made their traditional competitors successful for many years.
This pattern was also evident in case D, which moved away from its online investment company structure. The online stockbrokerage houses were also moving closer to a new brokerage type by providing information and at the same time keeping their online characteristics. For online and discount brokers, change in the front-office architecture resulted in a shift from price to content, and the formation of new co-alliances (Chemmanur et al., 2002).

The second group of customers consists of clients who demand market and trade information and bundling of services. The presence of this group has resulted in full-service stockbrokerage houses focusing on content, quality and bundling of services. The range of front-office options available to this group ranges from content and differentiation of service to alliances with other firms in the finance industry.

5.8.1 From price to content
Providing sales and clearance services for a smaller price than that of the full service brokerages is a strategy employed by many new brokerages following the introduction of the Internet (Wilhelm, 2001). The modest initial capital required to start an online brokerage is one of the reasons for the proliferation of this type of brokerages. The increase in the number of these brokerages undoubtedly has put pressure on existing online brokers.

Older online brokerages have become larger and adopted characteristics such as bureaucratic structures that once impeded full-service brokerage houses when confronted with an online business model. Therefore, to maintain their competitive advantage, older online brokerage houses had to become innovative to stay separate from mainstream online entities.

One strategy was to shift from price as a means of differentiation to the provision of market forecasts and information, while at the same time maintaining the online business in its entirety. The Internet allowed online brokerages to modularise their products and use technology to notify customers about new developments in the market. This approach was convenient and cost effective because it minimised the need for further investment in technology. Traditional brokers, on the other hand, do not modularise their products or services as their approach tends to be full-service or no
service. Case A’s senior sales and customer service manager explained how gathering and disseminating market information facilitated sales:

“We could even program our system to respond when a trader makes a huge profit by forwarding information on purchase items which may be of particular interest to that individual. In the future, therefore, we can look to effectively using our database in conjunction with some strategic alliances. Advertising opportunities could also be incorporated into this model. Around 60-70% of our advice offered to clients is heeded and there will always be a need for telephone support and advice. If a client is satisfied with the support provided by his broker, he will not choose to access the internet for support”.

The cornerstone of the traditional investment business is the offering of personalised advice. During the bull market of the mid to late 1990s, when most stocks were consistently going up, market participants and observers felt fully capable of investing without advisors. However, the bear market (after the burst of the e-commerce bubble in the later 1990s) made many investors apprehensive about investing. Case D’s director of senior trades and clearance emphasised the importance of market research and content as case D’s new differentiation strategy. He stated:

“Under these circumstances, online investment companies simply have no choice but to consider offering advice to their clients. The main problem is, however, that they had to find a synergy between their independent investing model and the advice-based strategy of traditional brokerages.

Our real bet – where it thinks the bulk of its future growth will come from – will be a radical new approach to winning and keeping business. Case D is gearing up to jump into the advice business. The new director of the company who founded his firm on the principle that it would never tell customers what stocks to buy, is about to start, well, telling customers what stocks to buy”.

According to Case D’s trade and clearance senior manager, the attribute that investors value most is unbiased advice:

“Without doubt, service and support will always be the cornerstone of any brokerage operation and as we move toward the future, I think growing emphasis will be placed on the issue of support. Within Traderspace Limited, for example, we currently have six people employed exclusively to operate a Helpdesk. They are not brokers, nor information technology employees - they are Helpdesk staff. They man
the Helpdesk, two at a time, eight hours a day, fielding technology-related calls.

The next element is customisation or personalisation, whether of the Internet site or the products traded. While charging for such a feature on the Internet can be difficult, it does create a draw card for your site. We are able, however, to charge for customised products. This is particularly relevant to the retail trader. For example, I firmly believe you can create your own bond contracts.

Focus on providing advice will help online brokerages find a way to solve another problem online brokerages face. Usually, once a client’s net worth exceeds a six-figure barrier, he starts considering getting advice on how to manage his money due to the potential extent of losses that can be incurred without professional management”.

This strategy was one of the reasons why pure online brokerages lost many of their clients. Those that started investing with relatively small amounts of money and made large gains began offering market research and brokerage advice.

The demands placed on the brokerage of the future will be more diverse because clients will seek expert trading advice, service, support and emotional support of a higher standard than what is currently available. The quality of service will depend on the ability of the broking firm to use software infrastructure and a knowledge base to meet the various needs of clients.

5.8.2 Co-alliances

Co-alliance models are shared partnerships in which each partner brings equal amounts of commitment in order to form a consortium. The composition of the consortium may change according to market opportunities or the core competencies of each member. Focus can be on specific functions, such as collaborative design or engineering, or on providing virtual support with a virtual team of consultants. In the case of the brokerages in Australia, an alliance of brokers, tax specialists and back-office operators has formed a discount service.

An evaluator who examined the findings referred to the formation of co-alliances among the stockbrokerage houses. The co-alliances involved creating an electronic market comprised of a number of small, independent brokerages who pooled their
resources while maintaining their independence. Case C’s senior sales manager explained this trend:

“Five independent broking firms have joined forces to reduce their back-office costs and collectively negotiate better commission for their clients. This type of arrangement is picking up in the sector. Many small and medium brokers were feeling the squeeze as banks cut commission and trade volumes tended to shrink.

The independent brokers have also elected (name of person withheld) as the head of the new arrangement. This would allow the broking firms to stay independent while gaining from the sales of a larger group and sharing back-office services. There is an opportunity for these groups to earn more income and to pool resources for marketing, sales training, compliance, information technology and distribution”.

5.8.3 Focus on advice

Providing quality advice and content is essential for full-service brokers wanting to maintain their customer base. Knowing exactly what types of shares are worth buying and which ones should be sold immediately is crucial, if high margin and high volume traders are to be retained.

As one of the traders from case A pointed out, the majority of this firm’s clients are either corporate clients or representatives of industrial funds. Therefore, having up-to-date and precise information is important. In addition, the contractual agreement with a full-service brokerage holds the brokerage legally and financially responsible if false or inaccurate information is provided to the client. This further highlights the criticality of the information and quality of content provided by full-service brokers. The director of case A stated:

“We are trying to build relationships. We are trying to attract clients to capture as many of their assets and many of their commercial transactions as possible.

A total financial relationship is not about trying to control client or push propriety products- that is a failed proposition in a world of transparency and smart investors. Instead, it is about adding real value for clients by delivering the right set of products and services to simplify their lives and help them make better financial decisions”.
Since the introduction of the Internet, case A has focused on advice and quality of content to develop its customer base. Studies proving that a majority of the information available on the Internet is unreliable have also helped the firm retain customers. In most cases, clients receive emails notifying them of the firm’s newsletter or get an email alert about a sudden change in the market and how it will affect their portfolios. Case A has also devised a special customer service program (MPS). The senior customer care manager stated:

“The last and most important element is alliances, seen through the convergence of media, technology and financial services. We can forge alliances with e-brokers, e-traders or phone companies and provide our customers with access to those services for a nominal introduction fee. Our customer base is an attractive target market - a widely sought after demographic - depositing money with us, which is then available to purchase goods or services on-line”.

This service intended to provide a one-stop shop for case A clients, allowing the firm to offer services ranging from information to archiving and trade documentation.

Case C uses a similar strategy. To maintain its growing customer base, case C also provides information and content for a separate (additional) fee to its standard client charges. The quality of information provided to its platinum members is considered to be of great importance. However, since the platinum clients of case C are fewer in number to its discount service clients, the bulk of information search is outsourced.

5.9 FRONT-OFFICE COMPONENT OF CF<sup>6</sup>

The front-office changes in the brokerages were due to the unification of sales and clearance technology at the back-office and full compliance with rules and regulations. After the brokerages’ compliance with the regulatory protocols, each firm could strategically differentiate itself as long as that differentiation fell within the predefined “legitimate” boundaries.

The Internet’s impact on the behaviour of clients and structural makeup of the front-office operations was threefold. First, a group of brokerage houses kept to their traditional business. These brokerage houses integrated large components of the Internet, such as email and online forums, into their operations instead of creating a new
type of organisation. They remained within their niches and built on their areas of competency. Case A was a clear example of this group.

Second, the Internet resulted in a mass exodus to online brokerages as a means to carry out retail, low margin trade by clients at a lower price. This was followed by a proliferation of online brokerage entities, which resulted in established online brokerage houses further differentiating the online operations in order to remain competitive. One of the significant strategies used by the established online firms was to continue offering some elements of the traditional brokerage. Online stockbrokerage houses began providing content in addition to sales and clearance trade platforms, as evident in cases C and D.

Third, a new organisational type was formed – one which focused its operations on providing information and market forecast. The majority of the content-providing function of brokerage houses was outsourced to these new entities.

5.9.1 Development of constructs
The front-office key constructs refer to factors that influence the firm-specific differentiation after adherence to the overall market and business rules devised and reinforced by the ASX and the ASIC. As illustrated in Figure 5.6, the changes that occurred in the front-office of the brokerages are the result of two distinct forces: (1) firm constructs; and (2) niche-pull forces.

Firm constructs
Each of the stockbrokerages in the sector has a set of unique characteristics that influences the range of strategic options they use. These characteristics include: history; size; range of services; competition; and financial resources. Each of these characteristics plays an important role in the individual brokerage’s differentiation strategies.

Firm history and size were the most influential key constructs that influenced the growth of the firms. Case A, relied heavily on its good customer service reputation. It integrated IS in its administrative and back-office operations but did not move out of its niche. It built on its customer service history to attract new clients.
Case B adopted a similar approach. The stockbrokerage’s history and resultant organisational inertia impeded its rate of change. However, its expertise in the mining and minerals sector allowed it to initiate a divergent differentiation strategy and start operating as a content provider for firms trading in mining and minerals. Case C relied on the history of its parent banking firm as one of the biggest financial institutions world wide whereas, whereas case D relied on its reputation as one of the first firms to introduce online brokerage in the sector.

Organisational size was the second most important key construct in the development of differentiation strategies among the participating brokerages. The size of case B was one of the main reasons it failed in experimenting with full-service and online brokerage strategies. Size also played a major part in case D’s reverse strategy of adding the element of research and content to its online trade platform.

*Niche-pull factors*

The second factor that influenced the front-office operations of the brokerages was niche-pull. Niche-pull is included as a front-office key construct because of its influence in determining types of services. Depending on the size and the rate of return the brokerages earns, a niche may have a few or many brokerages servicing it. Types of clients and new niches are two of the key constructs that influence the front-office change strategies employed by the sector.

In case A, the niche of traders (corporate or retail) with high trading margins - but often not very savvy with the Internet - resulted in the firm reinforcing its full-service brokerage operations at a time when most brokerage houses were migrating to the online business model. Case B’s niche consisted of traders interested in mining and minerals and this niche influenced the strategic changes that case B experimented with, ranging from full-service brokerage to information provider. The firm has moulded its operations around its expertise in mining and minerals and appeals the niche that trades in this sector. Cases C and D also developed their key differentiation strategies around their niches, i.e. clients demanding discount service and clients who need either online trade platforms or online trade platforms with the option of market information.
Figure 5.6 The front-office component of CF$^6$
As illustrated in Figure 5.6, technology acts a key construct in both groups of front-office factors. Technology can affect the differentiation strategies of a brokerage. Based on expertise and prior experiences with a specific IS technology, brokerages may or may not include a specific technology in their front-office strategic plans.

Technology also plays an important role in the dynamics of a niche. Niches are created depending on familiarity with IS technologies. Case A clients who were not necessarily comfortable with using the Internet to carry out trade, preferred the services of full-service brokerage houses. In contrast to this niche, usually younger, retail traders preferred online brokerages because they were generally computer savvy.

By combining the frameworks of all the participating cases, Figure 5.6 depicts the front-office strategies employed by the majority of brokers in the sector. As the front-office framework in Figure 5.6 indicates, a multitude of key constructs resulted in each case developing strategies according to their internal constraints and the resources available to service their niche’s requirements. Concerning case A, the dynamics of its internal constraints and the niche-pull resulted in the firm building on its existing capabilities and enhancing its customer service through the introduction of MPS. A combination of content provision and full-service brokerage for a select customer base was case B’s final appropriation of internal constraints and external niche-based pull.

Cases C and D implemented a combination of discount and online services, and provided content and market forecasts. It also retained customers who used the banking services of its parent company. So, at least in the short term, the strategies of cases C and D did not put the organisations in direct competition.

5.10 CONCLUSION

Changes in the traditional customer base and in investors’ mentality, as well as their enthusiastic initial response to the idea of online brokerages, lead investment professionals to believe that while online investment companies did not represent a life threatening danger to the traditional advice-based investment industry, their business models did have some advantages. The results of the research demonstrate that providing online services and staying current with modern technologies, along with offering personalised advice, are the success factors of the investment industry.
CHAPTER 6 – INFUSION OF INNOVATION

6.1 INTRODUCTION

In this chapter, the findings from the back and the front-office operations of the participating stockbrokerage firms are discussed. Alternative terminology to describe the adoption of IS technologies in rule-bound sectors is also provided. The emergent front and back-office constructs from the interviews (CF\textsuperscript{2}-CF\textsuperscript{5}) are amalgamated to develop a proposed framework (CF\textsuperscript{6}) to explain the IS technologies adoption in stockbroking sectors. The proposed framework describes the introduction, development and mandatory adoption of IS technologies in the back-office. This is complemented by illustrating the constructs that influence the front-office differentiation strategies of participating case organisations.

6.2 EMERGENT PATTERNS OF FRONT-OFFICE STRATEGIES

The four stockbrokerage firms participating in this research are considered to be representative of the brokerage houses present within the sector. The back-office operations of all the stockbrokerage houses were found to be identical due to the presence of a number of trade and clearance platforms (The Stock Exchange’s Automated Trading System (SEATS) and the Clearing House Electronic Sub-Register System (CHESS)).

Computerisation has transformed the operations within the stockbroking sector. The orders placed by customers through their preferred brokerage houses are registered and cleared via the market’s centralised IS trade and clearance platforms. The unification of all the back-office operations did not eliminate diversity in brokerage types. In fact, as it emerged from the findings, stockbrokerage houses actively sought to differentiate their operations within the predefined limit set forth by the sector’s regulatory bodies.

Figure 6.1 presents a matrix outlining the front-office strategies for those brokerage houses that participated in the research. On the horizontal axis the extent of service refers to two possible options, either being a full service stock broker offering market information and research or a non-advisory brokerage providing trade and clearance services without market information and advice. On the vertical axis, the degree of the
Internet usage refers to the structure of the firm being, a *click*, *brick* or a *brick and click* organisation. *Click* is the term referring to online brokers. *Brick* on the other hand, refers to traditional full-service brokerage houses. *Click and brick* refers to brokerage firms that combine elements of traditional and online brokerage types. Each of the quadrants indicates a strategic option with regard to the extent of service and the degree of the Internet integration in the daily operations of the stockbrokerages. The case positions marked as *one* are the positions of the participants prior to the introduction of the regulatory systems. Positions *two* and/or *three* outline the post implementation phase after adherence to back-office regulations (Figure 6.1).

![Image](image_url)

**Figure 6.1 Differentiation framework of the participants**

With the exception of case A, all other case organisations diversified their front-office operations. A participating organisation limited its brokerage operations and focused on support activities such as providing market forecasts and research (e.g. case B). Case organisations such as C and D incorporated elements of full service brokerage (providing market forecast and research) whilst maintaining their original business type. A strategic partnership with a bank, international financial institution(s) or firm(s)
specialising in market research, meant that brokerages could occupy more than one quadrant in the matrix (Figure 6.1).

6.3 EMERGENT THEMES

In chapter two, four themes within the IS diffusion literature were identified:

- proliferation of firm types and introduction of regulatory regime;
- convergence to organisational archetypes;
- impetus to strategically differentiate; and
- diversity in brokerage types

Each of these themes was tested during the data analysis phase of the research and is examined in detail below.

6.3.1 Proliferation of firm types and introduction of regulatory regime

The introduction and adoption of IS technologies such as the Internet changed the mode of interaction between brokers and their clients. The Internet broke the traditional bond that existed between the small brokerages and the dominant suppliers (e.g. case A). It also allowed the small brokerages to deal with a variety of retail clients directly. The outcome of this was a dilution in the level of control previously exercised by the large suppliers (Barrett et al., 1999). The Internet allowed stockbrokerages to reach customers at a fraction of the price being charged by full service brokerage houses.

The introduction and uptake of the Internet by the stockbrokerages resulted in the formation of online brokerage (e-brokerage) business model (Hovav et al., 2001). This e-business model attracted new groups of clients. This new client base comprised of young investors that were familiar with finding information online and usually invested in the market for a small trade fee.

Integration of the Internet resulted in reduction of the overhead cost associated with maintaining full time staff, premise and full-time market consultants. This prompted new stockbrokerage houses to adopt the e-brokerage model (Chemmanur et al., 2002). As the Internet brokerages did not require vast office space like the traditional brokerage houses, they carried out most of their operations online with a smaller number of
employees compared to their full service counterparts. The large number of new online entrants also prompted the incumbent brokerages to experiment with the new e-brokerage model (case B). Increasingly, the proliferation of the online brokerage houses resulted in intense competition amongst these firms to attract more clients.

The competition between the online and the full service brokerage firms resulted in many traditional stockbrokerage houses to not remain in business. Full service entities could not afford providing services at the prices charged by the e-brokerages (e.g. case B). Many of the full service firms after the intense cost competition with online brokers, which peaked in late 1990s and early 2000, did not recover financially. Competition among the online brokerages also emerged and this resulted in two distinct outcomes:

- rise of cost-based competition (resulting in firms offering services at lower prices);
- rise in incidents of mismanagement.

Cost-based competition among online brokers was intensified as the Internet facilitated the new online brokerages’ entry into the market. The rise in competition resulted in price differentiation as a competitive strategy to become obsolete. In order to survive, the online brokerage houses that survived the initial cost-based competition resorted to insider trading, price manipulations and collusion with firms carrying out initial public offers (IPOs). This was the trigger for the sector’s governing bodies to introduce and implement mandated trade and clearance platforms.

Firms were required to subscribe annually to CHESS and SEATS systems. The subscription was expensive and required constant support to operate (e.g. training, dedicated staff to administer the system locally), which further added to each firms overhead costs. Because of increased overheads, many online entities entered liquidation, merged or were taken over by bigger online firms. Essentially, the IS-based regulatory regime in the sector became a tool to curb the over-population of specific types of brokerage.

In the history of the ASX (Appendix H), instances where the market was faced with administrative, trade or membership problems, new regulatory measures were introduced. The market crash of 1987 resulted in the rationalisation of listing and trade
processes to allow access to market information and eliminate price manipulation. The introduction of SEATS facilitated this process by centralising the listing of shares at the ASX. The centralisation of listing and the public offering of shares provided brokerages and their clients access to up to date market information. CHESS was further updated because too many online firms were misleading their clients by promising extra services. Incidents of insider trading and collusion threatened the integrity of the market and the governing bodies found it necessary to introduce systems to curb this problem (Appendix I).

6.3.2 Convergence to organisational archetypes
From a population ecology perspective, the predetermined regulatory regime selects a blueprint of operations for all the firms in an industry. Barnett (1997) proposed this process occurs at times of depletion of a resource or when the environment cannot sustain large numbers of a specific firm type.

The standardisation of the back-office resulted in the formation of approved archetypes. Organisational archetypes are enforced by the deep structures that create meaning and become the unconscious blueprint for carrying out the process of trade and clearance. These frameworks in turn determine how stockbrokerage houses should perceive and react to the diffusion of technology (Barrett et al., 1995). The standardisation of the processes of the back-office produced a model of interaction with the sector's governing bodies that became the sanctioned *modus operandi* for all the incumbent and new brokerage houses (Christensen et al., 1998). The formation of a standard operating procedure was meant to highlight incidents such as insider trading and price manipulation.

Since all the back-office operations were identical, the realisation of incidents of mismanagement was easier to recognise than before the standardisation. There was a standard manner by which sales and clearance processes were carried out by all the brokerage houses. Any additional processes that did not match the rules were then highlighted and reported for further investigation to the Australian Securities and Investment Commission (ASIC). In addition, systems such as the Survey of Market Activity (SOMA) scrutinised the daily activities of all stockbrokers and contributed to the reinforcement of the organisation archetypes and the *status quo* within the sector.
The back-office dynamics of the stockbroking sector confirms the notion that after implementation of regulatory and operational protocols by the sector’s governing bodies, brokerage houses converged to organisational archetypes. The standardisation was also extended to the front-office operations though it did not develop beyond the business rules outlining the disclosure requirements of the stockbrokerages.

6.3.3 Impetus to strategically differentiate
Due to sales and clearance processes being identical across the back-office, competitive advantage could only be sought through the relationships between the brokerage houses and their clients in the front-office. Porter (2001) suggested that regulatory pressures tend to standardise processes and therefore there is an urgency for firms to differentiate themselves from their peers through specialisation. Although brokers and their clients had to abide by a series of market and transaction rules developed by the ASIC, the extent of these regulatory measures was not as all-embracing as that of the back-office. The relative autonomy at the front-office allowed stockbrokerage firms to experiment with various types of products and services to meet different demands of their client base. In Figure 6.1 all participating case organisations (with the exception of case A), adopted a series of front office strategies to enhance their customer care and niche development initiatives.

6.3.4 Diversity in brokerage types
While enforcing the IS-based regulations was aimed at standardising all the stockbroking operations, different brokerages types still existed in the sector. The findings revealed that variation in brokerage types was influenced by the clusters of clients demanding different levels of services. The observed front-office scenario in the sector was similar to the case of the Electronic Data Interchange (EDI) implementation in Denmark observed by Damsgaard et al. (2001a). In analysing the complex network technologies Damsgaard et al. (2001a) proposed interorganisational systems such as the EDI contain a myriad of social and technological relationships between the initiators of the EDI system and the subsequent users. In addition to the firms that adopt these systems, there are a number of legislative and regulatory bodies and scientific communities that monitor the operations of the EDI systems. Alignment of the aims of these stakeholders (e.g. users and governing bodies) results in formation of standards that address the need for integrity and security of a complex system. However, these
standards are only limited to areas where the governing bodies and the organisations adopting the EDI systems interacted.

In areas where the organisations were in contact with clients or partners in their value system, they were allowed relative autonomy in choosing specific functions of the EDI that suited their type of operations. Damsgaard et al. (2001b) further explain that the notion of technology push or the predefined type of technology for adoption is determined by channels of communication between the governing institutions and potential adopters of the technology. The different uses of the technology are driven by the choice of the adopters based on the demands from partners and clients.

In the case of the stockbroking sector, the niche-pull forces were triggered by the customer bases’ demand for a range of trade and consultation services. The types of services demanded were unique to each group of customers depending on their age, financial resources, level of investment and the degree of familiarity with the stock market. Prior to carrying out the research, two types of brokerage houses were identified. Theses types of firms were classified based on the extent of market information and advice they provide to their clients. The two groups of firms comprised of full-service stockbrokerage houses and non-advisory brokerages.

There are two sub categories of full-service providers, independent brokerages and large brokerage houses which are often in strategic alliances with Australian or international banks. Non-advisory brokers consist of two sub categories namely, discount brokerage houses and online brokers. The formation of two distinct types of brokerage houses was motivated by two clusters of clients.

One cluster of clients was composed of retail and corporate customers that trade in high volumes and preferred content and quality of information to facilitate their investment decisions. These customers preferred the full service type of brokerage houses. The second type of client cluster composed of a group of retail traders that had computer knowledge and were competent in search for market information on their own. These clients were usually retail traders who dealt with small volumes of trade. Discount and online brokers provided services for this customer base. It emerged from the findings that, formation of different brokerage types and the relationship between niche diversity and variety in organisational forms was a direct result of diversity in client types. In
analysis of the organisational types, Kautz \textit{et al.} (1996) proposed a niche-based technological transformation model where, firms adopt and re-configure their operations based on patterns of niches’ demand.

6.3.5 \textbf{Overall dynamics of adoption of IS technologies}

By contextualising the themes discussed above and the supporting evidence from the research, a relationship between the back and the front-office operations of the sector can be developed. Governing bodies introduced a range of trade and clearance protocols that directed the industry structure, mode of back-office operations and scrutinised brokerage’s interaction with the sector’s governing bodies. The imposition of regulatory mechanisms resulted in consolidation and standardisation of the operations across the sector. Once the macro trace or the uniform technology is in place, firms initiate a differentiation strategy from their immediate peers. The differentiation strategy is dependent in a series of characteristics (age, size and area of expertise) unique to each firm (Carroll \textit{et al.} 2003). The choice of front-office technology is influenced by communication with other brokers in the sector, recognition of fads and mimicking of peers.

Rogers (1995) proposed relative advantage, compatibility, complexity, trialability, and observability as the elements that influence the rate and extent of adoption of an innovation. The findings of the interviews pointed out to relative advantage and compatibility influencing the choice of technology and the differentiation strategies employed at the front-office.

Rogers (1995) describes relative advantage as the degree to which an innovation is perceived as better than the idea it supersedes. Social prestige, convenience and satisfaction are also important factors that influence the adopter’s perception of a new technology’s relative advantage. The introduction of turn-key customer service program by case A, and integrating elements of full service brokerage in operations of cases C and D were perceived to give the adopting case organisations a competitive edge over their immediate peers. The intention of the case organisations was to retain their present clientele whilst extending their reach to include clients that used service offered by the competition.
Compatibility is defined as the degree to which an innovation is perceived as being consistent with the existing values, past experiences and needs of potential adopters. As Figure 6.2 indicates, in addition to integrating IS in its operations, case A relied on its history and its relatively strong financial base to deter competition from new entrants and full service brokerage firms. Rather than diverging from full-service brokerage, this case organisation built on its present strengths and introduced a number of customer service initiatives (e.g. the turn-key solution - MPS) that integrated all finance needs of its clients. The turnkey solution provided by case A enabled the firm to manage its clients’ needs through one account. This service was offered for a minimum of twenty four months and the clients were legally bound to stay with case A regardless of the alternatives services that were available in the marketplace.

Case B, an independent full service firm had a long history in the resources sector. Due to its small size and relatively limited financial resources this case organisation could not afford to compete with brokerage houses such as case A. Moreover, the fall in demand for mining and minerals adversely affected the demand for trading in resource-based shares.

Case B initiated a divergent transformation strategy at the front-office. The case organisation became involved in providing support for brokers offering market research and content (on mining and minerals) for their clients. Case B’s intention to diversify in this type of activity, was bolstered by a rise in demand for shares in the resources sector.

Case C started by offering a full brokerage service. However, after the end of its partnership with one of the largest full service brokerage providers in the United States, it reverted back to providing a discount service. Since one of Australia’s biggest banks owned case C, the case organisation started providing customised brokerage services for the bank’s clients. This meant, Case C had access to a pool of potential clientele that used the bank, and case C could provided them with brokerage services at a lower cost compared to other discount service providers. Since case C had a small presence in the full service market since the days of its strategic alliance with its American partner, it provided the option of market forecasts and content for customers with large account holdings.
Differentiation based on key characteristics

Formation of different brokerage types.

Firm A strategic transition
(1) Full service
(2) Turn-key solution
(3) Affiliate programs

Firm B strategic transition
(1) Starting online operation (unsuccessful)
(2) Full service brokerage (Limited no. of customers)
(3) Providing content and market forecast

Firm C strategic transition
(1) Full service strategic alliance (kept at a limited level)
(2) Discount brokerage
(3) Integrating full service components in discount services.

Firm D strategic transition
(1) Online brokerage
(2) Online brokerage with market information option
Case D was one of the pioneers of independent online brokerage in Australia. However, due to the amalgamation of many of its competitors with banks and other financial institutions, this firm needed a new strategy to survive the competition from the newly formed online brokerages. The case organisation’s differentiation strategy involved adopting elements of full service brokerage in its operations whilst, maintaining its online presence. Customers of this case organisation in return for a nominal fee had access to market forecasts and content even though they traded shares via the Internet.

Figure 6.2 shows the front-office strategies of the participating case organisations was the result of a series of experiments with different combinations of trade and customer service. All the participating case organisations’ front-office strategies were within their predefined areas of expertise.

6.4 INFUSION OF INNOVATION

The review of the literature on the uptake of IS technologies and the findings from the case studies pointed to the shortcomings of the diffusion of innovation theory (DOI) in explaining the changes in rule-bound sectors. The integration of IS-based regulatory systems (SEATS and CHESS) were predefined and implemented regardless of the size and the operations of individual brokers. The elements of DOI such as relative advantage, compatibility, complexity, trialability, and observability had no effect on the manner by which the adoption of the back office regulatory systems was dictated. The introduction of SEATS and CHESS and the subsequent transformation of the back-office were not intended to provide relative advantage to stockbrokerages, be compatible with their present operations, or be trialable.

Using the DOI theory in explaining the dynamics of the front-office provides a partial explanation of the dynamics of the stockbroking sector. To address the role regulatory bodies play in shaping the strategic growth paths in the stockbroking sector, an alternative conceptual framework based on emerging constructs devised from the case studies is presented. The proposed framework (CP) aims to highlight the adoption of IS technologies and their resultant structural changes (Figure 6.8). Central to proposing an alternative approach to DOI theory, is the analysis of the influence regulatory structures exert on the formation of standardised procedures. A mechanism is also required to
explain the transition from the standardisation of back-office operations to divergent changes based on the types of niches in the industry at the front-office.

In order to explore the reasons for the discrepancy between the DOI prediction on the rate and the manner of adoption of technological innovation, and the observed dynamics of the stockbroking sector, the DOI theory was broken into its fundamental assumptions. This referred to as operationalisation (Figure 6.3).

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**Figure 6.3 Operationalisation of the DOI and proposing an alternative approach**

- Discrepancy between the DOI predictions and the scenario of the stockbroking firms
- Alternative approach
  - Review of literature
  - Alternative epistemological assumptions
  - The process of search and integrating alternative axioms in place of the DOI axioms
  - Alternative ontological assumptions
  - Findings CF1-CF6

- Alternative approach to DOI
  - Role of sector’s regulatory bodies
  - Imposition a regulatory structure
  - Brokerages’ strategic differentiation
  - Extent of differentiation

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Operationalisation refers to the process of breaking the theory into its fundamental components and analyse the effect of each component on the approach the theory takes in analysing a phenomena. Ontology and epistemology constitute the building blocks of a theory. The development of an alternative approach to DOI theory therefore begins by analysing the ontological and epistemological assumptions underlying DOI theory and then substituting them with alternatives (Figure 6.3).

Ontology describes the reality that a researcher holds to exist – the extremes for Burrell et al. (1979) being whether a ‘true’, objective reality can be found (realism) or if these apparent ‘truths’ are just created by individual cognition and social transmission of these ideas (nominalism or subjectivism). The epistemological debate concerns how knowledge can be held about the world. There are two epistemological stances: objectivism and relativism. Objectivism (positivism) posits that knowledge about the social world can be proved or disproved, leading to the uncovering of laws about its workings. Relativism (anti-positivism) on posits that knowledge can only be held by an individual, and uncovering an individual’s subjective knowledge about the world is all research can do (Dobson, 2001).

Lawson (2003) suggests that “all methods [theoretical approaches] have ontological presuppositions or preconditions that are conditions under which their usage is appropriate. To use any research approach is to immediately presuppose a worldview of sorts” (p.12). Thus, examining the ontological and epistemological assumptions of DOI enables social phenomena to be continually investigated. In other words, ontological assumptions will drive the formation of an epistemological approach to social enquiry (Kuhn, 1970). When the ontological assumptions of theory are not addressed during the research process, then a misfit between the methods of enquiry and the object of analysis may occur.

In addition to the proposed framework (CF$^6$), a terminology is proposed to replace the diffusion whilst providing a description of the dynamics of the stockbroking sector. The alternative terminology is intended to highlight not only the widespread uptake of IS technologies in the back-office, but also to emphasise the depth and scope of regulatory scrutiny by the sector’s governing bodies. The terminology had to take into account the variety of brokerage types whilst considering the governing bodies’ push for standardisation of practice in the sector.
Therefore, the term *infusion* is used as a replacement for *diffusion*. Infusion of Innovation (IOI) suggests the widespread use of IS technologies among the stock brokerage houses has contributed to the formation the e-brokerage business model. It is suggested that an IOI approach can address the shortcomings of DOI by emphasising the scope and depth of influence by regulatory structures and governing bodies in directing the trajectories of growth (Kishore *et al.*, 1998). According to Carroll (1993), Boisot *et al.* (1999), Walston *et al.* (2001) and Ward *et al.* (2005) the underlying assumptions of IOI approach are:

- the role of market and institutional governing bodies in directing the *approved* paths of growth;
- integration of the macro and micro levels of analysis on tracing the dynamics of change;
- highlighting the historical paths and the manner by which they control future growth trajectories;
- differentiation after strict adherence to the *approved* paths of growth; and
- adoption of front-office technology based on its *relative advantage* compared to alternatives and *compatibility* of the new system with the present front-office technologies employed in the firm.

Infusion of innovation suggests that it is possible to have niche-based differentiation whilst accounting for the regulatory control introduced and reinforced by external structures. Moreover, IOI assumes that firm’s differentiation from peers is possible provided there is conformity to the rules and regulations and a stockbrokerage’s unique resources and expertise matches the requirements of a specific niche.

### 6.5 FUNDAMENTAL COMPONENTS OF THE IOI

#### 6.5.1 Ontological assumptions

Bhashkar (1998) proposes individuals do not act in a social vacuum. The internalisation of the social institutions is a prerequisite for the understanding the others and "for the apprehension of the world as a meaningful social reality (Bashkar, 1998:p.34). These social structures are socially constructed. Bhashkar (1998) further suggests "individuals reproduce and occasionally transform the structures that are then experienced as objective reality and act upon the individuals producing them” (p.34).
From a DOI perspective, communication facilitates the introduction and mass adoption of new IS technologies. The deductive ontological stance of the DOI presumes existence of closure in the social realm, which is necessary to ensure the consistent occurrence of event held to in causal conjunction (Lawson, 1997). This deductive ontology is seen in Rogers (1995) who proposed the concepts of trialability and observability as influencing the rate of technological diffusion.

Closure enables the prediction and forecasting of future patterns for adopting innovative technologies in a sector (Van de Ven, 1988). Lawson (2003) proposed that theories such as. DOI, assume that an effect will always have the same cause (i.e. the operations of the causal system described by the theory are not influenced by any other external event).

The infusion of innovation ontology includes the explanation of technological transformations over time by pointing to the interplay between structure (regulatory regimes), agency (individual brokerage firms) and discourse (the interaction between external structures and individual brokerage firms). Employing a reciprocal approach to explain the relationship between macro (regulatory regimes) and micro (individual brokerage) levels of analysis means individuals and structures cannot be analysed separately.

The back-office dimension of infusion of innovation is influenced by the deterministic introduction of IS technology. This dimension is similar to the notion of technological determinism (Pinch et al., 1984). The ontological characteristic of the front-office component of the stockbroking sector is similar to the notion of interpretive flexibility introduced by Pinch et al. (1984). Interpretive flexibility refers to how a new technology or an organisational blueprint is interpreted by the relevant social group. From this perspective, IS-based strategic change in the front-office is the result of an individual firm’s perception of the technology’s attributes in enhancing the firm’s ability in catering for the demands of the client base.

Pinch et al. (1984) proposed that in regulated industries, it is not the design of the technological artefacts rather, their eventual use after stabilisation is a dimension that outlines the interplay between technological determinism ad interpretive flexibility of individuals. Pinch et al. (1984) proposed restricted interpretivism as an approach that
accounts for social conditioning. It is suggested that, change in regulated sectors can be understood by developing a relationship between normative structures (sector’s governing bodies) and the interpretation of social actors involved in the knowledge derivation process (individual brokerage firms). Therefore the ontological stance of the IOI has three distinct characteristics:

- it recognises that technological change involves factors beyond the characteristics and actions of relevant social groups;
- it highlights the need to account for deeper cultural, intellectual, or social origins of mandated technologies, therefore, points to the social/structural influences that an innovation propagates; and
- it accounts for the role of individual firms in influencing social structure and their effect on the mode of innovation adoption.

6.5.2 Epistemological assumptions of IOI

The epistemological stance of the DOI considers structures posing minimal influence outside the individual firm’s perception of reality. Consequently, individual firms are the sole decision makers with regard to the extent of IS adoption. Structures only become real when they materialise through individual firms’ actions (Dobson, 2002). Thus, the presence and the influence of regulatory bodies do not constitute a main change factor since they are only reproduced and perpetuated through the voluntary decision of the individual organisations.

The review of studies on the adoption of IS technologies by Anderson et al. (2004), Cook et al. (1999), Fichman (1992) and Lundblad (2003) pointed out that utilisation of the DOI theory results in the neglect of external structures as the DOI theory considers the influence of mandated regulatory systems on pare to the role of individual firms in the adoption process.

Archer (1995) proposes “structures, as emergent entities are not only irreducible to people they pre-exist them, and people are not puppets of structures because they have their own emergent properties which mean they either reproduce or transform social structures rather than create them” (p.21). Based on Archer’s conception of structure and agency (1995), the epistemological stance of the IOI framework suggests the presence of an interconnected relationship between the regulatory structures and individual stockbrokerage houses. This approach is similar to Cook et al. (1983) and
Conesa (1997) where the analysis of the relationships between standardisation and diversity encompasses the interrelationship between the changes triggered by external structures to the organisation and changes by individual firms.

Plummer (2001) in analysing the effects of IS change across the firms in the U.S. health sector observed the process of selection and retention operating at the macro level of analysis. From the macro perspective the process IS-based transformation of the industry encompassed the regulatory structures and the inter-firm relationships that contributed to the development of the industry’s regulatory regime. From the micro level of analysis, the organisation’s resources, capabilities and the types of clientele influenced the formation of firm types and range of service developed by each organisation in developing their customer base.

Walston (2001) and Plummer (2001) suggest, when examining the adoption of a new technology in rule-bound sectors, a co-evolutionary approach should be employed that takes into account the macro and the micro levels of analysis simultaneously. Overemphasis on either of the macro or micro levels of analysis can lead to any one of the following epistemological consequences:

- **structuralism**- structures are given prominence and the individual firm is seen as the effect of external regulatory structures rather than a causal effect on its own. This position explains regulatory change by examining the development and interaction of structures. The influence of individual firms and the notion of strategic choice is minimal; or

- **intentionalism**- explanatory primacy is given to individual firms’ strategic decision-making and choice. Internationalism accounts for forms of rational choice, arguing that structures exist as an effect or aggregation of individual firms. This explanatory focus minimises the status of structure and its effect on the uptake of IS technologies.

To highlight the need for a interconnected approach when analysing the macro (back-office) and micro (front-office) levels of analysis, the initial conceptual framework(CF$^1$), was divided into back and the from office components. The front-office component of CF$^1$ provided the initial interview protocol. Interviewing the four
participating case organisations resulted in the development of constructs of CF$_2$, CF$_3$, CF$_4$ and CF$_5$ which were compared to the proposed front-office constructs of CF$_1$. Findings of the interviews with the ASX and ASIC were added to the back-office component of CF$_1$, resulting in development of the finalised conceptual framework CF$_6$.

The findings revealed that structuralism and Intentionalism were relevant a specific dimension of infusion of IS technologies in stockbroking sector. Structuralism is relevant to the back-office operations of the stockbrokerage houses where the rules and regulations are determined and their adoption made compulsory by the sector’s regulatory authority. This approach is similar to population ecology employed in creating the back-office component of the proposed conceptual framework. Intentionalism, on the other hand, is similar to the dynamics of IS infusion at the front-office. The individual brokerage houses after strict adherence to the sector's regulatory regime are allowed relative autonomy to implement differentiation strategies. The formation of brokerage types based on individual firms’ unique resources is similar to the theory institutionalism employed in designing the front-office component of the framework (CF$_6$) presented in Figure 6.8.

6.5.3 The theoretical basis of the IOI

According to the DOI theory, the process of diffusion is seen as a decision to use technological or managerial innovation in a given organisational and/or industrial context (Mustonen-Ollila, 2004). This decision implies that there is an observable intention to use the innovation based on the strategies that other firms have employed. Mustonen-Ollila (2004) demonstrated that in IS-based adoption, firms prefer to adopt an externally-furnished innovation “only if it fits well with an identified problem and there were no internal resources to address the need of the firm” (p.43). Therefore, the process of adoption can be viewed as a function of an individual firm’s strategic choice.

In developing the IOI framework in Figure 6.8, the review of the literature and findings from the case organisations pointed to the need to employ two theoretical perspectives into consideration. It is suggested employing these two perspectives highlights the introduction of the mandated rules and regulations in the back-office whilst pointing to the notion of strategic choice at the front-office operations.
The back-office infusion of mandated IS technologies can be explained by *population ecology*. One of the most salient features of the population ecology theory is its emphasis on selection rather than adaptation in explaining the process of industry change. Hannan *et al.* (1984) proposed organisational change can be explained as a product of selection where new organisations entering an industry exhibit a range of structural features. Some of these features match the requirements of the environment and some do not. Majority of the brokers that were not able to continue operating in the sector did not match the requirements outlined by the sector’s regulatory bodies. Many of the participating firms could not afford the subscription to the trade and clearance platforms. A number of organisations could not compete with their peers over cost and many were forced into liquidation. Those organisations with features that matched the industry’s predefined *blue print* have a competitive advantage and are given *legitimacy* by the governing bodies to operate in the sector.

Carroll *et al.* (1995) have stated that the selection and implementation of a regulatory system by the governing bodies favours organisations that can deliver a product or service reliably. Furthermore, Baum *et al.* (1996) proposed the concept of *density dependence* as a key factor that influences the imposition of predefined structures. The density dependence model holds that a sudden rise in the number of a specific type of firm sets in motion the process of inter-organisational competition. This results in the introduction of a new structural blue print to control the sudden rise in firm numbers. The introduction of an organisational archetype results in the rates of birth and death of organisation to be reversed i.e. more organisation will die out compared to the number of new entrants. The initiation of successive versions of SEATS and CHESS was intended to control the instability resulting from the intense inter-organisational competition. This resulted in demise of most of the online brokers that started their business immediately after the introduction of the Internet in the sector.

The front-office dynamics of the stockbrokerage operations involved the convergence of organisational types based on the categories of clients in the sector. The interviews indicated that the choice of front-office strategy depended on the unique resources of the individual firms and the niche pull factors that attract particular firms to specific niches (Abramowitz *et al.*, 2000). The case organisations’ convergence was not driven by a single front-office blue print as was the case in the back-office. Rather, the strategic differentiation and the resultant variety in brokerage types were driven by the
variety in the customer niche and the unique requirements of the customers in the market.

This relationship between the macro and micro (selection and adaptation) is further illustrated in the next section when outlining the transition of the IOI transition processes.

### 6.5.4 Transition context

The transition contexts or the trajectories of growth for stockbrokers can be mapped using two different dimensions as identified in Figure 6.4. The first dimension relates to whether change is envisaged and coordinated by the sector’s governing bodies or it is the outcome of the normal behaviour of agents within the regime (involving no new mechanisms of coordination). The macro level of analysis outlines the strength of regulatory structures and the intended and unintended consequences of their regulatory measures. There are two possible outcomes (*trial-based transformation* and *dictated change*) depending in the strength of regulatory bodies.

![Figure 6.4 Strategy quadrant](https://via.placeholder.com/150)

Source: Bharadwaj (2000)
The micro level of analysis concerns the degree to which firms have autonomy in making strategic choices. In this level of analysis, as far as direct contact with clients and maintenance of customer relationships are concerned, most firms in highly regulated sectors are allowed to be different as long as they all abide by the rule of disclosure and fair trade. There are two possible outcomes (reorientation of strategic growth trajectory and niche-based renewal) depending on the extent of autonomy and strategic choice afforded to individual brokerage firms.

The four possible strategic outcomes as a result of interplay between the strength of regulatory bodies and extent of strategic choice are:

- **Dictated change** – Changes are aimed at standardising practices at the back-office. The types of change that regulatory mechanisms instigate are not necessarily visible to the end customer. Change mechanisms are introduced in areas where the governing bodies are in direct contact with individual intermediary firms.

- **Niche-based renewal** – Endogenous renewal arises in the context of socio-technical regime actors (firms, supply chains, and customers). In times of change, these actors make conscious efforts to find ways of responding to perceived external competitive threats from the introduction of standardised regulatory regime.

- **Trial-based transformation** – This type of transformation arises from uncoordinated pressures for change and responses formed beyond the incumbent technological regime.

- **Reorientation of strategic growth trajectory** – This refers to types of change that radically alters internal processes without being associated with discontinuities imposed by the sector’s regulatory bodies and institutional regimes.

Each of the quadrants in Figure 6.4 outline the strategic outcome of IS adoption with varying degrees of regulatory strength and individual firm’s autonomy in making strategic plans to maintain their competitive advantage.
Figure 6.5 The process of IOI transition
The underlying assumption of the proposed IOI approach involves explaining the dynamics of IS adoption in terms of a co-evolutionary (e.g. macro and micro) level of analysis. The macro level of analysis refers to the back-office operations of the sector. In this dimension, the introduction of the IS technology was seen as an opportunity to further enhance the effectiveness of monitoring and surveillance of the operations of the brokerage houses by the sector’s the regulatory authorities in the sector. Imposition of regulatory measures results in the setting of macro boundaries instigated by the sector’s regulatory bodies. This level outlines how a directed change occurs in the sector and is denoted by label A (Figure 6.5).

The IS-based changes at the front-office are the result of a match between the unique types of services each brokerage provides and the range of services each niche demands. This level outlines how niche-based renewal occurs in the context of innovation adoption and is denoted by label B (Figure 6.5).

Figure 6.5 shows the uptake of new technologies in a sector characterised as being highly regulated occurs sequentially at the macro and micro levels of analysis. The development of the IOI approach from directed change to niche-based renewal results in transition context that outlines the strategic evolution of IS technology adoption across the industry and firm levels of analysis.

6.6 CRITIQUE OF THE DOI APPROACH

In chapter two, the main conjectures of the DOI were outlined. Damsgaard et al. (1999) and Mustonen-Olila et al. (2003) proposed that a generic approach to the adoption and assimilation of new technologies have some characteristics that are common across all adoption scenarios. From a DOI perspective, these characteristics include:

- technology as discrete packages developed by independent and neutral innovators;
- diffusion is a homogenous process;
- adoption decisions are dependent on available information, preference functions and adopter’s characteristics; and
- time scale is relatively short and history is not a significant component of the diffusion process.
The development of the IOI approach challenges these underlying assumptions. In the following sections, the conjectures of the DOI theory are compared with the findings.

6.6.1 Technologies are not discrete packages
DOI theory proposes that innovation has distinct and measurable features. The DOI theory assumes the intention to adopt is driven by the same type of need across the industry and will result in similar patterns of adoption (Rogers, 1995). Therefore, the operations of the firms adopting a new technology are not influenced by any other external event.

In the case of the stockbrokerage sector, the regulatory systems introduced in the sector were part of a complex interplay of various technological systems and government institutions. The adoption of the IS systems was initially determined by the regulatory bodies with the intention to standardise all the sales and clearance processes across the sector. After strict adherence to the back-office regulations, as far as the adoption of front-office technologies were concerned, brokers had the opportunity to experiment with a variety of options available to them. The intention to adopt front-office technologies were driven for gaining competitive advantage. Variations in firm-based resources and type of client bases present in the sector, resulted in differences in the patterns of adoption. In addition, the patterns of front-office change were directly influenced by the composition of client bases as opposed to the direct influence of the regulatory authority in the sector.

6.6.2 Diffusion is a homogenous process
Mahajan et al. (1990a; 1990b) proposed that the diffusion of technology across a number of adopting firms should posit characteristics similar to those observed in other sectors and under different circumstances.

In the case of the stockbroking sector, the introduction and adoption of regulatory systems were identical across the sector. This standardisation was the result of a myriad of institutional and regulatory constraints that shaped the manner by which individual brokerage houses changed their back-office operations. In the front-office the homogeneity of standardised regulatory systems were replaced with niche-based differentiation strategies. The stockbrokerage firms based on their unique resources and the types of customer service technologies adopted by their peers, adopted technologies
to facilitate their front-office operations. This resulted in variations in the brokerage types and the extent of services offered to end customers.

6.6.3 Adoption decisions and adopter’s preferences
In DOI theory, adoption decisions are functions of available information, preference functions, risk and adopter’s characteristics. These conjectures are applicable to the front-office change in the stock brokerage sector. However, as far as the back-office operations of the sector is concerned, the choice of technology and the manner by which individual firms were meant to adopt the regulatory technologies, were predetermined by the sector’s regulatory bodies.

6.6.4 Time scale and history
In the DOI theory, time scales are relatively short and the mechanisms that derive the diffusion do not change over time. In the stockbroking sector, the introduction and subsequent adoption of the mandated technologies were carried out in a short period of time. Even though technology changes the manner by which regulations are enforced, nevertheless, the intention behind the imposition of rules and regulations has remained unchanged i.e. safeguarding the integrity of the market.

The differentiation strategies employed in the front-office were the result of much experimentation with alternative customer care strategies. These experiments were influenced by the historical characteristics of each firm. As the findings revealed case B for example, experimented with a variety of brokerage types, however its historically rooted areas of expertise at times impeded its strategic choice options. Therefore, although the changes in the front office were carried out in a manner to overcome the competitive forces as fast as possible, time in rule bound sectors should be viewed in the context of historical structures not as an independent factor.

6.7 IOI CONSTRUCTS
The initial conceptual framework (CF1) provided the basic theoretical background to examine the diffusion of IS technologies in a rule based sector. It specifically explained the process of adoption of IS-based trade and clearance platforms amongst the stockbrokers. CF1 was used to develop a set of interview questions examining the dynamics of the back and the front-office operations. The front-office component of
CF\(^1\) was used to develop the interview protocol for case A. The findings derived from the interviews resulted in a modification of CF\(^1\). The modified conceptual framework (CF\(^2\)) outlined the strategic differentiation responses of case A to the imposition of IS-based regulations by the ASX and ASIC. CF\(^2\) was in turn used to develop the interview protocols and modified interview question for case B.

Due to differences between the operations of cases A and B, the findings of the interviews with case B resulted in modifications to CF\(^2\) and this resulted in development of a new conceptual framework CF\(^3\) that outlined case B’s differentiation strategies after the imposition of SEATS and CHESS and introduction of the Internet as a trade platform. A similar process was used for cases C and D resulting in development of CF\(^4\) and CF\(^5\) respectively. After developing of CF\(^5\), the constructs of CF\(^2\), CF\(^3\), CF\(^4\) and CF\(^5\) were compared to those in CF\(^1\). Areas that needed modification were amended and a new set of constructs were added to the front-office component of CF\(^1\). Findings from the interviews with ASX and ASIC were added to the back-office component of CF\(^1\) resulting in development of the finalised framework (CF\(^6\)) that provided a range of constructs influencing the differentiation outcomes of participating brokerage houses.

### 6.7.1 Back-office constructs

The constructs of the back-office highlighted the nature of the regulatory regime in the sector. The review of the reports and the industry reports provided by the sector’s regulatory bodies identified protocols, membership of SEATS and CHESS and the requirements for membership imposed by the ASX and ASIC as the main factors that influence of convergence of firms to the sanctioned back-office systems. These findings were reflected in the development of the back-office component of the initial conceptual framework (CF\(^1\)).

The findings from the interviews however pointed to three main constructs that influence the dynamics of back-office changes. These constructs reinforced the standardisation of the back-office operations. The three emergent constructs of the back office are:

- surveillance;
- market elements/structure; and
- globalisation
**Surveillance**

_Surveillance_ refers to an operation which was facilitated by SOMA in order to pinpoint unexplainable changes in the trade volumes of the brokers. The premise of this operation was based on mechanisms where an average volume of trade per every brokerage house was developed. Based on this average, the monitoring system surveys the daily trade volume for insider trading and price setting. Surveillance also had a direct influence on the market structure. SOMA alerts would black-list brokerage houses and the specific broker that carried out the faulty trade item. This would later affect the licensing of the black-listed trader when the broker applies for licence renewal.

**Market elements/structure**

The _market elements/structure_ refer to the regime that sets the rules and regulations for the member brokers, their mode of operation, and the regulatory systems that they need to abide by to retain their trade license. In addition, brokerages are required to attend an annual training session should they wish their licence be considered for renewal. The rules and regulations that are imposed _via_ these key constructs are jointly supervised by the ASX and the ASIC. In the context of market elements/structure, _back-office technologies_ refer to the SEATS, CHESS and other IS-based systems that are designed as the sole trade and clearance platforms in the sector. _Regulatory systems_ refer to the set of regulatory processes defined under Corporate Law Economic Reform Program Act (CLERP 9). They outline the standard procedures on trade, clearance, transfer of ownership and reporting mechanisms that need to be provided by the brokers to their clients and the regulatory bodies. _Licensing requirements_ includes individual brokers attending the ASX and ASIC sanctioned courses, having the required skill outlined in CLERP 9 and passing the required examinations in order to be a licensed broker. Brokerage houses also need to abide by a series of documentations and protocols devised under CLERP 9 that govern the conduct of the Australian businesses. _Compulsory training_ refers to training sessions in ethics, market systems and new technologies that every broker is required to attend once a year from the date of the license issue.

**Globalisation**

In addition to the sector-based regulatory measures and surveillance, _globalisation_ is a key construct of the back-office. Potential entry of foreign trading firms and further
imposition of rules to address the requirements of the global trade and clearance institutes will result in structural changes as brokers need to adjust should they wish to delve into international trade markets. Entry of international bodies in the sector involved imposition of a number of systems and practice requirements for brokers that wished to be involved in cross country stock trade.

Illustrated in Figure 6.6, membership requirements with other constructs such as regulatory bodies, back-office technologies and compulsory training are all grouped under the *market structures*. These structures should be adhered to by all the newcomers to the sector. One construct that was not mentioned in the CF1 but emerged as a key factor in shaping the structure of the sector is the *surveillance* mechanisms developed
and implemented by the sector’s regulatory bodies. The role played by SOMA and other systems that scrutinised the daily trade of the brokerage firms played an important part in maintaining and perpetuating the regulatory regime imposed by the ASX and ASIC. Globalisation was mentioned in the proposed conceptual framework (CF1) and its position in the back office dimension of the final framework (CF6) has remained unchanged. Table 6.1 summarises the back-office constructs of the proposed framework.

Table 6.1 Summary of back-office constructs of CF6

<table>
<thead>
<tr>
<th>Construct</th>
<th>Relevance of constructs to individual case organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Surveillance</strong></td>
<td>The effect of this construct was identical across all the case organisations. It refers to a continuous process of monitoring the transaction and the manner in which brokers provide services to their clients. Surveillance is further reinforced by SOMA.</td>
</tr>
<tr>
<td><strong>Market elements</strong></td>
<td>The effect of this construct was identical across all the case organisations. Market elements refer to a set of key constructs that reinforce the integration of IS-based regulatory systems in the sector.</td>
</tr>
<tr>
<td>• Sanctioned technologies</td>
<td></td>
</tr>
<tr>
<td>• Regulatory systems</td>
<td></td>
</tr>
<tr>
<td>• Licensing</td>
<td></td>
</tr>
<tr>
<td>• requirements</td>
<td></td>
</tr>
<tr>
<td>• Compulsory training</td>
<td></td>
</tr>
<tr>
<td><strong>Globalisation</strong></td>
<td>Only 10 brokers were allowed trading in international markets. Two of the participating case organisations belong to this group of ten. In addition to SEATS, CHESS and other regulations introduced by the ASX and the ASIC, the global regulatory mechanisms must be adhered to should a broker decide to trade across international markets.</td>
</tr>
</tbody>
</table>

6.7.2 Front-office constructs

The front-office constructs refer to factors that influence the firm-specific differentiation after adherence to the overall market and business rules. The changes brought about in the front-office of the brokerages are the result of two distinct forces. First, each of the case organisations has a set of unique characteristics that influence the range of strategic options available to each firm. This is termed as organisation-specific constructs and includes history, size, range of services, reverse strategy, competition and financial resources.
Organisation-specific constructs

In this group of constructs, *firm history* and *brokerage size* are the most influential factors in directing the growth of individual firms. The reinforcing role of *history* could be seen in case A where the firm relied on its good reputation, quality of service, and market information to attract clients. While case A integrated IS technologies in its administrative and back-office operations, it did not change its niche, and instead provided innovative service to maintain its present customer base and attract new clients. The reputation of case A and its history as a quality service provider facilitated the organisation’s entry into regional areas of Australia. This was meant as a strategy to find franchise and gain access to clients without needing to invest directly in opening branches in the regional areas.

The case B’s reliance on mining and minerals sectors slowed it rate of progress (especially during the period of low demand for shares in resource sector in the mid 1990s). Nevertheless, the historical path of being specialised in mining and minerals industry enabled case B to initiate a divergent differentiation strategy. This case organisation experimented with becoming a partner for other brokerages by providing market information and research in the resources sector.

Case C relied on the history of its parent company as one of the biggest financial institutions world wide whereas case D relied on its reputation as one of the first firms introducing online brokerage in the Australian stockbroking sector.

*Brokerage size* is the second most important construct in developing differentiation strategies among the participating brokerages. Organisational size was the one of the main reasons for case B’s failure in experimenting with full service and online brokerage strategies. Size played a major part in case D’s reverse strategy by adding the element of research and content to its online trade platform. Brokerage size reinforced the front-office strategies of cases A and C. Both of these case organisations relied on their size and the economies of scale to finance their changes strategies. However in case A the large size of the case organisation meant that, the change strategy had to be in the context of full-service brokerage type of operations.

*Reverse strategy* was a construct in cases C and D that emerged as a front-office strategy in reaction to the increasing need of the clients for market information. Due to
intense competition from online brokers in case D and recent break-up of partnership in case C, these firms initiated the integration of elements of full service brokerage in their operations. In the case of these two organisations, providing market information and trade forecasts for limited number of clients was a tool to maintain their customer base. In addition, this measure was intended to attract clients that preferred online trade but needed market information to make investment decisions.

*Range of services* was a construct in common in all the case organisations. The range of services in the case A in addition to full service stockbrokerage included a new turn-key solution called MPS, where all the finance needs of customers were catered for. Case B’s range of service was primarily full service brokerage with a focus on the shares in resource sector. In addition, this case organisation started in experimenting with providing market forecasts and research for other brokerages. Cases C and D provided sales and clearance platforms. Due to rising competition cases C and D integrated information and market research as an optional service in their service portfolio.

*Competition* is a construct that has resulted in the formation of various front office strategies. The intense competition from smaller online brokers resulted in the divergent strategies of case B. competition from larger online brokerages resulted in reverse strategy in case D. In cases A and C competition from full service peers and other discount brokerages resulted in design and implementation of turn-key solution and reverse strategy respectively.

*Financial resources* was a construct that severely limited the strategic options of firm B. Due to its smaller size and relatively limited financial resources compared to other participating case organisations, case B experimented with providing an online service. When this strategy failed, case B reverted back to focusing on the resources sector, however, this time the firm provided information and market research as opposed to a sole brokerage service.

*Niche-pull factors*

The second set of factors that influence the front-office operations of the brokerages are the *niche-pull factors*. Having these factors included as the front-office key constructs was due to the role niches play in pulling brokerage groups to provide specific services to address the niches’ demands. Depending on the size and the rate of return, a niche
may be inhabited by few or many brokerages. Types of clients and new niches are some of the constructs that influence the front-office change strategies employed by the sector.

In case A, its customer base (corporate or retail) usually traded in high margins and often were unfamiliar with finding market information on the World Wide Web. Presence of these types of clients reinforced the intention of case A to resume with its full service brokerage operations at the time when most of the brokerage houses were migrating to online business model. The clientele of case B were interested in trading in the resources sector. This customer base influenced the firm’s diversification experiments ranging from full-service brokerage to information provider. However, at all times the focus of case B had been to mould its operations around its expertise on mining and minerals. Cases C and D also developed their key differentiation strategies around their niches i.e. clients demanding discount service and clients that need either online trade platform only or online trade platform with the option of market information.

Technology

Technology played an important role in the dynamics of a niche identification and front-office differentiation. Clients that were not necessarily comfortable with the use of the Internet in carrying out trade preferred the services of full-service brokerage houses. In contrast, younger retail traders usually preferred online brokerages since they were able to use the Internet in finding information on specific shares on the Internet. Table 6.2 summarises the front-office constructs of the proposed framework.

Table 6.2 Summary of front-office constructs of CF

<table>
<thead>
<tr>
<th>Construct</th>
<th>Relevance of constructs to individual case organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Case A</strong></td>
<td><strong>Case B</strong></td>
</tr>
<tr>
<td>History</td>
<td>The good history of case A’s service quality and quality of information it provided to its clients resulted in many clients</td>
</tr>
<tr>
<td></td>
<td>Its main area of expertise lies with the resources sector.</td>
</tr>
<tr>
<td></td>
<td>Staying with the case organisation.</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td><strong>Brokerage size</strong></td>
<td>One of the largest franchisers</td>
</tr>
<tr>
<td><strong>Reverse strategy</strong></td>
<td>NA</td>
</tr>
<tr>
<td><strong>Range of services</strong></td>
<td>Full service</td>
</tr>
<tr>
<td></td>
<td>Experiment with online</td>
</tr>
<tr>
<td></td>
<td>Starting on providing market information to other brokers</td>
</tr>
<tr>
<td></td>
<td>Focus on the resources sector</td>
</tr>
<tr>
<td><strong>Competition</strong></td>
<td>Mainly from large online brokers and other full service providers</td>
</tr>
<tr>
<td><strong>Financial Resources</strong></td>
<td>One of the strongest financial resources available. It is an arm of a major international bank</td>
</tr>
<tr>
<td><strong>Client types</strong></td>
<td>Corporate and retail</td>
</tr>
<tr>
<td><strong>Niche</strong></td>
<td>Presently experimenting with providing market information</td>
</tr>
<tr>
<td><strong>New niche</strong></td>
<td>MPS</td>
</tr>
<tr>
<td>---------------</td>
<td>-----</td>
</tr>
<tr>
<td><strong>IS technologies</strong></td>
<td>Used as a mean for communication only</td>
</tr>
</tbody>
</table>

Figure 6.7 shows the front-office constructs prior to data collection and analysis were divided into four main groups:

- external trends;
- competitors;
- key resources; and
- legacy systems.

The themes derived from the interviews highlighted the need to break the constructs into two main groups and explain their individual influence on the overall front-office dynamics of the sector. In this process the construct *external trends* identified at CF\textsuperscript{1} was removed. This is because the external trends such as economic instability and globalisation influenced the back-office operations of the firms. Competition, key resources and the legacy systems referring to the history of brokerage firms identified in CF\textsuperscript{1} were modified and integrated in the front-office component of CF\textsuperscript{6}. The process of development of front-office component of the final conceptual framework (CF\textsuperscript{6}) is illustrated in Figure 6.7.
Figure 6.7 The front-office component of CF^6 before and after data collection
The transition of construct before and after the data collection and analysis was based on separating the niche based construct and firm-based constructs and their effect on the front-office architecture of the participating stockbrokerage house.

### 6.8 CONCEPTUAL FRAMEWORK

The framework CF\(^6\) is the culmination of a range of back and front-office constructs (Figure 6.8). The framework identified in Figure 6.8 starts from the back-office where the IS-enabled regulatory systems have been introduced in the sector. The introduction of the IS technologies is followed with development and implementations of a range of standardised trade and clearance platforms. The SEATS and CHESS are sanctioned as the sole sources of back-office operations and should any firm decide to operate in the sector, these systems are the sole options available to them.

Figure 6.8 shows the constructs that reinforce this standardisation across the back-office are *technology regulations, regulatory systems, licensing requirements* and the *compulsory training*. They are further followed with surveillance (via SOMA) and globalisation. The outcome of this process shapes the back-office of the brokers to reflect the intention of the regulatory bodies to maintain a fair and accountable trade mechanism.

The front-office constructs are also included in Figure 6.8. The front-office change process starts after the completion of the back-office change where the standardisation is in place, the back-office operations of all the brokerages have become identical and brokerages start to actively look for areas where they can differentiate their operations from the peers. The constructs that influence the differentiation strategies of the brokerages include two distinct group; the *organisational characteristics* and the *niche-pull based constructs*. 
Figure 6.8 The proposed framework – Cf6

Key constructs
Back office

- Sanctioned technologies
- Regulatory systems
- Licensing requirements
- Compulsory training

Market elements/structure

Surveillance

Maintenance of fair and efficient market mechanism

Globalisation

The introduction of IS-based trade and clearance platforms

IS platforms

Subscription to IS-platforms

Unified back-office operations

Back Office

Front office

Generic business model
At the front office

Differentiation based on key characteristics

Formation of different brokerage types.

Strategic outcome

Organisation-specific Constructs

Niche-pull Constructs

Full service brokerage

Non-advisory brokerage

Franchise with multiple branches

Small independent

Discount brokerage

Online brokerage

History

Brokerage size

Reverse strategy

Range of services

Competition

Financial resources

IS technologies

Client types

Niche

New niche

Online brokerage

Full-service

New Ventures

Research and content

Discount brokerage

Corporate

Retail

Providing content

Limited service
Figure 6.8 shows the proposed framework (CF$^6$) developed as a result of the review of the literature, review of industry reports, observation and the findings from the interviews with participants from four case organisations. In the proposed framework, the change mechanisms are triggered in the back-office operations that result in sector-wide subscription to mandated trade and clearance platforms and standardised back-office operations. The main motivation for introducing the trade regulatory reform was to maintain a fair and efficient market mechanism free from price manipulation and insider trading.

Upon introduction of the change trigger to the sector, initially the extent and scope of uptake is driven by the regulatory authority of the sector. This manifests itself in a mechanism where only specific trade and clearance platforms are made available to the stockbrokerages. This deterministic unification at least as far as the back office operations are concerned shapes the blueprint for the legitimate structural and organisational forms.

The front-office changes in the sector occurred after the back-office standardisation. The standardisation of the back-office resulted in formation of sanctioned organisation archetype. However, firm characteristics and niche-pull forces facilitated the differentiation process in areas where the brokers were allowed limited autonomy. This resulted in formation of different brokerage types and as Figure 6.8 indicates, brokerage types were divided based on the level of advice they provide to their customers in addition to the default sales and clearance services.

### 6.9 CONCLUSION

In the stockbroking sector, there are a number of national and international governing bodies, each exerting a specific set of rules and regulations in terms of sales and clearance services. Each of the governing bodies constitutes a regulatory level depending on the operations of the brokerages they control. At each level of governance, the laws and regulations imposed by the governing bodies act as normative and professional boundaries. Firm level differentiation occurs after strict adherence to the rules and regulations introduced and reinforced by the sector’s regulatory bodies. Therefore, it is proposed, the presence of a strict regulatory control followed with firm-level differentiation can be explained by *infusion of innovation.*
In this chapter, the proposed themes developed at the review of the literature were compared with the collected data and the emergent constructs outlined by the participants. This comparison further resulted in proposing a generic conceptual framework (CF6) outlining the process of infusion of IS technologies in sectors characterised as being highly regulated.
CHAPTER 7 - CONCLUSION

7.1 INTRODUCTION

The primary aim of the research presented in this thesis was to make an original contribution to the existing body of knowledge about the role of regulatory structures in directing diffusion of information systems (IS) technologies in the stockbroking sector. In addition, the research sought to integrate elements of population ecology and institutionalism in the development of an alternative conceptual framework.

A comprehensive literature review and four case studies were used to explain the formation of various stockbrokerage types in light of a regulatory framework that standardised the operations of the stockbrokerage houses. This led to the development of a conceptual framework outlining the constructs that influence the structure and mode of interaction between the stockbrokerage houses and the sector’s regulatory bodies.

This chapter begins with a brief summary about the findings and compares the emergent constructs with the research questions posed in chapter one. The conclusions derived from each of the chapters of this thesis, and recommendations for future research, are also presented in this chapter.

7.2 BRIDGING CURRENT WISDOM AND THE RESEARCH FINDINGS

Exposure to IS technologies enabled regulatory change and the standardisation of sales and clearance operations. Intense competition from peers and new entrants resulted in a number of changes across the stockbroking sector. The introduction of IS technologies was initiated by the sector’s regulatory bodies. These bodies mandated that stockbrokerages implement the approved trade and clearance platforms – the Stock Exchange’s Automated Trading System (SEATS) and the Clearing House Electronic Sub-Register System (CHESS). The integration of SEATS and CHESS rationalised the trading system and provided a centralised clearance platform under the supervision of the Australian Stock Exchange (ASX) and the Australian Securities and Investment Commission (ASIC).
While the regulations determine the industry (macro) structure, the brokers are free to choose the niche they wish to engage with and offer services based on the needs of these customer bases. Consequently, this research sought to explore the role of niches in the formation of different brokerage types in light of the regulatory push for standardisation.

In analysing the diffusion of IS technologies in the stockbroking sector, the brokerages’ operations were divided into two distinct dimensions:

- the direct interaction between the individual brokerages and the sector’s governing bodies, which is termed the back-office; and
- the interaction of the brokerages with their clients, which is referred to as the front-office.

The reason for breaking the operations into the back and front-office was based on the findings, which revealed that the back-office was an area of operation under full control of the regulatory bodies of the sector. The front-office, although monitored regularly by the governing bodies, was an area where the brokerages were allowed relative autonomy in developing customised sales and customer service strategies. This autonomy resulted in the formation of various types of brokerage houses.

The presence of these two distinct dimensions highlighted the need for a theory to address the process of selection of the approved regulatory systems by the governing bodies. In addition, the firm level appropriation of resources and the tools employed by brokerages to differentiate their operations from their peers needed to be addressed.

The interplay between the deterministic setting of trade and clearance procedures at the back-office and firm-level strategic choice at the front-office indicated a gap in the theories on uptake of innovation. The present theories on diffusion of innovation have not explained the presence of different types of brokerage firms in light of an overwhelming regulatory push intended to standardise operations (Lundblad, 2003). Therefore, the following problem statement was posed to set the initial direction of this research:
• How is differentiation possible in a sector with an overwhelming regulatory push to standardise operations and structure?

In addressing the problem statement, three research questions were put forward. The questions below sought to provide background on the types of technology employed in the sector and highlighted the relationship between the brokerage houses and the regulatory authority.

**Research question 1a**  
Prior to introduction of IS-enabled sales and clearance platforms, what was the regulatory and governance regime in the sector?

**Research question 1b**  
What are the justifications for the imposition of regulatory measures by the sector’s governing bodies?

**Research question 1c**  
What forms of regulatory control were imposed on new entrants and incumbents in the brokerage sector?

It is important to consider the previous regime; its mode of coordination; and how it influenced the preceding structure of the sector. As David (1997) and Granovetter (2000) propose, the introduction of new technology or regulatory mechanisms is directly influenced by the historical relationships that existed prior to the introduction of the innovation. At times, this influence is so extensive that the introduction of a new system will reinforce the existing status quo rather than provide an innovative alternative within the sector.

Questions two, three, four and five enquired about the post-implementation phase of the introduction of regulatory mechanisms by the ASIC and the ASX. These questions addressed the mechanisms by which differentiation and regulatory-based standardisation co-evolved and influenced future growth trajectories in the stockbroking sector.

**Research question 2**  
At which points in the evolution of the sector did brokers aim for change and differentiation?

**Research question 3**  
What are the resultant structural options as brokers start to differentiate their operations from their peers?

**Research question 4**  
How do the niches present in the sector influence the outcome of the strategic differentiation by individual brokerage houses?

**Research Question 5**  
Does the cycle of change repeat itself when a new wave of change is introduced?
In addressing the questions above, a combination of population ecology and institutionalism theories were employed to develop an initial conceptual framework. Population ecology covers the selection, imposition and reinforcement of regulatory regimes and provides supporting explanations for the death of many stockbrokerages when the SEATS and CHESS regimes were introduced in the sector. The firm level adaptation and the differentiation strategies perspective was covered by the strategic choice and dynamic capabilities approach. Because the process of selection and adaptation occurs sequentially, analysis of the dynamics of the back and the front-office had to be undertaken in a similar manner. In addition, because the process of selection is complementary in nature, i.e. one cannot be analysed without the other dimension, a co-evolutionary perspective was employed to integrate the selection and adaptation perspectives.

The process of the research was iterative in nature. The structured case method adopted to gather and analyse the data resulted in an iterative analysis of the emergent conceptual frameworks. The preliminary conceptual framework (CF\(^1\)) provided the basic theoretical background on diffusion of IS technologies. It explained the process of adoption of IS-based trade and clearance platforms among the stockbrokers. The CF\(^1\) was used to develop a set of interview questions examining the dynamics of the back and the front-office operations.

The back-office operations of all brokerages were identical, therefore explaining the formation of stockbrokerage houses focused on the front-office operations of the firms. The front-office component of CF\(^1\) provided the initial interview protocol for case A. The findings of the interviews resulted in modification of CF\(^1\). The modified conceptual framework (CF\(^2\)) outlined the strategic differentiation responses of case A to the imposition of IS-based regulations by the ASX and the ASIC. CF\(^2\) was in turn used to develop the interview protocols and modified interview questions for case B.

Due to differences in the operations of case A and case B, the findings of the interviews with case B resulted in modifications in CF\(^2\) and this led to the development of a new conceptual framework. CF\(^3\) outlined case B’s differentiation strategies following the imposition of SEATS and CHESS and introduction of the Internet as a trade platform.
A similar process was repeated for cases C and D, resulting in development of CF\textsuperscript{4} and CF\textsuperscript{5} respectively. After developing CF\textsuperscript{5}, key constructs of CF\textsuperscript{2}, CF\textsuperscript{3}, CF\textsuperscript{4} and CF\textsuperscript{5} were compared to the proposed key constructs of CF\textsuperscript{1}. Areas that needed modification were amended and a new set of key constructs was added. This resulted in development of the finalised conceptual framework, CF\textsuperscript{6}. The finalised conceptual framework was the outcome of the research that produced a range of constructs influencing the differentiation outcomes of participating brokerage houses.

7.2.1 Dynamics of regulatory change in the stockbroking sector

Question one examined the relationships between the brokerage houses and the sector’s regulatory bodies. With regard to the justifications for imposing the regulatory regime, the participants stated that the technological regimes were first introduced as means to rationalise the operations of the sector.

The imposition of the regulatory regimes was seen as a necessity because the sector was part of the infrastructure of the Australian national economy (ASX, 2005g). Any mismanagement of funds, occurrence of insider trading or problems with the quality of market information disclosure to customers was seen as having negative repercussions in the economy. The imposition of rules and regulations was deemed necessary in maintaining cohesive operations in the sector. Therefore, rules and regulations were devised to allow a certain level of strategic choice in attracting and maintaining customers.

The imposition of the regulatory measures in the stockbroking sector was motivated by a sudden rise in the numbers of a brokerage type or an unforeseen event leading to a sudden fall in the overall value of the market. SEATS was imposed after the market crash of 1987. It was introduced to centralise the listing process and eliminate the floor traders from having an influence on how and when shares were listed.

Similarly, the introduction of CHESS was meant as support system for SEATS. The subsequent upgrades of CHESS were motivated by the sudden proliferation of online brokerages, which had not only contributed to the intense competition already present within the sector but also contributed to a rise in incidents of illegal trade, insider trading and misinformation for speedy profit. The use of IS technology to monitor and
perpetuate regulations throughout the back-office operations of the sector was a means to further enhance the effectiveness of the regulatory regimes.

7.2.2 Intention to differentiate
Questions two and three enquired about the extrinsic characteristics of the sector. Every brokerage house was required to standardise its operations based on the predefined framework developed by the ASX and the ASIC. While regulations were imposed to standardise the operations of the stockbrokerage houses, various brokerage types existed.

This meant that the further a brokerage moved towards a standardised type of operation, the more likely it was to have a specialist strategy or a specific type of client to look after. On the other hand, as the research indicated, the further a brokerage departed from the traditional full-service type of operations, the more likely it was to integrate elements of a full-service brokerage in its operations as it matured (cases C and D). In two specific cases brokers were experimenting with hybrid models, i.e. developing characteristics similar to the traditional and online models. This intention, however, was dependent on the type of customer they wanted to serve.

7.2.3 Niche composition and strategic differentiation
The fourth research question addressed the role of niches in the differentiation strategies of the stockbrokerage houses. The findings from the interviews revealed that after the changes in the back-office operations, a factor that influenced the composition of the brokerage houses was the role that individual niches played.

Niches are composed of customers that demand a specific type of broking service. Firms that have resources and the know-how to address these needs are usually attracted to the niche. In the stockbroking sector, there are two basic types of customers:

1. Customers who often trade in high volumes with high margins and who are mostly senior citizens. This group of customers prefers face-to-face interaction with brokers and access to market information rather than a simple trade platform (Afuah et al., 2001). They usually attract full-service brokerage houses that, besides the usual trade and clearance platforms, offer content and support for clients throughout the trade and clearance process.
2. The second customer group consists of younger clients or those who have the skills to source market information, from the Internet. These clients usually trade in low retail margins and trading for them is either a hobby or a way to earn an additional income. The non-advisory brokerage houses such as the discount brokerage houses and online brokerages are usually the firms that provide services to this group of customers.

In addition to organisational characteristics such as firm size, history and financial resources, customer groups and customer niches play an influential role in the formation of brokerage types.

7.2.4 Introduction of new technology
During the final stages of the research it became apparent that the governing bodies of the sector were in the process of implementing a new system that incorporated all the listing, surveillance and clearance requirements of the market in one systems package. Therefore, the final research question sought to determine whether the change mechanisms that occurred after the introduction of SEATS in 1987 would be repeated if a new wave of technological regime is introduced. Four themes emerged regarding the dynamics of change in this sector:

- interviews revealed that the ASX was in the process of introducing a new regulatory mechanism, the Corporate Law Economic Reform Program (CLERP9- Appendix I);
- a new level of training had become mandatory for all the brokers and advisors in the sector (appendix I);
- the ASX was in the process of introducing a new trade and platform system to replace CHESS;
- the new system was intended to integrate the ASX into a global exchange platform; and
- globalisation meant the ASX’s influence was about to change as new regulatory bodies would enter the sector.

The evaluators of this research were the managers of firms competing with the four stockbrokerage houses participating in the research. They indicated that a new sales and trading system might be introduced in Australia within three years. This system would link major financial markets in an electronic hub, enabling them to facilitate the cross-
country trade of shares and other financial products. The evaluators suggested that the imposition of the new global system would dilute the power of the present regulatory bodies. Therefore, these institutions were in the process of designing a new check and balance system to maintain the national regulatory mechanisms of the Australian market.

7.3 BRIDGING THE DOI AND IOI GAP

This section aims to provide a connection between the diffusion of innovation (DOI) and infusion of innovation (IOI) frameworks that were produced. This is with the view that the DOI model possesses merit if the focus of its analysis does not go beyond the individual firms as the initiators of IS-based change in the stockbroking sector.

IS-based change in the stockbroking sector was the result of the imposition of various regulatory measures by the sector’s governing bodies. Therefore, analysing the process of uptake of IS systems needs to be carried out from the perspective of the regulatory bodies and complemented with firm level strategic differentiation. As far as the individual broker’s choice and decision to differentiate is concerned, after addressing the requirements of the sector’s regulatory bodies, the DOI theory or at least elements of this theory can be utilised to address the dynamics of the front-office.

Employing IOI highlights this interplay between the regulated standardisation followed by firm-level strategic differentiation. By employing an IOI approach, the process of uptake of innovation is proposed to involve an uptake of IS-based change at both the macro and micro levels of analysis. Having these two levels present is important because, as the findings indicated, external structures and the individual brokerages have a complementary relationship, i.e. one cannot be analysed without the other.

7.4 CONTRIBUTION OF THE RESEARCH

This study contributes to the field of IS management research by developing an infusion of IS technologies framework. Finance markets and the quality of their operations are always a sign of an economy’s well-being (Aitken, 2001). Therefore, when this industry goes through cycles of change, it is critical to explore the reasons that prompted the change and the outcomes of the process. Aitken (2001) highlights a worldwide movement towards amalgamating trade markets through technology. This is further
coupled with the ever-increasing intent of the government to maintain efficiency while providing a safe trade environment. Understanding the impact of regulatory bodies on the adoption of IS innovations is crucial in an increasingly regulated world.

Dynamics of regulation and technology-based deregulation in stockbroking from an IOI perspective is not a well-researched area. Many works in the sector have concentrated on the technical and functional aspects of the technology and thus provided simplistic models of benefits (Loh et al., 1998; Shankar, 2002; Wilhelm, 2001; and, Chemmanur et al., 2002). Other studies have used a theoretical lens based on axioms that often focus on one individual firm as the basic unit of analysis while neglecting how external structures influence change (Chircu et al., 2000a; 2000b; Kauffman et al., 2000).

An additional significance that has resulted from having the stockbroking sector as a test case is the notion that concepts such as acceptance, use and diffusion all need autonomy and choice. In a sector where such strategic autonomy is limited or in terms of actual trade, non-existent, using a different paradigm to the DOI is indeed a far more suitable option. The Australian context of the stockbroking sector provides a unique attribute to the findings as opposed to other generic IS technology uptake models.

7.4.1 Contribution to the body of knowledge

This research contributes to the body of knowledge in a number of areas. The first contribution is an understanding of the nature and extent of regulatory factors that influence technology infusion in a sector that is characterised as highly regulated.

As Garcia et al. (1997) propose “the starting point of a researcher’s methodological choice within information systems, is not so much a problem of how many methods we employ or if those are of a quantitative or qualitative nature, but the ability to identify the philosophical and theoretical assumptions that lead to the choice of appropriate methodology” (p.444). Therefore, the IOI approach in questioning the axiomatic assumptions of the DOI theory proposed an alternative that is ontologically and epistemologically consistent with the emergent characteristics of the stockbroking sector.

The final contribution is that this research not only highlights the longitudinal evolution of the stockbroking sector but also proposes a framework to explain future
technological, economic and managerial changes that this sector may face. The framework will provide a mean for the academics and practitioners to predict and, to a certain extent, plan for their future strategies (Volberda 1996). In addition, the conceptual framework proposed in this research can provide the means to analyse sectors with similar characteristics to the Australian stockbroking sector. The proposed framework (CF\textsuperscript{6}) provides the theoretical basis for developing an alternative approach to mainstream DOI theory.

7.4.2 Managerial contributions
Managers are often inclined to think that they can alter the path of their organisation. The findings revealed that environmental selection influences brokerages’ strategic renewal behaviour. Exploring the environment by entering new markets or by undertaking new activities is an unpopular way of renewal unless in cases of extremely intense competition (case D) or in cases where, due to the small size of the brokerage, transformation of operations is more common despite being expensive (case B). These findings indicate that environmental selection and institutional effects, which place a limit on managerial leeway to renew the organisation, curb any possibility of change outside the predefined institutional regimes.

This study raises the important managerial question about whether there is one best trajectory of renewal or whether there are multiple successful renewal trajectories. The environmental selection perspective suggests one best fitting path of strategic renewal. This was valid in the back-office operations of the stockbrokerage houses. However, as observed from the emergent findings, there were multiple renewal trajectories which were directly related to the number of niches in the sector. This was similar to the propositions of the adaptationist perspective in which firms, after adherence to rules and regulations, differentiate based on the composition of the customer.

The results from this research show that firms can and do take multiple trajectories of renewal. On the basis of the data gathered from interviews and examination of the industry reports, it can be conjectured that firms have not found ‘one best path’ of strategic renewal.
7.5 LIMITATIONS

The analysis of the infusion of IS technologies in the Australian stock broking sector has a number of limitations. As the regulatory and technological indicators are mainly related to the stockbroking sector of the finance industry, developments in for instance the insurance, banking and other sectors in the industry were largely kept out of the analysis. In addition, the Australian context of this research could be considered a limitation if applying the findings of the research in a generic context. The ongoing IS-based change and blurring of boundaries between these sectors and other industries means the study should have also taken into consideration the dynamics of other sectors in the finance industry. This avenue of research will be exploited in the future.

The findings of this study would have been far more valuable if the stockbroking sector was compared to another rule-bound sector and a comparative analysis of the back and front-office dynamics of these sectors was provided. However, this comparative analysis will be part of future research that will compare the findings of the stockbroking sector to another rule-bound industry.

One of the limitations of a qualitative case study is that conclusions may be statistically limited because only a handful of cases are used to investigate certain research questions. This problem is compounded when host organisations for the cases are considered to be at the forefront of the particular phenomenon investigated. This research aimed to overcome this problem by inviting a number of stockbrokerages to participate. In addition, a number of themes were explored across all the participating firms in order to make more reliable generalisations.

7.6 RECOMMENDATIONS FOR FUTURE RESEARCH

Future research is required to unravel institutional and contingency effects on individual brokerage’s strategic renewal behaviour. This research focuses mainly on the macro level of analysis comprising inter-firm relationships and the interaction between the sector's regulatory bodies with member firms. One of the future research paths includes investigating to what extent intra-organisational relationships impact on the strategic renewal behaviour of the stockbrokerage firms.
Analysis of reports from the stockbroking sectors in neighbouring countries indicated that renewal patterns of stockbroking were significantly influenced by country-specific characteristics such as firm concentration ratio, the state of the economy and market size. These characteristics suggest different contingencies operating on the strategic renewal behaviour of individual firms. Future research is required to compare the regulatory and institutional forces affecting the composition of the stockbroking sectors in other countries such as Singapore and the United States.

This research focused on IS-based technology uptake in the stockbrokerage sector at the implementation stage. Thus, it will be useful to explore and compare the factors and processes of technology uptake within sectors that have the same regulatory characteristics as the stockbroking sector. The result of such a study should provide a set of generic factors that influence the direction of regulated change in rule-bound sectors.

In addition, studies such as this research are useful to examine the outcomes of government policies in regulating sectors or industries regarded as the infrastructure of an economy. The longitudinal nature of IOI enables examination of government policies and programs that are often medium to long term in nature.

The other avenue of future research is the development of a critical framework to examine the role of regulatory structures in shaping the structure of the sector. Critical studies aim to critique the status quo through exposure of what are believed to be deep-seated, structural contradictions within social systems. Lawson (1997) proposed critical realism as a philosophical environment within which to develop an explanation for the overwhelming influence of rigid structures and their effect in steering the direction of growth and diversification. The deep structures and mechanisms that make up the world are the primary focus of such ontology. In addition, Lawson (1997) proposes that “the world is composed not only of events and our experience or impression of them, but also of (irreducible) structures and mechanisms, powers and tendencies, etc. that, although not directly observable, nevertheless underlie actual events that we experience and govern or produce” (p. 8).

Critical realism argues for a relational perspective by examining both structures and agencies (or micro and macro contexts) of a social situation and, specifically, brings
time dependency into account (Dobson, 2002). Critical realism seeks to go beyond the description of phenomena to understand and explain the ‘why’ behind them by hypothesising the structures and mechanisms that shape these phenomena (Mingers, 2002).

This list of recommendations is by no means exhaustive, but should provide the foundation on which further contributions to knowledge can be made. In conclusion, the research presented in this thesis provides valuable insights and findings that can be further analysed by researchers, enabling them to explain the dynamics of infusion of information systems in rule-bound sectors.
REFERENCES


Burgess, L., Cooper, J., and Alcock, C. (2001). The Adoption of the Web as a Marketing Tool by Regional Tourism Associations (RTAs) in Australia. Proceedings of, Coffs Harbour, NSW.


R. Scott and M. N. Zald (Eds.), *Social Movements and Organization Theory*. Cambridge: Cambridge University Press.


APPENDIX A

Key Thesis Terms

Tables A1 and A2 provide definitions for terms and key words often used in this thesis. Table A1 contains a set of terms directly related to stockbroking.

Table A1 Key ASX terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASX</td>
<td>The Australian Stock Exchange (ASX) - The main Australian market place for trading equities, government bonds and other fixed interest securities.</td>
</tr>
<tr>
<td>ASX World Link</td>
<td>ASX World Link is the brand name of the service provided by ASX International Services Pty Ltd. The service allows an investor to invest in Participating International Securities listed on international markets in Australian dollars through an Australian broker.</td>
</tr>
<tr>
<td>ACH</td>
<td>The Australian Clearing House Pty Ltd (ACH), the subsidiary of ASX which clears options and futures traded on ASX</td>
</tr>
<tr>
<td>ASIC</td>
<td>Australian Securities and Investments Commission (ASIC) - The Government body responsible under the Corporations Law for regulating companies, company borrowings, and investment advisers and dealers.</td>
</tr>
<tr>
<td>CHESS</td>
<td>ASX's Clearing House Electronic Sub-Register System (CHESS) which provides the central register for electronic transfer of share ownership.</td>
</tr>
<tr>
<td>CHESS subregister</td>
<td>That part of an entity's register for a class of Approved Financial Products that is administered by ASTC and records uncertificated holdings of Financial Products in that class. Note: The register may be of shares, options, managed</td>
</tr>
</tbody>
</table>
investments or other financial products that are Approved Financial Products; including CDI's which are units of beneficial ownership issued over Principal Financial Products.

<table>
<thead>
<tr>
<th>SEATS</th>
<th>The stock exchange’s automated trading system (SEATS) provided for the trading of securities on ASX.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLERP 9</td>
<td>Corporate Law Economic Reform Program 9 (CLERP 9) - Continuous disclosure, the requirement that listed companies make timely disclosure of material information, lies at the heart of our market’s reputation of high integrity. Effective enforcement is a vital component of market integrity and ASX believes this additional power will complement and strengthen our successful supervision system.</td>
</tr>
<tr>
<td>AXISS</td>
<td>Australia's national inward investment agency (AXISS Australia), the Australian Government agency charged with positioning Australia as a global financial services centre.</td>
</tr>
<tr>
<td>FRC</td>
<td>The Financial Reporting Council (FRC) is an independent statutory body established by Part 12 of the Australian Securities and Investments Commission Act 2001 (the ASIC Act).</td>
</tr>
</tbody>
</table>
Table A2 provides a glossary of organisational and inter-organisational terminologies employed in this thesis.

### Table A2 Glossary of terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front-office</td>
<td>This refers to the operations and processes that are directly influenced by the interaction of the stock brokers and their clients. Examples of such processes are the sales, marketing and customer service strategies firms employ. The regulatory bodies’ presence in this dimension is only limited to maintaining fairness and transparency in disclosing market information. This term also refers to micro or firm level changes in the stock broking sector.</td>
</tr>
<tr>
<td>Back-office</td>
<td>This refers to the operations and processes that are directly influenced by the interaction of the stock brokers and the governing bodies in the stockbroking sector. Examples of such processes are the range of rules and regulations that dictate the type, manner and scope of use of approved set of sales and clearance platforms. This term also refers to macro or industry level changes in the stock broking sector.</td>
</tr>
<tr>
<td>Innovation</td>
<td>An Innovation is an idea, practice, or object perceived as new by an individual or other unit of adoption.</td>
</tr>
<tr>
<td>Innovation development process</td>
<td>The innovation-development process consists of all the decisions and activities, and their impacts, which occur from recognition of a need or problem, through research, development, and commercialisation of an innovation, through diffusion and adoption of the innovation by users, to its consequences.</td>
</tr>
<tr>
<td>Innovativeness</td>
<td>Innovativeness is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system. We specify five adopter categories, classifications of the members of a social system on</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
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<td>------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Population ecology (Selectionism)</td>
<td>Diversity of organisational forms is isomorphic to the diversity of environments. In each environment, in equilibrium, there is only one organisational form, the one the optimally adapted to the demands of the environment (this is the idea of realized niche!). Each unit in the environment faces the same environmental constraints hence has to adapt the same organisational structure to survive. Isomorphism results from selection - the environment selects only those organisations that optimally fit the environment.</td>
</tr>
<tr>
<td>Institutionalism (Adaptationism)</td>
<td>In institutional economics, final equilibrium outcomes are said to be dependent on the beliefs of agents and on the nature of institutions. Institutional economics defines institutions as any shared rule or sets of rules which guide individual behaviour by supplementing the conventional utility maximising calculation. Institutional economics reached its high point in the interwar period in the United States when it became the principal school of economic thought. New institutionalism, associated with the transaction costs school, is a latter day development of many ideas of the original institutional approach founded on a neoclassical view of economic behaviour.</td>
</tr>
<tr>
<td>Interactivity</td>
<td>Interactivity is the degree to which participants in a communication process can exchange roles in, and have control over, their mutual discourse.</td>
</tr>
<tr>
<td>Macro-level</td>
<td>In the context of this text, the macro-level concerns the relationship between regionally based initiatives and the emerging system of governance at the national, federal or European level.</td>
</tr>
<tr>
<td>Micro-level</td>
<td>Micro-level relationships involve the links between individual development bodies, firms and other actors and their</td>
</tr>
<tr>
<td><strong>Networks</strong></td>
<td>Networks are the essential means of linking one group of agents to others whom they affect. They are the intricate links based on trust and reciprocal patterns of communication and exchange between producers and clients that are necessary to ensure an economic capability and responsiveness in support of business development.</td>
</tr>
<tr>
<td><strong>Norm(s)</strong></td>
<td>Norms are the established behaviour patterns for the members of a social system. Opinion Leadership is the degree to which an individual is able to influence informally other individuals’ attitudes or overt behaviour in a desired way with relative frequency. A change agent is an individual who attempts to influence clients’ innovation-decisions in a direction that is deemed desirable by a change agency. An aide is a less than fully professional change agent who intensively contacts clients to influence their innovation-decisions.</td>
</tr>
<tr>
<td><strong>Observability</strong></td>
<td>Observability is the degree to which the results of an innovation are visible to others.</td>
</tr>
<tr>
<td><strong>Rate of adoption</strong></td>
<td>Rate of adoption is the relative speed with which an innovation is adopted by members of a social system. Variables affect its rate of adoption as (1) the type of innovation-decision, (2) the nature of communication channels diffusing the innovation at various stages in the innovation process, (3) the nature of the social system, and (4) the extent of change agents’ efforts in diffusing the innovation.</td>
</tr>
<tr>
<td><strong>Re-invention</strong></td>
<td>It is the degree to which an innovation is changed or modified by a user in the process of its adoption and implementation.</td>
</tr>
<tr>
<td><strong>Social system</strong></td>
<td>A social system is a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal. A system has structure, defined as the patterned arrangements of the units in a system, which gives stability and regularity to individual behaviour in a system.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<tr>
<td>-----------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Organisational adaptation</td>
<td>Adjustments made within a given organisation in order to create fit with the environment</td>
</tr>
<tr>
<td>Adaptation</td>
<td>The process by which an organisation makes adjustments in order to create a fit with the environment</td>
</tr>
<tr>
<td>Inter-organisational adaptation</td>
<td>Adjustments made between organisations in order to create a fit with the environment</td>
</tr>
<tr>
<td>Adjustment</td>
<td>Action initiated by managers in order to pursue goals of adaptation of enhanced performance.</td>
</tr>
<tr>
<td>Organisational adjustment</td>
<td>Actions initiated within an organisation such as changes in general procedures, personnel, organisational processes, organisational structure or overall firm strategy.</td>
</tr>
<tr>
<td>Inter-organisational adjustment</td>
<td>Actions initiated in relationships between firms such as changes in vendor/supplier arrangements, short-term alliances, cooperative marketing, distribution, or production arrangements, licensing and equity investments, an in joint ventures.</td>
</tr>
<tr>
<td>Flexibility</td>
<td>The firm’s ability to adapt as evidenced by the number of organisational and inter-organisational adjustments made.</td>
</tr>
<tr>
<td>Inter-organisational relationships</td>
<td>Agreements and interactions between organisations</td>
</tr>
<tr>
<td>Inter-organisational strategies</td>
<td>An integrated and coordinated set of inter-organisational commitments and actions designed to achieve competitive advantage.</td>
</tr>
<tr>
<td>The change agent</td>
<td>A change agent is an individual who influences clients’ innovation-decisions in a direction deemed desirable by a change agency.</td>
</tr>
</tbody>
</table>
APPENDIX B

Literature review

This review process was based on the selected publications for the period 1990 to 2006. In carrying out this review a set of keywords were used to short list the relevant articles and manuscripts. These key words that were selected in reviewing the articles were based on the terms that were identified in each of the reviewed articles. The key words included; “innovate,” “innovation,” “adopt”, “adoption”, “perception”, “implementation”, “assimilation”, “power”, “dependence”, “Institutional theory”, “population ecology”, “transaction cost economics”, and, “resource-based theory”. The articles that were principally selected described empirical studies of one or more organisations that innovate with IS.

The selected articles studied the adoption at industry, firm and sub-unit levels. The innovation(s) was to be specific and identified by name (e.g., open systems). Along the way, a number of articles were also reviewed that although did not fully address the developed criteria, did show potential in terms of the case, the depth and rigour of analysis and the manner by which the research method was designed and implemented. These articles were also included in the review process.

For each article the findings were reviewed and recorded based on the study type, the organisation(s) studied, the key findings, the theoretical interpretation, and in particular whether the study addressed: (1) the adoption process/approach (2) the adoption rationale (3) the implementation process/approach (4) implementation success/problems (5) organisational learning; and (6) other organisational impacts. A prototypical review is illustrated in Table B1.
Table B1: Prototypical review of empirical study

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Study type</td>
<td>Field study. Key informant (executive) interviews.</td>
</tr>
<tr>
<td>Organisation(s) studied</td>
<td>89 Hong Kong firms</td>
</tr>
<tr>
<td>Innovation(s) studied</td>
<td>Open systems</td>
</tr>
<tr>
<td>Key findings</td>
<td>Organisations are reactive more than proactive in adoption, and focus more on perceived barriers than on perceived benefits.</td>
</tr>
<tr>
<td>Theoretical interpretation</td>
<td>Factors explaining adoption model adapted from Tornatzky and Fleischer</td>
</tr>
<tr>
<td>Adoption process/approach (if included)</td>
<td>Adoption defined, but not otherwise studied</td>
</tr>
<tr>
<td>Adoption rationale (if included)</td>
<td>Studied indirectly through factors such as satisfaction with existing systems (negatively related to adoption)</td>
</tr>
<tr>
<td>Implementation process/approach (if included)</td>
<td>Not studied</td>
</tr>
<tr>
<td>Implementation success/problems (if included)</td>
<td>Not studied</td>
</tr>
<tr>
<td>Organisational learning (if included)</td>
<td>Not studied</td>
</tr>
<tr>
<td>Other organisational impacts (if included)</td>
<td>Not studied</td>
</tr>
</tbody>
</table>

The review was also intended to examine how different adoption and implementation processes/approaches and different adoption rationales might be associated with organisational and industry levels of analysis. As Table B2 identifies, the key constructs related to each key word is listed. In addition, to the keyword and key constructs, relevant references are listed.
Table B2 The review of literature on diffusion of (IS) technology based on set keywords.

<table>
<thead>
<tr>
<th>Innovation Processes</th>
<th>Characteristic accomplishments</th>
<th>Pertinent Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perception</strong></td>
<td>• Awareness</td>
<td>Agarwal <em>et al.</em> (1996; 2000)</td>
</tr>
<tr>
<td></td>
<td>• Familiarity</td>
<td>Blau <em>et al.</em> (1979)</td>
</tr>
<tr>
<td></td>
<td>• Predisposition</td>
<td>Boone (2000)</td>
</tr>
<tr>
<td></td>
<td>• Perception attribution</td>
<td>Brown <em>et al.</em> (1995)</td>
</tr>
<tr>
<td></td>
<td>• Sense making</td>
<td>Chau <em>et al.</em> (1997)</td>
</tr>
<tr>
<td></td>
<td>• Top Management Support</td>
<td>Grover <em>et al.</em> (1998)</td>
</tr>
<tr>
<td></td>
<td>• Technology champion</td>
<td>Kwon (1987)</td>
</tr>
<tr>
<td></td>
<td>• Training</td>
<td>Nilakanta <em>et al.</em> (1990)</td>
</tr>
<tr>
<td></td>
<td>• Links to propagating organisations</td>
<td>Pitcher <em>et. al.</em> (2001)</td>
</tr>
<tr>
<td></td>
<td>• Group norms</td>
<td>Rao <em>et al.</em> (1995a; 1995b; 1999)</td>
</tr>
<tr>
<td></td>
<td>• Attitude and behaviour</td>
<td>Rai (1997)</td>
</tr>
<tr>
<td></td>
<td>• Opinion Leaders</td>
<td>Roberts <em>et. al.</em> (2000)</td>
</tr>
<tr>
<td></td>
<td>• Change Agents</td>
<td>Tan <em>et al.</em> (2000)</td>
</tr>
<tr>
<td><strong>Adoption and Implementation</strong></td>
<td>• Rationale</td>
<td>Bakos (1991a; 1991b; 1998; 2000)</td>
</tr>
<tr>
<td></td>
<td>• Decision</td>
<td>Chau <em>et al.</em> (1997)</td>
</tr>
<tr>
<td></td>
<td>• Commitment</td>
<td>Cooper <em>et al.</em> (1990)</td>
</tr>
<tr>
<td></td>
<td>• Absorptive capacity</td>
<td>Dos Santos <em>et al.</em> (1995)</td>
</tr>
<tr>
<td></td>
<td>• Related knowledge</td>
<td>Grover <em>et al.</em> (1998)</td>
</tr>
<tr>
<td></td>
<td>• Diversity in Knowledge</td>
<td>Hart (1995)</td>
</tr>
<tr>
<td></td>
<td>• Technology compatibility</td>
<td>Kaufman (2000)</td>
</tr>
<tr>
<td></td>
<td>• Wealth</td>
<td>Kippendorf (1980)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loh <em>et al.</em> (1998)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Premkumar <em>et al.</em> (1994)</td>
</tr>
<tr>
<td><strong>Assimilation</strong></td>
<td>• Relative advantage</td>
<td>Brudney <em>et al.</em> (1995)</td>
</tr>
<tr>
<td></td>
<td>• Compatibility</td>
<td>Chircu <em>et al.</em> (2000)</td>
</tr>
<tr>
<td></td>
<td>• Complexity</td>
<td>Christenson <em>et al.</em> (1998)</td>
</tr>
<tr>
<td></td>
<td>• Trialability</td>
<td>Chua <em>et al.</em> (1997)</td>
</tr>
<tr>
<td></td>
<td>• Observability</td>
<td>Fichman <em>et al.</em> (1999; 2004)</td>
</tr>
<tr>
<td></td>
<td>• Usefulness</td>
<td>Grover <em>et al.</em> (1998)</td>
</tr>
<tr>
<td></td>
<td>• Appropriation</td>
<td>Irani <em>et al.</em> (2001a; 2005)</td>
</tr>
<tr>
<td></td>
<td>• Acceptance</td>
<td>Teppo <em>et al.</em> (2001)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Warren (2001)</td>
</tr>
<tr>
<td>• Formalisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Specialisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Vertical differentiation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Perpetuation of power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Regulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Rules and procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Traces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Directed growth</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Competition and transaction cost economics | • Transaction cost  
• Opportunity cost  
• Opportunism  
• Relative advantage  
• Profitability |
|------------------------------------------|-------------------------------------------------------------|
Barrett (1990)  
Boone et al. (1995)  
Carroll et al. (1994)  
Child et al. (1987)  
Child et al. (1996)  
Chircu et al. (2000a; 2000b)  
Dacin (1997)  
Damanpour (1996)  
Damsgaard et al. (2004)  
David et al. (1985; 1990; 1992; 1997)  
Delacroix et al. (1994)  
Economides (1996a; 1996b)  
Fleetwood, (2001)  
Hart (1995)  
Hart et al. (1997)  
Jayatilaka et al. (2003)  
Malone et al. (1994)  
Nagamatsu (2006)  
Whittington (1987)  
Whittington et al. (1999)  
Tables B3 and B4 describe the components of the DOI theory and outline the measures and constructs of the DOI theory.

Table B3 Components of the traditional approach to DOI

<table>
<thead>
<tr>
<th>Component</th>
<th>Definitions/Generalisation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition of DOI</strong></td>
<td>The process by which an innovation is communicated through certain channels over time among the members of a social system.</td>
</tr>
<tr>
<td><strong>Typical diffusion pattern</strong></td>
<td>Process starts out slowly among pioneering adopters, reaches “take-off” as a growing community of adopters is established and the effects of peer influence arise, and levels-off as the population adopters become exhausted, thus leading to an “S-shaped” cumulative adoption curve.</td>
</tr>
<tr>
<td><strong>Innovation characteristics</strong></td>
<td>Innovation possesses certain characteristics (relative advantage, compatibility, complexity, trial ability, observability) which, as perceived by adopters, determine the ultimate rate and pattern of adoption.</td>
</tr>
<tr>
<td><strong>Adopter characteristics</strong></td>
<td>Some potential adopters are more prone to innovate than others, and can be identified as such by their personal characteristics (education, age, job tenure etc.) Adopters can be usefully classified according to where they adopt relative to others (innovators, early majority, etc.)</td>
</tr>
<tr>
<td><strong>Adoption decision stages</strong></td>
<td>The adoption decision unfolds as a series of stages, flowing from knowledge of the innovation through persuasion, decision implementation and confirmation. Adopters are predisposed towards different kinds of differences (e.g. mass market communication versus word of mouth) at different stages.</td>
</tr>
<tr>
<td><strong>Opinion leader and change agents</strong></td>
<td>The actions of certain individuals (opinion leaders and change agents) can accelerate diffusion, especially when potential adopters view such individuals as being similar to themselves.</td>
</tr>
</tbody>
</table>
Table B4 Measures in DOI theory

<table>
<thead>
<tr>
<th>Measures</th>
<th>Conceptual definitions</th>
<th>Example Operationalisation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Earliness of adoption</strong></td>
<td>Relative earliness of adoption among populations of potential adopters</td>
<td>Five-item categorical scale (Rogers, 1995) Adoption/ non-adoption (Zmud 1992)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Elapsed time since adoption (Grover et al., 1998)</td>
</tr>
<tr>
<td><strong>Aggregated adoption</strong></td>
<td>The frequency of incidence of innovation adoption</td>
<td>Number of software process innovation adopted (Zmud, 1982)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of telecommunication innovations adopted (Grover et al., 1992)</td>
</tr>
<tr>
<td><strong>Internal diffusion</strong></td>
<td>The extent of use of an innovation across people. Projects, tasks or organisational units</td>
<td>Number of micro computers per employee (Bouchard, 1993)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Percentage of stores using scanners (Zmud et al., 1992)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Percentage of electronic switches (Grover 1998)</td>
</tr>
<tr>
<td><strong>Routinisation</strong></td>
<td>The extent to which an innovation becomes a stable and regular part of organisational procedures and behaviours.</td>
<td>Routinisation of Government innovation (Hart 1997)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Routinisation of Government Scanners (Zmud et al., 1992)</td>
</tr>
<tr>
<td><strong>Assimilation</strong></td>
<td>The extent of assimilation of an innovation (where assimilation extends from initial awareness to full institutionalisation).</td>
<td>Guttman-scale for healthcare innovations (Meyer et al., 1988)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Guttman-scale for software process innovations (Adler, 2001;2002; Fichman et al., 1997)</td>
</tr>
</tbody>
</table>
APPENDIX C

Review of IS diffusion in highly regulated sectors

The existing body of literature on diffusion of IS technologies in stock broking sector is not as developed as other sectors are. Therefore, the alternative was to search for literature on diffusion of IS technologies in sectors that possess characteristic similar to the stock broking sector. The industry sector that was to be used as a blue print should have been regulated. In addition, the introduction of innovative technologies should have been triggered by the governing bodies of the sector. Firm level innovation was to be only allowed after strict adherence to the overall rules and regulations imposed by the governing bodies. The sectors that closely resembled this framework were the health and the pharmaceuticals sector.

Therefore the review of the literature on diffusion of IS technologies in rule bound sectors started with journal papers on technological innovations initiated by the Government of Government appointed regulatory bodies. The journal papers reviewed are shown in Table C1.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Adoption/diffusion phenomenon</th>
<th>Major results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zmud et al. (1992)</td>
<td>Penetration of Information technology Within industrial firms</td>
<td>Strongly confirmed that IT-related Managerial interactions with the regulatory authorities dominate IT management processes in predicting IT penetration.</td>
</tr>
<tr>
<td>Oldenburg et al. (1999)</td>
<td>To examine the extent to which health promotion research is providing an empirical basis for the diffusion and</td>
<td>Health promotion was only possible within the guidelines developed and implemented by the governing authorities. These authorities inturn influence the type of technology and</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Institutionalisation of effective interventions, the manner by which it should be implemented.</td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Pearcey et al. (1996)</strong></td>
<td>There is a &quot;top-down&quot;, authoritarian, approach to dissemination of information and adoption of new technologies in health sector. The staff identified the area to be studied (devising a protocol for preoperative information-giving). The instruments used were semi-structured interviews and informal discussions and field notes. Rogers’ diffusion of innovation model was used to organize data collection and to analyse results. The model could not address the role of predefined protocols. An alternative perspective is needed to address the power relations in a sector.</td>
<td></td>
</tr>
<tr>
<td><strong>Stokes Berry (1994)</strong></td>
<td>Event history analysis of strategic planning study is designed to explain conditions under which state agencies adopt the innovation of strategic planning. Author also point to the agency’s orientation to its environment as a predictor. The author hypothesizes that agencies working closely with private sector businesses are more likely to adopt strategic planning because they import business best practices from their contacts.</td>
<td></td>
</tr>
<tr>
<td><strong>Brudney et al. (1995)</strong></td>
<td>Study of adoption of computer technology in municipalities with populations under 50,000 seeks to determine whether findings from larger local governments apply to smaller cities and towns. The finding suggests that adoption may be driven by environmental demands but a full-time manager can recognize computers’ potential uses and ensure that they are fully utilized.</td>
<td></td>
</tr>
<tr>
<td><strong>Tierney (2001)</strong></td>
<td>A review of the literature on the contribution of medical informatics to clinical For these reasons, the author concludes, few hospitals and clinicians have realized the promise</td>
<td></td>
</tr>
</tbody>
</table>
decisions, quality improvement and the use of practice guidelines finds that the value varies greatly with the type, quantity, and quality of information available. of quality improvement through EMRs. The EMR was designed by the Government and there was no other option for the health providing entities to use alternatives.

<table>
<thead>
<tr>
<th><strong>Green (2001)</strong></th>
<th>The author proposes that recently developed concepts in the study of evolution could serve as a framework for understanding the emergence of new medical technologies.</th>
<th>In the U.S., the evolution of medical technologies is tempered by two systems that attenuate the clinical risks of diverse approaches associated with emerging technologies: regulatory agencies and the tort liability system.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>James et al. (1991)</strong></td>
<td>The author provides a comparison of the diffusion of medical technologies under regulatory and free enterprise models. In each case physician and medical administrator manipulation foster ethical dilemmas and legal challenges.</td>
<td>The author provides a historical context for two imaging technologies: CT scanners and MRI devices outlining the influence of certificate of need (CON) requirements and the risks and challenges hospitals faced in meeting those requirements. The regulatory and financial barriers associated with CON engendered financial schemes and arrangements associated with unregulated outpatient imaging centres that clearly created conflicts of interests for physicians.</td>
</tr>
<tr>
<td><strong>Lehoux et al. (2000)</strong></td>
<td>In many countries, technology assessment is an important component of healthcare policy and medical practice. To date, however, technology assessments have</td>
<td>The authors contend in the cast of cochlear implants, most of the power and information was held by the manufacturers of cochlear implants, which cost between $25,000 and $40,000 per treated</td>
</tr>
</tbody>
</table>
not included reference to social, political, or ethical issues. The authors propose that technology assessments should include formal consideration of socio-political issues.

Baker et al. (2001) The article focuses on the effects of technological progress and the adoption of new technologies in light of an increasing managed care presence in United States. As it is widely believed that the majority of health care cost growth over the past 50 years is due to technological change, it is an important topic to research.

The use and the type of investments in health care are increasingly being regulated by the Government and this standardisation is proving detrimental to the survivability of the firms in the sector.

In addition to the review of literature on diffusion of IS technologies in rule-bound sectors, the following industry reports were also reviewed. These reports provided the preliminary background of the sector (Table C2).

Table C2 Reports on the Australian stockbroking sector

<table>
<thead>
<tr>
<th>Source</th>
<th>Date</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFR</td>
<td>2004</td>
<td>Top brokers break away from the pack. The Australian Financial</td>
</tr>
<tr>
<td>Source</td>
<td>Year</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>ASX</td>
<td>2003</td>
<td>ASX Supervisory Review Annual Report</td>
</tr>
<tr>
<td>ASX</td>
<td>2004</td>
<td>ASX Technology Management Services</td>
</tr>
<tr>
<td>ASX</td>
<td>2004</td>
<td>ASX World Link - Investing in Singapore</td>
</tr>
<tr>
<td>ASX</td>
<td>2004</td>
<td>ASXO Technology Management Services- Overview</td>
</tr>
<tr>
<td>ASX</td>
<td>2004</td>
<td>Data Centre and Technology Management</td>
</tr>
<tr>
<td>ASX</td>
<td>2004</td>
<td>The dual role of ASX</td>
</tr>
<tr>
<td>ASX</td>
<td>2004</td>
<td>Overview of CHESS - summary</td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>ASX</td>
<td>2005</td>
<td>ACH Clearing Rules,</td>
</tr>
<tr>
<td>ASX</td>
<td>2005</td>
<td>ACH Clearing Rules: Section 1</td>
</tr>
<tr>
<td>ASX</td>
<td>2005</td>
<td>Introduction and General Rules</td>
</tr>
<tr>
<td>ASX</td>
<td>2005</td>
<td>ACH Clearing Rules: Section 2</td>
</tr>
<tr>
<td>ASX</td>
<td>2005</td>
<td>Definitions and Interpretation</td>
</tr>
<tr>
<td>ASX</td>
<td>2005</td>
<td>ASX Corporate Governance</td>
</tr>
<tr>
<td>ASX</td>
<td>2005</td>
<td>ASX Market Rules</td>
</tr>
<tr>
<td>ASX</td>
<td>2005</td>
<td>ASX Operating Rules effective 11</td>
</tr>
<tr>
<td>ASX</td>
<td>2005</td>
<td>March 2004,</td>
</tr>
<tr>
<td>ASX</td>
<td>2005</td>
<td>Principles of Good Corporate</td>
</tr>
<tr>
<td>ASX</td>
<td>2005</td>
<td>Governance and Best Practice</td>
</tr>
<tr>
<td>ASX</td>
<td>2005</td>
<td>Recommendations</td>
</tr>
<tr>
<td>ASX</td>
<td>2005</td>
<td>Why and How ASX supervises the</td>
</tr>
<tr>
<td>ASX</td>
<td>2005</td>
<td>Market? Sydney: The Australian Stock</td>
</tr>
<tr>
<td>ASX</td>
<td>2005</td>
<td>Exchange Limited</td>
</tr>
</tbody>
</table>
APPENDIX D

The participants

Four brokerage houses each representing the types of brokerages operating in the sector agreed to participate in this research. A total of sixty members of the four participating brokerages took part in the interviews. The participating members of the brokerage houses were selected from strategic, operational and tactical levels of management. The rationale for selecting these groups was to explore the depth by which regulations penetrate the operations of the brokerage house and how each of the strategic, operational and tactical levels of analysis reacts to the rules and regulations. The composition of the participants is outlined in Figure D1.

Table D1 Composition of the front-office participants

<table>
<thead>
<tr>
<th>Firm</th>
<th>Participants</th>
<th>Dates</th>
<th>Outcome</th>
</tr>
</thead>
</table>
| Case A | Director x1  
Senior Trades Manager x 2  
Senior Trader x 4  
Technology Manager x 2  
Audit Manager x 2  
Senior Sales and Customer Service Manager x 2  
Brokers x 5  
Manager for Research services x 3 | All were interviewed during April-July 2004 | CF2     |
| Case B | Director x1  
Senior Trades Manager x 2  
Senior Trader x 2  
Technology Manager x 1  
Audit Manager x 2  
Senior Sales and Customer Service Manager x 2  
Brokers x 5  
Manager for Research services x 2 | All were interviewed during July-December 2004 | CF3     |
| Case C | Senior Trades Manager x 1  
Senior Trader x 2  
Technology Manager x 1  
Audit Manager x 2  
Senior Sales and Customer Service Manager x 2  
Brokers x 5  
Manager for Research services x 1 | All were interviewed during December 2004-March 2005 | CF2     |
| Case D | Senior Trades Manager x 2  
Senior Trader x 1  
Technology Manager x 1  
Audit Manager x 1  
Senior Sales and Customer Service Manager x 2  
Manager for Research services x 1 | All were interviewed during March 2005-September 2005 | CF3     |
An additional five participants from the sector’s regulatory bodies (the ASX and the ASIC) also took part to further elaborate on the dynamics of the back-office operations of the brokerage houses and the manner by which the policies and procedures are communicated and enforced by the sector’s regulatory bodies. Further information on the composition of back-office participants is provided in Table D2.

Table D2 Composition of the back-office participants

<table>
<thead>
<tr>
<th>Department</th>
<th>Role</th>
<th>Participants</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory Audit</td>
<td>Monitoring of daily operations of the ASX and member</td>
<td>• Director</td>
<td>Back-office component of CF&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>brokerage houses</td>
<td>• Senior Manager</td>
<td></td>
</tr>
<tr>
<td>Technology Management</td>
<td>Maintenance of technology networks between the ASX and</td>
<td>• Director</td>
<td></td>
</tr>
<tr>
<td></td>
<td>the brokerage houses</td>
<td>• Senior Manager</td>
<td></td>
</tr>
<tr>
<td>Broker Service Management</td>
<td>Training and certification of individual brokers</td>
<td>• Senior Manager</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX E

Participating evaluators

Evaluation process is one of the most important techniques for establishing the credibility of qualitative data and the resultant models and theoretical frameworks based on the qualitative findings. In this process, the data record, interpretations, and reports of the inquirer are reviewed by the members or participants who provided the data. These participants agreed that their perspectives have been adequately represented and that the conclusions reached are credible from their perspective. Upon confirmation of the transcripts and the findings, the participants were informed that the final conceptual framework and the process that led to the development of the model were to be evaluated by an independent group of participating evaluators. The process of ethics with regard to anonymity of the participants in the interview process was repeated at the evaluation stage. Neither the initial participants nor the evaluators were identified at any stage of the research.

A total of fifteen evaluators agreed to take part in the research (Table E1). The evaluators consisted of participants that at the data collection stage of the research had declined to be interviewed. In addition, the evaluators consisted of practitioners that were introduced to the researcher by the original participants. The transcripts and interview notes were later analysed based on the coding and codes were selected based on the hierarchical and relational ordering of the concepts identified by the original group of participants.

The evaluators each were given an illustrated version of the findings. They were then asked to evaluate the following questions and in case were further elaboration was needed they were asked to contribute freely.

- Does the developed theoretical model portray the dynamics of the sector effectively?
- Does the study show how the researcher validated the evolving model by comparing it to the data?
• Are the findings accurate?
• Does the proposed conceptual framework provide a valid picture of key influencing factors that shape the growth trajectories in the sector?

Table E1 illustrates the composition of the evaluators.

### Table E1 Composition of the participants

<table>
<thead>
<tr>
<th>Interview sessions</th>
<th>Role</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>Senior Manager of the direct competitor to Case A - x 2</td>
<td>All three were interviewed during August 2005</td>
</tr>
<tr>
<td>E2</td>
<td>Senior trades person from cases A, B, and D. Had not participated in the earlier phases of the research – x2</td>
<td>All three were interviewed during August 2005</td>
</tr>
<tr>
<td>E3</td>
<td>Manager in the ASX trades and security – x1</td>
<td>Telephone Interview in August 2005</td>
</tr>
<tr>
<td>E4</td>
<td>Senior trader- Competition to case A – x1</td>
<td>Telephone Interview in August 2005</td>
</tr>
<tr>
<td>E5</td>
<td>Senior trader- Competition to case C – x1</td>
<td>Telephone Interview in September 2005</td>
</tr>
<tr>
<td>E6</td>
<td>Senior trader- Competition to case D - 2</td>
<td>All the evaluators in this group were interviewed during October 2005</td>
</tr>
<tr>
<td>E7</td>
<td>ASX technology management - 1</td>
<td>Telephone Interview in October 2005</td>
</tr>
<tr>
<td>E8</td>
<td>Senior trades person- Manager in charge of change in case C- Not involved in the earlier phases of the research - 1</td>
<td>interviewed during October 2005</td>
</tr>
<tr>
<td>E9</td>
<td>OM technology- Finland - 1</td>
<td>Telephone Interview in November 2005</td>
</tr>
<tr>
<td>E10</td>
<td>OM technology- London - 3</td>
<td>Telephone Interview in November 2005</td>
</tr>
</tbody>
</table>
A review of the literature suggests that the diffusion of IS technologies is affected by several factors acting both singularly and in concert. These factors include the:

- then extant technology;
- source of the technology and/or the information;
- trigger for the introduction of the ICT;
- then extant structure of the industry;
- inter-firm relationships;
- coordination mechanisms operating in the industry; and
- ability of industry members to satisfy the structural and process changes

Each of the issues constituted a section within which a set of interview questions were developed. The answers to the interview questions is believed to highlight the role each of the above factors play in influencing the extent and scope of firm level differentiation in the sector.

The factors identified in the research can be linked to the research questions. For example, the extant structure of the industry is a general theme aspect of the research whereas the extant structure of the industry refers to research question 1a, 1b and 1c. The “extant structure” and the “extant technology” address the role of the regulatory structures in developing and initiating the change process. In interview questions that are asked in the context of the “The ability of industry members to satisfy the structural and process changes”, address the post implementation of SEATS and CHESS and the front-office differentiation strategies employed by individual brokerage houses.

Figure F1 outlines the classification of the research questions.
The then extant technology
The aim of this section is to identify the then present technology before the widespread use of IT in the operations of the company. The retrospective analysis will not go before mid 1990s since the bulk of technological and institutional changes started from that period. Once the technological institutions are identified one can then explore the influence this technological regime has had on the industry structure and operations.
- What has been the type of technology your broker been using?
- To what extent has ICT been integrated in the operations of your brokerage
- What are the standards and communication options in relation to ICT in the industry?

The then extant structure of the industry
- The inter-firm relationships
- The coordination mechanisms operating in the industry

This section is an extension of the section 2.3 where once the sources of change are identified, the aim is to put together the structure of the industry and retrace the process through which this structure transformed as brokers experimented with various options in their disposal. The questions should refer to the inter-firm relationships, the coordination mechanisms operating in the industry, Complexity, Stability, Centrality, Connectivity and Size.
- In your view how is the industry structured?
- What are the existing network structures?
- What associations should industry members join?

The source of the technology and/or the information
The questions should refer to nature of dependence, interdependence, adaptation and power. Once the source of technology/ information is identified, the relationships can then be examined to see whether it is dominated by a select group of brokers or whether the push for change is triggered by a coalition of smaller brokers. So the ultimate aim is to see if the trigger is in fact resulting in diffusion or translation.
- What changes has the industry gone through in the 1990s?
- What created the initial awareness of the possibility of using ICT in your brokerage?
- How did the company identify ICT opportunities?
- What made you choose the specific system you are working on now?
- Before the adoption of ICT in your operations, what was the expectation you had of ICT?

The ability of industry members to satisfy the structural and process changes
The ability to satisfy the environmental demands is the main criteria that signify legitimacy and survival in the industry. This refers to flexibility and ability to transform the firm to change with the environmental ripples as the domains or boundaries of industries expand or contract.
- When you considered the uptake of ICT for the first time, what were the standards and communication options?
- What processes did your brokerage go through to comply with the industry standards?
Development of interview questions
The layout and physical attractiveness of the questionnaire were considered to be of vital importance to obtain a reasonable response rate. According to Zikmund (1988) good interview question design is a key to obtaining good interview outcomes and warranting a high response rate. In addition, the logo of Edith Cowan was inserted on the front page of the questionnaire to raise the profile of the research, as respondents are highly likely to respond to interviews that are undertaken officially by a university (Jones et al., 1980).

In order to carry out the research the research question are then set in an order to start from a general theme of DOI and later refers to the industry as well as cluster level of changes highlighting the move from DOI to IOI. The research questions started from a general perspective questioning the patterns of diffusion across the stockbroking sector the questions later became more specified while at the same time allow exploration using selectionist and adaptationist perspectives.

In the initial set of interview questionnaires, the first section started with this researcher’s explanation of the research, its goals and aims to the participants and also explaining the ethics regulation of the university and its provisions for participant anonymity at all times.

In the second section of the interview questionnaire, the participant is asked to provide the basic information about the brokerage. This is important to develop a correlation between size and legitimacy as the research progresses. The profile should include:

- the basic service provided by the broker
- the size and the extent of the network the broker is a part of
- organisational chart

In the third section of the interview questionnaire, the aim of this section is to identify the then present technology before the widespread use of IT in the operations of the company. The retrospective analysis did explore the dynamics of the sector prior to SEATS since the bulk of technological and institutional changes started from that period. Once the technological institutions were identified, the questions were further
targeted at exploring the influence this technological regime has had on the industry structure and operations.

The fourth section’s questions referred to nature of dependence, interdependence, adaptation and power. Once the sources of technology/information were identified, the relationships were examined to see whether it is dominated by a select group of brokers or whether the push for change is triggered by a collusion of smaller brokers. So the ultimate aim is to see if the trigger is in fact resulting in diffusion or translation.

In the fifth section of the interview questionnaires, sources of change were identified. The aim is to put together the structure of the industry and retrace the process through which this structure transformed as brokers experimented with various options in their disposal. The questions referred to the inter-firm relationships.

The sixth section of the interview questions was targeted at the ability of industry members to satisfy the structural and process changes necessary to accept and take advantage of the new technology. This referred to flexibility and ability to transform the firm to change with the environmental ripples as the domains or boundaries of industries expand or retract.
PARTICIPANT CONSENT FORM

Infusion of Information Systems in Stockbroking Sector

(Please fill in the form below and return it in the self-addressed envelope provided.)

I _____________________________________________________________
(The participant’s full name)

have been informed about all aspects of the above research project and any questions I have asked have been answered to my satisfaction.

I agree to participate in this activity, realising that I may withdraw at any time. I also understand that at any time I can refrain from answering any question(s) that I feel may jeopardise my (or my company’s) position.

I agree that the research data gathered for this study may be published, provided I (and any organisation or employer that I am associated with) am not identifiable by name / understanding that I may be identified (delete whichever is not applicable).

I understand that I will be interviewed and the interview will be audio recorded. I also understand that the recording will be erased once the interview is transcribed. If I wish, the interview can also be done without the audio recording and be carried on “off-the-record”.

I hereby agree to take part in the above-named study.

Participant: _______________________________ Date: ________________

Investigator: ______________________________ Date: ________________
Information Letter to Participants

Dear

As a requirement of my Ph.D., I am undertaking an investigation to explore the diffusion of Information and Communication Technologies in Australian Stockbroking sector. The title of the study is “Infusion of Information Systems in Stockbroking Sector”. This study entails looking at the diffusion of Information Technology (IT) in the Stockbroking industry and the resultant structural changes as IT transforms the industry.

The reason for this letter is to invite you to participate in this study. The study will entail collecting data through face to face interviews with a number of stockbroking firms in Perth for a period of 9 to 18 months. Face to face interviews are intended to take approximately 30 minutes to 1 hour depending on the participant, during which, questions will be discussed in relation to the participant’s opinions on areas like industry change, industry dynamics, inter-organisational relationships and future trends in the industry. The interviews will be audio taped, however the participant(s) may choose not to answer some of the questions and are free to withdraw their participation at any time if they wish. The time and place of the interview is subject to the participants’ choice.

The interview procedure may be more than a one-time process and it may be necessary to carry out further interview sessions subject to participant’s acceptance and availability. Any information given to the Investigator by the participant whether in writing, by e-mail or verbally, will be kept strictly confidential and will only be used for the purpose of the project. Names or ranks of the participant(s) are kept secret and each participant is given a serial code to be used in the transcripts. Upon transcribing the interview, the audiotapes will be erased. Participants will also receive a copy of the published research findings when they become available. Please note that should you
decide not to participate in this study, your current position will in no way be prejudiced by your refusal to do so.

The potential benefits of the study will be the definition of key determinants of in diffusion of ICT and the model developed as a result of your participation will assist future research in the industry dynamics as a result of technological development within the wider context of regional economic development and business community inter-relationships.

Please keep this letter for your information and kindly return the completed consent form in the self-addressed envelope provided. Any questions concerning the project entitled “Infusion of Information Systems in Stockbroking Sector” can be directed to:

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If you have any concerns about the project or would like to talk to an independent person, you may contact:

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Your kind help in making this study possible is greatly appreciated

Thank you,

Hosein Gharavi
Preliminary Interview Draft Sheet- Used for the front-office interviews

Interview Number: _____________________
Date: ________________________________
Place: _______________________________
Statement of Consent signed: Y/ N

1.0 Details of interview:

Introduce myself and pass over contact details
Interviewee:  Name (or code) ____________________
            Position __________________________
            Department _______________________

Explain the procedure of the interview
Any question before we start?

2.0 Context of the research:
(Explanatory note 1) Interviewer has to identify himself and the following points have to be mentioned before the interview commences.

Explain:

• Background to the study
• Purpose of the interview
• Confidentiality of the interview (coding, storage of data etc)
• Get permission to record data

2.1 Company Profile
(Explanatory note 2) The participant is asked to provide the basic information about the brokerage. This is important to develop a correlation between size and legitimacy as the research progresses. The profile should include:

• The basic service provided by the broker
• The size and the extent of the network the broker is a part of
• Organisational chart
2.2 The then extant technology

(Explanatory note 3) The aim of this section is to identify the then present technology before the widespread use of IT in the operations of the company. The retrospective analysis will not go before mid 1990s since the bulk of technological and institutional changes started from that period. Once the technological institutions are identified one can then explore the influence this technological regime has had on the industry structure and operations.

- What has been the type of technology your broker been using?
- To what extent has ICT been integrated in the operations of your brokerage?
- What are the standards and communication options in relation to ICT in the industry?

2.3 Source of Technology/information

(Explanatory note 4) The questions should refer to nature of dependence, interdependence, adaptation and power. Once the source of technology/information is identified, the relationships can then be examined to see whether it is dominated by a select group of brokers or whether the push for change is triggered by a collusion of smaller brokers. So the ultimate aim is to see if the trigger is in fact resulting in diffusion or translation.

- What changes has the industry gone through in the 1990s?
- What created the initial awareness of the possibility of using ICT in your brokerage?
- How did the company identify ICT opportunities?
- What made you choose the specific system you are working on now?
- Before the adoption of ICT in your operations, what was the expectation you had of ICT?
- Describe what happened during this period?
- What would you do differently if you could do it all over again?

2.4 The then extant structure of the industry

(Explanatory note 5) This section is an extension of the section 2.3 where once the sources of change are identified, the aim is to put together the structure of the industry and retrace the process through which this structure transformed as brokers...
experimented with various options in their disposal. The questions should refer to the inter-firm relationships, the coordination mechanisms operating in the industry, Complexity, Stability, Centrality, Connectivity and Size.

- In your view how is the industry structured?
- What are the existing network structures?
- What associations should industry members join?
- Are the associations actively promoting the use of standards?
- What is the role of Australian Stock Exchange?

2.5 **The ability of industry members to satisfy the structural and process changes necessary to accept and take advantage of the new technology**

*(Explanatory note 6)* The ability to satisfy the environmental demands is the main criteria that signify legitimacy and survival in the industry. This refers to flexibility and ability to transform the firm to change with the environmental ripples as the domains or boundaries of industries expand or retract.

- When you considered the uptake of ICT for the first time, what were the standards and communication options?
- What processes did your brokerage go through to comply with the industry standards?
- Who dictated the industry structure?

*Section to be completed by the interviewer:*

3.0 **Debrief and Feedback:**

- Any thing we have not covered yet?
- Notes on non-verbal interaction during the interview
3.1 Summary of the interview

4.0 Reflections on the interview

(Explanatory note 7) What has been achieved and what should be the direction in carrying out the next interview session.

Points to remember when interviewing this person again.
Sample interview transcript

**Q** So please tell me about yourself and your working experience.

A) I have been in this industry for 11 years now and I started off in the back-office and basically I have seen how technology has changed over the last ten years going from certificates to paperless certificates. I currently sit on the two senior committees at … (name of the company is withheld)… being the steering committee which is part of the management and also the committee which covers IPO’s and all that.

**Q** Could also tell me about the company you are in. Are they stockbrokers? If so what sort of service do they provide and what is the scope of their service as compared to other stockbrokers in the industry?

A) We at … (name of the company is withheld)...have a vast range of services for clients ranging from buying and selling shares which encompasses the stockbroking side of things. We also have the financial planning side of things as well as the corporate department that does all the work. So those are the main areas that we cover basically.

**Q** Does that mean you have a license to trade by CHESS as well?

A) Yes we do.

**Q** And if I am not mistaken, SEATS was a systems used before CHESS is that correct?

A) SEATS was already implemented when I had joined.

**Q** Now what is the size of your firm compared to the other entities in the industry?

A) Well the company as a whole network is pretty large actually. We have got branches throughout Australia with billions of dollars under management. We are actually, in WA, we are actually a franchise business, so each branch is a franchise owner with the head office being in Queensland.
Q) How many of these franchises do you have in WA?

A) In WA, there is a Perth Branch and a Bunbury Branch as well. So in Perth there are probably about 30 advisors, 50 staff.

Q) During your experience here, what sort of technologies have you seen coming and going?

A) Ok, Well I started here probably in 1991-1992 where client could buy and sell shares and pretty much there was no settlement period. So right now we have got a settlement period of t+3 where client buys and sells stock and has to deliver and pay the money by t+3 days. When I started, there was none of that, so they paid when they did and/or delivered the stock when they did. Everything was stipulated all on paper and made it pretty risky because you had to keep it in safe and we could not just mail it to you because we had to register mail it. And so

Q) And it took a while to change the actual ownership?

A) Yes it did take a while because we had to step-deck it, to get it done to get your certificate re-issued out to you again so if you wanted to sell your stock whilst it was moving, you were taking the risk of when were you taking your certificates.

Q) And so you don’t have these documentations any more? Or do you still have the option to choose?

A) No, not at all. It is all certificated now. There is 2 forms basically; brokers-sponsored clients, whereby we keep your holdings electronically, administered by CHESS and there is also the issue-sponsored or the basic freelance, where you got an ID number where it is not hooked to any actual broker at all, so you can take the number and sell it through any broker. There are advantages and disadvantages of being issuer-sponsored holder. Firstly if you want to sell something you need that number and the advantage is that I suppose you can go any where and sell it but you can still do that being a broker as opposed to a client, because you can just sing a piece of paper and within 48 hours the stock is transferred to whichever broker you sold it through. If you are a broker-sponsored client, if there is bonus issue or dividend
reinvestments or anything like that, your holdings are updated immediately— all your holdings— so you get a full block of stocks and they all have the same ID number and it does not go missing because it is all held through us. We basically do the back-office job for you and it is more secure and no one can steal you identity for that matter.

**Q)** *When I talked to the ASX people, they told me that as far as they are concerned, the Internet basically has affected the operations of the brokers rather than having a direct impact on the ASX. Do you agree with this and if so to what extent has Internet transformed the processes brokers carry out in their normal trade routine?*

**A)** OK…. When ….Well I suppose the Internet comes in two places. First you got the discount brokers that are Internet-based and then you have client-information source which is the Internet race on what we can provide clients with. Covering the first one, when discount brokers first came out like (name of two discount brokers are withheld) being the main ones, being a full-service broker, we were honestly quite petrified, did not know what was going to happen, we were scared of losing clients because it was a substantial discount to what we were offering our clients as far as brokerage was concerned.

**Q)** *You are a full-service provider?*

**A)** That is correct. We pick up the phone, speak to our clients and advise them basically. We take them through the way until the end whereas a discount broker would be calling them up and you can sell through the bank or the Internet at a marginal cost, but what we found was that, I mean I lost probably 5 of your biggest clients when it first started but within 3 to 4 month they all came back to me again. They needed someone to speak to, they needed someone to walk them through the things and so you know that was a blessing in disguise. It split two clients up basically, you had high net worth client, professionals and then you had mums and dads who go to market here and there so the moms and dads or occasional traders went to discount brokers and the high net worth clients who wanted the service stayed with us. I mean I am a bit biased because I am full-service broker but I have been through it all and I have seen people come back to me saying…*
Q) **Do you think as far as your niche is concerned, generally clients with higher net worth choose full service brokers like yourself whereas others may go for a discount service?**

A) That is a factor but it also depends on how knowledgeable you are in what sort of investment you should go for. For instance you want to buy shares of company X and you know you want to buy company X shares, so you don’t necessarily need advice because the choice is already there, I mean all my clients can do that but they still prefer to come to me and speak to me. They say the level of service is important and I think in the broking industry the service is still very important in broking industry. A good example would be the banks. You go for a home loan, you go to speak to a bank manager, it is far more effective than speaking to someone with an 1800 number he would not know you from a bar of soap and that is the effect you are going to get. People want to get their comfort zone, it’s their money, it’s their investment, and they want to feel comfortable to talk to someone who knows what they are doing.

Q) **Is it true to say that what the Internet has done is that it has reduced the barriers so that a lot of brokers have been able to get in, then do you think information about the market and service level is still the tool to keep you safe from any potential competition?**

A) Yes that is right. I mean we have built a strong network over the years with people we know, brokers, companies’ directors different sources of information that you just cant pull out on the general information sheet of a brokerage for example. You still need a certain level of knowledge to digest the information, to read the market which is more important as well. It takes years to build your knowledge up, reading the screen and knowing the buyers and sellers and scales of trade. So anyone can be broker but how good they are, that’s the question. Going back to the Internet, it is…well it has made our jobs a lot easier as far servicing of our clients is concerned because clients can now have access to our research which they read and a lot of them may not, because they rather get the information from us. It is password protected, all clients have access to their portfolios and all portfolios on the screen so rather than the old days when they had to call wanting to know their position not knowing where they are going and get monthly statements, it is all posted on the
Internet for them, password protected so they can pull it up and it is updated and they like that.

Q) Besides the Internet, what about the regulatory bodies? Have they had any sort of influence on how the industry is structured?

A) We have been through one of the hardest time in the industry. The industry is regulated, because the ASX, ASIC and FRS are there to protect the clients and it is people’s money and the bottom line is it is other people’s money so it has to be very very regulated no matter how simple the system may be with technology and all that. We went through hardest change in March with FSR changes, the IPS 146 where all brokers have to be competent and what they did is you have to sit for exams so that nobody just walks into a broking firms and say I want to be a broker so we have a new certification process which is great and now it knocks off the ones who are not professionally competent. Well I am advising you on your money matters and I am sure you would prefer me to be competent.

Q) Besides regulation, suppose when the Internet came, where you faced with a situation where a brokerage firm or a number of dominant brokerage houses influence the way the industry grows?

A) Not really, it is probably happened at once.

Q) When the Internet came then what made you go for it? Was it because every body else was doing it?

A) It was, it was like colour TV coming out. New technology that makes our job easier in communicating with our customers and getting more efficient. It is not really the industry or other people that have the final say here. It is rather the people here that make the decision whether to take a technology or not. In our case we thought Internet was increasing our efficiency in providing a good customer service. There are 30 to 40 dealers in this office. To basically keep them happy here and make their job more efficient and help them in doing business you have to provide all of that. So you always have to look for better ways to fine-tune your business. So if there is
technology out there to make your business more efficient, you would get it. The Internet is one of it.

**Q** How has the Internet changed your relationship with other partners like banks, ATO and other institutes like a value chain sort of concept?

A) I think it has strengthened it and it has made it more clear cut because with the Internet comes the emails. We are able to correspond with emails so you have a hard copy of the emails and therefore you can then use them as documents in case of any misunderstanding. When you give instructions to the back-office or to a bank to transfer funds, it is there and they have to do it because it is a not phone call any more, it is a document.

**Q** In general again with the new systems coming in, do your partners influence your uptake of innovative systems or practices in any way?

A) There are always ideas flowing through. I mean one of it is we use a lender called …. (Company name withheld)… and because we do a fair bit of business with them they were willing to implement this system where we could get updated information on our system which was totally separate to theirs and have a link, basically updated client portfolios on the …. (Company name withheld)…clients and where they stand and so forth.

**Q** The other thing I want to know is well, as you know the number of banks in Australia are fairly limited, do you think in the long term we are going to have some thing like uniformity in practice whereby all the brokers work in the same manner because all the contacts and partners you have are going to be the same any ways?

A) They had that and then it was deregulated long ago. Basically we could charge what we wanted and it was not capped. Every one was charging 2 ½ % and clients were willing to pay that. Now you know I charge 2 ½ % and client says well the guy down the road charges me 1% …so I believe the real estate business was through that a year ago and so although technology makes our practice the same price and information makes us different. Well price…we did a survey here and it was brought up that service came up as number one rather than cost which was
interesting. Although we are a brokerage, they actually put service, like being able to contact the broker as priority number one or two.

**Q** What other factors did our survey identify as the ones important to your customers in choosing a broker?

A) Well you know…there was ‘research’, ‘level of service’, ‘how much they were helped with the broker’. So it was a good mixture.

**Q** The other thing I want to ask is you know when the Internet came into the industry, well I have done some study in some other service oriented industries and it was fond that when the Internet had been integrated in the industry, some brokers or agents instead of providing the same service by Internet had either identified a specific niche or had focused on a specific process in the operations of the industry. During your experience in this industry, have you come across such a phenomenon?

A) There is such a trend. …. (Company name withheld)...is one of them, (Company name withheld)...is also another example. They are all broking but specialised brokers covering a niche market. …. (Company name withheld)...has a different structure to their business whiles the other broker I named has a similar structure to us but I think their niche is sort of more focused. So if you want to branch out of the mainstream like the big brokers you know, you have to be different and it is happening already.

**Q** What about some brokers basically focusing solely on information rather than on trade? Have you come across such a case?

A) Well I don’t think they’ll be brokers doing that…well you got the …. (Company name withheld)...and there is so really sonly so much information to produce…

**Q** Suppose if a brokerage says look instead of employing 5 people doing market research for my brokers, I will outsource the research process to a company who specialises in this. Have you come across such a case?
A) It has been done. They’re people like …. (Company name withheld)…which basically do research and re-badge it for brokers as well so this has been happening for a while now.

Q) Do you think the Internet had any role in its phenomenon?

A) As far as the flow of information well yes, just imagine putting out a piece of research having to mail it out to your clientele is 2 to 3 days late so email has just been massive. The availability and speed of information has been tremendously improved with email. For instance …. (Company name withheld)…had a report that their 2nd half was not as good as it was expected, straight away the analysts had done a piece of commentary and within 20 minutes we had a piece on this in our email and your clients get this information when in fact they would read this in the papers tomorrow which would be late by then.

Q) Finally as far as the ASX is concerned, did you have an option to choose any other platform besides CHESS?

A) Not really. For now every one well operators are using SEATS and that is the only way to put orders through. But there are systems whereby it is order entry where you put orders directly to ASX.

Q) Do you think this could be a mechanism by ASX to sort of regulate how many brokers can be in the industry by restricting the number of people or companies having CHESS clearance?

A) They my do over time. Because there will be overflow of them otherwise because the market runs well but then I have been through a lot of booms and busts in the market through the last 10-11 years and a lot have given up and a lot have stayed on and they’re are new ones in. it sort of works itself out over time.

Q) Suppose it Internet came in today and it has a certain number of business models that you can choose from, does this happen that once you sort of adhere to rules of ASX and ASIC, you are allowed to be different?
A) Well I think the only way you can be different on the Internet is what you provide your clients: information and client portfolios but they are so much the same nowadays, there is so much you can do on the internet, having links to research and portfolios and every one has the same setup now and I think the only thing left is to focus more and more on the client choosing a more refined specific niche and that is the only reason I am here. I get referral for example because of client contact and that goes back to the survey we did about client contact and service was priority number 1 to the clients. They want to talk to some one when the market is bad.

Q) During your experience here, what sort of technologies have you seen coming and going?

A) The industry has undergone a period of substantial change, the impact of which is transforming the way financial services are delivered. The changes, among others, include a significant increase in the number of alternative channels available for the delivery of services. The most recent being the Internet or online transaction of shares via discount brokers where it involves provision of facilities such as accessing accounts, funds transfer, and buying financial products or services online. This is called "transactional" online share trading and is the subject-matter of this study. Since 1997 and the introduction of CHESS, at least four major banks in Australia were providing an Internet banking facility as a result there was this overwhelming move to incorporate Internet this and Internet that by all brokers in their operations. We then saw a huge growth in the number of discount brokers and then there was the case of introduction of t system where you had 3 days to change the ownership of your stocks when you bought or sold them. So as you see we have really witnessed a number of changes hitting us simultaneously and all this was in addition to the recent economic turbulence which initially was triggered by the economic problems in Asia and then the economic downturn in US at the moment. What we have noticed is a trend where brokers are rediscovering their old way of doing things. I suppose once we got burned by the false promises of the Internet, we have become wiser in utilising its potentials. At the same time we have been carrying out numerous studies be it surveys or meetings and so forth and one thing we have noticed is that as far as strategising our next move, most brokers are neglecting the customer side of the whole trade that is we do not know exactly what
motivates customers and how we can use that motivation to our benefit. In a recent study that our firm carried out, major factors that influence the consumer uptake of Internet banking in Australia, included, security concerns and lack of awareness about Internet transactions and its benefits stand out as the obstacles to non-adoption of Internet stocktaking in Australia. Security is a burning issue and even one instance of adverse media publicity can damage consumer confidence in the system. At the same time what we noticed was as far as the customer’s side is concerned, the uptake of Internet in trading stocks will not be uniform. The young, are the major market for it whereas the risk averse and the wealthy with very high trade margins are more likely to use full service providers like us. At first when Internet came every one took it onboard because well every one else had it already and they forgot to identify the relevant customer segments and predict the development of their growth. So they ended up with a big spending for a segment that they did not know if it wanted Internet in the first place or not. I think what the Internet did was it provided a faster tool and now brokers are realising that they need to go back to the old values that made them standout and be noticed by customers. Of course having a larger number of competitors means you need to provide a much better service to just keep the customers but then it means Internet will enable you to do operations you are good in and then you can start partnerships with firms that can provide you with the back-office services for a cost at a much faster and more efficient manner.

Q) What about the Internet and industry structure today? What changes have you noticed in since the CHESS?

A) OK Well the industry has broken up into so many small pieces besides corporate and retail there are other financial services that us brokers offer including trading of derivatives such as Exchange Traded Options and Warrants, and provides guidance on "buy and write strategies" to enhance investment returns, so the range of services or products have also improved and I think this has lead to brokers focusing even more on a handful of products rather than providing every thing. ..

Q) You are a full-service provider?

A) that is correct. We pick up the phone, speak to our clients and advise them basically. We take them through the way until the end and our product includes trading of
derivatives such as Exchange Traded Options and Warrants, and provides guidance on "buy and write strategies" to enhance investment returns whereas a discount broker would be calling them up and you can sell through the bank or the Internet at a marginal cost and the services they offer mostly is on shares only because other services or products needs specialised staff and further certification that means higher cost for tem so thy don’t do those services like we do.

Q) Is it true to say that what the Internet has done is that is has reduced the barriers so that a lot of brokers have been able to get in, then do you think information about the market and service level is still the tool to keep you safe from any potential competition?

A) Originally yes but now as Internet is maturing I don’t think the barriers are that much important. I suppose your statement is true if something more refined than Internet comes along or anew market a service is brought in. innovation has to do with barriers but this relationship sort of fade when the innovation matures and it not an innovation any more

Q) Do you have any final comments as far as the Internet and its effects on the stockbroking are concerned?

A) I think it is great, you know it has opened up a lot of information for both the clients and brokers. It has made the job more efficient to both parties and I suppose the only problem with that is SPAM and rumours and it has happened to some of clients which is aimed to keep prices moving which has to be looked into by ASIC and so forth.
APPENDIX G

Coding Scheme

The process of naming or labelling things, categories, and properties is known as coding. Coding can be done very formally and systematically or quite informally. In a structured case approach since the data gathering and analysis is grounded on the responses from the participants, the coding is usually carried out informally. This involves looking at each line, allocating codes to words or a group of words. The goal of this analysis is to generate an emergent set of categories and their properties, which fit, work and are related or relevant for introducing in the theory. The process of running the data open will allow unbiased and systematic coding of the transcripts which later need to be re-read and at this stage, have a preliminary direction of the interview. The coding occurs at three distinct levels each referring to different stages of the research:

In structured case approach, the investigation data collection, coding and analysis occur simultaneously. Initially, the aim is to generate the basic categories from which to build the emergent conceptual framework. In order to do this the researcher first minimises the differences between comparative groups. Coding of data begins as soon as it is collected whether this be through observation, field notes or interviews (Glaser, 1998). The goal of open coding is to generate an emergent set of categories and their properties which fit, work, and are relevant for integrating into a theory. In open coding the analyst "runs the data open" by fracturing the data into analytic pieces. Open coding gets the analyst "out of" the data. Incidents are raised to a conceptual level and coded into as many categories as possible.

As categories are generated the next incidents are compared to the category. This constant comparison of incidents very soon starts to generate theoretical properties of the category (Glaser, 1998). As a result, the analyst soon starts thinking in terms of the full range of types or continua of the category, its dimensions, the conditions under which it is pronounced or minimised, its major consequences, its relation to other categories, and its other properties (Glaser et al., 1967). The preliminary coding
mechanism was developed using the literature survey carried out at the beginning of the research.

Therefore, when change was introduced to the industry, there were two possible outcomes; either the industry absorbs the change and the change fits the current model or the new change is radically different from the old way of doing things in the industry. In this situation, the industry and its members were faced with two possible choices. Accept or reject. Upon rejection the members whom have rejected the idea will be seen as unfit and illegitimate and therefore either abruptly or in a medium term will be phased out. The group that had accepted the change will either absorb the change right away because it has fit in its current business model of again it has to accommodate that is it needs to change to fit to the idea. Assimilation refers to the process of receiving new facts or of responding to new situations in conformity with what is already available to consciousness, whereas; Accommodation refers to reconciliation of differences by making room for the new practice in the old way of doing things.

![Assimilation process diagram](Figure G1 Assimilation process)
This meant that the coding structure was later changed to reflect the dynamics of the sector effectively. The revised coding scheme was designed in such a manner to reflect the multiple level analysis of the research where, the macro level of analysis denotes the introduction of the innovation where opportunity to further strengthen the efficiency and monitoring regimes of the sector are recognised by the regulatory authority in the sector. This results in the setting of macro boundaries and paths to growth where the influences range from the regulatory bodies, professional organisations and global regulatory and trade entities.

This change in coding protocol was not a one-off process. The changes in codes and replacement of codes with different sets of codes were intended to highlight the iterative nature of the research.

Figures G2, G3 and G4 outline the coding structures. Figure G2 outlines the overall coding scheme whilst Figures F3 and F4 outline the environmental and organisational components of the overall coding scheme respectively. Figures G5, G6, G7 and G8 illustrate the coding and analysis via the Mind Manager© software.
Figure G2: The coding scheme

Internet is introduced to the industry

- Accommodate
  - Accommodation at macro level
  - Accommodation at micro level

Industry transformation

- Environmental context
  - KN 1
- Regulatory bodies
  - Regulatory systems
    - Professional organisations
- Technology characteristics
  - KN 2
- Type of technology
- Embedded characteristics

Functional transformation

- Organisational characteristics
  - KN 3
- Functional dynamics
  - KN 4
- Accommodation
- Consolidation
- Preliminary generalisation
- Differentiation
- Reciprocation

Economics of Transactions

Information implementation

Transaction characteristics

Strategic implementation

Sales

Technology trends

Marketing

Customer care
Figure G3 The macro-level codes
Figure G4 The micro-level codes
Figure G.5 The IOI coding
Figure G6: The macro-level codes

Ex-ante factors that may work in congruence or against the new setting. In most cases, these factors tend to be the evolving format of the previous regimes.

Introduction of the Innovation

Recognition of the opportunity by the institutional path-makers (regulatory institutions monitoring and controlling the trajectory of growth in the industry)

Influencers

ASX

Regulatory bodies

Professional organizations

Local alliances

International regulatory bodies

Globalization and international trade

Regional cooperation

Cross industry spillovers

Regulatory system

Technology/Trade and clearance platforms

Regulatory standards

Trajectory of growth

Imposition of protocols influencing the structuration of the sector

Macro level of analysis: A conceptual structure.mmap - 22/11/2005 -
Figure G7 The micro-level codes
Figure G8 Using Mind Manager for coding and data analysis
**APPENDIX H**

**The history of the ASX**

The history of ASX and the changes this institution has experienced during the past two decades is illustrated in Table H1.

Table H1 History of the ASX

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1937</td>
<td>Formation of the Australian Associated Stock Exchanges (AASE).</td>
</tr>
<tr>
<td>1938</td>
<td>Publication of the first share price index.</td>
</tr>
<tr>
<td>1942</td>
<td>Price increases in shares of listed companies were limited by the Australian government.</td>
</tr>
<tr>
<td>1947</td>
<td>Open market conditions were re-introduced.</td>
</tr>
<tr>
<td>1960</td>
<td>The Sydney Futures Exchange begins as the Sydney Greasy Wool Futures Exchange.</td>
</tr>
<tr>
<td>1967</td>
<td>Company Law Advisory Committee is established prompted by failure of finance companies.</td>
</tr>
<tr>
<td>1970</td>
<td>NSW enacts Securities Industry Act which introduces more elaborate provisions about establishing stock exchanges, regulating securities industry participants and creating new offences of false trading, market rigging and the making of false statements about securities. Other States follow.</td>
</tr>
<tr>
<td>1971-72</td>
<td>Legislation on accounts and audit, disclosure of substantial shareholdings.</td>
</tr>
<tr>
<td>1972</td>
<td>National listing for all securities was introduced.</td>
</tr>
<tr>
<td>1974</td>
<td>Formation of Interstate Corporate Affairs Commission. WA participates from 1 July 1975.</td>
</tr>
<tr>
<td>1975-76</td>
<td>Improvements of securities industry legislation.</td>
</tr>
<tr>
<td>1976</td>
<td>Australian Options Market commenced trading in call options. First</td>
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<tr>
<td>Year</td>
<td>Event</td>
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<tr>
<td>1976-77</td>
<td>Appointment of first two “outside” Councillors to AASE Council</td>
</tr>
<tr>
<td>1978</td>
<td>Agreement between Commonwealth and States for a co-operative regime for companies and securities legislation.</td>
</tr>
<tr>
<td>1982</td>
<td>Companies’ legislation based on co-operation between Commonwealth and State governments became effective.</td>
</tr>
<tr>
<td>1985</td>
<td>The Stock Exchange of Melbourne Limited established the Australian Financial Futures Market on 27 September. On December 13 and 14, for the first time in 100 years of stock exchange history, all members of the six Stock Exchange Committees, together with the outside Councillors of the AASE, met under one roof. They considered a paper entitled The Future Structure of Australian Associated Stock Exchanges and its Member Exchanges, which recommended the formation of a national exchange through the merging of all six AASE Member Exchanges. These proposals were accepted and the agreement was subsequently ratified by the membership of all Exchanges.</td>
</tr>
<tr>
<td>1986</td>
<td>Futures Industry Act and Codes of 1986 commence comprehensive regulation of futures. Northern Territory becomes participant in co-operative regime and there is uniform law.</td>
</tr>
<tr>
<td>1987</td>
<td>Formation of the national Australian Stock Exchange (ASX) and National Guarantee Fund to amalgamate the six state stock exchanges and their fidelity funds. October stock market downturn- launch of computer-based trading (SEATS) for limited range of ASX-listed stocks. Senate Standing Committee on Constitutional and Legal Affairs concludes that Co-Operative Scheme should be replaced by comprehensive national legislation and that a single agency to administer it should be established.</td>
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<tr>
<td>Year</td>
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</tr>
<tr>
<td>1988</td>
<td>10 millionth option on the Australian Options Market traded in June.</td>
</tr>
<tr>
<td>1990</td>
<td>Several large companies fail. High Court holds that s51(xx) of constitution does not allow Commonwealth to make a law for incorporation of trading or financial corporations. Heads of Agreement to prepare uniform legislation. All legislation to support National Corporations Law uniform legislative scheme is in place by 1 January 1991. ASX enters into Memorandum of Understanding (MOU) re provision of information with SFE. Closure of the trading floors and conversion of all stocks to SEATS trading from October. Establishment of exchange traded warrants market in January.</td>
</tr>
<tr>
<td>1993</td>
<td>Fixed-interest securities added to SEATS. Commencement of National Adjudicatory Tribunal. ASC and ASX enter MOU concerning broker supervision. The main Corporations Law amendments required for CHESS, an electronic clearing and settlement system, passed by the Federal Parliament and proclaimed in June 1993. All listed companies have their securities made available for settlement using ASX’s Flexible</td>
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<td>Year</td>
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<td>------</td>
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<tr>
<td><strong>1994</strong></td>
<td>First stage of CHESS introduced, to lead to full automation in 1996. ASC and ASX enter MOU concerning listed company supervision. Corporate Law Reform Act 1994 mandates continuous disclosure of material information by listed companies. Indemnification of directors is also addressed. A new derivatives market known as ASX Share Ratios developed - the first exchange-traded derivatives in the world to be based on the relative performance of a security.</td>
</tr>
<tr>
<td><strong>1995</strong></td>
<td>Major redevelopment of the SEATS trading system initiated. Electronic company announcement platform commenced. Stamp duty on share transactions cut in half. First Corporate Law Simplification Act 1995 – simplified drafting, share buy-backs, proprietary companies, simplified company registers. Odd Lot system was abolished. LEPOs introduced following ASX’s successful court defence of their right to issue these products. In August, ASX launched its website <a href="http://www.asx.com.au">www.asx.com.au</a>. ASX Listing Rule introduced requiring all listed companies to report on their corporate governance practices.</td>
</tr>
<tr>
<td><strong>1996</strong></td>
<td>ASX Members vote to demutualise. CHESS phase two implemented. CHESS Units of Foreign Securities (CUFS) settlement introduced for foreign companies. ASX and OCH enter MOU with IOSCO (International Organisation of Securities Commissions). ASX enters MOUs with Korea Stock Exchange and Kuala Lumpur Stock Exchange. ASX begins development of an electronic derivatives trading system – OM’s CLICK. In June ASX established a National Call Centre to provide a single point of toll-free telephone contact with ASX from anywhere in Australia.</td>
</tr>
<tr>
<td><strong>1997</strong></td>
<td>A phased cut-over to the Derivative Market’s automated trading system (CLICK) began in October. ASX Demutualisation legislation, the Corporations Law Amendment (ASX) Bill, passed by Australian Parliament, effective 16 December. SEATS 97 trading system upgrade began. Open interface rules developed. Internet based Enterprise Market developed for smaller businesses. ASC and ASX enter MOU on transfer of information about listed disclosing entities. ASX admitted to Intermarket Surveillance Group. Wallis Inquiry report into Financial System released in March. ASX enters MOU with Jakarta Stock Exchange, Surabaya Stock...</td>
</tr>
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</table>

<p>| 1999 | Financial Sector Reform (Amendments and Transitional Provisions) Act (No 1) 1999 – provides for transfer of regulatory responsibility for building societies, credit unions and friendly societies to ASIC. Corporate Law Economic Reform Program Act 1999 – introduces a business judgment rule, a statutory derivative action, relaxes regulation of share acquisitions aimed at takeover of corporate control, modifies compulsory acquisition rules, extends takeover provisions and managed investment schemes and enhances role of the Corporations and Securities Panel. Also, changes fundraising rules and abolishes requirement to register prospectuses. Restates functions of Accounting Standards Board and establishes Financial Reporting Council. T+3 settlement replaces T+5. ASX Sydney moves to 20 Bridge Street. New clearing system (DCS) and rules for derivatives market with options and futures clearing capability in multiple currencies. ASX also introduces a new capital adequacy regime (Rule 1A), third party clearing, a BLOX trial, and IPO Settlement in CHESS. ASX enters MOU with Thailand Stock Exchange and Singapore Stock Exchange. ASX purchased 13 per cent stake in Austraclear. Interest |</p>
<table>
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<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>2000</td>
<td>ASX forms joint venture with Perpetual Registrars to form ASX Perpetual Registrars Limited (APRL). ASX World Link established to provide the mechanism for Australian investors to trade in internationally quoted securities. This includes a co trading link between the Australian and Singapore markets. ASX signs MOUs with Tokyo Stock Exchange and Hong Kong Exchanges and Clearing. ASX introduces Real Time Gross Settlement (RTGS), CHESS settlement for other markets and OCH settlement for other markets. In November ASX announced the creation of a new entity, ASX Supervisory Review Pty Ltd to monitor and oversee ASX’s supervisory activity. ASX/Reuters Charity Foundation established in February. In March ASX entered into 15 year agreement with Standard and Poor’s Index Services. In September ASX took a 15 per cent interest in BridgeDFS (later renamed IRESS Market Technology).</td>
</tr>
<tr>
<td>2001</td>
<td>In March, as part of ASX World Link, a North American trading link became operational enabling Australian investors to trade, settle and hold approximately 200 securities quoted on NASDAQ, NYSE and AMEX. Business Rule amendments were introduced to: require more precise record keeping requirements; to allow ASX to exchange information with complaints resolution schemes; and to enhance compliance responsibility of market participants. Financial Services Reform Legislation was introduced to Parliament in April 2001 and passed in August 2001. Under this legislation ASX’s market participants will be subject to the new harmonised licensing regime applicable to all financial services providers. It also increased the permitted voting power in ASX from 5 per cent to 15 per cent of issued shares. Enterprise Market ceases operation on 30 April. Stamp duty on transactions in marketable securities abolished from 1 July. Modern clearance system for Government-backed securities introduced by Federal Parliament (Commonwealth Inscribed Stock Amendment Bill). The first managed funds on the Exchange’s new trading platform for listed investment funds, including exchange traded funds (ETFs), were listed in July. ASX-SGX co-trading link went live 20 December. ASX acquires 50 per cent interest in investor relations firm Orient Capital. ASX is successful in its application for futures market authorisation to trade futures products such as equity and index futures.</td>
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<tr>
<td>Year</td>
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<tr>
<td>2002</td>
<td>ASX Supervisory Review Pty Limited became operational in March.  &lt;br&gt;ASX Futures Market launched in January. “Principles of Good Corporate Governance and Best Practice Recommendations” published in March. SFE Corporation Limited lists in April making ASX the only Exchange in the world to trade the securities of two listed Exchanges. ASX made formal application to Government in July for approval to split National Guarantee Fund into separate capital components, one for fidelity purposes and the other for clearing support. ASX Corporate Governance Council established in August to lead development of best practice governance standards and publish guidelines for all listed companies. ASX introduced secure internet-based facilities for the mandatory electronic lodgement of company announcements. Government Corporate Law reforms introduced in September. ASX enters MOU with Shanghai Stock Exchange in September. In November ASX announced its intention to form Australian Clearing House. A century of historic company records provided to State Libraries in November. ASX’s online share market classes became available at no cost from October.</td>
</tr>
<tr>
<td>2003</td>
<td>ASX enters MOU with Shenzhen Stock Exchange in September. In May Promina Limited listed on ASX and became the world’s largest listing in the financial year. On 1 July ASX announced a strategic alliance with Aspect Huntley for the joint marketing and development of new and innovative market information products. In association with Aspect, ASX launches a new text-based news service. ASX’s online options classes became available at no cost from February.</td>
</tr>
<tr>
<td>2004</td>
<td>Market Integrity Division formed within ASX in January to review and evolve ASX’s practices in market supervision as circumstances and expectations require. In June the ASX Board signed an agreement to replace the SEAT system with a new integrated system designed by Swedish company OM. This will further enhance Australia’s place in capital markets by providing a single integrated electronic platform for equities and derivative products. An agreement was signed to implement a new surveillance system to replace SOMA. Australian Clearing House created out of the former Options Clearing House. ASX acquired remaining 50 per cent of Orient Capital in February. ASX launched</td>
</tr>
</tbody>
</table>
world-first reporting code for biotechnology industry in April. ASX Grains Futures awarded the Ernst and Young Risk Management Award at the Rabobank Agribusiness Awards for Excellence 2004.

| 2005 | ASX and the Federal Government reach an in-principle agreement on the split of the National Guarantee Fund, freeing $70 million for transfer to ASX subsidiary Australian Clearing House. |

Source: ASX (2005a)
APPENDIX I

Regulatory systems

The findings in this appendix are based on the reports provided by the participants from the sector’s governing bodies. Use of the reports in the thesis was allowed after the reports extracts were checked and the participants removed names of specific firms and departments within the governing bodies.

SEATS and its development

The conversion of stocks from floor trading to SEATS began on October 19, 1987. SEATS was based on a similar system developed by the Toronto Stock Exchange known as CATS (Computer Automated Trading System). Unlike Australia however, Toronto have not transferred all their stocks onto the CATS system. Australia succeeded in doing so on October 1, 1990. The introduction of SEATS enabled the geographically dispersed trading floors to be connected via a series of dedicated telephone lines to a network of interconnected computer terminals located in brokers offices. The two larger exchanges (Sydney and Melbourne) began installing these terminals in March, 1987. Three types of terminals were initially available:

- **Master Trading Terminals**: Permitted the registered user to submit, amend, or cancel any orders for the entire member organisation.
- **Normal Trading Terminals**: Allows orders to be submitted, amended, or cancelled for that same terminal. The trading terminals can be used to access information or monitor the current market in any stock (‘WATCH’ facility), view previous transactions, and retrieve specific information regarding particular securities including company announcements.
- **Order Entry Terminals**: Allows orders to be submitted to the “order book” to be later authorised by SEATS operators within the firm.

Trading on SEATS developed in several stages. In each stage, trading in a particular group of stocks was transferred over to the SEATS platform. The speed at which SEATS’ infrastructure developed occurred quite rapidly (ASX, 2005a, 2005b, 2005c, 2005e).
By 27 May, 1987, there were 222 authorised Sydney operators and 72 authorised Melbourne operators spread across 59 broking firms. These operators were able to observe designated stocks using the ‘watch’ facility, actively trade on the industrial and mining boards, as well as gain hands on experience in practice stocks. On 19 June, 1987, the total number of authorised operators increased to 305. The increase in the level of authorised operators within the period of one month signalled that there was a high demand for the introduction of electronic trading (ASX, 2005a, 2005b).

Demand arose from many firms requiring terminals on both the trading floor and in their offices, many firms ordering several terminals, and the division of firms between private and institutional clients. The flexibility afforded by an electronic system over a floor trading system both in terms of costs and training was demonstrated by the rapidity with which the system was put in place.

During the design phase of SEATS, several factors needed to be taken into consideration. These included the retrieval and storage of information; in particular the system of bookings could be readily integrated across the different states. Four other state exchanges joined SEATS soon after its commencement. These exchanges were Perth, Hobart, Adelaide and Brisbane (PHAB). It was decided with the forthcoming introduction of SEATS, that a new settlement system replace the old Broker/Broker Accounting system. The Broker/Broker Settlement (BBS) system was proposed to be implemented in Sydney and Melbourne. The BBS system was designed to support efficient interstate delivery notification and money settlement.

In May 1993, an ASX team examined the concepts being developed in other overseas trading systems. These examinations were conducted for the purposes of identifying emerging standards and capabilities that could be incorporated in the new ASX trading system. In March 1995, the ASX Board authorised and committed substantial resources to the development of a new trading platform known as SEATS 97. The SEATS 97 project was broken into three separate sub-projects: the Network and Gateway, the Trader Workstation and the Open Interface in order to address the key concerns of members’ and subsequently reach the project objective. The new trading system was implemented through a series of phased releases, in order to minimise risk to the existing machine. This resulted in further automation of trade and clearance whilst
further strengthening the monitoring and regulatory abilities of the ASX and ASIC. Figure I1 illustrates the SEATS listing screen.

**SEATS Market Control**

Supervision of trading through SEATS is undertaken by SEATS Market Control (SMC), which has day-to-day responsibility for the operation of the trading system. SMC assists Trading Participants in using the system and in fulfilling their trading mandates from an operational perspective. Trading Participants are required to perform their trading operations within the scope of the trading rules, contained mainly in Chapter 2 of the ASX Business Rules and the ASXF Business Rules (ASX, 2005d, 2005h).

Compliance with these rules is to a large extent facilitated or achieved automatically through the operation of the system, which will reject or provide an alert in respect of trading activity which is or may be in breach of the rules. Consequently, the supervisory aspects of the role of SMC are limited. However, SMC does play a role in the
accreditation and training of Designated Trading Representatives (DTRs) and has certain supervisory powers to refer potential breaches for investigation and to monitor compliance with reporting and other obligations. For example, SMC makes initial decisions on rule breaches by DTRs, refers illegal crossings to Surveillance, monitors reporting of short sales and monitors notification of overseas/overnight trades. SMC also has a general responsibility to ensure that trading participants conduct an orderly market and do not participate in manipulative trading (ASX, 2005c, 2005d, 2005e, 2005h).

Components to the new trading platform
There are three principal components of the SEATS 97 project. They include the Network and Gateway, Trader Workstations, and Open Interface. A diagram of these three components are presented in Exhibit below.

Network and Gateways
The Network and Gateway form the communications framework of the new trading platform. The SEATS gateway is a high powered PC running the Microsoft NT operating system and represents the broker’s entry point into the ASX network. It is used as a reliable mechanism for transmitting, receiving and disseminating market data to and from Trader Workstations and Open Interface devices.

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Figure I2 SEATS trading platform
Furthermore, gateways also act as a security firewall between ASX and a broker’s network whereby access to ASX trading facilities is denied to unauthorised parties or unrecognised software programs. The SEATS Gateway receives information from the SEATS Trading Processor (Trading Engine) and is stored in a readily available format. This enables fast access to information by users via a Trader Workstation or Open Interface device and reduces the demand on the Network.

The Network connects all Trader Workstations and/or Open Interface devices to the Trading Engine via the Gateway. Messages are encoded and decoded using a carrier modem that enables the Network to carry traded related requests. Order entries and cancellations are conveyed from a Trader Workstation and/or Open Interface device up to the Trading Engine where trade and market data are sent from the Trading Engine back to Trader Workstations and/or their Open Interface devices.

**Settlement and Clearance Procedures and imposition of CHESS**

Settlement involves the process of exchanging legal ownership titles over securities for funds. Once a trade has been executed in effect less than half of the procedures associated with the transfer of share ownership have been completed. To conclude the transaction in total, the seller must transfer the share ownership to the buyer and the buyer must deliver cash to the seller. The number of days to settle has been reduced from around twenty to a uniform five days, where the target is three days. In the jargon of the Exchange, settlement now routinely occurs on T+5 which means the trade date plus five working days.

The catalyst for change in settlement procedures was the stock market crash of October 1987, which raised concerns about the system of clearance and settlement. A world consultative group calling themselves the Group of 30 (‘G30’) brought forth a set of recommendations in March 1989 to improve global clearance and settlement practices.

**The Australian Stock**

Exchange was one of the first to embrace these recommendations which set a world target for settlement of T+3 in 1994. While Australia has yet to achieve this target for the whole of its market, other exchanges have done so with Denmark and Canada currently operating under a T+3 settlement cycle. Incidentally, the US which was
leading the world in trade clearing and settlement for the last two years, dropped to a rank thirteen following its move to a T+3 settlement cycle in mid 1995.

Australia developed a three stage strategy to reform the Australian system of clearance and settlement practices. In Stage One the ASX introduced the system of uncertificated holdings via a system called FAST (Flexible Accelerated Security Transfer) and multilateral netting. The introduction of FAST facilitated the next stage of implementing a T+5 fixed period settlement discipline to all securities. The final stage of the overall reform plan involved the introduction of CHESS (Clearing House Electronic Sub-register System). Implemented in two phases, CHESS was designed to provide a fully electronic transfer of title through a central clearing house and a full delivery versus payment (DvP) system.

Once Stage Three has been completed and fully operational, a move towards a T+3 fixed settlement discipline would be feasible. Before we explain these systems a quick review of the settlement system prevailing prior to the changes is provided in the next section to help provide a clearer understanding of how settlement takes place.

**Broker Settlement System**

Once a trade was executed through SEATS, it was “locked in” and transmitted via the ASX computer network to the Broker-Broker Settlement system (BBS). When selling brokers received confirmation of their trades from the ASX (via a trade confirmation written report), they had one day to alert the exchange to any errors otherwise the trades were confirmed. On T+2 the Exchange would send a scrip delivery notice in the form of an optical character recognition ‘OCR’ card to selling brokers, providing details of which brokers were to receive the scrip. The selling brokers by this time would usually have sent mail to their clients asking for the share scrip and also providing a share transfer form that selling clients were required to sign. This form would subsequently have been sent to a share registry (a business which maintained the register of owners in a given company) so that the seller’s names could be removed from the share register and the buying client’s names added.

While selling brokers would have been communicating with their clients, so to would buying brokers. Buying brokers would have sent a request to their clients to forward the money required to buy shares. Once selling brokers had the scrip and transfer forms
they then delivered these to the share registries and notified the exchange that they had done so by returning their OCR delivery cards. This signified to the exchange that delivery had been affected, at which time the Exchange demanded payment from buying brokers.

Upon delivery of outstanding obligations on a trade-for-trade basis, net payments were then made by the ASX to each individual broker via the Payment Netting System85. Under this BBS system, if there had been any delay in mail or response times of buying and selling clients the whole completion cycle could have been held up for as long as three weeks. As brokers were not prepared to do subsequent trades (to sell on behalf of the new owner) until the first had been completed, lack of settlement discipline meant that liquidity in the market-place was severely impeded. The process also resulted in higher transaction costs, as buying brokers often had to sustain significant overdrafts as they could never determine with precision when selling brokers and their clients would ‘demand’ settlement86. The “on demand” settlement discipline adopted by BBS allowed brokers up to 10 days (not including the day of trade), to meet their delivery obligations.

‘T+5’ Fixed Settlement Discipline In March 1992, the ASX introduced a T+5 rolling settlement discipline. What this meant was that trades that occurred on a given day would be required to be settled on the fifth business day after the trade had been effected. The new T+5 fixed period settlement discipline operated simultaneously with the developments of BBS and FAST.

A new settlement component that was introduced along with T+5, was the Delivery Netting Service (DNS). Prior to the DNS all trades were treated on a trade-for-trade basis for the purpose of settlement. As an example of the difficulties imposed by this procedure, imagine that there are six trades of the same quantity of the same stock between clients A, B, C, D, E and F. Suppose A sold 100 shares of BHP to B who subsequently sells them to C and so on until finally E sold the 100 shares to F. Under the BBS system there would have been five separate deliveries of BHP share scrip, with all the associated OCR cards. The DNS system allows trades to be netted off against one another so that far fewer deliveries need to take place. In the example above, only one delivery would be required by broker A to broker F. Daily net delivery obligations was determined and conveyed to the respective brokers with outstanding obligations by the
end of T+191. However, an option was available for brokers to settle individually outside the netting system. Normally, such agreements would be made between the two counter parties and settlement would take place on the agreed settlement date, which may or may not be the fifth business day after the day of trade.

**CHESS**

The introduction of the Clearing House Electronic Subregister System (CHESS) in July 1994 was the final stage of a three stage systems strategy to automate transfer and settlement processes for ASX transactions. FAST was replaced with CHESS. The ultimate goal of CHESS is to provide an electronic transfer of securities trades with a simultaneous transfer of funds. That is, a system which guarantees delivery versus payment (DvP). Whereas FAST permitted book entry between brokers and sponsored selling clients, CHESS permits a book entry for the whole of the settlement process including the transfer of ownership. In effect an electronic messaging system connects brokers, the ASX and share registries. Share holdings are dematerialised and can be settled within one day of the trade taking place through SEATS.

Since the introduction of CHESS, the share register of a listed company must be segmented into three subregisters. These are:

- certificated subregister;
- CHESS subregister (uncertificated); and
- issuer sponsored subregister (uncertificated)

Investors in the certificated subregister hold share certificates as physical documentation of share ownership. With the increased development of CHESS, a stockbroker may request delivery of share certificates prior to the sale being transacted. For instance, Pont Securities Limited requires share certificates in their office by the second day following the sale. CHESS operates a subregister which comprises of all uncertificated holdings of a controlling entity which is a CHESS participant. The CHESS subregister system is managed by the ASX Settlement and Transfer Corporation (ASTC), a wholly owned subsidiary of the ASX and the approved securities clearing house under the Corporation Law. An issuer sponsored subregister are holdings sponsored by the listed company that issued the share, which provides the advantage of uncertificated holdings without the need to be sponsored by a particular stockbroker.
The issuer sponsored facility is maintained directly by the company and is separate from the CHESS subregister. An investor may provide the access for the transfer of any shares sold by a Holder Identification Number (HIN) is registered under CHESS, or a Shareholder Reference Number (SRN) is they are issuer sponsored.

CHESS was implemented under two phases. The objective of Phase 1 of CHESS was to introduce the electronic transfer of securities following trades. It began operations on 19 September 1994, with less than 1% of stocks participating. The growth in participation was slow where only 8% of ASX trading (representing 25 companies) had been converted by 31 December, 1995. Currently however, 98% of the value of stocks traded are settled through CHESS. The remaining 2% comprises New Zealand and other international stocks which do not have an equivalent settlement regime as the CHESS system in Australia, or regulatory/government rules do not facilitate CHESS. The move to Phase 2 began on 9 April 1996. Under Phase 2 of CHESS, trades were settled with the electronic transfer of securities and cash. Conversion into Phase 2 occurred on 12 August 1996, providing DvP settlement for shares in almost all Australian-incorporated listed companies. With the introduction of Phase 2 in CHESS, the risk associated with settlement default will be significantly reduced.

CHESS will only be effective for those parties who are trading dematerialised holdings. Given that uncertificated shareholdings provides greater efficiency in the operation of company share registries, some ASX-listed companies offer only uncertificated holdings where share certificates are not issued. That is, these companies hold two subregisters, being a CHESS subregister and an Issuer Sponsored subregister. It is likely that more ASX-listed companies will choose to offer only uncertificated holdings in the future.

**Market surveillance**

In March 1989 the ASX set up a separate Market Surveillance division. The division's stated function was to "upgrade and audit surveillance operations with a view to increasing investor confidence in the ASX, thereby causing a decline in the use of off-shore markets to transact business in Australian securities and an increase in the business directed to brokers rather than other investment advisers". In this paper the means by which Surveillance has proceeded to accomplish this task and the problems it has encountered along the way are reviewed.
**Surveillance in context**

Market Surveillance is a concept of the 1980s. Developments in Australia follow closely those in the United States and Canada which were initiated in the early 1980s. In January 1981, senior officers of several American exchanges met to discuss ways of enhancing their surveillance efforts. Their meeting coincided with steadily growing trading volume, an increase in sophisticated financial products and increasingly complex trading strategies.

In February 1981 the Inter-market Surveillance Group (ISG) was set up to "design, develop and implement a coordinated inter-market surveillance effort". In 1989 this group had nine active participants including the American Exchange, the Boston Stock Exchange, the Chicago Board Options Exchange, the Cincinnati Stock Exchange, the Midwest Stock Exchange, the National Association of Security Dealers, the New York Stock Exchange, the Pacific Stock Exchange, and the Philadelphia Stock Exchange.

Besides these organisations, several others including the Chicago Board of Trade, the Chicago Mercantile Exchange, the Kansas Board of Trade, the New York Futures Exchange and the Montreal and Toronto Exchanges were affiliate members. The objective of the US surveillance group has been to develop a set of data to be routinely shared among the participating organisations. This includes reported quotes and transactions for all equity and option securities from all marketplaces. In addition the ISG coordinates other information (e.g. block transaction participants) for use by participating organisations while investigating particular issues of concern.

Although the ASX is not a member of the American ISG it hopes to soon have Memoranda of Understanding between itself and many of the ISG's member organisations. In addition, the ASX is working towards similar understandings with other world exchanges such as the International Stock Exchange (London) and the New Zealand Stock Exchange. These memorandums provide for information to be shared by the signatories. Following overseas initiatives the ASX has recently set up its own ISG with the Sydney Futures Exchange.
The Objective(s) of Surveillance

Surveillance objective(s) are straightforward - to help maintain a fair and efficient market for securities. Although definitions of the terms fair and efficient can vary, in general, these terms are taken to mean the following:

A market is fair where all participants face the same conditions of trading. For example, orders are filled according to their time of arrival and/or no party is legitimately able to trade on information that is attained from a position of privilege (e.g. the director, officer or associate thereof of a given body corporate). Where a party does trade on privileged information this is generally described as insider trading.

A market is efficient where one party cannot interfere with the free-market forces of supply and demand such that the price of a given security is not an accurate reflection of the underlying assets (both physical and human) and information pertaining to those assets, of a given body corporate. Where such interference occurs this is generally described as market manipulation.

To help maintain a fair and efficient market Surveillance follows a series of steps. First, it identifies and provides prima-facie evidence of market manipulation, insider trading, as well as breaches of the exchange's listing and business rules. Note that these are not mutually exclusive. Second, it alerts regulatory authorities (e.g. the Australian Securities Commission (ASIC) and the ASX Membership division where brokers maybe involved) for the purpose of investigating and prosecuting current offenders as well as deterring future offenders.

The costs to the exchange of ensuring a fair an efficient market are not trivial. Surveillance itself has a budget of approximately 1.5 million dollars per annum with a similar amount contributed by Companies and Membership. While some in the industry question whose responsibility it is to maintain the surveillance function, acceptance of this task by the exchange can be considered to be an essential element in its self-regulation.

One of the advantages afforded the ASX by accepting this self-regulatory role is that it maintains much of the responsibility for the regulation of the securities markets in the hands of those in whose interest it is to have the fairest and most efficient market
possible the brokers. In this context, the objective of surveillance can be thought of as providing the foundations to support the industry's desire to maintain self-regulation. Without self regulation the industry would have far less influence over the practices such as "suspension from trading" and "disciplinary action" both of which, if placed in the hands of those outside the industry, may ultimately disadvantage traders and therefore brokers.

A further non-mutually exclusive objective of surveillance is to ensure that the market is continuously fully informed. Upon identifying unusual price and volume movements in a security's price, the Surveillance division sets about the task of trying to associate the change with a series of information signals. In the process it is developing a highly sophisticated and integrated information system. To summarise, the Surveillance division has at least three non-mutually exclusive objectives:

• to encourage market participants to maintain a fair and efficient market by alerting regulatory agencies to instances where these criteria are subverted;
• to act as a cornerstone in the exchange's self-regulatory role; and
• to develop its own integrated market information service to maintain a fair and efficient market.

**Surveillance's three major areas of concern**

In carrying out the first of the above three objectives, the Surveillance division concentrates on identifying breaches of three major areas of concern. These are:

breaches of Corporations Law including Part 7.11 (previously, Part X, the Securities Industry Code) and the takeover provisions:

• breaches of the exchange's listing rules; and
• breaches of the exchange's business rules

That these are separately identified is not meant to imply that they are mutually exclusive. In one investigation all three elements may be involved. Part 7.11 describes in broad terms trading activity which is prohibited and remedies that are available. Surveillance is particularly interested in sections 997 to 1002 and section 845 "Dealing by Employees of Licence Holders". Section 997 of the Corporations Law which prohibits market manipulation describes the phenomena as the intent to induce others to
buy (sell) securities by rising (lowering) the price of the security or stabilizing its price. Leaving aside the vexing issue of proving "intent", the latter action is particularly problematic in view of exchange business rule (2.6(2)(i)) requiring brokers to "ensure the conduct of an orderly market".

Notwithstanding this rule Surveillance has found some evidence of investors who received share placements in an illiquid security being the first into the market aggressively purchasing more shares. Indeed rumour has it that in one placement this was a condition of the deal. While these actions may seem to make good economic sense to the company and its promoters, the question that Surveillance has to grapple with is when does this type of activity create a false market such as to constitute an offence under section 997. Presently, if placement participants can be established to be acting in a similar manner, such that their combined activity significantly alters the price of a given security, they become associated ("acting in concert") and their action is deemed unacceptable.

Section 998 prohibits "False Trading and Market Rigging Transactions". However, unlike section 997 more specifics are provided as to the meaning of the term. The section stresses that share trading which is entered into for the purpose of creating the illusion of active trading in a security, but for which beneficial ownership does not change, will constitute false or misleading trading. The section also stresses that actual trades are not the only means of creating a false or misleading market, specifically noting offers or invitations to buy or sell as being equally liable to scrutiny. A problematic aspect of this section as far as Surveillance is concerned is the definition of beneficial interest. For example, when two public companies that have cross-holdings trade securities, does this constitute a change of beneficial interest. In deciding whether to press their claims (and expend resources gathering evidence) Surveillance must make a judgement about what amount of crossholding would be considered material in misleading the market if such a case got to court.

Note, however, that if the cross-holding and the trade are disclosed or can be reasonably assumed to be understood by the market place, Surveillance's interest in the situation dissipates. Section 999, 1000 and 1001 deal specifically with the provision of false or misleading information (by way of promise or forecast) with the intent to induce trading for the purposes of the perpetrators’ monetary gain. Offenders are liable if they show
callous disregard for the truth or falsity of the information and/or if they knew or ought to know that it was likely to have a material affect upon trading. Offenders are equally liable if they dishonestly conceal material facts. Surveillance has found some statements by directors that are incongruous with their actions in the market.

Section 1002 prohibits the dealing in securities by insiders on the basis of information that is "not generally available" and which would have a material effect on the share price. Insiders are defined as persons who have gained that information as a result of their association with the body corporate whose securities are the subject of the information. The prohibition relates to any person or associate of that person, where the passing on of information is for the purpose of trading. Notwithstanding the difficulty of providing convincing evidence that material changes have occurred to a security's price and the equally vexing problem of proving that the price change was caused by the insider acting on information, Surveillance personnel generally find the task of documenting insider trading activity considerably more straightforward than the task of documenting market manipulation. This occurs in part because insiders are a more finite and therefore identifiable group than market manipulators. Another useful way of distinguishing between the two is in respect of the importance of information. Whereas both types of activity appear in the first instance to take place in the absence of information, in the case of insider trading the information is only absent as far as the rest of the market is concerned.

Within a short time, the information acted on by the insider will become public at which time efforts can be made to determine who in the organisation would have had access to that information. In the case of market manipulation, however, there is no information, other than that intended by the manipulator(s) to be wrongly inferred from trading activity. Herein is the most basic difference between market manipulation and insider trading. In the case of insider trading the share price represents an accurate reflection of the underlying investment (which is why some claim that insider trading, though it may not be fair, at least encourages informational efficiency in the market) whereas in the case of market manipulation the price of the share bears little or no resemblance to the value of the security.

Besides identifying market manipulation and insider trading, the Surveillance division also investigates possible breaches of sections 710/713 and section 232 of the
Corporations Law. These refer to actions in respect of Substantial Shareholder Notices and improper use of officer's position. In both cases Surveillance's interest is aroused where it has reason to believe that that the market is either uninformed or misled. In addition Surveillance is concerned with several of the exchange listing and business rules. Whereas the former matters are referred to the ASC for subsequent action, matters involving breaches of the ASX rules are referred directly to the Membership or Companies divisions of ASX. In respect of the listing rules, ASX Companies division has the primary responsibility for maintaining and enforcing company compliance with the rules. Surveillance's main interest in the rules is in respect of Rules 3J(3)(a) and 3J(3)(b) which place restrictions on the ability of companies to deal with associates as regards their assets without allowing shareholders to vote on the matter.

The key determinant of surveillance action "extent of disclosure"
The foregoing discussion of the problems Surveillance has in interpreting government and exchange rules highlights, implicitly if not explicitly, a key determinant of action by Surveillance, namely, "the extent of disclosure". Investigations by Surveillance are usually only initiated where Surveillance has reason to suspect that information relevant to the pricing of a security was purposefully denied to the market. Similarly, it begins an investigation where it believes that unsubstantiated rumours are correlated with an irregular price or volume movement in a security. As a corollary, it chooses not to investigate a complaint or unusual price or volume movement where its officers believe that the information giving rise to a change was generally known to the marketplace or in the case of a rumour that it has substance.

Surveillance and IS technologies
ASX Surveillance initiates its investigations by at least three means. One of these is via complaints and information from disadvantaged parties. Another is via reports emanating from the media. While these first two avenues accounted for upwards of 80% of investigations at the time Surveillance was first set up (March 1989), the influence of these leads has diminished as the division has become much more pro-active towards its task. In the place of intermittent complaints and inside information one now finds an increasingly sophisticated combination of computing and manpower which is able to detect and explain (if possible) unusual changes in the price or volume of a security over shorter and shorter periods.
At the centre of the computer system is a program known as Surveillance of Market Activity (SOMA). This program is a customised version of the AMEX Stock Watch system. In essence, it attempts to mimic the information and decisions that would be taken by experienced Surveillance staff. SOMA registers what are known as "primary alerts" when the share price or volume resulting from a trade exceeds some specified but flexible limits. Alerts would also occur if shares were marked up on small volume at the end of a day's trading or when a sequence of such alerts occurred over several days. A more detailed list of current alerts is described in Table 2. These alerts are archived (with a comment on what action was taken) and form part of Surveillance's on-going database of information about a company.

Following the primary alert, two SOMA analysts (one responsible for equities and the other for derivative securities) attempt to explain the alert by reference to available information. A decision as to whether the rise reflects available information takes into account the general state of the Australian market and its relationship to other markets, the industry affiliation of the security in question and information unique to the firm. This often includes broker recommendations which are regularly received and entered into Surveillance's own on-going databases of information. This information is occasionally supplemented by solicited advice from experienced members of the securities profession. For the purpose of comparing the alert to available information Surveillance maintains online access to a variety of electronic company, financial and general news services.

Surveillance also employs a series of free-text retrieval computer programs (such as ASKSAM, LOTUS MAGELLAN and ISYS) which permit almost instantaneous searches on sub-strings such as the company name. If Surveillance staff are unable to explain the alert by reference to publicly available information, the matter is referred to the Companies division to establish whether it is necessary to further refer the matter to the company's management/directors. The aim is to discover whether there might be information in the company's possession that is not generally known. Where this last avenue proves fruitless the stock is tagged for further investigation. Subsequent patterns in trading and investigation enable it to be labelled a possible manipulation, insider trading and/or a breach of the law or exchange business rules. Formal and informal group meetings convened throughout the day decide on the priority to be attached to each investigation.
Criteria for selection include whether the suspicious trading has already received interest by the media or other parties such as the Companies division of the exchange or the ASC, and the extent of the potential or actual gain to the parties involved. The potential scope of the investigation, its relation to others in progress and resource limitations constitute another criterion affecting the decision. The presence of three full time and two part-time investigators, means that decisions regarding detailed investigations are made based upon a priority system which includes elements such as the type of breach and the amount of funds involved. Some matters not immediately investigated may eventually be so as it becomes obvious that there are links to previous cases.

These links are drawn from the basic information (e.g. names, addresses) entered into the Surveillance central database in respect of each alleged manipulation. This includes company details and details of clients trading at the time of the alert. For those potential manipulations which are chosen for intensive investigation, the analysts start by replaying the market during the time the manipulation was perpetrated. This is jointly facilitated by the use of the Stock Exchange Automated Trading System (SEATS) and a database program called SEATSCAN. SEATS registers and archives trades to the nearest one hundredth of a second which allows the market to be later recreated on a screen. This includes bids and offers as well as actual trades.

These associations quickly permit an assessment of whether or not the trading involves insider trading or the more vexing market manipulation. A weak spot in the system which will continue, whilst ever Surveillance is having an effect on the way dubious business is done in Australia, is the ability of traders to trade through overseas entities and brokers, particularly the South East Asian and European region. While the Surveillance division is establishing Memorandums of Understanding between overseas exchanges, it is yet to cement strong contacts with Asian exchanges. Even if the ASX was able to cement these contacts it is doubtful whether it would be any better off as the amount of information required to be maintained by brokers in these regions seems considerably less than that required in Australia and in other marketplaces around the world. This in part explains why many manipulations are proving difficult to get to court.
In this task SEATS now plays a vital role. Not only because it allows Surveillance to identify the manipulation, but also because it allows others in the market, (e.g. brokers through their SEATS terminals) to see what is happening. Consider the following example. A group of manipulators plan to push the price of a share up by 20% by trading among themselves such that the beneficial ownership remains unchanged at the end of a sequence of trading. The success of this manipulation (involving one or a combination of "matched trades", "pre-arranged trades", or churning depends crucially upon whether associates are able to trade with one another without the market (other than Surveillance) easily detecting this.

Insider Trading

ASX has in place sophisticated technology (e.g. the SMARTS trading alert system) and procedures to assist in the early detection of potential breaches of our insider trading laws and other forms of market manipulation. This is supported by ASX’s continuous disclosure regime. In addition, ASX works closely with ASIC to provide ongoing assistance with its insider trading investigations. ASX has referred potential issues concerning insider trading laws to ASIC over the last three financial years. While this has worked well to date, with the increased market activity, additional resources will be added.

To strengthen ASX’s role as a front line detector of insider trading activity and build on the work we are currently doing in this area, a more dedicated specialist insider trading unit will be established. This additional resource will enhance ASX’s ability to be even more proactive in identifying potential insider trading practices and further improve the ongoing assistance it provides to ASIC with its investigations. This unit will be appropriately staffed and additional technology resources will be added to assist in detecting insider trading activities, including further enhancements to the SMARTS alert system, a non-trading surveillance system to provide improved search and “non-trading” alerts and a risk-based assessment system to better facilitate the supervision of participants. These additional resources will enable ASX to better examine potential insider trading activities and provide relevant information more quickly to ASIC to assist its investigations.
**Technological Integrity**

One of the goals of the ASX is to develop a range of information systems (IS) technologies that will sustain and enhance the integrity of the market. This is demonstrated by the in-house development and building of the Clearing House Electronic Sub Register System (CHESS), which was developed in 1994. The automation of the Clearing and Settling back-office functions has enabled major advances in settling to T+3 and in Real Time Gross Settlement (RTGS). ASX has also adopted a system built by external suppliers of technology solutions to develop and enhance its capabilities, the Derivatives Clearing System (DCS) developed and supported by the Australian company <Name of company withheld>. ASX set standards, policies and procedures for managing the integrity of the technological infrastructure. These are constantly updated as technology changes and cover areas such as operating systems, security and change management. The ASX by imposing the regulated systems intends to ensure:

- infrastructure and application integrity;
- reliable and timely changes across all ASX systems;
- changes do not fail or impact other systems; and,
- accurate configuration management information is available

**IS technology developments**

ASX has been at the forefront of exchanges by delivering high-quality, innovative technology solutions that align with the interests and initiatives of our customers. The move to CLICK XT™ represents the most substantial generational change in our systems since the “open outcry” system was made obsolete by SEATS in 1987. Developed by OMX Technology AB, CLICK XT will integrate onto a single platform the entire suite of ASX-traded products: equities, warrants and interest rate securities (currently traded on SEATS) and equity options, index options, index futures and commodity futures (currently traded on OMX’s CLICK system). This will provide customers with improved functionality and new trading opportunities, such as contingent trading across equities and derivatives. The project is well underway, with migration of products to the new platform taking place progressively for project completion during 2006.