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A Reflection on the Use of Structured Case Analysis: Infusion of Information Systems in a Regulated Sector

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ABSTRACT

The objective of this paper is to reflect on the conception, development and implementation of structured case analysis in examining the infusion of the Information Systems (IS) in a regulated industry sector; the Australian Stockbroking Sector. The research revealed that in rule-bound industries such as the stockbroking sector, the adoption of IS technologies occurred through a wave of standardisation perpetuated by the sector's governing bodies followed with individual firms' strategic differentiation. The reflection on the research methodology involves 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. Finally, the limitations of the research methodology are outlined.

Keywords

Infusion, Diffusion, research methodology, structured case analysis, information systems

INTRODUCTION

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. Computerization, 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. 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.* (2005) 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.

To analyze 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: (1) *a conceptual framework*; (2) *a predefined research cycle*; and (3) *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. A theory-driven preliminary 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. This was crucial since this research was new and to the author's knowledge not many such researches were carried out in Australia. 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 particular types 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 the predictions of the Diffusion of Innovation (DOI) doctrine and the observed 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.

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 organizations attempting to design and implement enterprise-wide data warehouses to improve organizational 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 (Eisendhardt, 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, organization 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 emphasizes 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). 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.

PROCESS

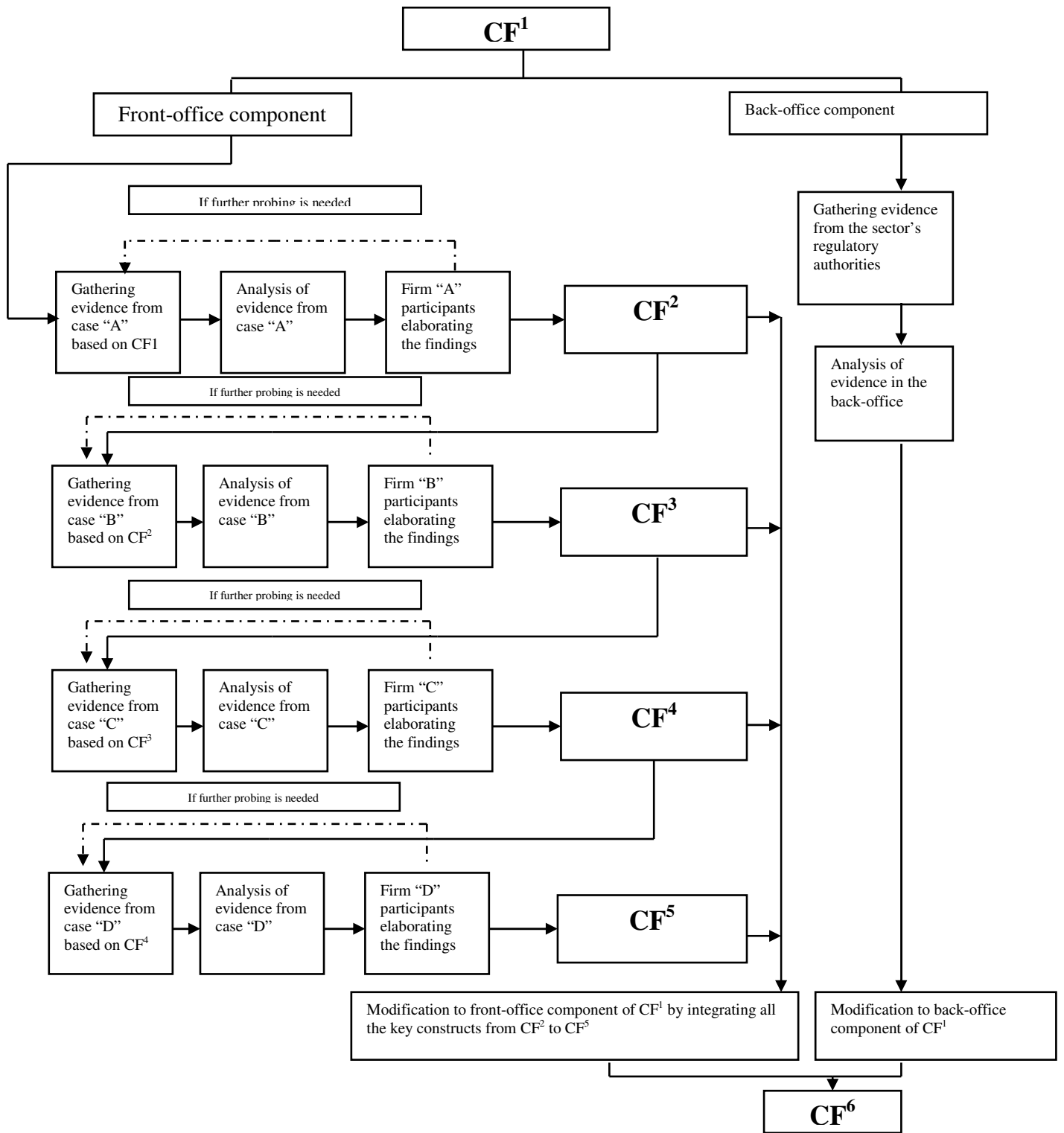
As per Figure 1, the planning stage includes the development of the first and subsequent iterations of the conceptual frameworks and the data collection protocol. The data collection stage is the process of obtaining the case study information that can include interviews, archival material and observation of the target brokerages. In the analyze 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 rigor. 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 (CF1) was initiated after the review of literature on diffusion of IS. The review and the comparative analysis of the original CF1 with the modified CF2-CF5 was carried out in the reflection stage when concepts were clarified and relationships specified. The process of the structured case methodology was 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.

Development of conceptual frameworks

As per Figure 1, individual brokerage houses participating in the study provided data on their front-office operations. The front-office component of CF1 provided the initial interview protocol for case A. The findings of the interviews resulted in modification of CF1. The modified conceptual framework (CF2) 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). CF2 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 CF2 and this resulted in development of a new conceptual framework, CF3, 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 CF4 and CF5 respectively. After developing of CF5, key constructs of CF2, CF3, CF4 and CF5 were compared to the proposed key constructs of CF1. Areas that needed modification were amended and a new set of key constructs were added to the front-office component of the CF1. Findings of the interviews with the ASX and ASIC were added to the back-office component of CF1, resulting in development of the finalized conceptual framework CF6. CF6 was the outcome of the research that provided a range of constructs influencing the differentiation outcomes of participating brokerage houses.



Adapted from Susman et al., (1978) and Denzin et al., (1994)

Figure 1 – Structured Case Planning

Selection of cases

Miles *et al.* (1994) suggest that several dimensions to case selection need to be considered, such as its conceptual nature, social size, physical location and temporal extent. 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 strata were set based on the classification of the brokers devised by the ASX (2004). 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.

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 analyzed 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. 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.

CASE STUDY VALIDITY

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, generalizability, 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 *et al.*, 1985; Baskerville *et al.*, 1995 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). 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). 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). 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).

LIMITATIONS

One of the possible limitations of the structured case study research can be attributed to its exploratory nature. This is emphasized 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.

RESEARCH FINDINGS

The interviews indicated that as far the regulatory bodies were concerned, the justification for involvement of the regulatory bodies in the financial system and the resultant regulatory rigidity was considered to be the consumer protection; promotion of competition; and protection of the stability and soundness of the financial system. Most importantly the imposition of strict regulatory control on the extent of change is the moral hazard or 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 micro level, 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.

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. 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. 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. Each of the options was in line with the available resources and most importantly of all, the type of niche (needing information or just a trade platform) they served (by becoming full-service, discount or online brokerage). The choice of front-office technology is influenced by communication with other brokers in the sector, recognition of fads and mimicking of peers.

In addition to the proposed framework, 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) provides an alternative perspective on the specific guidance as to technology representation. Technology and technology-enabled change can be represented as the social implementation of a material object, where the social implementation of a particular technology, in part, is a response to human transformative activity. The brokers interviewed described a decision-making system where the firm's choice of a new system and managerial practice is not solely the domain of management. In the stock broking 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 of industry services.

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 methodological approaches adopted in pursuing this thesis were found to be useful in seeking answers to the aim and objectives of the research. Infusion of Innovation (IOI) was proposed to address the shortcomings of DOI by emphasizing the scope and depth of influence by regulatory structures and governing bodies in directing the trajectories of growth.

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