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# The interplay between structural rigidity and uptake of innovation-a critical examination of infusion of innovation in the stockbroking sector

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# THE INTERPLAY BETWEEN STRUCTURAL RIGIDITY AND UPTAKE OF INNOVATION- A CRITICAL EXAMINATION OF INFUSION OF INNOVATION IN THE STOCKBROKING SECTOR

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## **Abstract**

*In the studies concerned with the uptake of innovation, the process of diffusion and subsequent uptake of technological innovations is seen as a direct outcome of communication between users of an innovation and the potential adopters. Rogers (1995) explains that innovation spreads across a population of organisations beginning with the initial awareness of the innovation, and progressing to its formal adoption and full scale development. Diffusion of innovation theory (DOI) was employed to explore the adoption of information systems (IS) technologies in the listing, sales and clearance processes in the Australian stockbroking sector. The research revealed that in rule-bound industries such as the stockbroking sector, the adoption of IS technologies occur in the context of two dimensions: (1) a wave of standardisation perpetuated by the sector's governing bodies followed with (2) individual firms' strategic differentiation. The differentiation phase initiates after strict adherence to the overall rules and regulations devised by the sector's governing bodies. In addition, the demands of the customer groups influence the direction of change in the composition of the sector.*

*Keywords: Diffusion of innovation, Infusion of innovation, Innovation, Regulatory bodies, Stockbroking sector, Australia.*

## **1 INTRODUCTION**

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 a large percentage of processes undertaken by the stockbrokerage houses were 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 standardise 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 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.

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.

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: (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. 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.

## 2 CRITICAL GROUNDING OF THE RESEARCH

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. Among the widely used strategies was the development of an existing customer base via the development of new technologies and processes (Wilhelm, 2001). 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 *et al.* (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.

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. 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 case 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).

### **3 RESEARCH APPROACH**

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. This was intended to guarantee a reliable and rich set of structured cases.

#### **3.1 Data collection**

Data was collected from industry reports and interviews with managers, directors and traders involved in the sector. 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. 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. 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. At the same time, each of the interview questions needed to be adjusted to “incorporate new themes which have emerged” (Eisenhardt, 1989; p.539).

Five participants from the Australian Stock Exchange (ASX) and the Australian Securities and Investment Commission (ASIC) agreed to take part in the research. 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.

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.

To address the front office operations, a total of 60 participants were selected from each type of broker operating in the sector. 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. 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.

- 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 North American Financial institution. 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.

## **4 RESEARCH FINDINGS**

### **4.1 The dynamics of the back office**

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 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. 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.

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.

### **4.2 Dynamics of the front office**

The interviews as far as the front office of the operations are concerned; there are two main groups of brokers: full service (advisory) stock brokers and non-advisory stock brokers. Full service brokers offer advice on buying and selling shares make recommendations and provide research. In addition their services may be personalised and they may offer tax and other financial services. As a result clients generally pay a high brokerage fee to buy and sell shares. Non-advisory brokers, on the other hand offer no recommendations or advice regarding the appropriateness of an investor's decision;

consequently their brokerage fees tend to be lower than that of a full service stockbroker. Non-advisory stock brokers can either operate only on the phone or via the Internet. 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.

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).

## 5 DISCUSSION

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 *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.

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 customer service solution) 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.

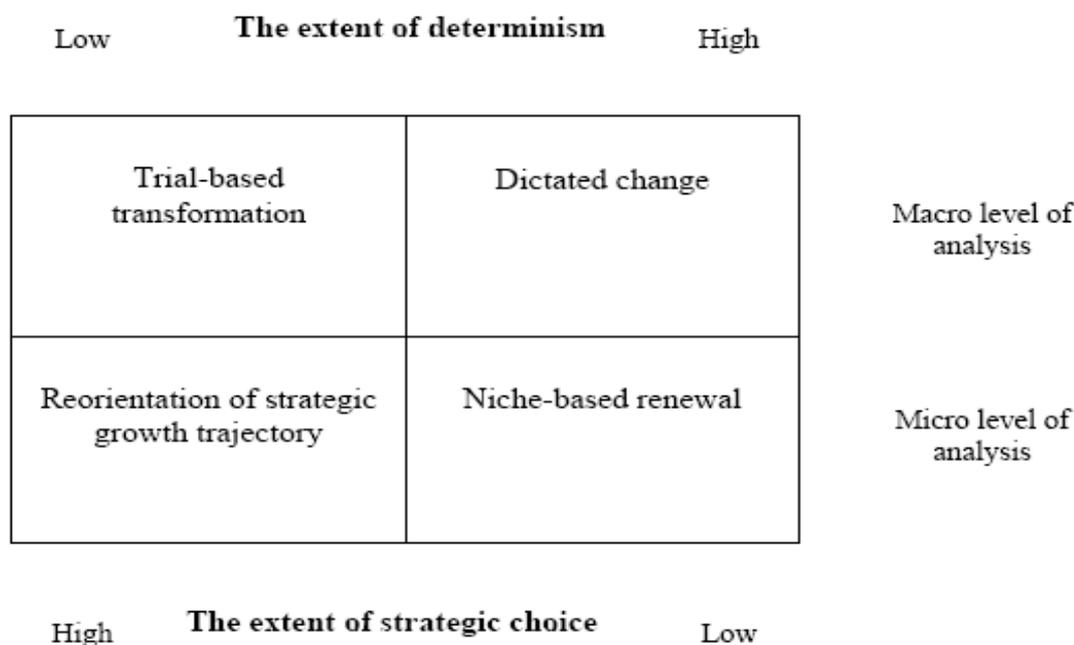
Case C started by offering a full brokerage service. However, after the end of its partnership with one of the largest full service brokerage providers in the United States, it reverted back to providing a discount service. Since one of Australia's biggest banks owned case C, the case organisation started 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. 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.

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)* 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).

## 6 PROPOSED CONCEPTUAL FRAMEWORK

The transition contexts or the trajectories of growth for stockbrokers can be mapped using two different dimensions as identified in Figure 1. 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. 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 ruled of disclosure and fair trade.



Source: Bharadwaj (2000)

Figure 1 Strategy quadrant

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 1 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.

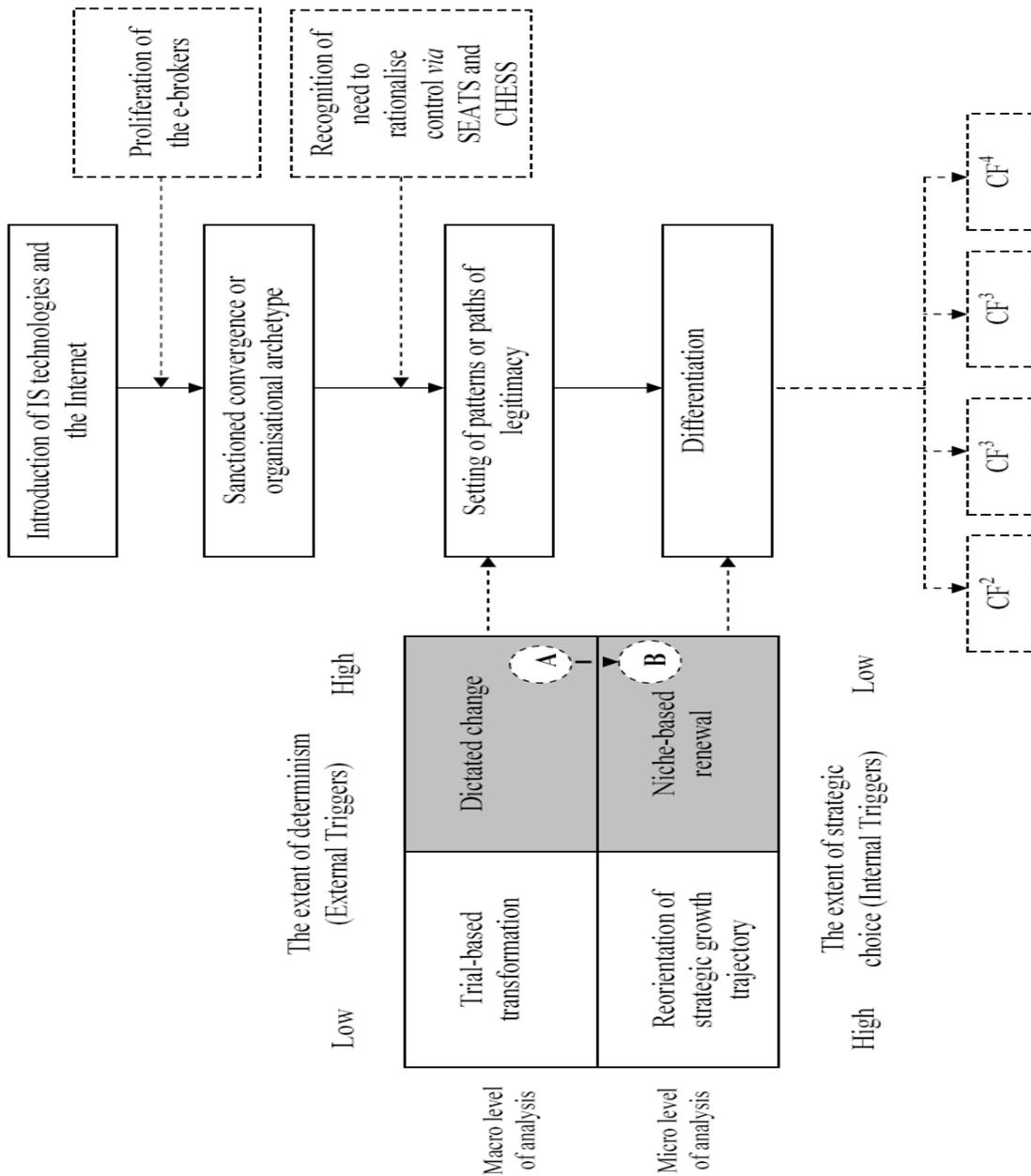


Figure 2 The process of IOI transition

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 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 2).

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 2 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.

## 7 CONCLUSION

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. Under this approach technology and its associated human elements can be seen as a structure (although few definitions of "structure" within critical realism include any reference to material objects). Under this view a technologically 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 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.

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. However within these boundaries once the overall rules and regulations are adhered to, each agents is allowed to differentiate itself from its immediate competitors. The extent of differentiation is however different across governing bodies, sectors and industries. This points to the inadequacy of the DOI theory in explaining the dynamics of regulatory control by the ASX and individual brokerages intention to differentiate their operations from immediate peers.

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