EMPIRICAL INSIGHTS
INTO
THE BLACK BOX OF DECISION-MAKING
IN
NEW VENTURES

(A Study Based on Biotechnology Companies in Australia and India)

By

DEEPAK SARDANA

Dedicated

To

Mom & Dad

Inspired

By

Peter Drucker

(The Greatest Management Guru of all times)

&

Other

'Holistic' Thinkers in Management

Declaration

This study contains no material that has previously been accepted for the award of any other degree at any other university. To the best of my knowledge and belief, this study contains no material previously published or written by any other person, except where due reference is given in the text.

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15th September 2007

THE AUSTRALIAN NATIONAL UNIVERSITY

NATIONAL GRADUATE SCHOOL OF MANAGEMENT

COLLEGE OF BUSINESS & ECONOMICS

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THE AUSTRALIAN NATIONAL UNIVERSITY

Date: 15th September 2007

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Title: Empirical Insights into the Black Box of Decision-Making in New Ventures

Department: College of Business and Economics

Degree: PhD

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ACKNOWLEDGEMENTS

It has been a long journey, which had much hardship but at the same time enjoyment. In this endeavour, I met people who guided me and supported me along the correct path. Now is the right opportunity to express my gratitude and thanks to all.

First and foremost, many thanks to my principal supervisor Professor Don Scott-Kemmis for being a constant source of encouragement, and providing me with brilliant guidance throughout the process. His enthusiasm and sharpness always kept me motivated. I treasure many of our friendly conversations sparkling with humour and wit. He has been an outstanding mentor.

I would also like to record my debt of gratitude to my advisors: Professor S.K. Brahmachari, Dr Robert Forrester, and Associate Professor John Bailey. Each one of them contributed with their many thoughtful comments, and they were always keen to help me. I was 'irritatingly' demanding of Dr Robert Forrester for his expertise in statistical methods, but he always welcomed me with a smile. Discussions with Professor Brahmachari and Professor Bailey were always invigorating, almost always leading to new insights.

I am very grateful to Dr Judy Matthews for her constant warmth and support. She has been a great motivator. My colleagues, Anne Holmes and Robert Dalitz, who were ahead of me in PhD studies, became my de facto mentors. My sincere thanks to them. I also thank Dr Myra Whitney, who provided copyediting assistance.

I would also like to record my thanks to all the very senior managers, founders, and directors of the companies who were willing to provide me generous time for interviews despite their very busy schedules.

My heartfelt thanks goes to my very 'close' and 'special' friends who shared a lot of laughter, secrets, ideas, gym sessions, evening walks, 'experimental' cooking evenings, and jokes, but who, above all, proved their trustworthiness in times of disappointment, personal pain, and despair. I feel blessed to have - Abid, Vivianne, Sandeep, Zohair, Genevieve, Amish and Deirdre – as my 'true' friends.

I am also touched by the great trust and affection by my close relatives and friends in India. Last but not the least, my deepest felt thanks to my parents (Mrs Sneh Sardana and Mr M.C. Sardana) and my younger brother (Naresh Sardana) for their unconditional love. Despite the geographical distance and their personal commitments, they were always very close, and without their ongoing kindness, love and encouragement, this thesis would not have been possible.

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Chapter 1

Introduction

Peter Drucker: Making good decisions is a crucial skill at every level.

Access to information and knowledge is a source of competitive advantage (Ford et al., 2005). This has resulted in, inter alia, the mushrooming of a huge management consultancy and report writing business. Ford et al. (2005) say that consulting industry in the United States alone stands at $15 billion. However, they also draw our attention to the fact that managers' quest for knowledge and information rarely draws them to university based management researchers.[1] The primary reason for this, according to Ford et al. (2005), is divergence in thoughts and needs between academics and consulting groups. This is surprising because both of them seek to improve the workings of business. Managers often feel that works by academics are incomprehensible and irrelevant to their day-to-day work whereas academics think managers are more interested in quick fixes and the latest fads than in any systematic research (Ford et al., 2005).

In order to improve the relationship between managers and management researchers, Ford et al. (2005) suggest that more 'practice-relevant' research should be carried out. They suggest that even though a rapid shift to practice-relevant research may not be feasible, a step in the direction of applied management research would be mutually beneficial. This, they suggest, can happen by adopting a two-prong strategy: management faculties stop looking at practice-relevant research as second-rate; and researchers understand that 'being both too academic and insufficiently academic inevitably gives rise to a rather persecuted imagination' (Mohrman et al., cited in Ford et al., 2005:32).

This study aims to achieve both relevance for direct practical applications and academic rigour. It aims to demonstrate, within the new venture context, the link between the decision process and the performance of the decision—i.e., which styles of decision processes are likely to yield what sort of results, taking into account the decision-maker(s). Hence, the research aims to establish a relationship between the decision-maker and the decision process, and between the decision process and the performance (outcome relative to objective) of the decision—i.e., what sort of decision-maker will most likely follow which decision process approach and what the consequence is likely to be. The study will be beneficial to decision-makers

[1] Ford et al. (2005) say that even though about $1 billion worth of business books are sold each year, only a small portion of them are written by management researchers. They observe that in 2001 only 10 per cent of Business Week's 'Top Business Books' were authored by academics.

(especially entrepreneurs and senior managers in a new venture) as it will identify more effective approaches to decision-making.[2]

It is imperative to bring to the notice of readers that while the decision process involves many steps, it is the 'planning' in decision processes that has attracted the most attention from researchers. Different researchers have suggested different typologies for the decision process based largely on the 'level' of planning (discussed in Chapter 3). There is much debate about precisely this point—the extent to which entrepreneurs do plan—and it remains a source of confusion (discussed in Chapter 2). While seeking to develop a broader understanding of entrepreneurial decision-making in the new venture context, this thesis aims to address this area of confusion.

The research reported here, which involves detailed studies of new biotechnology ventures based in India and Australia, addresses two questions:

1. Is there a relationship between the characteristics of the decision-making process and the outcomes of the decision?
2. How does prior experience of the entrepreneurs/entrepreneurial team affect the decision process in a new venture?

1.1 What is Entrepreneurial Decision-Making?

High technology new ventures may be more attractive for investors and employees, and more innovative, but they are also more risky. They exist in a very dynamic business environment with high levels of uncertainty. While statistically there are more failures than success stories, it is the phenomenal success of a few that leaves an enduring impression.

Mitchell (1997) is puzzled by the popular opinion that sees entrepreneurs as people with 'extraordinary powers' to create new ventures.[3] He suggests that the

[2] Ford et al. (2005) suggest that researchers should make clear upfront '[w]hy this research should matter to managers.'
Gartner et al. (1992) quote Hales to emphasise the need for empirical evidence about the difference between 'good' and 'bad' managerial work.

[3] The general perception about the entrepreneur tends to be based on either their peculiar characteristics or their peculiar way of doing things. While there is no consensus among researchers on the latter front, researchers have failed to link the personality dimensions of entrepreneurs to performance (Deakins & Freel, 1998; Gartner, 1989; Lee et al., 2001). It seems that characterising an 'ideal' entrepreneur is pointless.

'mystical status of the entrepreneur' arises because 'the 'ordinary' is rarely news, [while] the 'extraordinary' and the 'idealized' assume an unwarranted pre-eminence' (p. 122). He also says that the 'extraordinary' seems extraordinary because it is portrayed that way to outsiders though in fact it may be viewed as ordinary by insiders. Not surprisingly, popular opinion is of the 'seat-of-the-pants,' 'intuitive,' and 'opportunistic' styles of successful entrepreneurs. More surprising is the fact that many researchers consider that successful entrepreneurs are successful not because they plan well but because they seize whatever opportunities come their way.

But, if this popular image of an entrepreneur is correct, why do almost all 'how to be a successful entrepreneur' books emphasise the importance of being very systematic and taking a planned approach to new venture formation? Similarly, why do venture capitalists value business plans highly and carefully assess the competence and experience of new venture managers?

While 'how to' guides emphasise planning, many are formulaic in their approach to such planning. This compelled Mowen (1993:10) to comment that 'high-stakes decisions cannot be approached from such a simplistic viewpoint and these cookbook-style recipes for success will not help you.'

To move beyond the picture of daredevils or formulaic planners, Mitchell (1997) suggests that understanding the *approach* taken by entrepreneurs would be useful. For Russo and Schoemaker (2002:xii), 'decision-making prowess is a skill that can be learned—and that should be learned.' This is important (and encouraging) because 'some managers make very poor strategic choices, with devastating consequences for their firms, while others in very similar circumstances make much better choices' (Dean & Sharfman, 1996:369). In this regard, Russo and Schoemaker (2002:xviii) draw our attention to an old joke about a man who is asked if he can play the piano. He replies, 'I don't know. Give me a piano and let's find out.' They comment that such an approach to decision-making is not so funny (p. xviii).

According to Ireland et al. (2003), wealth is created by entrepreneurship (i.e., opportunity seeking behaviour) and by strategic management (i.e., advantage seeking behaviour). However, an integration of strategic management and entrepreneurship

frameworks in academic research has not developed despite a call for this by several authors (Hitt et al., 2001).

The vast strategic decision-making literature usually focuses on the context of large companies. In considering this literature, the advice of Gartner et al. (1992:17) is important: 'Emerging organizations are not smaller, 'incomplete' versions of existing organizations, but unique states of existence with organizational properties that are arranged in a fundamentally different way from an existing organization.'[4]

Also, according to Dean and Sharfman (1996), a link between the decision process and the level of effectiveness of the decision has not yet been convincingly demonstrated, even in large firms. This may be because the 'decision processes in large firms are often disconnected from organizational actions' (Brunsson, cited in Forbes, 2005:357). However, the decision process in new ventures is more likely to be 'a functional exercise that is genuinely representative of firms' interactions with their environments' (Forbes, 2005:357).

1.2 Approach to the Research

In researching the *decision process,* it is imperative to appropriately align the unit of performance with the unit of analysis. First, Dean and Sharfman (1996) note that in many cases researchers have tended to assess the effectiveness of decision-making by assessing overall firm performance. They argue that this is problematic because 'firm performance is a function of a diverse array of factors, which may mask the effect of the decision processes' (p. 371).

Second, Long and McMullan state (cited in Krueger, 1993:5) that 'few researchers follow the process from the idea stage to the ultimate decision to initiate the venture.' This study follows decisions in response to opportunities or problems

[4] The approach to the present study also followed the suggestion by Davidsson and Wilkund (2001) that the *start of any new economic activity* falls within the purview of entrepreneurship. It also notes Hornday's observation (cited in Davidsson & Wiklund, 2001:94) that 'research on small business…is well worth doing but neither that researcher nor the emerging scholarly field of entrepreneurship benefit from attaching the entrepreneurship label to it….' Wortman (1987) has also observed that research in small business is distinct from entrepreneurship research, although many researchers conflate the two fields.

from the initial stage to their enactment and at least proximate outcome. This has been done not by observation or direct participation but by retrospective interviews. Langley et al. (1995:267) quote Simon's view that 'such verbalized articulations of thought are sufficient to capture the essence of what goes on in the head of a decision maker.'

> Much of the iceberg is, indeed, below the surface and inaccessible to verbalization, but its concealed bulk is made of the same kind of ice as the part we can see…. The secret of problem solving is that there is no secret. It is accomplished through complex structures of familiar simple elements. The proof is that we have been able to stimulate it, using no more than those simple elements as the building blocks of our programs. (Simon, 1977, quoted in Langley et al., 1995:267)

Third, Langley et al. (1995:261) quote Dewey and Bentley's statement that 'decisions typically become inextricably intertwined with other decisions… So no decision can be understood de novo or in vitro, apart from the perceptions of the actors and the mindsets and cultures of the contexts in which they are embedded.' They argue that decision-making must be studied in toto and in vivo at the individual level. The research design followed here strikes a compromise between the demanding objective and the practicalities of the research.

1.3 Structure of the Thesis

- **Entrepreneurial decision-making: Do we know what it is?** This chapter reviews the literature relevant to *decision-making in a new venture context*. The review identifies the conceptual and methodological limitations of alternative approaches.
- **Decision-making in management**: There is little empirical work related to decision-making in a new venture context. Consequently, it is necessary to derive useful insights from the vast literature on decision-making in management science.
- **Developing a 'working' framework:** The approach here is to develop a preliminary decision-making framework from the decision-making literature. This framework provides a basic guide to direct the initial research. That framework is later developed in light of the empirical insights.

- **Research methodology:** This research presents a range of methodological and organisational challenges. This chapter discusses these challenges and how they were addressed.
- **Decision process: Qualitative analysis:** This chapter draws on the many decisions studied within the 31 case studies of new biotech ventures in Australia and India to evolve a new framework from the basic 'working' framework. The revised framework is discussed along with illustrative examples from the empirical work. The chapter concludes with a discussion on whether *decision-making by entrepreneurs has any typical characteristics and, hence, whether there is 'entrepreneurial decision-making.'*
- **Decision-making and Decision Outcomes:** This chapter makes use of quantitative data to tease out any difference between 'successful' and 'unsuccessful' decisions. The analysis shows that there is a clear distinction between decision processes that were seen to be generally associated with successful and with unsuccessful decisions.
- **Does 'relevant' prior experience make any difference to the decision process?** Decision-maker(s) are central to the decision process because they drive it. But *do decision-makers make a difference to the decision process?* This chapter analyses *how* and *why* the decision-making characteristics of decision-makers affect the process of making decisions.
- **Does 'relevant' experience make any difference to the outcome?** The previous chapters analysed relationships between the *process and outcome of decision-making*, and the *decision-maker and the decision process*. This chapter provides an integrated analysis of the decision-maker, decision process and outcome. It makes extensive use of qualitative data and quantitative data.
- **Key findings:** This chapter draws out and discusses the key findings and makes suggestions for future research.
- **Who learns what?** This chapter is an addendum in that it was not the focus of the research. However, it has been written because a major lacuna in entrepreneurship literature concerns 'who learns (in terms of 'key' learning) what in what context,' and this research has generated an opportunity to also address this question. Learning is central to entrepreneurship (and indeed management more generally). This chapter assesses whether there is any relationship

Chapter 2

Entrepreneurial Decision-Making: Do we know what it is?

Robert H. Schuller: 'Spectacular achievement is always preceded by unspectacular preparation.'

Many consider that there is an entrepreneurial style of decision-making. Discussion of the nature of decision-making in new ventures remains ambiguous and confusing. It is argued that this is due in large part to a lack of careful systematic empirical research. Researchers may have been deterred by the lack of an appropriate framework or by the complexities of research where the unit of analysis is a 'decision.' Indeed, entrepreneurial decision-making has never been well understood; different lines of analyses with different assumptions and methods have led to varied empirical results.

This chapter discusses the distinct lines of thought that have developed on entrepreneurial decision-making. It identifies the reasons why different findings have emerged from different research approaches. Drawing on that discussion, a framework for understanding 'entrepreneurial decision-making' and the research questions that shape the inquiry are outlined.

2.1 'Research' in Entrepreneurship

An entrepreneurial culture encouraging innovation has become one of the hallmarks of any society looking to achieve high growth and development. In Russia, India, China, East Europe and indeed in most other parts of the world, there has been a systematic effort over past two decades to embrace the 'free-enterprise revolution' pioneered by the US society. From this perspective there is, as Bygrave (1993) suggests, particular value in understanding entrepreneurship better.

The problem with understanding entrepreneurship better starts at the first step—the definition of an entrepreneur (Gartner, 1994; Hornaday, 1992). As stated by Kanbur, 'it is a phenomenon that is all pervasive yet least understood and defined by economists' (Herbert & Link, 1988:xvii). There are many different meanings of the term 'entrepreneur' (Herbert & Link, 1988). For Smith, the entrepreneur is a 'capitalist'; for Cantillon, a 'decision maker'; for Say, an 'industrial leader' and a 'manager'; for Pigou, an 'owner of an enterprise'; and for Kirzner and Schultz, an 'allocator of resources for alternative uses'.[1] Herbert and Link (1988:155) propose their own definition, which they believe takes into account most of the factors related to an 'entrepreneur'. For them, an entrepreneur is one 'who specializes in taking

[1] Herbert and Link (1988) discuss the evolution of the concept and definition of 'entrepreneur.'

responsibility for and making judgemental decisions that affect the location, the form, and the use of goods, resources, or institutions.' This definition not only emphasises the activity side of the 'entrepreneurship' (i.e., taking responsibility, making decisions etc.) but also relates it to the context and the content.

Others focus on entrepreneurial activity rather than the entrepreneur. Danhoff (as quoted in Gartner, 1985:699) focuses entirely on the activity: 'Entrepreneurship is an activity or function and not a specific individual or occupation…the specific personal entrepreneur is an unrealistic abstraction.' Bygrave (1993) also emphasises activities in arguing for entrepreneurship research to focus on entrepreneurs, entrepreneurial processes and entrepreneurial events. Similarly, Spilling (1996:93) usefully distinguishes between entrepreneurs and entrepreneurial activity:

> Although all entrepreneurs are people, and all entrepreneurial action is taken by people, the role of an entrepreneur may be just one of many roles taken by a person, or the role of being an entrepreneur may be just temporary. Thus, it may be important to distinguish between individuals and the entrepreneurial role. According to Barth (1972/63, pp. 5-6, 12), the entrepreneur is not a person in any strict sociological sense. Rather the concept should be interpreted as an *aspect of a role*. The concept relates to actions and activities, and it characterizes certain qualities and orientations within these activities.

Entrepreneurial activity is not restricted to the formation of a new venture, but 'new venture formation' (especially by nascent entrepreneurs) has been a focus of much attention by researchers.[2] For example, for Hitt et al. (quoted in Robinson and McDougall, 2001:659) '[t]he establishment of new ventures lies at the foundation of entrepreneurship.'

This focus on new venture formation follows an earlier focus on the characteristics of entrepreneur and entrepreneurial activity. Within that field, behavioural studies in entrepreneurship (i.e., what entrepreneurs do) grew in influence over trait-based studies (i.e., who entrepreneurs are) after the latter failed to provide any evidence of a relationship between entrepreneurs' characteristics and venture performance (Lee et al., 2001). Gartner (1989) was one of the first to emphatically make a case for behavioural studies in entrepreneurship. Reviewing earlier empirical

[2] Davidsson and Wiklund (2001:89):'Like Gartner (1988), we think the main focus of entrepreneurship should be on emergence, but what emerges is new economic activity and not necessarily a new organisation.'

work, he concluded, 'In empirical research…when certain psychological traits are carefully evaluated, it is not possible to differentiate entrepreneurs from managers or from the general population based on the entrepreneur's supposed possession of such traits' (p. 58). He added that '[t]he entrepreneur is not a fixed state of existence, rather entrepreneurship is a role that individuals undertake to create organizations' (p. 64).[3]

Box 2.1 What Do Entrepreneurs Do?

Gartner (1985) has categorised the activities by entrepreneurs (as interpreted by various researchers) into following six categories:

1. The entrepreneur locates a business - Cole (1965), Kilby (1971), Maidique (1980), Schumpeter (1934), Vesper (1980).
2. The entrepreneur accumulates resources - Cole (1965), Kilby (1971), Leibenstein (1968), Schumpeter (1934), Vesper (1980).
3. The entrepreneur markets products and services - Cole (1965), Kilby (1971), Maidique (1980), Libenstein (1968), Schumpeter (1934), Vesper (1980).
4. The entrepreneur produces the product - Kilby (1971), Maidique (1980), Schumpeter (1934), Vesper (1980).
5. The entrepreneur builds an organisation - Cole (1965), Kilby (1971), Leibenstein (1968), Schumpeter (1934).
6. The entrepreneur responds to government and society - Cole (1965), Kilby (1971).

Gartner (1985) has put all six dimensions of 'what do entrepreneurs do' in the 'process' element of his framework.

But are most of these things done by entrepreneurs only? Perhaps not. This might be one of the reasons why, in order to bring clarity and distinguish the field of entrepreneurship, Gartner (1988) has made it synonymous with the 'creation of organizations.' He prepared a framework of four dimensions for studying new ventures: the individuals involved in the creation of the new venture; the activities undertaken by those individuals during the new venture creation process; the organisational structure and strategy of the new venture; and the environmental context of the new venture.

[3] According to Bolton and Thompson (cited in Lowe & Marriott, 2006:105), entrepreneurship is as much a function of technique as it is of temperament or talent and one can learn to manage temperament.

Despite this attention on new ventures (and entrepreneurs) in the field of entrepreneurship, understanding *how* entrepreneurs carry out the activities to create new ventures has remained limited. Katz and Gartner (1988) explored organisation theory and the entrepreneurship literature to identify a theoretical and empirically based framework for identifying the properties that would indicate an organisation in the process of creation. They found that 'most theories on organizations assume complex properties that occur only after organizations achieve some particular size…' (Carter et al., 1996:153).

Most empirical studies into entrepreneurship have focussed on *what* entrepreneurs (refer to Box 2.1) and new venture formations have done and not *how* those activities are carried out.[4] For example, while there has been inconclusive empirical research on the writing (and use) of business plans during the initial phase of the company, little empirical attention has been given to the approach to planning during initial start.

Carter et al. (1996) conclude that future studies should focus more on *how* issues and more precisely identify the kinds of behaviours appropriate for certain new venture conditions, particularly how entrepreneurs make judgements about the potential success and how entrepreneurs undertake planning. Similarly, Gartner et al. (1998:229) also suggest that '[p]aying attention to the details involved in a start-up might be one important aspect of learning about entrepreneurship.' Gibb (cited in Harris et al., 2000) has also emphasised the importance of the *how* dimension by stating that the design of entrepreneurship programmes should concentrate on the process rather than the content.

There are many dimensions to entrepreneurial process (Huff & Reger, 1987). Most researchers in this area, however, have focused on 'planning' (Olson & Bokor, 1995), the results of which are quite varied. Lumpkin et al. (1998) observe that '[l]earning more about the types of planning that can best contribute to entrepreneurial success is a fruitful area for future research.' Burmeister and Schade (2006:3) also encourage researchers in entrepreneurship to look into the process side:

[4] On the basis of a review of the literature, Mueller and Naffziger (1999) state that most of the research within strategic management has focused on 'developing a written plan' while little (or no) research has examined 'who engages in planning and who does not'. They argue that it is important to understand *how* plans are made.

> [E]ntrepreneurship researchers may want to analyse the empirical relevance of other characteristics that are ascribed to the stereotypical Schumpeterian entrepreneur such as making decisions in an intuitive manner.

Surprisingly, decision-making in new ventures has been a relatively neglected area of study. For example, in a recent survey by Chandler and Lyon (2001), there was no mention of any study that has taken a 'decision in a new venture' as the unit of analysis. That is, none has focused on decision-making. In fact, many consider that entrepreneurial planning is an oxymoron.[5] McMullen and Shepherd (2006) make a case for studying the 'process'. They state that overlooking it has contributed to the generation of alternative theories of the entrepreneur. In this chapter, the endeavour is to assess whether entrepreneurship and planning are incompatible or whether that assumption has been an obstacle to systematic research.

2.2 'Entrepreneurial Decision-Making': The Dominant Concept

Entrepreneurial decision-making has generally been characterised as an intuitive, ad hoc and opportunistic style of decision-making—i.e., action oriented (Delmar & Shane, 2003). The prevalence of this notion is such that, in their review of approaches to strategic management, Mintzberg and Lampel (1999:22) claim that 'like the design school, the entrepreneurial school centred the process on the chief executive; but unlike the design school and opposite from the planning school, it rooted that process in the mysteries of intuition and not planning.' Similarly, Frese et al. (2000), in categorising various types of strategy, characterise 'opportunistic' strategies in terms similar to Mintzberg's entrepreneurial mode.

Similarly, Pira and Gillin (2005) emphasise that along with 'intellectual' intelligence, entrepreneurs widely use emotional and spiritual intelligence. They suggest that by using intuition and value driven motivations 'the serial entrepreneur can change a business-as-usual paradigm to a creative business of high growth and spiritual worth.'[6]

[5] Gruber (2006) highlights that there is a lack of empirical evidence that can substantiate the arguments of the opposing schools (that are discussed in this chapter).

[6] Quinn et al. (1988:615) categorise a style of organisational structure as 'entrepreneurial *adhocracy*': 'because the adhocracy must respond to a complex environment that it cannot predict, it is unable to

Much other research has concluded that the entrepreneurial style of management is not systematic and planned but is rather ad hoc and opportunistic. Robinson (1979) concludes that during the early stages of a new venture, entrepreneurs' decisions are more likely to be intuitive ('seat-of-the pants') and it is only after a venture becomes large that they rely on more formal and systematic planning.[7] Bhide (2000:15) says:

> [M]ost *Inc*. company founders did not spend much time searching for opportunities, doing market research, or writing business plans; they merely replicated or modified an idea they encountered through previous employment or by accident…. The *Inc*. companies did not have seasoned professional managers at their helm, rather they had enthusiastic and inexperienced founders who personally undertook most of the crucial functions of the business….

In writing about their 'devil may care' attitude, he says, 'Entrepreneurs can pursue 'heads I win, tails I don't lose much' opportunities because they are less prone than average to irrational ambiguity aversion and they have a talent for exploiting the cognitive biases and defects of other individuals' (2000:19). Bhide (1994) argues that a comprehensive analytical approach to planning doesn't suit most start-ups. According to Bhide, the 1990 National Federation of Independent Business Study (USA) of 2,994 start-ups showed that founders who spent a long time in study, reflection and planning were no more likely to survive their first three years than people who seized opportunities without planning. In order to support his view, he gives examples and excerpts of interviews with many successful entrepreneurs (see Box 2.2).

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rely on deliberate strategies. In other words, it cannot predetermine precise patterns in its stream of activities….'

[7] This article is based on the experience of consultants of the Small Business Development Centre (of the University of Georgia) with several small business owners. Robinson, in this article, suggests three different stages of decision-making—from an intuitive style to a very formal style. He finally suggests that a middle path is the best for small business owners.

Box 2.2 Bhide and Entrepreneurialism

Bhide (1994):

- In a section entitled 'Does Planning Pay?' all the examples depict people succeeding by sheer chance and no former thought. For example, Peter (Bohdan Associates) observes, 'We're very reactive, not proactive. Business comes to us, and we react. I've never had a business plan' (p. 152).

- 'Bill Gates turned Microsoft into a multibillion-dollar company without a breakthrough product by showing up in the industry early and capitalizing upon the opportunities that came his way' (p. 155).

- '…the astute entrepreneur isn't interested in completeness. He or she understands that returns from additional analysis diminish rapidly and avoids using spreadsheet software to churn out detailed but not particularly insightful analyses of a project's break-even point, capital requirements, payback period, or NPV' (p. 157).

- 'Screening out unpromising ventures requires judgement and reflection, not new data' (p. 151).

Bhide (2000):

- 'Only 4% of the *Inc*. founders found their business ideas through a systematic search; 71% replicated or modified an idea encountered through previous employment, and the other 20% discovered their ideas serendipitously' (p. 54).

- '41% of the entrepreneurs had no business plan at all and 26% had just a rudimentary plan… 5% worked up financial projections for investors. Only 28% wrote a full-blown business plan.'

- 'More than half did not consult with a lawyer, for instance, and three-quarters did not develop any marketing materials' (p. 55).

- John Mineck, co-founder of Practice Management Systems, said, 'People buy a salesperson. They bought me and I had no sales experience…' (p. 51).

- 'When Paul Allen and Bill Gates developed Microsoft's first product, they did not do any market research or competitor analysis first' (p. 53).

- 'Thus entrepreneurs like Gates and Allen might have such confidence in their programming skills that they do not bother with an objective evaluation of the abilities of their rivals and under-invest in research and planning' (p. 56).

- 'Bohdan's founder, in contrast, started selling computers out of his home by accident—he placed an ad to sell his used computer and was surprised by the demand. Then, simply by 'reacting' to customers, Bohdan grew to a $48mn revenue business' (p. 61).

- 'Entrepreneurs experiment to solve a problem…. A few entrepreneurs start out with a long-term vision for their business. Many entrepreneurs do not; consequently they have a propensity to pursue any option that yields them a short-term profit' (p. 65-66).

More interesting are the observations made by Pascale (1984). He characterises the role of 'peripheral vision' and suggests that a 'single-minded' strategy can be detrimental. He draws on a case study of Honda to argue that '[t]he Japanese have particular discomfort with strategic concepts' (p. 48). He is particularly critical of the BCG study of Honda Motors—a source for cases written for use at Harvard Business School and others. Pascale's case study reflects on how critical decisions were made from the start of the Honda Company to their early success in the USA. He argues that the decisions that made Honda a success were not made in a systematic manner but were of an ad hoc and opportunistic nature. Thus, according to Pascale, the case written by BCG is inaccurate as it takes a biased approach to the role of *rational* decision-making in Honda. For example, he quotes a senior executive from Honda as saying:

> In truth we had no strategy other than the idea of seeing if we could sell something in the United States. It was a new frontier, a new challenge, and it fit the 'success against all odds' culture that Mr. Honda had cultivated…. We did not discuss profits or deadlines for breakeven, Fujisawa told me if anyone could succeed, I could and authorized $1mn for the venture. (p. 54)

Baker and Aldrich (cited in Baker et al., 2001) found that most firms had created plans only in order to obtain financing and that in most cases the financing attempts failed. Similarly, Berman et al. (1997), on the basis of a survey of the presidents of small business firms (from different industries) located in Massachusetts, found that 26 per cent of the respondents engaged in planning while 74 per cent said that they did not plan in a systematic manner.

In short, the dominant and prevailing concept related to entrepreneurial decision-making is that it is ad hoc, opportunistic and intuitive. However, there is an alternative view.

2.3 Confusion vis-à-vis 'Entrepreneurial Decision-Making'

A challenge for developing a theoretical construct of 'entrepreneurial decision-making' is that the empirical research appears to have had contradictory results. Some researchers (Delmar & Shane, 2003; Langley, 1988; Lyles et al., 1993; Robinson & Pearce, 1984) find that engaging in a formal planning process gives in-depth

knowledge of the business and, thus, helps in obtaining a better understanding of the situation and options related to it. A study by Olson and Bokor (1995), based on a mail survey to CEOs of the 500 firms listed in the December 1987 issue of *Inc*., also concluded that the performance of small, rapidly growing firms is influenced by the interaction of planning formality (strategy process) and product/service innovation (strategy content). Haber and Reichel (2006), based on interviews with 305 small tourism ventures (an industry not considered technology intensive), concluded that planning does contribute to higher customer satisfaction.

In the same vein, Ireland et al. (2001:60) observe that the most successful innovations that result in the growth of a firm and more wealth creation are the result of well-designed and implemented strategies. In support of their viewpoint, they put forth several examples. Sull (2004:71), based on in-depth case-study of several start-ups over five years, arrived at a similar conclusion:

> Uncertainty lurks in every corner and comes in many flavours: known unknowns (what you know you don't know); unknown unknowns (what you don't know you don't know); new information that is imperfect or incomplete; and conflicting signals. At one extreme entrepreneurs can ignore uncertainty—simply jump into the fray and make it up as they go along. This approach was favoured by a generation of dot-com entrepreneurs…. Rather than ignore uncertainty in the foolhardy hope that the business is coated with Teflon, attempt to avoid it altogether or get burned while perpetually fighting fires, entrepreneurs should instead manage uncertainty by taking a disciplined approach.

Such conclusions by researchers who contradict the 'dominant' view on entrepreneurial decision-making are not the only source of confusion. Contradictory observations by the same author also add to the equivocality. For example, Bhide (1994, 2000) has related entrepreneurial actions to an ad hoc, intuitive and opportunistic style. However, he also suggests:

> The apparently sketchy planning and haphazard evolution of many successful ventures…doesn't mean that entrepreneurs should follow a ready-fire-aim approach. Despite appearances, astute entrepreneurs do analyze and strategize extensively. (1994:161)

Box 2.3 Bhide's Comments Supporting Planning

While some successful ventures may have begun through 'intuitive' decision-making and opportunistic strategies, it does not follow that such approaches and strategies are more likely to be successful than other approaches and strategies. Bhide acknowledges this, as is reflected in some of his writing:

Bhide (1994):

- 'Successful entrepreneurs don't take risks blindly. Rather they use a quick, cheap approach that represents a middle ground between planning paralysis and no planning…. Our evidence suggests three general guidelines for aspiring founders:

  1. Screen opportunities quickly to weed out non-promising ventures.
  2. Analyse ideas parsimoniously. Focus on a few important issues.
  3. Integrate action and analysis. Don't wait for all the answers, and be ready to change course.' (p. 150)
- '…the entrepreneur may require considerable technical know-how in deal making, strategic planning, managing overhead, and other business skills' (p. 153).
- '…niche markets cannot support much investment or overhead, entrepreneurs do not need the revolutionary's ability to raise capital and build large organizations. Rather, the entrepreneur must be able to secure others' resources on favourable terms and do with less, building brand awareness through guerrilla marketing and word of mouth instead of national advertising, for example' (p. 154).
- '…entrepreneurs should favour ventures that aren't capital intensive and have the profit margins to sustain rapid growth with internally generated funds. In a similar fashion, entrepreneurs should look for a high margin for error, ventures with simple operations and low fixed costs that are less likely to face a cash crunch because of factors such as technical delays, cost overruns, and slow build-up of sales' (p. 156).
- '…the entrepreneur only does as much planning and analysis as seems useful and makes subjective judgement calls when necessary' (p. 157).
- 'Entrepreneurs who hope to secure a niche face different problems…entrepreneurs should therefore analyse carefully the incremental costs of serving a niche…' (p. 158).
- 'Trial and error is less feasible with large scale, capital-intensive ventures' (p. 160).

While the studies cited above conclude that 'planning' often has a key role in venture success and contrast such considered approaches with intuitive decision-making, the work of many other authors is even more ambiguous. Pascale (1984) argued that Honda had no 'entry strategy' for the US market, yet many quotes from senior officials of Honda in his case study contradict this. The following is an example:

> We chose Los Angeles where there was a large second and third generation Japanese community, a climate suitable for motorcycle use, and a growing population. (1984:55)

In their study of first-time entrepreneurs, Harris et al. (2000) found that the entrepreneurs did not use business plans and that there was no evidence of higher growth for those who did. Most of the entrepreneurs abandoned structured analysis (taught to them) in favour of an emergent approach. However, in a related study of four ventures, Harris et al. (2000) found that many entrepreneurs integrated elements of the emergent processes with useful aspects of the planning approach and that many used detailed computer based financial planning and control systems (both in short-term control and longer-term thinking).

The challenges of developing theory related to entrepreneurial decision-making are further complicated when prior studies are interpreted differently. For example, the study done by Schwenk and Shrader (1993) has been quoted in two different ways:

- Mueller and Naffziger (1999) and Olson and Bokor (1995) state that Schwenk and Shrader, after examining 14 studies, conclude that there is a positive association between the strategic planning and performance of small businesses.
- Frese et al. (2000:14) state that as 'Schwenk and Shrader (1993) pointed out, the relationship between strategic planning (as customarily defined by management science) and success is not as high as one would expect.'

This begins to look like the argument about whether the glass is half full or half empty. Schwenk and Shrader (1993) found a low but positive relationship between strategic planning and performance.[8]

While the academic literature may come to no clear conclusion about this relationship, many prescriptive books advertising 'the best way to start a new venture' have few doubts. These books (Nesheim, 2000; Timmons, 1999) provide suggestions to prospective entrepreneurs for following a very systematic and planned approach.[9]

Jolly (1997), in his book on the commercialisation of new technologies, provides similar prescriptive advice. However, the conclusions he draws are based on the commercialisation of new technologies by well-established firms, a view of Jolly's approach also shared by Boussouara and Deakins (1999). A study that has been primarily based on examples derived from established firms does not provide a basis for developing suggestions about how to commercialise new technologies in a new venture context.

2.4 What is the Source of this Confusion?

All human beings are 'boundedly' rational, and all plan (to some extent). The concept of 'bounded rationality' is based on the assumption that 'individuals are intendedly rational' (March, 1994:9). If entrepreneurs are really intuitive and ad hoc decision-makers,[10] what makes some of them successful and others not? Is it just their good luck?

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[8] However, an earlier study by Shrader et al. (1989), based on a survey of CEOs or top managers of small business firms (in manufacturing, retail and service industries) located in central Iowa, showed that there is partial support for a negative relationship between performance and strategic planning.

[9] In the context of quite limited systematic research into decision-making in new ventures, many authors have used the broad terms 'planning' ('analysis') and 'intuition' as mutually exclusive characterisations. Perhaps reality is more nuanced than these a priori positions suggest.

[10] The occurrence of 'opportunistic' behaviour (be it entrepreneurs or any other human being) is not surprising. What an entrepreneur may have to watch against is losing direction/focus (van Gelderen et al., 2000) while grabbing all sorts of opportunities coming along the way. For example, Sull (2004:74) says:

> …some ventures rush willy-nilly into dozens of partnerships with any company that will say yes, never articulating the business case for these relationships or figuring out the costs of making them work. As a result, they end up with a long list of partnerships that amount to little more than names on a press release.

There are several reasons for the confusion in the literature regarding the characterisation of decision-making as either by intuition or analysis.

First, and perhaps most important, has been the varying interpretations of 'planning' or 'strategic planning.' Mintzberg (2000) has listed quite a few, and a comprehensive literature review would no doubt lead to many more definitions.

Miller et al. (cited in van Gelderen et al., 2000:167) argue that, in the psychological sense, it is impossible to have no strategy because any goal directed behaviour is connected to some kind of strategy. Van Gelderen et al. (2000:167) explain that while 'strategy in the sense of strategic management is usually externalized in a written strategic plan,' they consider that a strategy can be a carefully followed written down plan or a loosely followed sketch in the mind of a business owner.

Mintzberg and Waters (1985) questioned the very concept of 'strategic planning,' which then was interpreted as 'complete' deliberate strategy making. They identified many styles of decision-making that lie between purely 'deliberate' and purely 'emergent', and they suggested that practice usually lies somewhere in between. This is now as widely accepted as the concept of 'bounded rationality.' What has happened, however, is that the majority of researchers seem to have accepted all strategy making with any element of 'emergent' as emergent and have characterised 'strategic planning' as a pure form of deliberate strategy making. In other words, the majority of researchers still have not changed the operational definition of 'planning/strategic planning' even since the establishment of the concept of 'bounded rationality'.[11] Harris et al. (2000:126) has the following to say about this:

[11] Slevin and Covin (1997), while reviewing the literature on strategy formation, also point towards the highly fragmented literature in this area. While they have highlighted the nature of fragmentation, in this research article they go with the widely popular definitions of 'planned' and 'emergent' strategies. They only seek to relate the 'strategy formation' types to the context. The say:

> …planned strategies represent decision-making in the rational mode. Emergent strategies, on the other hand, represent decision-making under conditions of bounded rationality; that is, where cognitive limitations, incomplete information, behavioural processes, and the like, intervene to preclude optimal *a priori* decisions from being made… (p. 191)

The 10 different schools of thought about strategic management further reflect more fragmentation that has taken place over the years. Mintzberg and Lapel (1999), in a very thought-provoking article, ask for more integration.

> The planned approach to strategy involves assumptions of a strict process approach to strategy formation, with strategic decision-making taking place in a number of steps.

Second, some researchers have not followed a sound analytical methodology. In particular, while analysing a decision, several researchers have used the firm as their unit of analysis. They then draw conclusions about the decision based on the performance of the firm. Ucbasaran et al. (2001:68) caution:

> Focusing on firm-level aspects, while important, may be insufficient for understanding fully the outcomes associated with the entrepreneurial phenomenon… It is crucial, therefore, that any study exploring the outcome(s) of the entrepreneurial process is clear on the unit of analysis being used.

If one were to analyse the excerpts used by Pascale (1984), one would conclude that many of decisions by Honda executives were quite logical (not intuitive or ad hoc) and turned out to be successful. For example, they went to Los Angeles because a lot of third generation Japanese lived there. Their advertising campaign and positioning were very successful. The board decided in favour of the idea by the director of sales (who naturally would have more knowledge of the market), not those offered by the president and treasurer. However, many of the decisions made in ad hoc way, and for which they neither planned nor had any prior experience, failed. For example, they thought that their bikes were better than European or American bikes in US conditions. What would have been the outcome had they known about the nature of the use of motorcycles in the US and had tested their motorcycles on American roads?

Third, many researchers do not adequately take context into consideration. For example, Baker and Aldrich (cited in Baker et al., 2001) found that most firms had created plans only in order to obtain financing and that in most cases the financing attempts failed. In fact, the majority of attempts to raise new venture finance fail, and in almost all cases a business plan is a necessary, if certainly not sufficient, condition for attracting investment.

Similarly, some researchers are sufficiently cognisant of the relevance of the industrial context on the nature of decision-making.[12] For example, the nature of, and the method used to make, decisions (and the consequences of those decisions) in high-risk, high-capital industries may be quite different from those in low-risk, low-capital industries. Apart from other contextual factors, it is imperative to take into account the amount of risk and the level of uncertainty associated with a particular decision.

Fourth, much research in strategic assessment and decision-making has been developed in the context of a large firm, where there are formal structures, processes and roles and decision-making must be carefully managed. When researchers focus on the strategy process in the new venture or small business, the framework is often derived from previous research work in large firms.[13] Seen through this lens, entrepreneurial decision-making tends to be seen as intuitive, ad hoc and opportunistic. Gartner et al., (1992:17), in their widely quoted theoretical article, argue that, 'Emerging organizations are not smaller, 'incomplete' versions of existing organizations, but unique states of existence with organizational properties that are arranged in a fundamentally different way from an existing organization.' Many researchers—many of whom have been discussed here—have come to the conclusion that entrepreneurs make intuitive and ad hoc decisions. However, that conclusion is reached through a framework comparing entrepreneurial decision-making with the strategy process used by managers in a large firm. Some examples of this approach are shown in Box 2.4.

[12] Autio (1999:342) while criticising multiple-industry based studies observes, 'While sampling strategy should be dictated by the research question, many of the multiple-industry samples appear to have been convenience samples.'

[13] Autio (1997) on the basis of a literature study highlighted ten misconceptions related to NTBFs (new technology-based firms) in the academics. One of the misconceptions is,

> The traditional approach to research on new, technology-based firms is largely rooted in the neoclassical economic paradigm. This paradigm has essentially viewed new, technology-based firms simply as small versions of large, established firms. (p. 197)

Box 2.4 Using a 'Large Firms' Lens to Identify Entrepreneurial Decision-Making

In a large firm, a manager would have a team to assist with making and implementing decisions whereas entrepreneurs (or entrepreneurial teams) often have to make and implement decisions themselves. Similarly, a large company would be more concerned with a large market size to sustain the business whereas a small business can occupy a niche market or can still be profitable with a smaller market. Not surprisingly, Kaish and Gilad (1991:56) found that:

'[M]anagers are more concerned than entrepreneurs with economic issues of profit and market i.e., the end result, but entrepreneurs focused more on the implementing factors of who was involved in the deal, the role of the government, and how much money would have to be put into the deal…. The managers are concerned with the objective economic measures of outcome, profit and market size possibly, because their success depends exclusively on these economic indicators of performance.'

According to Busenitz and Barney (cited in Alvarez & Busenitz, 2001:758), 'entrepreneurs use heuristics more extensively than managers in larger organizations.' Alvarez and Busentiz (2001:758) further add:

'The term heuristics refers to simplifying strategies that individuals [entrepreneurs in this case] use to make strategic decisions, especially in complex situations where less complete or uncertain information is available…. [M]anagerial cognition is more factual-based while entrepreneurial cognition builds from limited or key experiences and beliefs.'

One irony has not escaped Drucker (1986:29), who suggests that, 'Entrepreneurship is 'risky' mainly because so few of the so-called entrepreneurs know what they are doing. They lack the methodology. They violate elementary and well-known rules. This is particularly true of high-tech entrepreneurs…' (See Box 2.5 for other observations made by Drucker.) Ireland et al. (2001) add that the most successful entrepreneurs carefully evaluate risk-return relationships, rejecting ventures when the relationship is unattractive.

Box 2.5 Drucker's Observations on Entrepreneurs as Risk-takers

'A year or two ago I attended a university symposium on entrepreneurship at which a number of psychologists spoke. Although their papers disagreed on everything else, they all talked of an 'entrepreneurial personality,' which was characterized by a 'propensity for risk-taking.' A well-known and successful innovator and entrepreneur who had built a process-based innovation into a substantial worldwide business was then asked to comment. He said: 'I find myself baffled by your papers. I think I know as many *successful [italics added]* innovators and entrepreneurs as anyone, beginning with myself. I have never come across an 'entrepreneurial personality.' The successful ones I know all have, however, one thing—and only one thing in common: they are not 'risk takers.' They try to define the risks they have to take and to minimize them as much as possible...' (1986:139).

'The popular picture of innovators—half pop-psychology, half Hollywood—makes them look like a cross between Superman and the Knights of the Round Table. Alas, most of them in real life are unromantic figures, and much more likely to spend hours on cash-flow projections than to dash off looking for 'risks.' *Of course innovation is risky. But so is stepping into the car…. All economic activity is by definition 'high risk*' [*italics added*]' (1986:139).

Fifth, because new ventures are inherently more risky, entrepreneurs have been seen as risk takers with a high tolerance for ambiguity (Low & Macmillan, 1988). This widely held image of a risk taker couples easily with intuitive and ad hoc decision-making. It is unclear whether entrepreneurs' appetite for risk is any different from that of the general population (Brockhaus, 1980).

With an over-reliance on, and simplistic interpretation of, the binary concept of 'intuition' and 'planning' and a lack of careful systematic empirical research, ambiguity and confusion have continued.

2.5 Reconciling the Differences

2.5.1 'Intuition' in Entrepreneurship

The Oxford Dictionary gives definitions of 'intuition' that are strikingly dissimilar:

- 'The immediate apprehension of an object by the mind *without the intervention of any reasoning process'*
- 'The action of looking upon or into; *contemplation*; inspection'

It is the former definition of 'intuition' that is more widely used and understood. Indeed, Mitchell et al. (2005:667-668) rightly observe:

> Put the word intuition into 'Google' and your web search will associate intuition with…intuitive parenting, psychic spying, intuitive tarot reading…intuitive feng shui, living intuitively, building magical business success by unlocking intuitive powers… etc. It is therefore not surprising that the overpowering linkage of intuition to mystery and myth that pervades…also predispose entrepreneurship researchers to expect intuition to be a construct in entrepreneurship research that cannot be well understood, if understood at all.

Mitchell et al. (2005) argue that entrepreneurs often use intuition. However, entrepreneurial intuition is poorly defined in the research literature. They provide a useful theoretical definition of intuition developed through a comprehensive literature survey of antecedents. They focus on an individual's role in the entrepreneurial process (which itself may involve various processes and sub-processes) rather than the traits and attributes of an individual (which they see as a static view of entrepreneurial intuition). They note that intuition is a dynamic process that involves 'coming-to-consciousness.' However, as one becomes adept in something, the same conscious and deliberate effort is not required—that is, it becomes a 'routine' or a usual 'procedure' for them.[14] As Gordon (cited in Mitchell et al., 2005:665) has said: 'People becoming competent in a given domain move away from the use of symbolic or declarative knowledge and toward a reliance on perceptual, non-verbalizable procedural knowledge.' This suggestion, according to Mitchell et al. (2005:665), echoes assertions by other researchers that 'experts utilize procedural knowledge more than novices do'.

Gordon (quoted in Mitchell et al., 2005:666) further elaborates on the applicability of intuition in different problem situations:

[14] Lowe and Marriott (2006:106) have a similar opinion,

> [Intuition] is often referred to as gut feeling and can be a powerful source of ideas, when used appropriately. The most successful entrepreneurs also often comment that they were lucky in having the right idea at the right time. The truth is that structured idea generation combined with intuition is probably the successful approach to idea generation and, undoubtedly, leads to lucky breaks too.

> In [both novel and familiar problem-solving], the expert has access only to the information that comes into working memory, and that information is declarative in nature. The major implication of this view is that by definition procedural knowledge *cannot* be directly verbalized. It is therefore counterproductive to ask an expert how he or she made a decision or solved a problem. The best that the expert can do is verbalize the thoughts that came to working memory as a product of the procedures and use declarative knowledge to conjecture what those procedures must have been.

Mitchell et al. (2005:666) conclude that 'intuition is not a unidirectional process of coming to consciousness, but is instead a dynamic process that initially (as it is developing) involves an explicit awareness of the coming-to-consciousness process, and which is subsequently experienced as 'having a hunch' or 'just knowing.''

Although the proposals of Mitchell et al. (2005) on what entrepreneurial intuition is seem realistic, in this research 'intuition' will still be used in the popular sense—that is, the apprehension of a situation without conscious reasoning. Nevertheless, following Mitchell et al., the research will carefully consider the role of 'relevant experience' or 'expert advice'[15] in entrepreneurial decision-making.

Prior experience clearly has a major role in decision-making. Many scholars in the field of entrepreneurship (like Dutton & Duncan, 1987; Hart, 1992; Hart & Banbury, 1994; Hitt & Tyler, 1991; Schweiger et al., 1989; Sharfman & Dean, 1997) have emphasised the importance of experience based decision-making for efficient and quick decisions across all functions in a turbulent environment. Boyd and Fulk (1996), based on survey responses by 74 executives from various industries, conclude that regardless of the importance of impersonal information (i.e., external data gathered by formal means), executives will still make use of introspective information (i.e., knowledge based on personal experiences and sources) more than formal scanning techniques. In a useful study by Barringer et al. (2005), founders of companies with prior experience in the same or a closely related industry were identified in 76 per cent of the rapid-growth firms in the sample but only 24 per cent

[15] Bonaccio and Dalal (2006:1), on the basis of their literature review, observe that the 'field of judgment and decision-making has not systematically investigated the social context of decisions.' By this they mean the impact of advice seeking and taking on decision-making.

of the slow-growth firms. They conclude that related industry experience provides a founder with critical knowledge plus the advantage of access to a network of contacts that can help a firm overcome liabilities of newness and build a growth-oriented business. Their study also affirmed the importance of a college education, which seems to provide the founders with the skills necessary to launch a venture, particularly if the venture is in a technically oriented industry such as biotechnology or computer science. Drucker (1986:26) again provides a useful summary perspective:

> But everyone who can face up to decision making can learn to be an entrepreneur and to behave entrepreneurially. Entrepreneurship, then, is behaviour rather than personality trait. And its foundations lie in concept and theory rather than in intuition.

2.5.2 'Planning' in Entrepreneurship[16]

The creation, identification and exploitation of opportunities have become increasingly organised, indeed planned, over the past century. Drucker (1986:34) wrote:

> …one of the great achievements of the nineteenth century was the 'invention of invention.' Before 1880 or so, invention was mysterious; early nineteenth-century books talk incessantly of the 'flash of genius.' The inventor himself was a half-romantic, half-ridiculous figure, tinkering away in a lonely garret. By 1914 the time World War I broke out, 'invention' had become 'research,' a systematic, purposeful activity, which is planned and organized with high predictability both of the results aimed at and likely to be achieved.

Something similar seems to be happening with reference to entrepreneurial decision-making. Several researchers have been redefining the concept of 'strategic planning.' They see strategic planning as a continuous process because there is usually some limit to completely removing the uncertainty associated with a decision and with the passage of time an uncertain variable may become more comprehensible. Most people try to plan within their limitations (experience, resource, time etc.). This is, in effect, the definition of 'strategy' by Miller et al. (1960); that is, any goal directed behaviour is connected to some kind of strategy. Pineda et al., (1998:60) in their empirically based article, rightly observe that 'any small business manager

[16] Also refer to Delmar and Shane (2003) for a detailed discussion on the dominant understanding of the use of planning in entrepreneurship and its counterargument.

'worth his salt' knows that a good decision has to be based upon adequate and accurate information.'

As stated above, 'strategy' is not a one-time process or event but an ongoing process. In the 1980s, Mintzberg talked extensively about 'emergent strategies'. More recently, this term has been misused or misinterpreted to mean that strategy cannot be *planned* but is only an *emergent process*. This seems to imply that 'planning' is a useless exercise. The effect of this thinking has been more profound in entrepreneurship, especially following the creation of the concept of entrepreneurial typology (discussed earlier) by various researchers (e.g., Frese et al., 2000; Mintzberg & Waters, 1985; Quinn et al., 1988 etc.).

2.5.2(a) *Understanding the 'emergent process'*

The construct of 'strategic experimentation' is based on the notion that 'no matter how much attention to detail is involved in the preparation of the business plan, the actual formation and development of the business will involve considerable adjustment to and/or deviation from that plan' (Nicholls-Nixon et al., 2000:494). Many researchers (Drucker, 1986; Nicholls-Nixon et al., 2000; Sull, 2004) have used the term 'strategic experimentation' instead of 'emergent process'. Perhaps in using the term 'strategic experimentation' one doesn't fall into the trap of meaning 'pure' emergent process because strategic experimentation implies that strategy does have elements of both deliberate and emergent process, as originally proposed by Mintzberg in the 1980s.

Sull (2004) discusses the power of strategic experimentation in an entrepreneurial context. He identifies several types of uncertainty: known unknowns (what you know you don't know); unknown unknowns (what you don't know you don't know); new information that is imperfect or incomplete; and conflicting signals. Although one has to be prepared to learn (Nicholls-Nixon et al., 2000:498) and be ready to make amendments, Sull (2004:76) cautions against 'experiment creep', which he says 'occurs when an experiment drags on too long, costs too much or lacks clarity about which sources of uncertainty are being tested.' Drucker (1986:215), based on his vast experience of consulting entrepreneurs and business people, makes this observation:

> The entrepreneur of so much of the popular literature or of Hollywood movies, the person who suddenly has a 'brilliant idea' and rushes off to put it into effect, is not going to succeed with it. In fact, for this strategy to succeed at all, the innovation must be based on a careful and deliberate attempt to exploit one of the major opportunities for innovation.

2.5.2(b) *What sort of planning do entrepreneurs do (if they do it)?*

The term 'planning' is traditionally related to formal and complete planning. More recently, researchers have debated the use of the terms 'formal' versus 'informal' planning and 'complete' versus 'critical point' planning.[17]

Boussouara and Deakins (1999) argue that the performance and development of high technology start-ups depend on critical incident decision-making. Frese et al. (2000) has made a similar observation. They add that critical point strategy is perhaps the best for start-ups as it requires business owners to do some amount of planning in order to decide which issues are more important and thus need to be prioritised. Stewart (cited in Zacharakis & Meyer, 1998) says that although decision-makers believe they thoroughly consider all relevant information, most typically they rely on only three to seven factors or cues.

Van Gelderen et al. (2000) state that while success leads to a higher use of planning strategy and planning strategy leads to higher success, a 'critical point' is connected to success at an earlier phase of a new venture. They also conclude that reactive strategy leads to failure and failure leads to a higher degree of reactive strategy. In a very valuable empirical study, Bracker et al. (1988) found that a combination of opportunistic and (structured strategic) planning orientation accounted for significantly better performance.[18]

Sull (2004:72) observes that '[a]n entrepreneur or manager begins the process by formulating a hypothesis—a mental model that generally includes a definition of

[17] It is necessary to clearly distinguish between the two constructs of 'formal' planning and 'complete' planning. For the purpose of this article, 'complete' planning simply means a rational way of planning in which the idea is not to leave anything uncertain and equivocal. 'Formal' planning means that formal methods have been used, including a formal survey, formal business plan and a methodological top-down approach. Together, these constructs (i.e., 'formal' and 'complete') comprise the construct of 'traditional' planning. 'Formal' planning is not synonymous with 'complete' planning. (Refer to Frese et al. (2000); Gibson & Cassar (2005); Matthews & Scott (1995); and Olson & Bokor (1995) for definitions of 'formal' planning and 'complete' planning.)

[18] In this study, Bracker et al. (1988) has given due consideration to the 'context'. The research was done in the electronics industry and industry specific performance measures were used.

the opportunity, the resource required to pursue it, the value that would be created if it were to be successful and a plan to pursue it. The model may reside implicitly in the head of the entrepreneur or it may be expressed explicitly as a business plan.' This implies that what is important for an entrepreneur is to have a plan, formal or informal. Drucker (1986:192) seems to be suggesting that even a reasonable degree of planning that is not too difficult to achieve would suffice:

> To build market focus into a new venture is not in fact particularly difficult. It does not require a great deal of money to find out whether an unexpected market is an indication of genuine potential or a fluke. It requires sensitivity and a little systematic work… The greatest danger for the venture is to 'know better' than the customer what the product or service is or should be, how it should be bought, and what it should be used for…Businesses are not paid to reform customers. They are paid to satisfy customers.

Having reviewed studies into the use of information in SMEs, Fuellhart and Glasmeier (2003:233) suggest that most small firms are 'opportunistic in their information-seeking behaviours, leaning largely towards those sources that can be accessed with little additional effort outside of the scope of normal business activities. Information such as trade journals, customers, and members of the supply chain figure prominently in this list…' Similarly, Brush (1992) concludes that entrepreneurs use customers, business contacts, competitors, suppliers, employees and industry experts more often than friends, consultants, social networks and family members to gather market information.

Indeed, one can find many examples of entrepreneurs using various simple approaches to assess their ideas. For example, Vesper (1990:167) gives an example of two people who had an idea to sell a mix that people could use to make hot-spiced wine without having to look up a recipe and gather all the ingredients. He quotes their experience:

> We went out into the kitchen and mixed up a batch, put some into a thermos bottle and drove to a supermarket. The store manager listened to our description of the product, then took a taste from the thermos. He told us that if we would package it to sell for under one dollar retail he would order a couple of cases and let us put it on the shelf. From there we went to some more stores and got similar reactions from the other managers. That convinced us we at least had a market for getting the product tried.

For Bahrami and Evans (1987), the style of decision-making in high technology companies (which includes new ventures) has two distinctive features—simultaneously centralised and decentralised; and emphasising path finding and implementation rather than problem solving through extensive analysis. They believe that '[t]his orientation is reflected in their planning process, which places considerable emphasis on updating strategies by establishing systematic forums for discussion, rather than extensive forecasts of future conditions' (Bahrami & Evans, 1987:57-58).

A careful analysis of the literature reveals that decision-making in entrepreneurship cannot be simply generalised and labelled as ad hoc and intuitive. One should expect different degrees of rationality, planning, intuitiveness and adhockery for different types of decisions in a new venture. To empirically test this, the research design must consider various aspects of decision-making (in a new venture).

2.6 What Needs to be Done?

Clearly there would be value in exploring further the decision-making process in new ventures and analysing the factors that influence the process and its outcomes. This section draws on the strategic decision-making literature and the entrepreneurship literature to identify factors that are likely to play a role in the decision process in a new venture context.[19]

2.6.1 Internal Context

The internal context of a firm is related to the organisation's structure and its resources. In a new venture (especially if it is being started by an entrepreneur or a group of entrepreneurs), the internal context will be primarily a function of the founder(s) (i.e., the entrepreneur/entrepreneurial team) (Beckman, 2006:745) because

[19] Hitt et al. (2001) and Ireland et al. (2003) have specifically called for a closer integration of strategic management and entrepreneurship.

the founders, along with a few other key employees (if there are any), would constitute the organisation.[20]

The main asset of any new venture is usually the founders and their knowledge base, and generally they lack resources. It is their past experiences and their beliefs that constitute entrepreneurial cognition (Alvarez & Busenitz, 2001). Entrepreneurs who use their available information to make decisions that utilise the available resources in a superior and more efficient way will be more successful (Alvarez & Busenitz, 2001). The capability to make such decisions will have a direct relationship with both the relevant experience (Gavetti et al., 2005; Grebel et al., 2003; Mosakowski, 1998; Ottesen, 2005; Sexton et al., 1997; Srivastava & Lee, 2005 etc.) and the social networks of the entrepreneur(s) (Ireland et al., 2003; Witt, 2004).[21] Again, the emphasis is on the characteristics of the entrepreneurial process as a determinant of performance rather than the characteristics of the entrepreneur, a point emphasised by Drucker and Gartner time and again.

The nature of planning is in part determined by the available information. The more information is available, the more comprehensive[22] the decision-making is likely to be and the more confidence can be attached to that decision (Forbes, 2005).

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[20] Gartner et al. (1994:6) observe, '*The 'entrepreneur' in entrepreneurship is more likely to be plural, rather than singular*. The locus of entrepreneurial activity often resides not in one person, but in many.' They say that people with direct influence on an entrepreneurial activity are not the only ones to be called entrepreneurs. Other people, such as advisors, suppliers, junior employees or anyone else involved with the activity, should also be called entrepreneurs.

I do not completely disagree with Gartner et al. (1994). However, that observation may not always be correct. The use of that definition would make research in this field complicated because there would then be no boundary. For the purpose of this research, an entrepreneur is someone with high stakes (like senior management and major shareholders) in a particular entrepreneurial activity.

[21] The social capital of an entrepreneur or an entrepreneurial team has probably received the maximum attention by researchers in the field of entrepreneurship. Refer to Ireland et al. (2003) and Witt (2004) to get an overview of research in this area. Murray (2004) discusses specifically the social capital of academic scientists and its usefulness to the firm established by them. This is especially relevant to this research as most of the firm founders in biotechnology are academic scientists.

[22] According to Dean and Sharfman (as quoted in Forbes, 2005:629), 'the construct of decision comprehensiveness captures the extensiveness with which organizations scan, analyse and plan in confronting decision situations.'

Frederickson and Mitchell (1984:401-402) quote Janis and Mann's definition of a comprehensive process that includes the following characteristics:

> '(1) the thorough canvassing of a wide range of alternatives, (2) surveying a full range of objectives, (3) carefully weighing the costs and risks of various consequences, (4) intensively searching for information to evaluate alternative actions, (5) objectively evaluating information, or expert judgment regarding alternative actions, (6) re-examining the positive and negative consequences of all known alternatives, and (7) making detailed plans, including the explicit consideration of contingencies, for implementing the chosen action.'

The availability of information is largely determined by the availability of time and resources, which in turn will shape the 'boundary spanning' activities of the firm and the quality of the information. Pineda et al. (1998) also suggests that there is a relationship between the boundary spanning activities and the decision priority (important or not-so-important decision)[23] and decision-makers' perception of their competence in making a particular decision (which may be determined by their functional knowledge and their experience in that field).

Some other decision-specific factors that affect the decision process are power structure[24] and past strategies[25].

2.6.2 External Context

External context refers to the industry specific environment and the location of the business. These two factors will usually determine the nature of the external context—dynamic versus static; complex versus simple; high competition or low competition; high barriers to entry or low barriers to entry; mature industry or a new industry. (Refer to Box 2.6 for definitions of constructs describing external context.)

High-technology companies (such as biotechnology and information technology) are usually considered to be knowledge intensive, existing in a dynamic and complex environment. This means that many decisions have to be taken rapidly and there can be a relatively high degree of uncertainty while making decisions.[26] This could have a bearing on the decision-making process, as Cooney et al. (2001) suggest: 'If entrepreneurial behaviour and endeavour emerges from, and is influenced by the context within which the entrepreneur operates then the process cannot be homogeneous but instead reflects the particular environment in which it takes place.'

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[23] Nutt (1998, 2000) suggests that the more important the decision, the greater the decision-makers' use of analysis informed by quantitative data and/or subjective expert opinion that 'the perceived importance of the decision has a bearing on the information gathering and thus, on decision formulation stages of the decision process.' Regner (2003) and Pineda et al (1998) also suggest that the likelihood of using systemic approaches, involving the organised acquisition of information, increases with the level of importance of the decision.

[24] This will be a function of all the stakeholders (including founders).

[25] Decisions that are interrelated with one another tend to influence decisions that are of present concern. This is often termed 'strategic coherence' or 'strategic fit' in a positive context and 'strategic inertia' in a negative context. Schwenk (1984) makes use of a postulate called 'anchoring process' by Tversky and Kahneman to explain 'strategic inertia'.

[26] Refer to McMullen and Shepherd (2006) for a detailed discussion on the relationship between perceived uncertainty, prior knowledge, motivation and entrepreneurial action.

Box 2.6 Definitions of Constructs Describing (External) Environment [27]

- Complexity is related to the number of elements and interconnectedness among them (Rajgopalan et al., 1993).
- Munificence is related to the resource support provided by an environment (Rajgopalan et al., 1993).
- Dynamism is related to the rate of change. An environment can be dynamic (unstable) even if it changes in predictable ways or is composed of only a few simple linkages (Hart & Banbury, 1994).
- A turbulent environment, however, is one that is both dynamic and complex; it changes both frequently and unpredictably (Hart & Banbury, 1994).

Rauch and Frese (1998) suggest that environmental conditions such as hostility and uncertainty act as moderators of the relationship between planning and small-scale enterprise success. If one has few resources, one needs to be particularly careful in one's steps of action. In such cases, planning helps. Even though Rauch and Frese (1998) provide evidence of the use of planning in uncertain conditions, they do not suggest the type of planning (formal/informal, critical point/complete, etc.) that would be most useful. Van Gelderen et al. (2000) suggest that 'complete planning' is of not much use in a changing environment. For a complex environment, they say, entrepreneurs tend to use 'complete planning' but not 'critical point' planning or opportunistic strategy.[28] In their opinion, a 'reactive' strategy will be used more often in an environment with many competitors and few resources because one finds it difficult to plan in whatever form. Similarly, Matthews and Scott (1995) suggest that it is more likely that under conditions of high uncertainty, future orientation will give

[27] 'Rate of change' is the key construct for both 'dynamic' and 'turbulent' environment, whereas 'uncertainty' is the key construct of 'turbulent' environment only.

Dess and Beard (1984) discuss munificence, dynamism and complexity in relation to environmental contexts. Rajgopalan et al. (1993) provide a detailed account and framework that integrates various dimensions related to the strategic decision process.

[28] A very useful empirical study by Gruber (2006) shows that 'critical point' planning is better in a dynamic environment and a munificent approach to planning in less dynamic environments. This questionnaire-based study involved entrepreneurs from multiple industries using high technology.

way to a preoccupation with the immediate survival and the growth needs of the firm. As such, sophistication of strategic and operational planning will decline.

From her research, Eisenhardt (1989) concluded that executives making fast decisions (in a new venture) used extensive real-time information, not forecasted information. These executives considered several options alternatively and made maximum use of experienced counsellors. She added that executives making fast decisions routinely paid close attention to quantitative indicators such as daily and weekly tracking of bookings, scrap, inventory, cash flow, engineering milestones and competitors' moves. Similarly, Daft et al. (1988:134) suggests that decision-makers in high performing firms 'tailor scanning more closely to perceived uncertainty.'

2.7 The Decision-Making Process and the Content of Decisions

Olson and Bokor (1995:34) say 'strategy process and content are interrelated concepts when linked to performance; that is, the content-performance relationship is influenced by process, while the process-performance relationship is sensitive to content.' Content and process are in turn influenced by context. Different environmental sectors—customers, suppliers, distributors, competitors, government, public attitudes, technology and financial markets—also affect strategic and operational planning differently (Matthews & Scott, 1995), so some dimensions of the firm's strategy are more likely to change than others (Nicholls-Nixon et al., 2000). Nicholls-Nixon et al. (2000:501) say that '[m]ost resistant to change are dimensions that define the purpose of the organization, give institutional reality to insiders and outsiders, and determine the distribution of resources.' They propose that the organisational attributes most likely to be changed, ranked from the most likely, were: marketing strategy, core technology, forms of authority and stated goals. Another way of looking at this is that up front more effort is put into removing any major uncertainty about the 'core' dimensions.[29] In different industrial contexts, there will be differences in what is 'core' to a new venture, which is then likely to affect the content of their strategy.

[29] The characteristic (or nature) of the decision therefore has a bearing on the process of decision-making. Baron (2004), Bourgeois III (1980), Papadakis et al. (1998) and Regner (2003) discuss the effect of the nature of the decision on the decision-making process.

2.8 Decision-Making Process and Performance

2.8.1 Introduction

Brockmann and Simmonds (1997:463) categorically state that 'determining a link to firm performance should complete the entire decision-making, implementing, and evaluating phases of the strategic management process.' However, Dess and Robinson (1984:265) observe that 'organizational performance (OP) has become an important component of empirical research in the field of business policy'. Researchers frequently talk about it when investigating such organisational phenomena as structure, strategy and planning. Pettigrew (1992) suggests that building an outcome into a process research design has at least two important advantages. Firstly, the outcome provides a focal point or anchor for the whole investigation. 'Performance' is becoming a central construct of interest in research concerned with the planning and performance relationship (Ebben & Johnson, 2005). Secondly, it adds value to the study because there is the possibility of exploring how and why variations in context and process shape variability in the observed outcomes.

Much of the entrepreneurship literature, and particularly the literature on new venture strategy, as observed by Cooper (cited in Gartner et al., 1998:220), has focused on identifying variables that predict new firm performance. However, Cooper (1993) believes that there has been limited success when it comes to determining the predictors of new venture performance at a 'firm' level. Carter, et al. (1996) has emphasised the need for future studies to explore how entrepreneurs undertake planning and make judgements about the potential success of a venture. They make a strong case for in-depth case studies to analyse the process of planning by linking it to the 'context' and the 'performance.'

Most researchers, however, tend to relate the outcome of the decision process to the performance of the firm. Many decisions would indeed have an impact on the firm, but there may not be a direct relationship. Hough and White (2003) argue that relating decision processes directly to firm performance is problematic. This is because the causal ordering is ambiguous, the relationship is likely to be confounded and firm-level analyses always ask questions concerning the extent to which an organisation usually uses a particular type of rational decision process, thereby

ignoring the possibility that decision-makers may in practice vary their use of processes among specific decisions.

2.8.2 Operationalising 'Performance'

It is vital that researchers aim to relate specific decisions to the outcomes of these decisions. Venkataraman and Ramanujam (1986:801) observe that 'the treatment of performance in research settings is perhaps one of the thorniest issues confronting the academic researcher.' What is the appropriate operational definition of performance, especially in the new venture context? Murphy et al. (cited in Ebben & Johnson, 2005) found 71 different operational measures of performance in the 51 articles they studied:

> According to Hickson *et al*., (2003), researchers have generally used either financial criteria or adoption criteria to define success, but it is not always possible to isolate the specific financial impact of an individual decision, and decisions even when made (i.e., adopted) may or may not work when implemented.

Kirchhoff (1977) suggests that there is no ultimate criterion of effectiveness because complex organisations pursues multiple goals and simplistic single variable models are inadequate expressions of the real world.[30] Dess and Robinson (1984) suggest that, when available, objective measures of organisational performance (particularly economic performance) are preferred to subjective measures. However, subjective measures may be useful in attempting to operationalise the broader, non-economic dimensions of organisational performance.[31]

Venkataraman and Ramanujam (1986:804) recommend the inclusion of operational (or more proximate) performance indicators. They suggest that this approach 'takes us beyond the 'black box' approach that seems to characterize the exclusive use of financial indicators and focuses on those key operational success factors that might lead to financial performance.'

[30] The majority of research on the linkage between strategy-making processes and firm performance has adopted an econometric approach (Hart & Banbury, 1994). While such analyses can isolate statistically the independent effects of each of the predictors, they do not provide insight into which combinations of processes perform especially well. Relating decision processes directly to firm performance is also problematic because the causal ordering is ambiguous (Hough & White, 2003:481).

[31] Smith et al. (1988), in their empirical study, found consistency between different performance assessments (objective vs. subjective), which suggests that subjective performance data are reliable.

Kirchoff (1977) refers to 'derived' and 'prescribed' approaches to evaluating organisational performance. 'Derived' refers to judgements of an individual (or group) external to the organisation whereas 'prescribed' refers to those that an organisation defines for itself. He emphasises that '[r]eal effectiveness can only be measured relative to a particular set of derived or prescribed goals' (p. 352).[32]

2.9 What are the Objectives of This Research?

While some scholars in entrepreneurship (Ardichvili et al., 2003; Cooper et al., 1995; Gaglio, 2004; Gaglio & Katz, 2001; Holcombe, 2003; Keh et al., 2002; Krackhardt, 1995; Lumpkin & Dess, 1996) have started to build a theoretical and empirical framework to better understand the 'recognition of the opportunity', the process dimension has remained largely neglected. When the process of entrepreneurial decision-making has been studied, the results have been divergent. This review of the literature also suggests that context has a strong influence on the process and content and, therefore, should not be neglected.

Figure 2.1 provides a diagrammatic framework integrating the four broad dimensions: context, process, content and performance. It is argued that each of these dimensions must be carefully assessed in any systematic research into entrepreneurial decision-making. This simple framework reminds the researcher about 'what influences' and 'what gets influenced' by the decision-making process in a new venture.

[32] Dean and Sharfman (1996), though, suggest that the use of factual information is better than asking entrepreneurs their general impression of decision effectiveness.

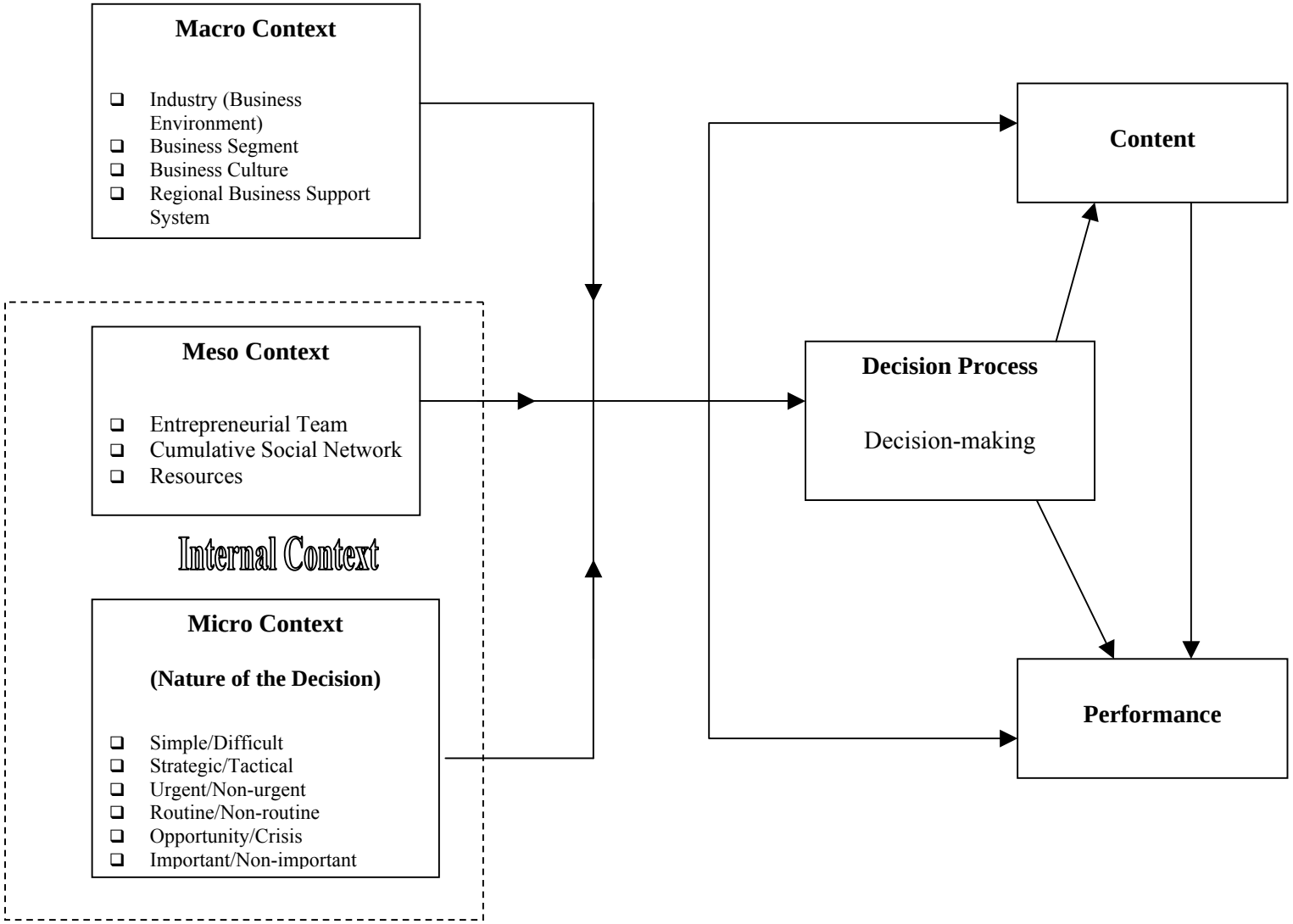


Figure 2.1 Links between the Decision Process and the Decision Context, Decision Content and the Performance

This literature review of decision-making (especially planning) within an entrepreneurial context (especially new ventures), raises several questions, some of which are:

- Is there such a thing as 'entrepreneurial' decision-making?
  - If so, what are its characteristics?
  - If not, how does/do an entrepreneur/entrepreneurial team make(s) decisions?[33]
- Why do some new ventures perform better than others?
  - Is it in any way possible to relate the performance of a decision made in a new venture to the way it has been made?[34]
- Is there any relationship between the experience of the entrepreneurial team and the start of the new venture?
- Is there any relationship among the experience of the entrepreneurial team and the way they make decisions and the performance of the new venture?

To pursue systematic research addressing these issues, the following are required:

- A conceptual framework for the research. While there is no suitable framework to operationalise the research,[35] an initial 'working' framework for the research can be developed based on a thorough review of the research literature on strategy process/decision-making. Such a review is provided in the next chapter.[36]
- A sound research design and methodology (Chapter 5).

[33] Gruber (2006:6) argues that 'the level of effort entrepreneurs put into different activities should be studied, because such a view improves on dichotomous conceptualizations that merely report whether or not a certain activity has been pursued.'

[34] Low and MacMillan (1988:141) have strongly recommended that researchers in entrepreneurship 'go beyond descriptive studies and … pursue causal inference.' Wortman (1987) has also recommended that studies investigate causal relationships. This study will have both elements. The research methodology is discussed in detail in Chapter 5.

[35] Forbes (1999) identifies various cognitive stages—intention, scanning, interpretation, action and performance—in the new venture formation context. Most of these stages are similar to stages that researchers of strategy process have identified (discussed in the next chapter) for the decision process (i.e., micro-level study). However, his linking these cognitive stages at meso-level (i.e., firm level) is not empirically supported and is difficult to understand using simple logic. He relates intention to the pre-founding of new ventures and the rest of the stages to post-founding. For this reason, this framework was not used.

Chapter 3

Decision-Making in Management

George L. Morrisey: ‘Developing the plan is actually laying out the sequence of events that have to occur for you to achieve your goal.’

3.1 'Decision-making' in the Strategic Management Literature

'Decision-making' in the strategic management literature can be classified into two broad categories: strategy content (i.e., a decision per se) and the process by which it is made and implemented (Rajgopalan, Rasheed & Datta, 1993).[1] However, managers often see the value of strategic planning in the process rather than the plan per se (Bryson & Bromiley, 1993).[2] One can also gauge the importance of the 'strategy process' from a definition of strategic management by Schendel and Hofer (quoted in Pettigrew, 1992:5): 'Strategic management is a *process* that deals with the entrepreneurial work of the organization, with organizational renewal and growth, and more particularly with developing and utilizing the strategy which is to guide the organization's operations.' In fact, Bourgeois (1980), while not denying the relation between strategy content and organisational performance, suggests that it is equally important to gain knowledge about the processes through which management determines strategies in the first place. Pettigrew (1992) takes this idea a step forward by suggesting that processes actually shape outcomes and, therefore, research into strategic management should explore this.

Despite the importance of the process dimension, the 'content' issue dominates the research agenda in strategic management (Pettigrew, 1992; Rajgopalan et al., 1993). Rajgopalan et al. (1993) reason that strategy process research has lagged behind strategy content research because the latter benefited from the early development of integrative models by researchers; however, there is an absence of such integrative models in strategy process research.

The reason for the lack of an integrative model in strategy process research is that the research in this area remains highly fragmented and characterised by limited

[1] Researchers concerned with the process side of strategic management have traditionally been concerned with exploring well-established companies and how they tend to be successful over time. As such, the strategies have drawn maximum attention and research work. Decision-making in strategic management has generally been labelled the 'strategy formation process'. However, decisions can be long-term strategies or short-term 'tactics'. It should be noted that, more recently, researchers like Nutt (1993) have shed light on tactical decision-making in organisations. For the purpose of this research, the strategy formation process is synonymous with the decision-making process that involves both strategy and tactics.

[2] Bryson and Bromiley's (1993) research is exploratory in nature and is based on a cross-sectional analysis of 68 cases using secondary data. They reported that while context affects both process and outcome, it is the process that has maximum effect on the outcome. For example, communication and problem solving strategies seem to have maximum effect on outcome.

cumulative theory building (Rajgopalan et al., 1993). This is primarily due to strategy making always being portrayed in dichotomous terms: rational versus incremental; planning versus intuition; emergent versus deliberate; formal versus informal; formulation versus implementation; or exploration versus exploitation (Hart & Banbury, 1994; Friend & Hickling, 1987).

This chapter focuses on these dichotomies in the strategy process, particularly planning versus intuition and deliberate versus emergent. This is because the contrast seems to be more profound along these dimensions. Moreover, these dichotomies have led researchers to develop 'typologies' of the decision process (such as Ansoff, 1987; Bourgeois & Brodwin, 1984; Chaffe, 1985; Grandori, 1984; Hart, 1992; Idenburg, 1993; Miles & Snow, 1978; Mintzberg, 1973, 1987; Mintzberg & Waters, 1985; Nonaka, 1988; Nutt, 1984; and Shrivastava & Grant, 1985). These typologies represent the *how* characteristics of decision-making. But are these typologies useful or misleading? Do they provide a way of understanding the decision process? Are these different typologies one of the reasons for the lack of an integrative model to study the decision process? Should they be used to develop a framework for this research? To explore these questions, an understanding of how typologies were created is required. The effect of this approach on the study of the decision-making process is also needed. This will enable a more suitable approach to be identified.

3.2 Typologies of Decision Processes

Two theoretical constructs—'bounded rationality' and 'emergent strategies'—have had a major impact on management science. They explain many issues that the earlier dominant concepts of 'rationality' and 'planning' cannot. While these new constructs provide many useful alternative explanations, they are more useful as a complement to the dominant concepts. While there has been acceptance of these as independent constructs, there has been less acceptance of attempts to integrate the newer and the older concepts. This has led to theoretical fragmentation that, as will be discussed further, has had a major effect on the process dimension of strategic management.

3.2.1 Prescriptive Versus Emergent Strategies

Mintzberg and Waters (1985:270) state that deliberate and emergent strategies in their 'pure' form can be taken as two ends of a continuum:

> [T]he fundamental difference between deliberate and emergent strategy is that whereas the former focuses on direction and control —getting desired things done—the latter opens up this notion of 'strategic learning'…Emergent strategy itself implies learning what works—taking one action at a time in search for that viable pattern or consistency.

The logic of the notion of emergent strategy has been very clearly stated by Quinn (1989:47):

> [N]o organization—no matter how brilliant, rational, or imaginative—could possibly foresee the timing, the severity, or even the nature of all such precipitating events. Further, when these events did occur there might be neither enough time, resources, or information to undertake a full formal strategic analysis of all possible options and their consequences.

The influential concept of 'emergent strategy,' now accepted by almost all researchers, was developed in response to the prescriptive schools' promotion of 'thought independent of action'. This is where 'strategy formation above all is a process of *conception*, rather than…one of *learning*' (Mintzberg, 1990:182). Mintzberg and Waters (1985) took a balanced approach when they emphasised that real-world strategies lie somewhere between the two ends of the spectrum—'emergent' and 'deliberate' strategies. The dominant logic behind this is that emergent and deliberate strategies are not orthogonal in nature. Researchers have perhaps not followed this logic in theory and practice. The sharp criticism of 'planning' is a continuing phenomenon, the basis of which lies in the treatment of deliberate and emergent strategies as necessarily contradictory. For example, Farjoun (2002:570), while reviewing the literature on strategic management, criticises not only the mechanistic/prescriptive school of thought (i.e., planning) but also the analytical tools suggested by it:

> [P]orter's (1996, 1997) reflection on the concept of strategy, which includes several dynamic extensions, still retains a view of strategy as a planned and stable position, and suggests a linear causal flow running from environment to position (i.e. strategy) to internal organization. Similarly, SWOT analysis rooted in mechanistic ideas, still remains a

> primary consulting tool (Hill and Westbrook, 1997) and serves as an organizing framework for research and teaching (Barney, 1997)….

However, March (2006:208), defending 'technologies of model-based rationality', observes that the failures related to these technologies are mainly due to their misguided use. It is probably because of this that Nutt (2002:92) argues that while some of the organisational decision-making literature has denigrated the role of analysis, (if used appropriately) analysis produces superior results when matched to the decision task.

3.2.2 Rationality Versus Intuition

Decision-making is usually not completely rational but boundedly rational (March, 1994, 2006). 'Bounded rationality'—also termed 'limited rationality' by March (1994)—means that as there will always be some uncertainty, so the decision-maker has to exercise judgement.[3] Some decisions may have a high level of uncertainty because of a very low level of available information. March (1994:8-9) observes that both enthusiasts and sceptics endorse limited rationality as a natural extension of theories of pure rationality. Yet again they relate planning to pure rationality and adhockery to intuition.

Some researchers, however, take a more balanced approach. Mitchell et al. (2005) develop a useful theoretical definition of 'intuition' from a comprehensive literature survey of antecedents. They note that intuition is a dynamic process that involves 'coming-to-consciousness'. However, as one becomes adept at something, the same level of conscious and deliberate effort is not required; that is, it becomes a routine or a usual procedure that is referred to as 'having an hunch' or 'just knowing' (2005:666). Miller and Ireland (2005) also conceptualise intuition as a 'holistic hunch', which corresponds to judgement or choice made through a subconscious synthesis of information drawn from experience. They say that 'gut feeling' is often used to describe the final choice but that the subconscious process involved in a

[3] Rottenstreich and Kivetz (2006), however, observe that people demonstrate 'non-probabilistic' behaviour (leading to rational behaviour) when there is low uncertainty or when they think that they have either total (or even partial) control. For example, a decision to eat sandwiches for lunch does not involve uncertainty and leads to a non-probabilistic act. (Refer to Rottenstreich and Kivetz (2006) for a detailed discussion and related examples.)

holistic hunch is not well understood. Klein (1999:31) also defines intuition as 'the use of *experience* to recognize key patterns that indicate the dynamics of the situation.' Intuition, then, is not simply a gut feeling, as is characterised by many researchers. Dane and Pratt (2007) give four elements of intuition: non-conscious, holistic, associative and faster. The key word is 'associative', which, according to them, differentiates intuition from guessing.[4]

3.3 Decision Process and Typologies

For Eisenhardt and Zbaracki (1992:22), 'rationality is multidimensional, and so strategic decision makers are rational in some ways, but not others.' Spender (quoted in Hitt & Tyler, 1991:331) comments that '[w]hile the decision process has rational components, a process of judgement is used to deal with uncertainty.' For Farjoun (2002:579), 'formulation includes not just analysis and synthesis but also invention, intuition, persuasion, and negotiation.' His definition of strategy blends mechanistic ideas (postures, states and plans) with organic ideas (such as emergent strategies). Hart (1992:345) suggests that 'high performance requires a balancing and simultaneous mastery of seemingly contradictory or paradoxical organizational capabilities—decisiveness and reflectiveness, broad vision and attention to detail, and bold moves and incremental adjustment.' Isenberg (1986), based on his small-scale but effective empirical study, found that while managers make contingency plans (a rational strategy), they also often act quickly on incomplete information. It was found that while managers often used satisficing behaviour for decision-making, they valued information highly. Using an in-depth case-study approach, Eisenhardt (1989) found that, in fast-paced environments, executives sought information from many sources but focused on a few. Fredrickson (1986), after reviewing literature on the strategic decision process (and organisational structure), observed that the approaches taken by managers were simultaneously rational and intuitive (i.e., executives engaged in some but not all aspects of rational choice). The typologies proposed by some of the researchers are summarised in Table 3.1.

Hart (1992:335), who claims to have developed an integrated set of typologies, is able to capture the essence of the diverse typologies made by other

[4] Refer to Dane and Pratt (2007) for definitions of intuition proposed by different researchers.

researchers. He nevertheless states that none of his individual composite typologies captures the range of themes and dimensions associated with the strategy-making process: 'The five modes are not seen as mutually exclusive. In practice, organizations may combine two or more modes into distinctive combinations of strategy-making processes.' In fact, he further suggests that '[f]irms that are able to combine several modes into a high 'process capacity' might be expected to perform well on more performance dimensions than single-mode…' (p. 345).

TABLE 3.1 TYPOLOGIES PROPOSED BY DIFFERENT RESEARCHERS

Researchers	Typologies of the Decision Process
Ansoff (1987)	Systematic; Ad hoc; Reactive; Organic
Bourgeois and Brodwin (1984)	Commander; Change; Collaborative; Cultural; and Crescive
Chaffe (1985)	Linear; Adaptive; and Interpretive
Grandori (1984)	Optimizing; Satisficing; Incremental; Cybernetic; and Random
Hart (1992)	Command; Symbolic; Rational; Transactive; and Generative
Idenburg (1993)	Rational Planning, Logical Increment; Guided Learning; and Emergent
Mintzberg (1973)	Entrepreneurial; Planning; and Adaptive
Mintzberg (1987)	Plan; Position; Ploy; Perspective; and Pattern
Mintzberg and Waters (1985)	Entrepreneurial; Planned; Ideological; Umbrella; Process; Consensus; Unconnected; and Imposed
Nonaka (1988)	Deductive; Compressive, and Inductive
Nutt (1984)	Normative; Bureaucratic; Behavioral; and Adaptive
Shrivastava and Grant (1985)	Managerial Autocracy; Systematic Bureaucracy; Adaptive Planning; and Political Expediency

3.3.1 Are Typologies Useful?

The rationale to construct typologies is that there is a finite set of processes from which strategic decisions evolve and that these take the form of patterns or gestalts that can be characterised and identified across organisations (Dess et al., 1997). While this approach is useful, determining typologies associated with a particular decision gives only a partial understanding of the decision process. For example, two decisions (A and B) may have components of adhockery and systematic procedures (using Ansoff's typology), but this information alone does not provide a practical understanding of the complete decision process.

A more realistic approach begins with the recognition that every decision is unique because the way the decision-making process evolves depends on many variables. Typologies only seem to increase our understanding of the pure types of decision-making (or strategy formation) processes, which are generally not pure in nature. Some researchers (discussed below) have sought to build generic models of decision-making that are more useful for understanding the decision process.

3.4 Decision-Making Models

According to Mintzberg (cited in Hickson, 1987:167), 'the decision process encompasses all those steps taken from the time a stimulus for an action is perceived until the time the commitment to the action is made.'[5] Mintzberg et al. (1976:247) had earlier concluded from their empirical work that 'decision processes are programmable even if they are not in fact programmed.' They say that even though the processes may not be explicit, there seemed to be a basic logic or structure underlying what the decision-maker does and that this structure could be described by the systematic study of his or her behaviour. A few years later, Lyles (1981) concluded from her study that the problem formulation process could be analysed and flowcharted.

A basic decision-making model that would be sufficiently realistic and inclusive to be useful for the analysis of decision-making for this study should:

- incorporate iterative decision-making processes. Rarely are strategic decisions taken without a reconsideration of some aspect of them, if not most (Lyles, 1981). The concept of 'strategic experimentation' has been proposed to capture these iterative processes (Nicholls-Nixon et al., 2000). Therefore, a useful generic decision-making model must include iterative decision-making processes.
- include different types of decision-making. As suggested earlier, many researchers have developed typologies that pitch rationality and intuitiveness and planned and adaptiveness at two extremes. While such approaches are useful for establishing a broader taxonomy of decision-making, they lack

[5] More recently Hastie (2001:657) has observed that '[d]ecision making refers to the entire process of choosing a course of action.' This should involve, according to McMullen and Shepherd (2006), a consideration of both attention and the evaluation stage.

utility. Decision-making more often includes aspects of several typologies rather than conforms to one typology. A generic decision-making model must also be able to accommodate elements of different typologies of decision-making.

- integrate into a model of 'process' the role of 'context' and 'content'. Many researchers have argued for an integrated approach to strategy formation, taking content, context and process into consideration simultaneously. Ansoff (1987) made the strategy formation process central to his concept of the 'strategic paradigm'. He linked the strategy formation process to power, culture, environment, capabilities and the final outcome (i.e., decisions about strategy).

There is a range of analytical models of the decision-making process. Researchers typically delineate different phases, such as the three phase characterisation: identification of the problem or opportunity; development of the idea (mainly related to validating the idea by giving meaning to the data); and implementation of the idea. Some researchers have added sub-phases to each as more clarity in concepts has emerged.

One direction for the development of decision-making models involves essentially the elaboration of these stages (as suggested) while retaining the basic linear sequential approach (when it comes to forming a model or framework). Most researchers taking this approach acknowledge iteration in decision-making but use a linear model because of complications in framing an iterative model (e.g., Bourgeois, 1980; Beyer & Trice, 1982; Heerkens, 2006; Schwenk, 1984; Witte, 1972). A second approach, however, actually builds iterative processes into their models of decision-making (e.g., Daft & Weick 1984; Lyles, 1981; Mintzberg et al. 1976; Nutt 1993).

Nutt (1993) has outlined a structured model of the decision process. However, this approach is inadequate as a generic model because it does not provide a means to take into consideration the political dimension of decision-making. Most decision-making does not rely on authorisation for the decision by a single decision-maker. Daft and Weick (1984) have proposed a model that includes iterative 'feedback' loops within an essentially linear three-phase model. But the simple categorisation of the

phases has limited utility as an analytical framework. The model by Shrivastava and Grant (1985) is iterative. However, if one compares it with the model by Mintzberg et al. (1976), it is only partially iterative. Narayanan and Fahey (1982) proposed an iterative model but only from the 'political' perspective of decision-making. Friend and Hickling (1987) have developed an iterative model, but it is too reductionist in approach.

The Mintzberg et al. (1976) model attempts both to provide a detailed structure to describe decision processes and to incorporate the iterative nature of decision processes. It takes into consideration three central phases: the **identification** phase (this includes decision recognition routine and diagnosis), the **development** phase (this includes search routines and design), and the **selection** phase (this includes 'screening' by way of bargaining, judgement and analysis and the final authorisation). These central phases are supplemented by decision control routines, decision communication routines and political factors. Mintzberg et al. (1976) show that the model applies to different types of decisions, from a 'simple decision' process to a 'complex decision' process. The Mintzberg et al. (1976) model of decision-making does meet the criteria identified above and, therefore, provides an initial foundation for empirical analysis. In the following chapter, the Mintzberg et al. (1976) model is used as a foundation to develop a working model for this empirical research.

Chapter 4

Developing a 'Working' Framework

Peter Marshall: 'Give to us clear vision that we may know where to stand and what to stand for—because unless we stand for something, we shall fall for anything.'

As discussed earlier, the purpose of this research is to explore decision-making in new ventures for which no specific framework has existed. Based on the review of the literature on the strategic decision process, it was decided that the Mintzberg et al. (1976) model remained a robust model for this research. However, it needed to be revised to take into account relevant research conducted after 1976.

The purpose of this chapter is to revise the Mintzberg et al. (1976) model of decision-making and propose a new model through which decision patterns can be investigated in early-stage new ventures. The framework extends the Mintzberg et al. (1976) model by adding new dimensions based on recent literature in decision-making and entrepreneurship. In drawing on both these bodies of literature, the identification of relevant additional dimensions is particularly oriented to the new venture context.

The idea was to use this proposed framework as a working framework (Figure 4.1). This decision process framework analyses concept development, decision formulation and decision implementation. The rationale for using a working framework rather than a purely emergent approach is that a completely emergent approach to research may be unsuitable when a large number of cases needs to be studied to allow generalisation (Nutt, 2000). There is a risk that the researcher could lose direction (Miles & Huberman, 1994).[1] However, with an imposed framework there is the danger of losing important messages that do not fit the framework (Nutt, 2000). As such, it was decided to have a working framework that would be modified (if need be) as the analysis progressed. The framework did get modified, which is normal and even desirable (Miles & Huberman, 1994) in explorative work. While this revised framework will be discussed in Chapter 6, the discussion in this chapter will be limited to the working framework developed from Mintzberg et al. (1976).

4.1 A Working Framework: Pre-Empirical Study

4.1.1 Stage 1: Concept Development

The concept development stage in the decision process is characterised by a focus on the identification, acquisition and assessment of just enough information to validate

[1] This is discussed further in the research methodology chapter.

the opportunity or problem prima facie. Casson (1982) considers that the profit generation capacity of an entrepreneur is related to his or her access to information and his or her way of making decisions based on such information. For Casson, the control of information is more important to an entrepreneur than market power. The acquisition of information is not costless, so it is imperative for an entrepreneur to collect relevant information in an effective and efficient manner. Hence, at this stage of new venture formation, the acquisition and assessment of relevant knowledge is a key investment and the competencies for selection and evaluation are key competencies. Kaish and Gilad (1991) say that the reality about entrepreneurial search and alertness to an opportunity lies somewhere between a 'neoclassical information search' and a 'Kirznerian non-deliberate learning experience'. They argue that the discovery of opportunity cannot be systematised but is serendipitous, depending more on 'entrepreneurial alertness' than a cost-benefit approach to the information search.

Recognition is characterised by a 'not too clear' understanding of the situation, the objective or idea and the venture's environment.[2] Entrepreneurial decision makers have to rely on limited information to identify their relevant environment. In order to achieve equivocality reduction[3], such decision-makers tend to rely on a range of information sources but at the same time don't have any formal structure and resources to reassess their beliefs. In the very early stage of venture creation, the entrepreneur collects information to make a broad assessment of his or her ideas. The information gathering is often undirected in the sense that there are very few formal measures to generate information; most of the data tends to be irregular and casual. Further, Kaish and Gilad (1991) postulate that entrepreneurs usually make use of readily available business sources and media, informal gatherings (such as trade shows and conferences etc.), and informal and non-business sources to identify opportunities. In the early stages of new ventures, the reason for this approach can be the unanalysable environment or a lack of resources and time to completely analyse the environment.

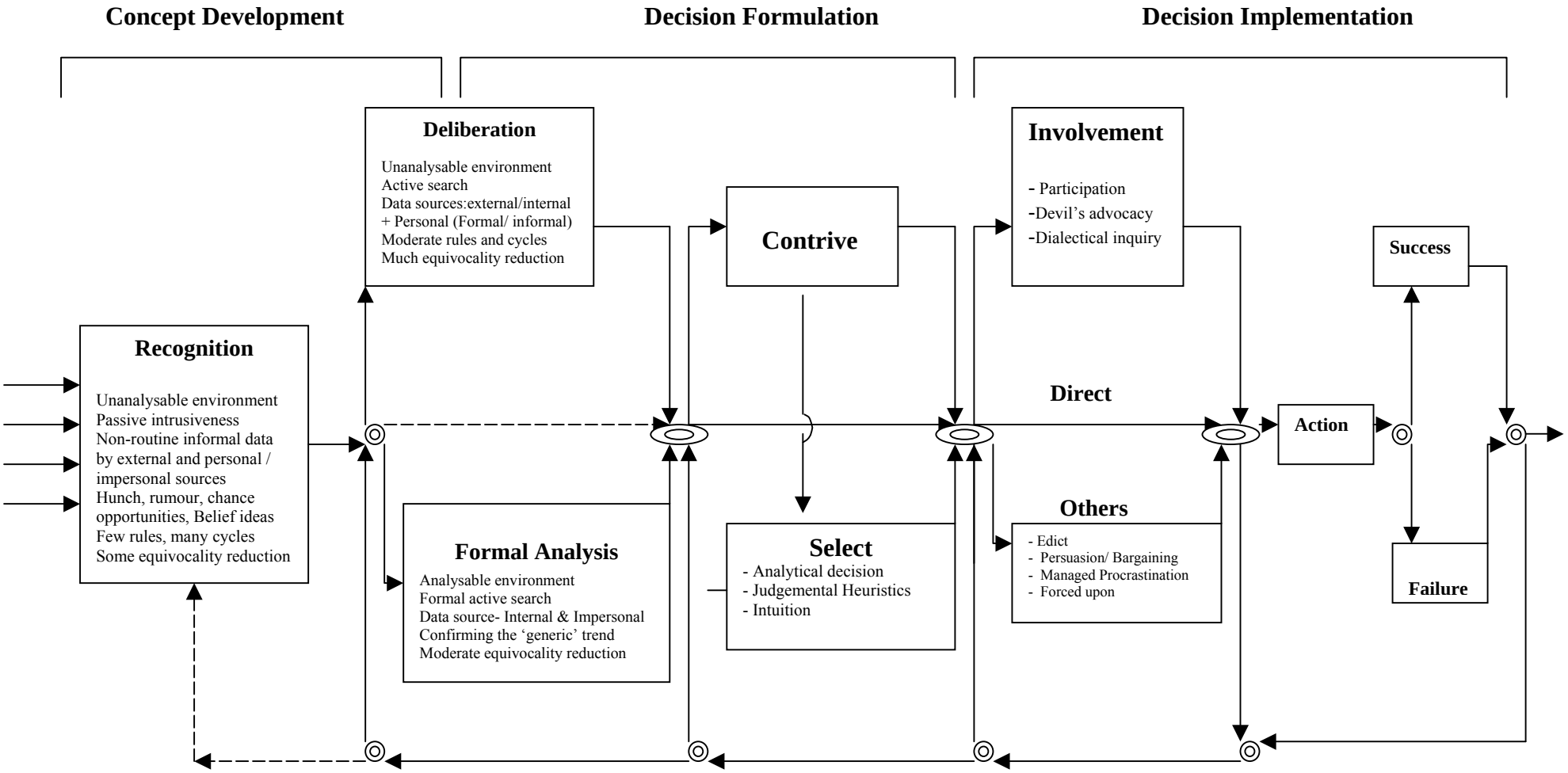
[2] Ideas drawn from Daft and Weick (1984).
[3] Daft and Weick (1984:291), based on work by other researchers, say that '[e]quivocality is the extent to which data are unclear and suggest multiple interpretations about the environment.'

Deliberation[4] and Formal Analysis[5] come after the entrepreneur has partially ascertained the validity of the belief in a wider and generic perspective that has led to reduction in uncertainty about the idea. The next step is to look into the host of other issues that are specific to that decision. The new venture decision-maker addresses these issues not only in order to make decisions on whether and how to proceed but also in order to garner support from other possible stakeholders. Being typically short of resources and time to make a formal study, a new venture decision-maker relies on proactive and purposive methods to reduce the uncertainty associated with these issues. This phase is thus more systematic and the search for information is more logical.[6]

[4] The idea has been drawn from Daft and Weick (1984) but the terminology has been changed to suit the needs and make it more appropriate to this research. 'Deliberate' is used instead of 'enact'. 'Deliberate' as used here is derived from the *Oxford Dictionary* and means 'of a body of persons: to take counsel together, considering and examining the reasons for and against a proposal or course of action.' The meaning of 'deliberation' has also been expanded to include decisions that are based on relevant self-experience. This construct seems more appropriate and directly relevant to the research than 'enact' that means 'to work in or upon', according to the *Oxford Dictionary*.

[5] Similarly, 'Formal Analysis' is used instead of 'discovering' (Daft & Weick, 1984). 'Formal' in the *Oxford Dictionary* means 'marked by extreme or excessive regularity or symmetry; stiff or rigid in design; wanting in ease or freedom of outline or arrangement' and 'analysis' means 'when reduced to its fundamental elements; at the conclusion of the investigation or examination involved; all things duly considered and weighed.' This again seems to convey a better meaning in the present research context. Analysis can take place for decisions that are not so ambiguous and can be analysed by more formal means. This is close in meaning to what 'planning' or 'formal analysis' stands for in the traditional strategic management literature. 'Discovering', on the other hand, means 'to divulge, reveal, disclose knowledge (anything secret or unknown)'. This concept is a bit too broad because discovering can also take place in deliberation.

[6] 'Logic', as used in this research, is derived from the *Oxford Dictionary* and means 'the branch of philosophy that treats of the forms of thinking in general, and more especially of inference and of scientific method' or 'the science or art of reasoning as applied to some particular department of knowledge or investigation.' 'Logical', thus, is not synonymous with 'formal' and is not to be used interchangeably. A 'logical' decision may be taken with or without 'formal analysis.'



Note: ◎ are the critical points in the decision process where process options are selected.

Figure 4.1 Proposed Generic Model for Strategic and Tactical Decision-making Process in New Ventures

The *deliberation* mode reflects an active strategy to overcome an unanalysable environment. The environment may be unanalysable because of the dynamic nature of the industry concerned, the newness related to the opportunity or problem, lack of adequate resources to carry out analysis within the timeframe or a combination of any of these. The decision-makers then tend to rely on their own experience[7] and a host of advisers and experts for the best possible information.

Formal analysis is also an active strategy to gather information to facilitate decision-making. The only difference is that some decision variables (if not the whole environment) are considered to be analysable. Carefully devised tools and techniques are used to gather required information about the environment and relay it back to the organisation and the decision-maker.

4.1.2 Stage 2: Decision Formulation

The decision formulation stage comprises steps related to coming up with different plausible courses and then choosing one that is likely to give optimum results. The entrepreneur must 'contrive' a solution appropriate to the decision-makers' specific situation.[8] Deciding on a course of action that is well-established or designing a unique solution to the circumstantial need can do this. The latter approach can take two paths: custom-made solution(s) and modified solution(s) (Mintzberg et al., 1976). During the information-gathering phase (especially deliberation), one can come up with one or several plausible options that have been successfully put into practice before in quite a similar environmental context. In the latter event (i.e., generation of several options), the decision-makers can decide to pursue an option without change or decide to modify an option that adequately fulfils their needs. In the former case, as deliberation/formal analysis brings forth tested options/solutions, selection would automatically follow by any one means (discussed later).

The information-gathering phase may reveal much required information but may fail to reveal any plausible course of direction that has previously been

[7] It is to be noted that the experience can be of various types - directly relevant to the decision; indirectly relevant to the decision; generic in nature; etc.

[8] The meaning of 'contrive' as applied here has been taken from the Oxford Dictionary and means 'to invent, devise, excogitate with ingenuity and cleverness (any plan or purpose)'. In order to come up with a unique solution, the qualities that define contrive are essential.

successfully put into practice in a related environment. Given that situation, the decision-makers have to frame a completely new option. In order to do so, they make use of the information gathered earlier to suggest one or a few new options. In the latter case, the decision-makers can decide to pursue an option that fits their needs in a reasonable manner.

'Selection' is the step to eliminate options that are not feasible and to determine what is appropriate (Mintzberg et al., 1976).[9] In this step, the idea is to challenge the appropriateness of alternatives. The choices to be made can be from ready-to-use alternatives gathered during *concept development* stages or from custom-made or modified solutions or both. Different options may be considered simultaneously to speed up the process or can be considered sequentially. The selection can take place in several ways depending upon the context. The major approaches to *selection* in decision-making are:

- Analytical Decisions: This involves an evaluation of the merits of individual decisions based on available facts and the consideration of a range of factors such as affordability, cost-benefits and compatibility et cetera.
- Judgemental Heuristics[10]: In many circumstances, entrepreneurs have to rely on heuristics to make decisions because entrepreneurial decision-making typically combines high ambiguity and uncertainty with the need for speedy decisions (Busenitz & Barney, 1997).[11] Lei et al. (cited in Alvarez & Busenitz, 2001:759) support this idea by pointing out that '[h]igher-level learning involves the formation and use of heuristics to generate new insights into solving ambiguous problems.' Such learning associated with heuristic based logic, according to Krabuanrat and Phelps (cited in Alvarez & Busenitz, 2001:759), may use less information and be less accurate, but the use of individual specific clusters of knowledge facilitates quick

[9] 'Select' is more appropriate than 'screen', which, according to the *Oxford Dictionary,* means 'to examine systematically in order to discover suitability for admission or acceptance.' The decision, as mentioned above, on an option can be made without being systematic.
[10] 'Heuristics' refers to simplifying strategies that entrepreneurs use to make strategic decisions in complex situations, where less complete or uncertain information is available (Alvarez & Busenitz, 2001:758). The entrepreneurial heuristic is made of limited or key experiences and beliefs that are available to the entrepreneur. This could comprise the entrepreneurs' own experience or that of others whom (s)he is in contact with.
[11] This article by Busenitz and Barney (1997) has been widely cited by academics.

adjustments to emerging trends. One can think of several ways in which heuristic processes influence decision-making.

- In the case of 'availability heuristics', decisions are based on recent events relating to the situation at hand.
- In 'representativeness heuristic' processes, a decision is based on similarities between the situation at hand and stereotypes of similar occurrences.
- In the case of 'anchoring and adjustment heuristic' processes, decisions are based on incremental adjustments to an initial value determined by historical precedent or some reference point.

- Intuition or Gut-feeling: This is the ability to know or recognise quickly and readily the possibilities of a given situation without much deliberation. This may lead to speedy and reasonable decisions if rooted in experience in the given domain; without experience, this can be risky.

4.1.3 Stage 3: Decision Implementation

A major criticism of the prescriptive schools (especially the 'design' school) is that they consider strategy formulation and implementation as two separate activities (Farjoun, 2002). Majone and Wildavasky (as quoted in Moore, 1995), who were among the first theorists to challenge the separation of formulation and implementation, say that formulation should actually be seen as part of implementation. However, Beyer and Trice (1982) and Nutt (2000) suggest that implementation is an integral part of the decision-making process but that it follows after the adoption of the selected decision. Since the latter undertook sound empirical studies, it was decided to follow them, albeit with some change. In a new venture, decisions are made by the entrepreneur or the entrepreneurial team (along with investors) and they have to implement them. As such, it was assumed that adoption and implementation would be simultaneous or contiguous (unlike a large company, where adoption and implementation may be distinct).

Hickson (1987:173) reminds us of the political nature of decisions: 'In a decision-making process, therefore, the search is not only for problem solving but for

interest accommodating alternatives…Since there are multiple interests, all of which cannot be met at once…each decision is only a 'quasi-resolution of conflict.''[12] Similarly, Eisenhardt and Zbaracki (1992:23) discuss the significance of the political model of decision-making that is based on the premise that 'people are individually rational, but not collectively so.' The key assumption behind this is that though individuals may share common goals (like the welfare of the firm), they also have competing interests. These competing interests, as stated by Allison (cited in Eisenhardt & Zbaracki, 1982:23), arise out of conflicting preferences and from 'different bets on the shape of the future…and clashes in personal ambitions and interests.' By applying a micro perspective to politics in strategy formulation, Narayanan and Fahey (1982) show the pervasiveness of conflicts among different actors in strategic decision-making. The final decision for action can be achieved in various ways (discussed below) and is circumstantial, dependent on the importance of the decision to be taken and many other factors (as discussed in chapters 2 and 3). Some ways of arriving at a decision include:

- Directly: This is where the decision-maker is the sole authority, there is consensus among the actors on the decisions (even if there is not complete agreement on the facts and assumptions underpinning that decision) or there is only one obvious or preferred way of doing things.
- Involvement[13]: A decision can be reached by consensus when two or more individuals or parties, having a strong interaction, arrive at a decision to pursue a course of action. Agreement on a course of action through the involvement of two or more stakeholders can be arrived at by various processes, for example:

    - Dialectical inquiry (Schweiger et al., 1989): In this approach, different recommendations for action are developed from the same data but are based on contrary assumptions. The recommendations and the underlying assumptions are subjected to critical evaluation through

[12] It is noted that in the early stages of a new venture there might not be a proper organisation. However, due to the involvement of many different actors, it takes the shape of a quasi-organisation , so the same concept can be put to good use.

[13] Nutt (1998b) described participation as one of the approaches for implementation and said that people react more favourably and become more committed when they participate in the decision-making process.

debate. Thereafter, assumptions that have survived the debate are considered and new recommendations are made.

- Devil's advocacy (Schweiger et al., 1989): In this approach, a subgroup develops a solid argument for a reasonable recommendation and submits that recommendation and its underlying assumptions for a formal critique. The other group tries to show why the proposed recommendation must not be adopted. This process of criticism and revision goes on until there is mutual acceptance.

- Others: The agreement on a final decision is made by a group of decision-makers who may have conflicting goal systems:
  - Decision-making by 'edict' happens when one individual is the sole authority in making a decision and it is deemed appropriate by him or her to overrule different opinions and make a decision that best suits his or her ideology (Nutt, 1998b).
  - When different parties show an adequate level of conciliation on an agreeable solution, the decision is based on 'bargaining' (Nutt, 1998a).
  - Managed Procrastination[14]: A need is presented for action and the proposed solution is justified on the basis of its usefulness for another comparable organisation. A conciliatory result is time dependent—that is, a 'wait and watch' policy for the need to emerge for the desired action.
  - Where one party is able to persuade others about the efficacy of a proposed course of action, a decision arises from 'persuasion' (Nutt, 1998b).
  - Forced Upon: The entrepreneurial decision-maker may have to make a decision that is effectively forced upon him or her by some external body or individual (for example, an investor).

Having developed a working framework for decision-making in new ventures, the next step was to develop a suitable methodology for relating the decision-making process in a new venture to suitable performance criteria. This would theoretically

[14] The idea presented here is similar to 'intervention' presented by Nutt (1998b:224).

formalise the research and give suitable direction for the empirical study. This step is discussed in the following section.

4.2 Operationalising 'Decision-Making and Performance' in a New Venture Context

Amason et al. (2006:127) say that, in strategic management research, relating the variables to performance is considered to be ideal and that a similar objective is emerging in the field of entrepreneurship. In fact, several recent studies (as discussed in chapters 2 and 3) have tended to focus on the use of planning in a new venture (albeit with varied findings). Other studies (such as Amason et al., 2006; Fiegener, 2005; Hambrick et al., 2005) have focused their attention on the performance of the 'top executive team.'[15]

For the purpose of this research, it was decided to follow the advice of both Venkataraman and Ramanujam (1986) and Kirchoff (1977), as discussed in Chapter 2, in order to develop a construct for 'performance'. Given that the research was to be at the micro level of decisions, the assessment of performance needed to be at that level. As several types of decisions would be discussed within a company, no one variable would suit all decisions. It was decided to compare the declared 'expected' goal of the company vis-à-vis a particular decision to the level of attainment of that goal. Many decisions to be discussed were operational decisions, so operational goals were taken into account. This approach proved to be useful for the following reasons:

1. The research involved the study of multiple decisions in multiple companies. Given that each decision within a company is unique to it, so are the objectives related to each decision.
2. The context for the study of decisions in new ventures was the biotechnology industry. Companies in this sector usually have a long gestation time, so financial indicators were not suitable.

The approach of using factual information rather than asking entrepreneurs their general impression of decision effectiveness was proposed by Dean and Sharfman (1996).

[15] As mentioned previously, in a new venture (especially founded by nascent entrepreneurs), founders basically make the organisational structure.

Operationalising this approach was made simpler by following the recommended approach of Venkataraman and Ramanujam (1986). Information about the operational and financial (if any) goals related to a particular decision from both secondary and primary sources was collected. They suggest that this has maximum validity. However, it is a bit difficult to operationalise. As such, the primary indicators of decision outcomes were objective facts relevant to each specific decision—for example, the level of success of an initial public offering (IPO) in raising the required capital.

Chapter 5

Research Methodology

Richard C. Cushing: Always plan ahead. It wasn't raining when Noah built the ark.

The importance of a research methodology chapter in a research report, particularly a PhD thesis, cannot be gainsaid. Miles and Huberman (1994:262) observe that most reports are 'most often heavy on the 'what' (the findings, the descriptions) and rather thin on the 'how' (how you get to the 'what')…So, we don't know how much confidence we can place in them.' In this chapter, the approach taken to conduct the research is outlined in detail.

In order to do this research, a systematic and disciplined approach was required. Some decisions had to be made upfront and revisited when the need arose. The order of the sections of this chapter reflect the systematic and detailed manner in which decisions were made regarding the conduct of the research—finding an appropriate research design; establishing the research strategy based on the research design; and executing the research strategy. In the section on execution, there is a detailed discussion of the conduct of the research: the collection of (primary and secondary) data; different methods of the data analysis, including their sequence and purpose; and the triangulation of the data. The chapter concludes with a discussion of some of the limitations and ethical issues in the research.

5.1 Research Design: Finding an Appropriate Direction

The following observation and suggestion by Bygrave (1989:17-18) provided a valuable guide for research design:

> A worrisome trend in recent years is the increasing number of strategy types of papers that are appearing in entrepreneurship. Approximately half the winners of the Academy of Management Entrepreneurship Heizer Award wrote business strategy dissertations. It is an understandable trend because a doctoral dissertation on business strategy is a "classic" dissertation…. The classic dissertation is seldom the most suitable format for an emerging paradigm such as entrepreneurship because it is too rigid…. [A]t the beginning of a paradigm, inspired inductive logic (or more likely enlightened speculations) applied to exploratory, empirical research may be more useful than deductive reasoning from theory….

There is no established framework for research on the decision-making process in a new venture. The approach that has been developed could be described as 'limited exploration' (Stebbins, 2001:2-3). It is a limited exploration because quite a few researchers have studied the decision-making process but not in a new venture

context. As such, there were approaches to the decision-making process to build upon.[1]

Miles and Huberman (2001:155) make the following suggestion:

> [T]he deductive researcher *starts* with a preliminary causal network, and the inductive researcher *ends up* with one…In either approach, the initial version is amended and refined as it is tested against empirical events and characteristics. By the end of data gathering, both species of researchers are about at the same place.

Miles (1979) suggest that a rough working framework needs to be in place near the beginning of fieldwork because those who come to the study with no assumptions usually encounter much difficulty. A preliminary framework was constructed, which was expected to change based on the data to be gathered. Hence, the research design had components of both deductive and inductive approaches.[2]

This approach in practice is similar to that described by Stebbins (2001:7):

> [I]t is more accurate to qualify exploration as *primarily* inductive and confirmation as *primarily* deductive. During an exploratory study, researchers do think deductively at times, although they do so largely within their emerging theoretical framework rather than within established theory and a set of hypotheses deduced from it. Moreover they engage in confirmation, but what they confirm are their emergent generalizations rather than an ensemble of a priori predictions.

The research design also provided a methodological approach to the analysis of 'partially known' phenomena (Figure 5.1) that was consistent with the advice of both Miles (1979) and Bygrave (1989).

[1] Stebbins (2001:10) states:

> [E]ven though a program of exploration can bring a field to the point of diminishing returns in new ideas, it is still better to abide by the rule, when in doubt explore, rather than by its opposite, when in doubt confirm. Following the first rule avoids premature theoretical closure…

[2] Nutt (1993) states that both emergent frameworks and imposed frameworks have drawbacks. While imposing a framework may result in losing important messages that do not fit a framework, emergent frameworks may not be useful to handle large cases, and so lead to a very limited (or no) generalisation. I intended to take care of both pitfalls by using this middle approach.

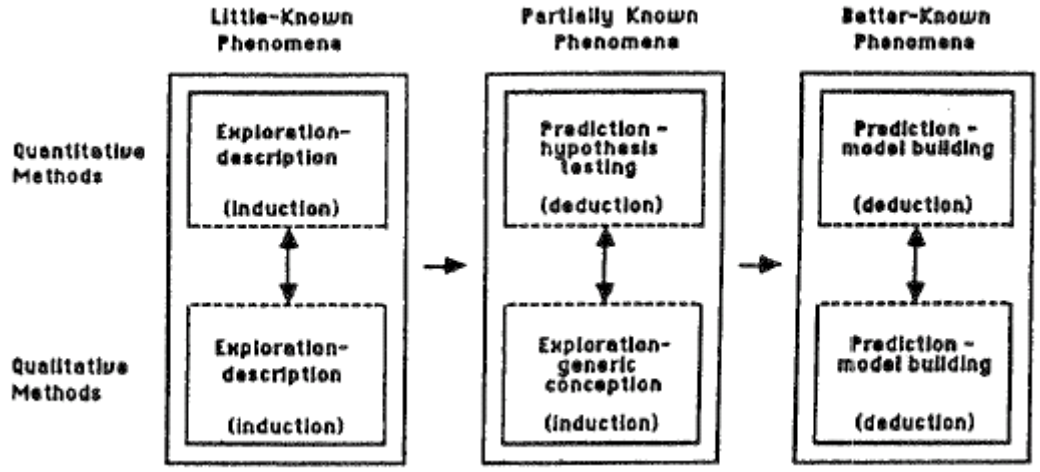


Figure 5.1 The Relationship between Qualitative and Quantitative Methods

Source: Stebbins (2001:7)

Stebbins (2001:5) also argues that '*[e]xploration* is not a synonym for *qualitative research*…' According to him, the former emphasises the 'development of theory from data' whereas the latter emphasises 'methodology and the actual collection of data by which this development is accomplished… He says that 'qualitative elements are found in most kinds of social science research, including many at confirmatory level' (p. 5). Since exploration is distinct from confirmatory procedure, Stebbins (2001:5) believes that using the qualitative descriptor masks 'the role of exploration as a crucial scientific process.'

Given that in most exploratory studies qualitative data predominate, they may well be augmented, where possible, with quantitative analysis (Stebbins, 2001:6). Similarly, Miles and Huberman (1994:215) note that 'the tactic of **counting** is not irrelevant in qualitative research' as it makes it easier to see what is there, and '[d]oing qualitative analysis of all data with the aid of numbers is a good way of testing for possible bias, and seeing how robust our insights are' (p. 254).

Mintzberg (1979:587), while exploring decision-making processes, observed:

> [S]ystematic data creates the foundation for our theories, it is the anecdotal data that enables us to do the building…I believe that the researcher who never goes near the water, who collects quantitative data from a distance

> without anecdotes to support them will always have difficulty explaining interesting relationships (although he may uncover them).

While this study was exploratory and the data primarily qualitative, the methodology was designed to provide a basis for systematic quantitative analysis.

Schwartz and Jacobs (cited in Walker, 1985:12) observe that researchers following a 'humanistic' style believe that in order to appreciate the meanings conferred upon social events by interacting individuals, one must first interpret the social context in which these events occur. Walker (1985:11-13) suggests that, because of this, qualitative methods came to occupy an honourable position within the humanistic tradition. This is also true for exploration that aims to generate new ideas to form grounded theory (Glaser & Strauss, 1967). That being the case, 'ideas are the main reason of the enterprise and everything else—study design, measurement techniques, received theory without an exploratory base—is subordinate to them' (Stebbins, 2001:9-10).

These social sciences exploratory methods have been criticised for being inadequately scientific. Stebbins (2001:17) states that exploration in the social sciences has been 'pejoratively described as a mere 'fishing expedition'… [which] is more akin to serendipity rather than exploration.' He further adds that 'Social science exploration is positivistic, in part, because it is nomothetic, its principal goal being production of valid generalizations about a type of group, process, activity, or situation' (2001:11).

Recognising the challenge of carrying out sound research in a complex area where initial frameworks may not be adequate, the approach developed combines:

- Conceptual exploration (semi-exploratory)
- Qualitative and quantitative data
- Deductive and inductive approaches.

5.2 Research Strategy: Think Before You Leap

Figure 5.2 gives an overview of the research strategy for this thesis.

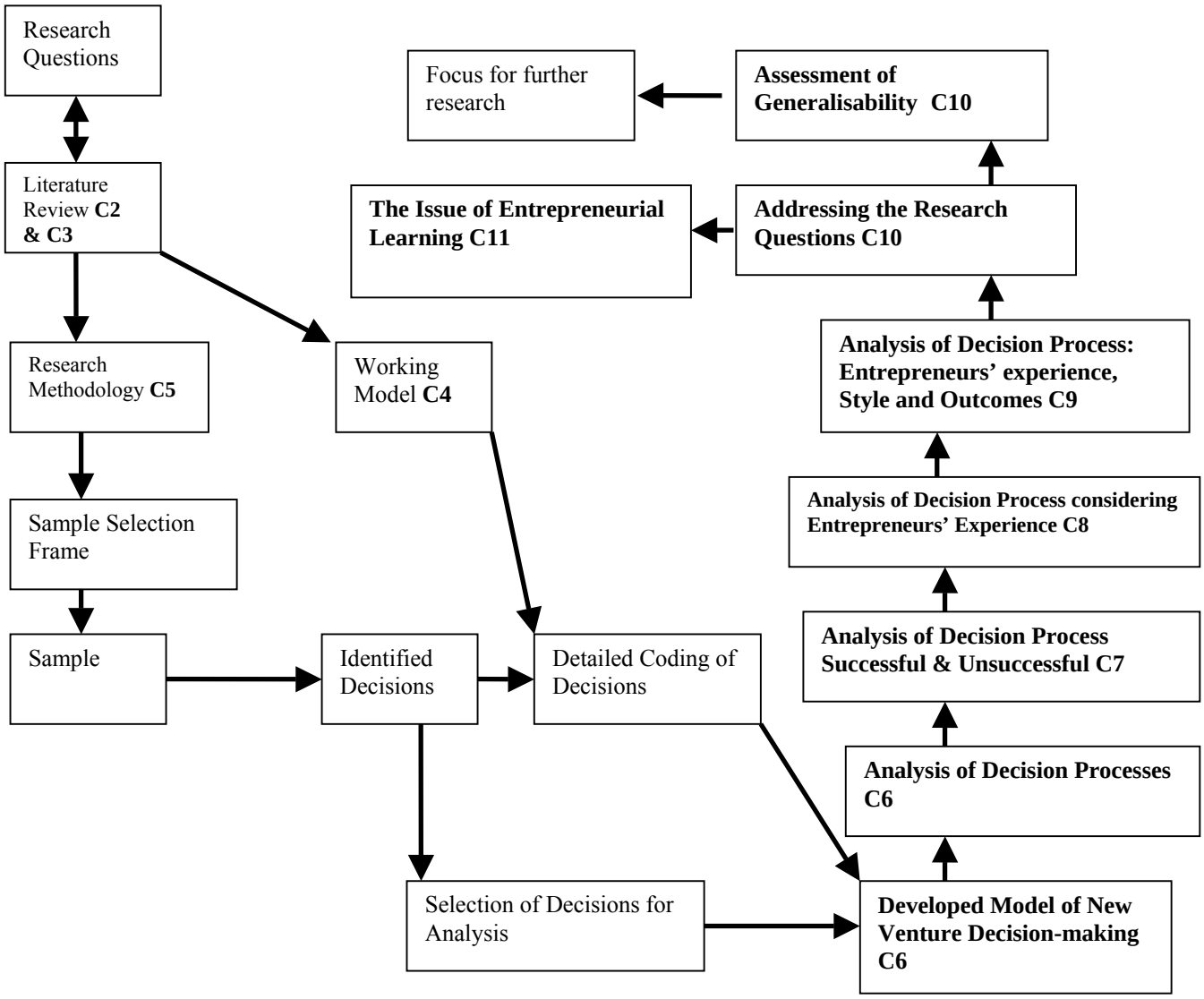


Figure 5.2 Overview of the Research Strategy

In the following sections, there is a detailed discussion of the various steps involved in this research answering the 'how' of this research.

5.2.1 Pilot Study

A pilot study (Yin, 2003) was conducted to ascertain whether the research framework and the questionnaire based on this framework would generate useful and reliable

data. The pilot study was also useful in conceptualising the data organisation and style of coding in NVivo®[3], a qualitative analysis software tool used for the data analysis.

5.2.2 Unit of Analysis

The sampling unit was a company whereas a 'decision' was the recording unit. 'Sampling' units related to sampling and provide the basis for statistical considerations whereas 'recording' units collectively carry the information within sampling units and provide the basis for the analysis (Krippendorff, 1980:60).[4]

For analysis, a 'decision' was where a clear boundary could be set up.[5] For example, a decision to go to an initial public offering (IPO) may include several sub-decisions regarding timing, market capital valuation and choice of underwriters et cetera. This boundary setting is to some extent inevitably subjective. Too much atomisation may lead at times to 'losing the sight of the forest for a tree.' This style of boundary demarcation is similar to the suggestion by Langley et al. (1995) 'to move beyond 'decision processes' per se to issue streams.'[6]

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[3] 'NVivo is designed for researchers who need to combine subtle coding with qualitative linking, shaping, searching and modelling. NVivo is ideal for those working with complex data, such as multimedia, and who want to conduct deep levels of analysis.' (Hwww.qsrinternational.comH, accessed on 7 February 2006)

NVivo allows 'the researcher to specify relationships among codes and use these relationships in analysis, and to write memos and link them to text and codes' (Weitzman 2003:312).

Campbell and Gillin (2002) say that '[t]o ensure that both the richness and complexity of the sources is captured, without sacrificing academic rigour, NVivo® software (used by Global Entrepreneurship Monitor—GEM) is employed to help extract coherent data from the interview transcripts in a systematic and holistic way.'

[4] Going by this definition, in some of the analytical constructs for content analysis, a 'decision' is the sampling unit as well as recording unit, whereas in other places 'company' is the sampling unit and 'decision' is the recording unit. In that way, the research is a multi-level analysis.

[5] Langley et al. (1995) identified this problem related to fixing a clear boundary for 'decisions' because decisions tend to interact with one another. This observation is very useful in shaping the strategy for analysis. The example mentioned by Krippendorff (1980:58-59) was very useful in getting a clear understanding of it:

> Suppose during a study of television violence, one notices in one program that one violent incident triggers a long chain of violent encounters which constitutes the theme of the drama while in another program many violent encounters are separately provoked and not precipitated by others. Now, should the chain of violent encounters be regarded as one sampling unit or separated into many? Should each carry the same weight? … Unless one finds units that are independent as far as the phenomenon of interest is concerned, breaking a highly organized message into separate sampling units invariably distorts the information contained in the resulting data.

[6] Mintzberg et al. (1976) approached this problem in a similar way.

5.2.3 Sampling

The scope of this research is new ventures in the biotechnology sector. The biotechnology sector was chosen because (1) it is considered to be technology intensive, knowledge based, risk prone and existing in a dynamic environment; and (2) the researcher has a degree in life sciences and working experience in business development in a biotechnology venture.[7] Knowledge of the characteristics of the industry is often required to make some judgements about the nature of decisions (Lyon et al., 2000).

Ventures were selected from two countries: Australia and India. Although cross-cultural comparison was not an objective of the study, this design enabled some analysis along these lines.[8]

5.2.3(a) *Sample Size*

There was no standard benchmark for sample size in similar studies. For example, Mintzberg et al. (1976) had 25 decisions; Nutt (1984) had 78 projects; Quinn (1990) studied decisions in 10 companies; and Nutt (1998) studied 376 decisions. In all of these studies, a similar methodology was used for data collection—retrospective interviews.

Eisenhardt (1989) advises that a number between four and 10 cases (in this context, a 'case' is a company) usually works well. However, as the research strategy included use of NVivo® for data analysis, this observation made by Miles and Huberman (1994:45) was also taken into consideration: 'Is it easier to do it with the

[7] Flick (2002) and Horsburgh (2003) argue that a researcher's background and experiences are an important part of the data collection and analysis in any qualitative study. A strong background of knowledge about the technology and the sector enabled a focused discussion in the interviews on the decision process.

[8] Eisenhardt and Zbaracki (1992:33) say: 'Studies of different cultures would be particularly timely since most research on strategic decision-making has been conducted in Northern European and North American contexts.'
Rajgopalan et al. (1993:359): '[S]trategic decision process has paid very little attention to the cultural and institutional context within which the organisation is embedded…For example, consensual decision-making is more common among Japanese firms than among US firms…' This observation is at the macro level—that is, it is about decision style in a culture. This research is at the micro level. If there is a consensus or not in a decision process (irrespective of culture), it will be evident for that decision process and will also reflect the micro context of the decision.

right software? Yes, two or three times easier. Some programs automatically generate and store material of this sort as you go along.'

A sample size of 20 to 30 companies was considered to be manageable and adequate for generating the required data. For the pilot study, a sub-sample of 10 per cent of the expected total was selected (three companies).

5.2.3(b) *Sample Selection*

The population for the sample was decided on following parameters:

1. The venture had to be an independent venture and not a corporate venture.
2. The venture should have been formed between the start of 1998 (so that key decisions were not too long ago)[9] and the end of 2002 (so that ventures were sufficiently developed).
3. The venture must have started in Australia or India.[10]
4. Reasonable information about the company had to be available from secondary sources.

The following databases were used to choose companies, based upon the above criteria:

- Department of State Development, Trade and Innovation, Queensland Government, Australia (website accessed in late 2004–early 2005).
- Department of Innovation, Industry and Regional Development, Victorian Government, Australia (website accessed in late 2004–early 2005).
- Department of State and Regional Development, New South Wales Government, Australia (website accessed in late 2004–early 2005).
- Biospectrum-ABLE[11] 2005 survey for Indian Companies (hard copy).

[9] Amason et al. (2005) define new ventures as firms that are six years old or younger because the first six years have been reported (in *The State of Small Business*, 1992) to be crucial to success or failure. Beckman (2006) considered firms that were less than 10 years of age as young high-technology firms for her empirical study. The sample by McGee and Dowling (cited in Autio, 1999:339) of 'young independent firms' consisted of firms that were less than eight years old.

[10] The 'initial start' of the company is thought to be significantly affected by the environment (among other factors), and the 'initial start' may influence the *what* and *why* of subsequent decisions. The researcher had knowledge of the Australian and Indian contexts, so it was decided to have only those ventures that had started in Australia and India.

It was decided that the companies would not be differentiated on the basis of various sub-sectors within biotechnology as it was not the intention to relate decision-making to industrial sub-sectors. Therefore, the study included: agri-biotech companies, veterinary biotech companies, contract research organisations, diagnostic companies, drug discovery companies, drug delivery companies and bioinformatics companies.[12]

TABLE 5.1 NUMBER OF AUSTRALIAN COMPANIES CONTACTED AND THE NUMBER THAT PARTICIPATED

	Companies formed between 1998-2002	Companies deemed to fit the criteria and contacted for interview	Companies participating
New South Wales (Sydney)/ Canberra	**17**	**10**	**7**
Queensland (Brisbane)	**18**	**10**	**5**
Victoria (Melbourne)	**43**	**15**	**10**
Total	**78**	**35**	**22**

TABLE 5.2 NUMBER OF INDIAN COMPANIES CONTACTED AND THE NUMBER THAT PARTICIPATED

	Companies formed between 1998-2002	Companies deemed to fit the criteria and contacted for interview	Companies participating
Hyderabad	**6-7**	**5**	**3**
Bangalore	**12-14**	**9**	**8**
Total	**18-21**	**14**	**11**

Note: In total, 33 companies participated (including companies that participated in the pilot study), but only 30 companies were considered for analysis because the data collected from three companies was

[11] ABLE: Association of Biotechnology Led Enterprises. *Biospectrum* is the only magazine in India dedicated to the 'business of biotechnology.'

[12] This is not to say that the specific context may not be important in influencing the characteristics of the decision-making process.

not considered to be adequate. The list of companies that participated is provided in Table 5.3. From these 30 companies, 232 decision units were collected, which did not include 'initial start and the very first external funding (if any).' (See Appendix A for the details of the companies that participated and the interviewees). All 232 decision units were coded.

For practical reasons, the selection of companies was restricted to the major cities of Canberra, Sydney, Melbourne and Brisbane in Australia and Bangalore and Hyderabad in India.

TABLE 5.3 LIST OF COMPANIES THAT PARTICIPATED

Country	Companies
Australia	Acrux, BioDiem, Biotron, CBio, Clone International, Cryosite, Cytopia, Epitan, Evogenix, Genera Biosystems, Genetic Solutions, Genetraks, Illiad Chemicals, Norwood Abbey, Peplin, Pharmaxis, Phenomix, Plantic Technologies, Prana Biotech, Proteome Systems, Tissue Therapies, VRI Biomedical
India	Avesthagen, Bigtec, Genotypic Technologies, Genotex International, Helix Genomics, Jalaja Technologies, Lotus Labs, Metahelix Life Sciences, Ocimum Biosolutions, Strand Genomics, Thinkgen

Based on the above criteria, a list of companies in these cities was drawn up and ordered according to the availability of secondary data.[13] The companies were approached for interview in that order.

5.2.4 Data Collection

5.2.4(a) *Collection of Primary Data*

Collecting useful data on decision-making poses a challenge:

- 'Measuring in real organisational terms means measuring things that really happen in organisations as they experience them' (Mintzberg, 1979:586).

[13] Essentially this was based on the amount of information available through Factiva®. Factiva®, a Dow Jones and Reuters company, provides essential business news and information together with the content delivery tools and services that enable professionals to make better decisions faster. Factiva's unrivalled collection of more than 9,000 authoritative sources includes the exclusive combination of the *Wall Street Journal*, the *Financial Times*™, the Dow Jones and Reuters newswires and the Associated Press as well as Reuters Fundamentals, DandB™, and Bureau van Dijk company profiles.

- '[L]ongitudinal field research is excruciatingly time consuming, so it does not fit the time constraints imposed on most researchers, especially doctoral students' (Bygrave, 1989).

Protocol analysis (Ericsson & Simon, 1993; Newell & Simon, 1972) was considered as an approach to data collection. Although this method has recently been widely used to understand the process of 'individual' problem solving and decision-making, it was not considered to be the best alternative for the purpose of this research because:

- Protocol analysis relies on hypothetical cases given to individuals, so it analyses the *process* based on the short-term memory of the individuals. According to Ericcson and Simon (1993), any situation that does not make use of short-term memory will result in a distorted verbalised process. Most real-life situations are complex and are made over time with many iterations; this is difficult to achieve in hypothetical cases in a laboratory setting (Cooper & Holzman, 1985).
- Most decisions (especially strategic decisions) in business settings are not taken by an individual. However, the protocol method is best suited to understand the problem solving or decision-making process of individuals, making it unsuitable for this study.
- Important decisions in a new venture are expected to be non-routine in nature. One objective was to relate the real process to the performance. Ericsson and Simon (1993), on the contrary, bring to notice variability in the verbalised responses of subjects when dealing with new situations that were typically non-routine in nature.

For the above reasons, semi-structured interviews supported by secondary data on a particular decision were considered the best option. They were able to provide the most information on the 'process' along with good ideas about the 'know-how' and 'know-what' of the team involved in the decision process (Hoffman, 1989).

The interviews were retrospective, semi-structured and in-depth in nature. The approach was similar to the collection of oral histories. Gartner et al. (1992) have suggested the need to legitimise the use of oral histories as a way of gathering

information on the nature of entrepreneurial activity. They further suggest that these oral histories are best taken from entrepreneurs themselves.[14] In fact, Mitchell (1997) has even shown how 'entrepreneurial oral histories can demystify a portion of the entrepreneurial experience by illuminating the content of insider success and failure.'[15]

The detailed analysis of secondary sources on each firm usually allowed the identification of the major decisions. Interviews were then used to focus on a particular decision and understand its decision process. Retrospective interviews were expected to be appropriate, as this approach has been used by many researchers (Mintzberg et al., 1976; Nutt, 1984; Nutt, 1998; Quinn, 1990) to understand the decision-making process. The present research had a similar objective—that is, to understand the decision-making process in a new venture context.[16]

With regard to the validity of retrospective interviews, an empirical investigation by Huber (1985) showed that the stability of the information was not significantly related to how much time elapsed between the making and first reporting of decisions and that the most important issues were the most stable.

Walker (1985:4-5) states that the in-depth interview is a conversation in which the researcher encourages the informant to relate, in their own terms, experiences and attitudes that are relevant to the research problem so the interviewer is not bound by a rigid questionnaire. Quoting Dean et al., he adds that an in-depth interview is not completely unstructured because the skilled interviewer constantly 'appraises the

[14] According to Johns (2006:402):

> Well-conducted qualitative research has great potential to illuminate context effects, for at least two reasons having to do with circumventing the omitted variables problem. First, alert qualitative researchers can be sensitive to the full range of discrete contextual levers (and their interactions) that might affect behaviour in a studied setting. Second, they can be sensitive to the full range of behaviours and attitudes that context might affect, often 'working backwards' to make inferences about the situation.

[15] Mitchell (1997:136) says that oral history serves research in three ways: 'First, it illuminates. Second, by this illumination it demystifies. And third, by demystifying it renders doable that which was previously deemed to be impossible.' He says that in oral histories 'asymmetricity' is likely but that analysis is expected to compensate for it.

[16] The majority of research on the linkage between strategy-making processes and firm performance has adopted an econometric approach (Hart & Banbury, 1994). While such analyses can isolate statistically the independent effects of each predictor, they do not provide insight into which combinations of processes perform especially well. Relating decision processes directly to firm performance is problematic because the causal ordering is ambiguous (Hough & White, 2003:481).

meaning of emerging data for his problem and uses the resulting insights to phrase questions that will further develop the implications of these data' (p. 5).

This technique was particularly suitable for exploring the decision process. While every decision has its own unique trajectory, it was expected that a decision process could be characterised through concepts similar to those outlined in the framework. The interview approach drew on the aide memoire idea of Walker (1985:4-5). It also followed the advice of Russo and Schoemaker (2002:86-89) to ask contradictory questions to the prevailing trend so that the respondent takes an extra effort to explain; and to ask 'probing questions, such as asking people to explain ***how*** they know what they assert to know, the ***process*** they used to arrive at their conclusions.'

5.2.4(b) *Selection of Interviewees*

Huber and Power (1985) suggest that if only one informant is to be questioned, an attempt should be made to identify the person most knowledgeable about the issue of interest. Because the focus of the research was to understand the decision process for early decisions in a new venture, the founders and the senior managers hired quite early in the stage were considered to have the best knowledge. A substantial effort was made to interview more than one person so that more decisions per company could be covered and triangulated (discussed later in the chapter).[17]

5.2.4(c) *Preparations done prior to Interviews*

As discussed above, a conceptual framework for decision-making was used as a guide for the interviews (and for the data analysis) rather than as a predictive framework. However, the approach to data collection was carefully designed and each interview involved significant preparation. The design took into account the advice of Mintzberg (1979:585):

[17] Chandler and Hanks also found evidence relating to the reliability and validity of self-reported, single reported data when they examined the self-reports of owners or chief executives of small firms (Lyons et al., 2000). However, I still made an effort to take all the required precautions by using various triangulating techniques.

> No matter how small our sample or what our interest, we have always tried to go into organizations with a well-defined focus—to collect specific kinds of data systematically.

It also considered Fielding and Fielding (1987:34):

> It is impractical to list all the available means of data collection and analysis and use as many as possible. What is important is to choose at least one method which is specifically suited to exploring the structural aspects of the problem and at least one which can capture the essential elements of its meaning to those involved…The implication is to incorporate at least one method of data collection that describes and interprets the context in which the interaction occurs and one that is designed primarily to illuminate the process of interaction itself.[18]

The design of the interview process involved:

1. **Secondary Data Collection**: Apart from generic biotechnology reports for the respective countries, secondary data was collected for each of the companies (prior to interviews) that had given their consent for interview. This data was collected from the company website, ASX (Australian Stock Exchange) website (if the company was a listed company), and Factiva. A complete file for each company was made and all press releases concerning various decisions/developments were put in chronological order.
2. **Interview Schedule**: A generic interview schedule was developed based on the framework and a characterisation of the key decisions usually required in a new biotechnology venture. The questionnaire was pilot tested and revised. (See Appendix B.)
3. **Personalising the interview schedule:** The data from the secondary sources for a company was analysed to identify major decisions and the interrelationships between decisions and, where possible, an ordering of the steps in a particular decision.

Given the expected limitation of time for the interviewees and the objective of discussing some particular decisions at length, a few decisions for each company were selected and a matrix prepared for each company (akin to an aide memoire), giving an overview picture on one page of issues to be discussed. (See Appendix C.)

[18] In this case, it was secondary sources for the former and interviews for the latter.

5.2.5 Data Analysis

The overall strategy for analysis was greatly influenced by the work of Miles and Huberman (1994). Denzin (cited in Fielding & Fielding, 1987:25) suggests that multiple methods increase the reliability of the analysis. Three styles of analysis were used because they were not only used in similar studies but also seemed to fit appropriately with the logic of the research:

1. **Descriptive Qualitative Analysis**: This first stage involved the development of categories and subcategories of the decision process and the establishment of preliminary associations among them.
2. **Flow Charts or 'Decision Process' Diagrams**: 'Decision process' diagrams of decisions were constructed. This approach is based on the work of Mintzberg et al. (1976) and Nutt (1993).
3. **Quantitative Substantiation**: Drawing on methodological ideas of Barringer et al (2005), Isenberg (1986), Miller and Friesen (1978) and Nutt (1984, 1993, and 1998), content analysis was used to develop quantitative data. Content analysis also provided the opportunity to go beyond the simple descriptive statistics and undertake the more complex analysis that Chandler and Lyon (2000) consider desirable for the development of entrepreneurship research.

   According to Krippendorff (1980), content analysis is a research technique for making replicable and valid inferences from data to their context. Its history is rooted in the journalistic fascination with numbers, supposedly making a quantitative statement more convincing than a qualitative one. Krippendorff (1980:21) further quotes Berelson, who defines content analysis as 'a research technique for the objective, systematic and quantitative description of the manifest content of communication.'

4. **Statistical Tool**: Bergmann (cited in Bygrave, 1989:11) observed that '[c]ounting is, indeed, the only use of numbers that is precise and accurate. The measurement of continuous dimensions, such as time and space, is not precise and accurate in the same sense.' Simple numbers obtained during

quantitative substantiation were themselves quite useful for further analysis; other statistical methods, however, were also used.

5.3 Execution of the Research Strategy

5.3.1 Data Collection

Wherever possible, more than one interviewee per company was identified and the interviews were conducted separately.

Jones (1985:48) states that an interview is 'a complicated, shifting, social process occurring between two individual human beings that can never be exactly replicated.' The following approaches were used to increase the reliability of the content of interviews:

- Face-to-face interviews were used because interpersonal interaction allows a sharp exploration of the concepts and issues under investigation. As such, it 'can be the best way of collecting high quality data' (Mathers et al., 1998:3).
- The interviewees were briefed on the research at the outset in relatively broad terms (Jones, 1985:48).
- Probing was used to check the meanings of terms and statements that were not understood to ensure that the interviewee was not making a judgement on the basis of his or her own preconceptions (Jones, 1985:45-53).
- Respondents were encouraged to elaborate on their responses to increase the accuracy of those responses (Huber & Power, 1985).

5.3.2 Data Recording

The interviews were tape recorded and transcribed.[19]

Even though not all the data that researchers are interested in is of the kind their respondents find threatening and difficult to reveal (Walker, 1985:45-53), it was anticipated that respondents would be a bit hesitant to talk about the decision process for decisions that had gone awry, particularly if they were being tape recorded. In order to minimise this risk, the following measures were taken:

[19] The transcripts were prepared by using unedited quotes, so even the quotes of interviewees used in the following chapters are unedited.

1. A respondent's acceptance letter was signed. This specified the limitations on the researcher's use of the information, including quotations. This contributed to interviewees feeling that they were answering questions on their own terms (Jones, 1985:49).
2. The earlier questions were straightforward and non-controversial. Walker (1985:45-53) observes that most people quickly forget about a tape recorder in that situation.
3. The respondents could refuse to be recorded. (All interviewees agreed to be recorded.)

A complete transcript of each interview was prepared and sent to the interviewees so they could check its accuracy. Recording enables the interviewer to remain attentive and focused during the interview (rather than scribble notes or struggle to remember what to ask). In preparing a transcript, the researcher absorbs all the contents in a slow and tedious way. This brings the researcher very close to the meaning of the spoken words. The only major disadvantage is the amount of time needed to produce complete transcriptions.

5.3.3 Data Analysis[20]

5.3.3(a) *Qualitative Data Analysis*

After the transcripts were prepared for each interviewee, a separate document for each decision taken in a company was prepared. All transcripts, including the subsets on individual decisions, were then analysed and coded using the qualitative data analysis software NVivo®. The approach to coding used no more than eight themes or concepts and about eight to 10 codes per theme or concept.[21] Miles and Huberman (1994:58) observe that codes can be developed at different times during analysis; some get created and get used at the start and others follow. This flexibility in coding is based on the logic of Andreski (cited in Fielding & Fielding, 1987:20): '[N]o amount of sophistication in model building can compensate for the error of leaving out even a one essential variable'. Miles and Huberman (1994:67) have suggested that one way of retaining mindfulness in coding is the marginal remark. NVivo® (by its

[20] This is voluminous and contains confidential material, so available only on request.
[21] This approach to coding draws on the experience of Bazeley and Richards (2000:116): 'Most projects end up with around 10 major groupings, or trees—sometimes less and rarely much more.'

'DataBite' facility) proved to be very useful for writing down thoughts related to some statement or a particular decision.

Consistency in coding documents is essential. Otherwise the researcher can skew the results and make them non-replicable (Krippendorff, 1980:21). For this purpose, a set of rules for coding were developed (see Box 5.1).

Eisenhardt (1989) considers that each sample case is analogous to an experiment and that multiple cases are analogous to multiple experiments. According to her, cross-case analysis forces the investigator 'to go beyond initial impressions, especially through the use of structured and diverse lenses on the data', thus improving the likelihood of accuracy and reliable theory (p. 541). She explains that this is a two-part process involving (1) refining the definition of the construct and (2) building evidence which measures the construct in each case.

Miles and Huberman (1994:87) suggest that 'extracting and clustering the segments in which a theme appears, as we do with conventional coding and pattern coding…are a much better way to look across a data set within a single or multiple cases.' NVivo® is well suited for this purpose. Through the conduct of the interviews, preliminary ideas about concepts and relationships developed. Miles and Huberman (1994:246) state that '[t]he human mind finds patterns so quickly and easily that it needs no how-to advice.' But '[p]attern finding can be very productive when the number of cases and/or data overload is severe' (1994:246).

The analysis sought to establish interrelationships among themes or concepts and the attributes of the decision (particularly whether a decision was associated with a successful outcome). NVivo® provides a data analysis facility that facilitates 'stacking comparisons'. This retains case level information but forms a 'meta-matrix' of variables (Miles and Huberman, 1994:174-176).[22]

[22] In a variable-centred approach, the building blocks are variables and their intercorrelations rather than cases. The details of any specific case recede behind the broad patterns found across a variety of cases and little explicit case-to-case comparison is done. By contrast, case-oriented analysis is good at finding specific, concrete, historically grounded patterns common to a set of cases. (Miles & Huberman, 1994:174)

5.3.3(b) *How were Flow Charts or 'Decision Process' diagrams done?*

Miles and Huberman (1994:260) differentiate between 'building a chain of evidence' and 'causal networks.' They say that the former requires painstaking verification at each step and there must be a logical basis for the claim of the relationships. They consider that 'the decision tree approach is stronger on logical order rather than narrative order as such' (p. 186). Following Mintzberg et al. (1976), flow charts or 'decision process' diagrams were prepared to map out critical paths and decision points mentioned in the narrative data in a logical manner. This step took the analysis to another level: systematic refining and extension of the original (Mintzberg inspired) framework based on empirically grounded data. The refining of the data took place as the surprises vis-à-vis the original framework were not discarded but taken into consideration (Miles & Huberman, 1994:270).

The rationale for undertaking this approach was based on 'enumerative induction,' a process in which one collects a variety of instances all going in the same direction to establish appreciable patterns, as had been done by Mintzberg et al. (1976).

The 'decision process' diagrams were constructed with the use of software called SmartDraw®. Mintzberg et al. (1976) were able to find a few patterns with their 25 diagrams; this study resulted in the development of about 50 diagrams for analysis. The question was: which 50 decisions should be drawn? Initially, it was decided that at least one decision (simple or complex) from each company would be drawn. However, it was soon realised that drawing simple decisions was not of much value.

Box 5.1 Coding Style

According to Krippendorff (1980:75):

'The 'categories must be exhaustive and mutually exclusive' is an often stated requirement. It pertains to the semantics of a data language in that it fixes a relation between the phenomena to be described and the data representing them. This dual requirement demands that the semantics of a data language partition the universe of possible recording units into distinct classes and that the members of each class are represented by a different datum so that the distinctions made in the world are unambiguously represented in the data.'

1. Triangulations and repetitions are not coded. For example, if a respondent has talked about hiring professional consultants and then has talked about it in more than one place, care has been taken to code it only once and not repetitively to avoid distortion of 'quantitative' results. One professional consultant being coded more than once would quantitatively show more than one consultant. Similarly, an idea expressed before and then used again is not double-coded.
2. Sometimes a paragraph (from the transcript) has been used in two separate decision documents (to give a complete meaning to each). Such portions are coded only if they actually form part of the decision process (and are not just background to it).
3. A single (one) code has been used for the same *dimension* of a line of thought that has spilled into the following passage. However, for separate dimensions of the same line of thought, separate coding has been done. For example, if the discussion is about the marketing of a product, *pricing* is a separate dimension to *identifying means of marketing* (i.e., direct selling or online selling or through distributors).
4. In the same passage, double coding has generally been avoided (especially for the same dimension of a line of thought) from the following two groups—'Deliberation' and 'Formal Planning'—until and unless two or more completely different issues have been discussed in the same passage.
    a. Deliberation + Planning
    b. Formal Planning + Planning
    c. Business Plan + Formal Planning
    d. Formal Planning + Deliberation
    e. Professional Consultants + Deliberation
    f. Professional Consultants + Formal Planning
    g. Deliberation + Directed Search
    h. Deliberation + Logic
    i. Logic + Planning
    j. Logic + Formal Planning
    k. Logic + Professional Consultants

* Note: Biz Plan may or may not have involved Professional Consultants. In such cases, double coding has been done.

5. Sometimes coding has been done in answer to triangulation questions but only when that particular thing is a new concept.
6. Care has been taken to avoid double coding for other 'themes' as well. For example: Negotiation/Compromise, (Negotiation)/Persuasion cannot take place without 'Involvement' of the other party. In such cases, double coding has been avoided. That is, passages coded with Negotiation/Compromise, (Negotiation)/Persuasion are not coded with 'Involvement'. A 'Natural Decision' may or may not have 'Involvement', so they have been coded at the same place when necessary. Likewise, where 'deliberation' has already been coded, 'second opinion' has generally been avoided.

The approach was to draw at least one complex decision from each company. Among the different complex decisions of a company, decisions that showed some relation to performance were preferred (i.e., one could make a statement on the success, partial success or failure of a decision). The logic of this approach is self-evident and was driven by the desire to identify patterns related to the style of decision process and their success or failure. This led to two types of categories—patterns not related to performance (such as those found by Mintzberg et al., 1976) and patterns related to performance. The assumption was that if one can do the latter, the former is automatically achieved.

TABLE 5.4 DECISIONS DRAWN WITH THE HELP OF SMARTDRAW®

	Total	**Drawn with the help of SmartDraw®**
Decisions labelled as 'Success'	**34**	**22**
Decisions labelled as 'Failure'	**14**	**4**
Total	**48**	**26**

* Total 53 diagrams were drawn with the help of SmartDraw®.
* The other 27 diagrams included decisions labelled as 'partial success' and a mix of other simple and complex decisions.
* Fewer 'Failure' diagrams were made as they were either ad hoc or opportunistic, so the only pattern that could be seen was a very simplistic straightforward diagram without deliberation or formal analysis and almost no iterations. Once a couple of them were drawn, some complex looking decisions were deliberately drawn.

5.3.3(c) *Content Analysis*

Krippendorff (1980:112) suggests that '[t]he ability to correlate information obtained from content analysis with data obtained from other techniques makes content analysis part of the large system of methodology in the social sciences.' He says that in order for content analysis to be of any meaning rather than just a quantitative identification of specified characteristics within a text, one should endeavour to relate the classification, categorisation and frequency counts of these specified characteristics to some phenomena, which is necessary if the results of content analysis are to be empirically meaningful (1980:23). Krippendorff (1980) suggests that any content analysis must be performed relative to, and justified in terms of, the

context of the data. In particular, he argues that it should be 'predictive of something that is observable in principle…to help conceptualize that portion of the reality that gave rise to the analysed text' (p. 23).

These suggestions led to a decision to go beyond using visible (graphic/diagrammatic) patterns to identify differences between successful and unsuccessful decisions. The approach had three aspects:

- To search for a clear distinction (based on methods other than diagrammatic patterns) between successful and unsuccessful decisions. The analysis focused on only those decisions for which performance (success/failure) could be clearly established based on criteria identified by the venture prior to the decision.[23] For example, a company X applying for an IPO would have taken out a press release about its market valuation expectations, the amount it wants to raise and the timing.
- To search for a distinction between companies that can clearly be stated to have a very good start and the companies that had a very difficult start. (Companies for which a clear-cut judgement was not feasible were not taken into account.) This was based on the discussion about the 'initial start' of the company with the founders, where 'initial start' was discussed usually from the conception of the idea to raising the first external funds. If there were no external funds raised, it was up to the time when the 'business concept' stabilised.
- To search for a clear distinction between companies that can clearly be stated to be performing well and those that are 'stuck in the middle'. (Again, companies for which a clear-cut judgement was not feasible were not taken into account.) This approach extended the study from one level of analysis (i.e., decisions as the unit of analysis) to another level (i.e., company), thus introducing a degree of multi-level analysis.[24]

[23] At this stage, those decisions that had earlier been labelled as partial success were not included. I decided this even though I had already made a few 'decision process' diagrams of such decisions.

[24] This is similar to the concept of building macro theory upon a micro basis (Fielding & Fielding, 1986:16)

Indications of distinct patterns of decision-making emerged from the cross-case analysis. Content analysis was used as a tool to deepen the analysis, as suggested by Miles and Huberman (1994:254). To sharpen the analysis, cases were chosen based on the strategies—using terminology used by Miles and Huberman (1994:28)—'stratified purposeful', 'maximum variation' and 'criterion based' sampling.

Krippendorff (1980:27) argues that a clear framework is essential for content analysis: 'Only if the target of a content analysis is unambiguously stated can one judge whether the content analysis is completed and specify the kind of evidence eventually needed to validate the results.' He suggests formulating an analytical construct (1980:99): 'Analytical constructs may also be characterised as a theory about a context that is operationalized in such a way that its independent variables are capable of representing all possible data and its dependent variables represent what the content analyst wishes to infer, predict, or learn about the context of his data.'

In this study, the independent variables for the content analysis were based on the decision process framework. The cross-case analysis indicated relationships with the dependent variables (e.g., the performance of the decision).

For a process to be replicable, the rules that govern it must be explicit and equally applicable to all units of analysis (Krippendorff, 1980:21). The rules for coding (discussed above) were followed strictly. This facilitated the analysis using NVivo® and provided confidence in the findings.

5.3.3(d) *Statistical Analysis*

Analysis of variance (ANOVA) was the preferred statistical test in the majority of cases because it calculates the differences between the means of two or more groups (compared with t-tests, which compare the means of two groups only).[25] ANOVA enables the researcher to 'analyse the total variation of our data into components that may be attributed to various 'sources' or 'causes' of variation' (Gupta, 2000:1010).[26] The reason for using ANOVA was the nature of the data; the means of the factors

[25] Hhttp://www.georgetown.edu/departments/psychology/researchmethods/statistics/inferential/anova.htmH, accessed 21 September 2006).

[26] Refer to Keppel and Zedeck (1989) for a detailed discussion on ANOVA.

were more useful for analysis. (This aspect will become clear when the results of the statistical analysis are discussed in chapters 7, 8, 9, and 11.)

On some occasions, REML (residual maximum likelihood) and Wald tests were used to test whether an effect existed. This was due to the unbalanced nature of the data with respect to factors (categories).[27]

The generic model for the analysis can be stated as:

$$y_{ij} = \mu + \alpha_i + \beta_j + \varepsilon_{ij}$$

where

y_{ij} = response to i^{th} type (i = 1, 2, … n) and j^{th} type (j = 1, 2, … n)

μ = mean effect

α_i = effect of i^{th} type

β_j = effect of j^{th} type

ε_{ij} = residual

Note: α and β are qualitative variables or factors. Given that they are not continuous, it is appropriate to use ANOVA rather than regression. (ANOVA is a special case of regression.)

5.4 Triangulation: Confirming the Path for Others to Reach the Same Destination

Fielding and Fielding (1986:24-25) suggest that 'the role of triangulation is to increase the researcher's confidence so that findings may be better imparted to the audience and to lessen recourse to the assertion of privileged insight.' Four types of triangulation—data triangulation, investigator triangulation, methodological

[27] According to Smyth and Verbyla (1996):

> Residual maximum likelihood estimation (REML) is often preferred to maximum likelihood estimation as a method of estimating covariance parameters in linear models because it takes account of the loss of degrees of freedom in estimating the mean and produces unbiased estimating equations for the variance parameters.

triangulation and theory triangulation—suggested by Denzin (cited in Fielding & Fielding, 1986) and used in this study are discussed below.

5.4.1 Data Triangulation

This was done at two levels. Firstly, extensive use was made of secondary data to check the primary data. This was to used to assess rationalisation by the interviewees, which is an important issue regarding the validity and reliability of the data.

Secondly, when interviewing more than one person, a few common questions were used. When there was only one interviewee in a company, a couple of questions that had already been asked early in the interview would be repeated.

Fielding and Fielding (1980:31) suggest that the important feature of triangulation is not the simple combination of different kinds of data but the attempt to relate them so as to counteract the threats to validity identified in each.

5.4.2 Investigator Triangulation

Investigator triangulation is where more than one person examines the same situation. In this case, the key criterion for validity and reproducibility is associated with the style of coding (because all three different methods of analysis are contingent on it). In order to increase the reliability of coding and the data generated from it, a major effort was made to make the coding reproducible through the rules for coding. Reproducibility was tested in two ways, as suggested by Krippendorff (1980:131):

- Intra-observer inconsistencies: Coding by the researcher was checked by the researcher about a month after the final version of coding. A very high degree of consistency was found.
- Inter-observer inconsistencies: An MBA student and a senior academic researcher were given the coding rules and asked to review the researcher's coding of several cases.[28] Neither of the two had prior in-depth knowledge of the companies. In that way, their assessment was based on the interview

[28] Ideally, each of the observers should have done the coding themselves. However, it takes a lot of effort to learn the software (NVivo®) and the coding style. Given their time constraints, it was decided to take this path. Even though this is methodologically less rigorous, it assesses the acceptability of conceptual themes and coding style.

transcript and the coding rules. The former checked about 15 per cent of the data and the latter about five per cent. In both the cases, they selected the decisions randomly. There was a very high degree of consistency with the concepts or themes the researcher had coded, being ~92 per cent and ~94 per cent respectively.[29]

5.4.3 Methodological Triangulation

There are two ways of achieving methodological triangulation. The 'within-method' approach is when the same method is used on different occasions. The 'between-method' approach is when different methods are applied to the same subject.

The analytical strategy used was similar to the between-method approach because three different methods (qualitative analysis, decision process diagrams and quantitative substantiation) were employed. Webb et al. (cited in Krippendorff, 1980:52) suggests that multiple methods should be used without prior knowledge as to which one is the best or more valid. If there is a high correlation among their results, it indicates that they are assessing the same underlying phenomena.

5.4.4 Theory Triangulation

Theory triangulation is examining a situation from the standpoint of competing theories. This was not relevant to this research because it was an exploratory study.

5.5 Study Limitations

Apart from financial resources to support the fieldwork, a limitation was the difficulty in getting appointments with the interviewees. A good deal of time and effort had to be expended in convincing interviewees to be interviewed and arranging appointments. Almost all interviewees were prepared to allocate only one to one and half hours to the interview. In some companies, only a single interviewee was available.

[29] Miller and Freisen (1977) and Yin and Heald (1975) note that two-thirds agreement is adequate internal consistency much as the Spearman-Brown reliability coefficient of 0.67 might be considered adequate for questionnaire research.

Lyles and Mitroff (1980) and Nutt (2000) observe that the story uncovered from informants to create a description of each decision may not fully correspond to actual events. The self-reporter's preference for rational explanation in our society makes it easier to communicate in that way. Nutt (2000:184) quotes March as observing that 'decision makers may act about things that they can not talk about and talk about things that they can not do.' These urges could then prompt an informant to resort to a story that becomes more rational and tidy than the real decision. However, some distortions would tend to show up through the various triangulation methods as variations in what informants say (Nutt, 2000).

One potential limitation was that the events recalled would be simplified, where important detail would be stripped out because of social desirability. Sensitive information may also limit what is said (Nutt, 2000). Even though varied approaches (such as the use of multiple sources of data collection) were used to minimise this effect, it is practically not possible to eliminate all of it.

5.6 Ethical Issues

In carrying out research involving people, thought must be given to ethical concerns that may arise through the study. Ethical research aims to not harm or mislead participants and to protect their identities and the data they provide (Salkind, 1997). This is the utilitarian approach discussed by Miles and Huberman (1994:289-290), where the focus is on the effects of specific actions for the researcher and participants and the wider community. Universal rules of ethics and benefits to the participants were not expressly considered except that harm was avoided and the participants were not coerced. Interviewees were given a copy of their interview transcript.

The ANU Human Ethics Committee approved the research design before any research was executed. Before each interview, the informant signed a consent form (See Appendix D) that informed them of what research was being done and what their rights were (Salkind, 1997). The aim was to ensure that they were fully aware of the research and that they could control their participation in the research.

5.7 Study Highlights

A key aspect of the research design is the micro unit of analysis (i.e., a decision). While Chandler and Lyon (2001) and Davidsson and Wiklund (2001) have discussed different levels of analysis used by researchers in the field of entrepreneurship, none has specifically highlighted the importance of the decision as a unit of analysis. Given their comprehensive coverage of the literature, it is reasonable to conclude that either no published study in entrepreneurship has used the decision as the unit of analysis or such studies are very rare.

Again, both Chandler and Lyon (2001) and Davidsson and Wiklund (2001) have highlighted the importance of multi-level analysis. They have encouraged researchers to go beyond the 'individual' and 'firm' level analysis.

Other highlights of the research design can be seen in Table 5.5. They reflect a series of careful decisions made in order to develop a research design and strategy. These decisions were based on the advice and experience of other researchers of either new venture formation or decision-making or both as well as on what was needed in the study (Davidsson and Wiklund, 2001).

TABLE 5.5 THIS RESEARCH VIS-À-VIS THE TREND OF EMPIRICAL STUDIES IN ENTREPRENEURSHIP

	Characteristics	Observation by Chandler and Lyon (2001)	Does this research have it?
1	A clearly specified research model	Too few studies clearly specify this.	Yes
2	Unit of analysis	35% Individual, 4% Group or Team, 2% Innovation or Project, ~50% Firm level, 9% Industry or Macro-level. So, Decision level-0%.	Yes (Unit of analysis is a secision)
3	Qualitative methods	Only 18% of the studies employed qualitative methods.	Yes
4	Qualitative + quantitative analysis	Only 18.5% of those who employed qualitative methods.	Yes
5	Multiple data sources	Multiple data source studies remain the exception.	Yes
6	Validation procedures beyond face validity	Only 26% of studies have this.	Yes

Chapter 6

The Decision Process: Qualitative Analysis

Tom Landry: Setting a goal is not the main thing. It is deciding how you will go about achieving it and staying with that plan.

In Chapter 4, a preliminary working framework was developed largely from the literature on decision-making but also from carefully drawn relevant research in the entrepreneurship field. In this chapter, the new framework—the result of revisions of the framework in light of empirical data from the case studies—will be discussed. Various elements of the decision process will be discussed at length through the provision of examples from the case studies and from relevant empirical studies reported in the literature. This will lead to a better understanding of the decision process.

Once each element of the decision process has been discussed, it will be useful to discuss the complete decision process (making use of the new empirically-grounded framework). The final step will be to look for patterns (if any) in the decision processes, as was attempted by Mintzberg et al. (1976). However, before starting a detailed discussion on the decision process framework, it is important to know what changes the working framework went through following the analysis of the empirical data.

6.1 An Empirically Derived Generic Decision-Making Model for New Ventures

In this section, the discussion will be on the changes that were made to the original working model (discussed in Chapter 4) to derive the empirically validated model. (Refer to Figure 6.1.)[1] As discussed in the chapter on research methodology (see 'Research Design' in Chapter 5), it was expected (and desirable) that the working model would change because it was developed using the available literature only and was meant to be a guide for the data collection. The discussion in this first section will be more theoretical and outline only the changes made to the working model (discussed in Chapter 4). In the following section, the elements of this model will be discussed in more detail and examples will be provided from the case studies. The major changes are related to: developing decision options; the style of decision-making; the authorisation of the decision made; and decision implementation.

[1] Appendix E outlines the other two stages of evolution of the working model before this version was finalised and became stable.

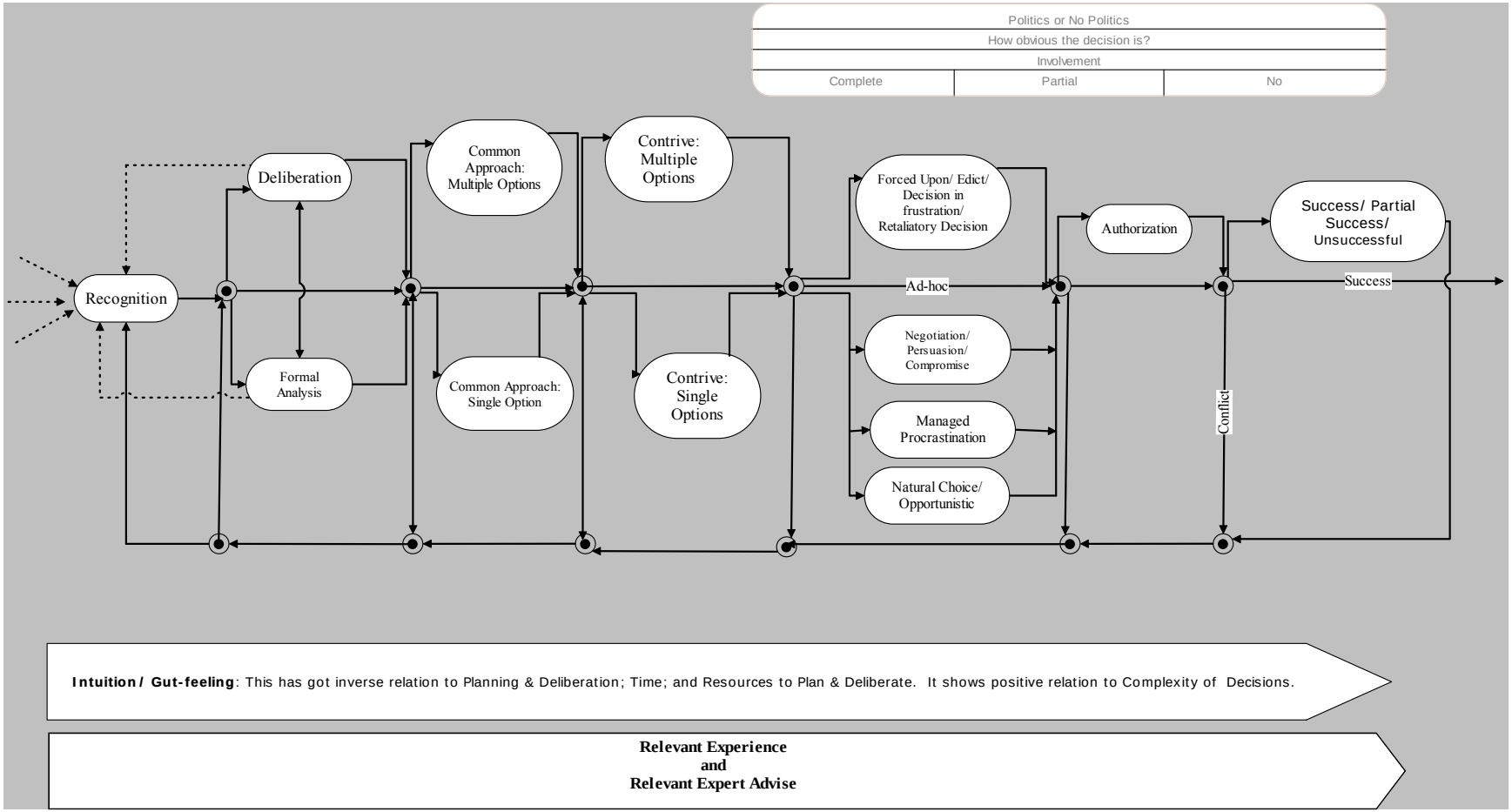

Figure 6.1 Empirically Grounded Generic Model for the Decision-making Process in New Ventures

6.1.1 Developing Decision Options

In the original model, deliberation and formal analysis were proposed as two separate activities that decision-makers undertake to 'diagnose'—a term used by Mintzberg et al. (1976)—a potential opportunity or problem. On the basis of this diagnosis, a decision-maker would 'design' options. The multiple options would be diagnosed in detail to come up with a suitable option. In that case, 'search' and 'screen'—terms used by Mintzberg et al. (1976)—are actually part of the diagnosis. These assumptions arrived at in the original working model held, although they were extended; in other words, the 'contrive' and 'selection' phases were elaborated.

It was found that decision options were identified by decision-makers using 'common approaches' and that these were used more frequently than expected. A 'common approach' is a preferred way of doing a thing in a particular situation and is well-established. There can be one or more common approaches for a particular situation. Decision-makers can select one common approach (if there are many) and either use it as it is or adapt it to their need. On occasions where no common approach is available, decision-makers can contrive single or multiple options for their own purpose and one of them (if there is more than one) can be selected.

It was also found that adding an extra step in the model using the 'common approach' would help get a clear understanding about the later step—i.e., 'contrive'—when both steps were involved. This would clarify whether the contrived option was completely new or modified. This wasn't possible with the working model. (Refer to Figure 4.1 in Chapter 4.)

It is quite obvious that contriving completely new options or modifying common approaches will involve deliberation (expert advice or an entrepreneur's own experience) or formal analysis. In the graphical model (refer to Figure 6.1), the element of deliberation or formal analysis is shown through the addition of an extra backward loop before a loop to 'contrive' is made. Alternatively, a loop from 'common approach' to 'contrive' could be made directly based on the assumption that 'contrive' involves a thought process. While the former approach would clearly demonstrate whether deliberation, formal analysis or both were used to contrive an

option, the latter approach would make drawing a decision process easier. (Refer to options 1 and 2 respectively in Figure 6.2.)

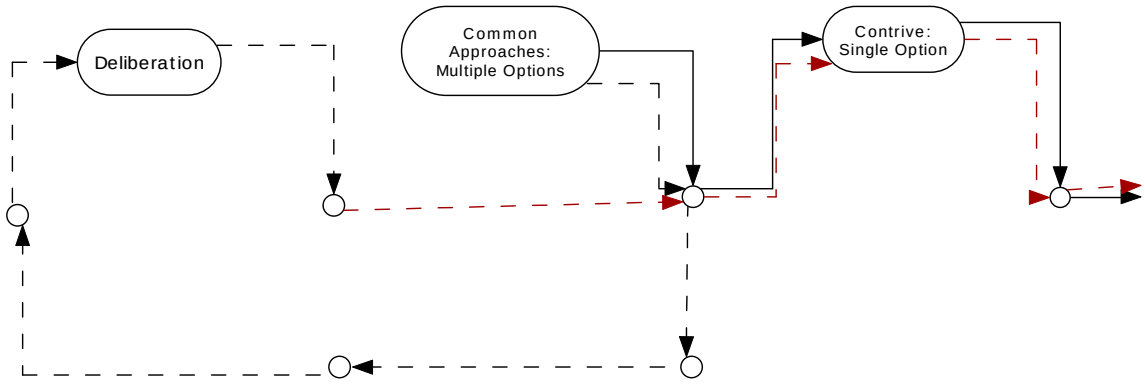

Figure 6.2 The Operation of the Graphical Model (Example A)

Note:

----▶ Option 1 (The loop starts from 'Common Approaches').

——▶ Option 2 (The loop starts from 'Common Approaches').

Making a choice from multiple options could be based on deliberation, formal analysis or intuition. While an element of intuition or guesswork will always exist, to differentiate between intuition and complete guesswork, the term 'ad hoc' is used for the latter.[1] The specific nature of making a choice can be shown pictorially in different ways (based on the preference of the researcher).[2]

[1b]'Ad hoc decision-making' is a broader term. It also includes decisions that a novice decision-maker would consider logical and meaningful but an experienced person would not (Moore, 1995). The problem with such decisions is that the decision-maker, despite his or her lack of knowledge, has not used an expert or a knowledgeable person in that area and made a decision on superficial knowledge (without making a sincere effort to understand that domain). But because they have made an effort, even though superficial, and have tried to make sense out of that in a logical manner, the decision-making cannot be said to be completely intuitive or made on gut feeling or guesswork—although, of course, there will be an element of this. This is elaborated further in this chapter and in Chapter 7 by way of examples.

[2] Pictorially, one can show the element of deliberation or formal analysis by adding an extra backward loop (refer to Figure 6.1) from the 'multiple options' to either 'deliberation' or 'formal analysis' before linking it to 'single option'. One could also make a loop from 'multiple option' to 'single option' based on the assumption that there would be some thought process in the selection. (Refer to Figure 6.1.) When the choice has been made by an ad hoc means, one would need to show it explicitly with the help of an 'ad hoc' path connecting line.

6.1.2 Style of Decision-making

Another factor that is of critical importance is the level of involvement of all stakeholders in the decision process. This depends on the political nature of the decision and the obviousness of the decision (solution). For example, a decision may be important but there may be only one preferred way of doing it, so even without the involvement of all stakeholders it is decided to go in that direction. However, operationalising the construct of 'involvement' proved to be difficult using a retrospective interview method. It was difficult to obtain information on the micro-level involvement detailed in the working model, even though it could be determined whether the stakeholders participated and to what extent.

Most of the 'other' categories discussed in the working model—edict, persuasion/bargaining, managed procrastination, forced upon, natural choice, and consensus—were empirically observed in one or more case studies. However, the categories in the working model were found to be inadequate to capture all the styles of decision-making. Therefore, other categories emerged—opportunistic, decision in frustration, compromise, and retaliatory decisions[3]. These were grouped into four major categories (refer to Figure 6.1).

6.1.3 Decision Authorisation

The working model was based on an assumption that, because in new ventures the entrepreneur or entrepreneurial team make decisions, adoption would be direct once a decision was made. However, it was observed that a few decisions had to be approved by the board (which normally does not get involved with day-to-day decision-making), especially when there were significant external investors. In that case, for the purpose of model generalisation, it was imperative to add 'authorisation.'

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[3] 'Retaliatory decisions' are decisions that are in response to an unfavourable decision taken by another negotiating party or discussant. 'Decision in frustration' is a decision that a decision maker is forced to make because of an unfavourable business environment or because there is one single feasible option and that option is not the desired one.

6.1.4. Decision Implementation

In some instances, it was found that the observation by Majone and Wildavasky (cited in Moore, 1995) that formulation should actually be seen as part of implementation was found to be more applicable vis-à-vis the argument that implementation follows formulation. In other instances, it was found that some decision processes depicted in the flow chart (as per the model) were either decision-formulation or decision-implementation only. In that case, action (as shown in the working model) following the selection of an option lost its relevance. This will be discussed at length later in the chapter and examples will be provided to explain it.

Because it became evident that, in some instances, formulation and implementation were not two separate phases but ones that blended into one another (and due to the highly iterative nature of a decision-process), it was decided to do away with the three phases: concept development, decision formulation and decision implementation.

6.1.5 Other Observations

1. Acknowledging the fact that judgement/intuition can never be completely eliminated in the majority of decisions and that one can feel its presence throughout a decision process, it was included in the decision process.[4]
2. The prior experience of decision-makers, particularly if relevant to the decision, was seen to play a critical role in decision-making. If relevant experience were absent, the use of relevant expert advice seemed to have a significant effect on the decision process. Prior experience must also be included in the model.

The model is iterative. At any stage the decision process can revert to any previous stage. Because the model was made for a practical purpose, a conscious attempt was made to simplify its use. For example, a decision that involves 'formal analysis' followed by 'deliberation' can be shown in two ways. This resulted in a loop to a node after 'contrive' or directly from the node between 'common approach'

[4] This observation confirms the claim of McMullen and Shepherd (2006:134): 'Whether entrepreneurial action occurs, however, depends on how much one must rely on one's judgment, which in turn, depends on the degree of uncertainty experienced in the decision of whether to act.'

and ‘deliberation’ (see Figure 6.3). The latter option (and many like that) was created to make the model user friendly.

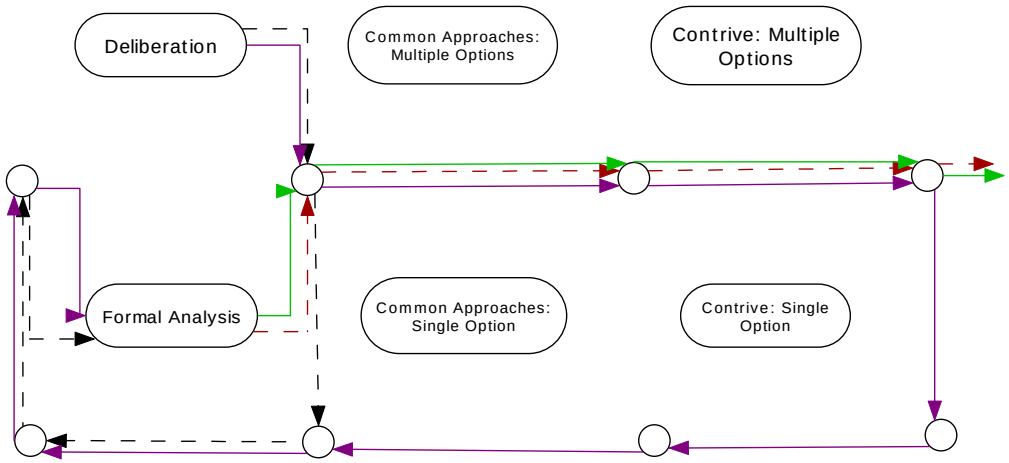

Figure 6.3 The Operation of the Graphical Model (Example B)

6.2 Elements of the Decision Process

The theoretical basis for the inclusion of various elements in the generic decision process model (see Figure 6.1) was discussed in both Chapter 4 and an earlier section of this chapter. In this section, each element of the decision process—recognition, deliberation, formal analysis, common approaches, contrive, select and authorisation—is discussed in further detail using case study examples.

6.2.1 Recognition

In the decision process, recognition can either be of a problem or an opportunity. However, in the field of entrepreneurship, problems with ‘opportunity recognition’ has gained the most attention in the research. This might be expected and is in keeping with the Schumpeterian concept. Following this tradition, Gaglio (2004:534) defines ‘opportunity’ as ‘the chance to introduce *innovative* (rather than imitative) goods, services, or processes to an industry or economic marketplace.’ Others (e.g., Hill et al., 1999) define opportunity as the chance to start a business. However, it would be useful to broaden this definition because in a new venture there may be opportunities of several levels and kinds about which decisions have to be made. For example, there are opportunities to hire a prominent person, buy machinery cheaply or find a good location for a new office et cetera.

Singh et al. (1999) suggest that an 'idea' is a stepping stone that leads to an opportunity. For them, 'opportunity recognition is a *process* rather than a one time 'eureka' experience.' Singh et al. (1999), however, differentiate between an idea and an opportunity: 'Some people come up with initial new venture ideas. After some additional thought and/or evaluation, they may recognize that their ideas are potential new venture opportunities. With even further thought and consideration one may then decide to start a new venture.' For the purpose of this research, an idea is the same as a potential opportunity. The thinking process refines that idea (which may include determining whether the idea is a potential opportunity) and helps choose a potential opportunity from several (if there are several). As mentioned previously, an opportunity is not limited to starting a new venture; one comes across several opportunities even after a new venture has been set up.

In the approach taken here, recognition includes 'opportunity recognition' and 'problem recognition.' But what facilitates the recognition of a problem or opportunity? Domain knowledge, experience, social networks, search activities, unexpected occurrences, an unfavourable environment and even serendipity are some of the likely explanations for the recognition of a problem or opportunity.

6.2.1(a) *Domain Knowledge*

Fiet et al. (2005) suggest that entrepreneurs cannot rely only on generic information to succeed. They have to combine specific information with general information in order to enjoy competitive advantage. Alvarez and Busenitz (2001) had earlier suggested that it is primarily the generic knowledge of entrepreneurs that allow them to recognise an opportunity created by specialists. It is often the synthesis of specialised and generalised information that leads to the recognition of a potential opportunity. For example, Dr Bernard Flynn (Iliad Chemicals) said:

> It was kind of self-evident from the activity—i.e., the compounds that we were making in the anti-cancer area—that there would be potential commercial significance because they are significantly more potent than a number of other systems that were considered to be viable candidates clinically, based on invitro data that we had at that time. So that seemed to suggest that there was a commercial potential to that. Obviously in the area of drug discovery, biological activity of any compound, if it exists, then it is self-evident that it has a commercial potential.

Dr Wayne Millen (Epitan) recounted a similar sort of argument when he licensed drug molecules that had potential to prevent skin burn related diseases:

> Now, skin cancer is the world's most prolific cancer, and I saw the potential for that, particularly living in Australia because this is the skin cancer capital of the world, and I at that stage was living in Perth, which is skin cancer capital of Australia. So I am sitting in a country at the top of the tree and in a state and in a city that just understood skin cancer.

From the above examples, it can be concluded that it is generic knowledge that a breakthrough drug candidate in a disease area with a reasonable market size is a potential opportunity. However, it is the specific knowledge related to the lead molecule that prompts entrepreneurial action.

6.2.1(b) *Experience*

Following the belief of the Austrian school of thought in entrepreneurship that it is the possession of information appropriate to a particular opportunity that leads to opportunity discovery and entrepreneurship, Shane (2000) argues that all people possessing that information are equally likely to be an entrepreneur. Quoting Busenitz and Barney, Shane (2000:450) further observes that 'no individual-level attributes or behaviours have been found to generate significant differences between entrepreneurs and other members of society that are robust, consistent across different samples, or explain much variance.' However, one attribute related to an individual that does seem to have caught the attention of researchers as facilitating opportunity recognition (and decision-making in general) is experience. Vesper has shown that work experience was a true factor upon which founders recognised business opportunities (Corbett, 2005). Ardichvili et al. (2003) theorise that individuals who have certain types of existing knowledge have a better likelihood of recognising opportunities than those who do not have such knowledge.[5] Beckman (2006:742) makes the observation that 'the idea generation cannot be separated from the experience of a firm's founder.' Most of the ventures in this research (with a few exceptions) were formed around an area where at least one of the founders was either knowledgeable enough to

[5] A closely related construct of experience is education. Arenius and Clercq (2005) state that individuals' educational level will positively affect the likelihood of perceiving opportunities because highly educated individuals have a broader knowledge base and possibly bigger social networks to draw upon. This construct of education was not considered separately because most of the founders in biotechnology are in any case highly educated (typically having a PhD).

understand the science or was associated with the development of it. For example, Mr. Mohan explained the idea of the software that led to start of Helix Genomics:

> It was during Dr Prasad's MSc project. He was doing the genome analysis. He found that all the tools that were available on the Internet were not sufficient to further his research. Also Rajnikant was also having a lot of problems in using the online Internet software in computational biology. I think that spark was from our MSc projects. We found that there was a lot of communication gap between sequence biology and structural biology. There was also a lot of communication gap happening in the formats that people follow across the world. So individual scientists are following their own formats. There is a lot of scope for integration and also there is a lot of scope for building intelligent software.

It is not only during the start of the company that entrepreneurs prefer options related to their experience. Even for late stage decisions, experience plays an important role in not only recognition but also acceptance of an opportunity. Dr Alan Robertson said this about two projects that Pharmaxis acquired:

> Bill and Brett [the founding principal scientists] are interested in autoimmune diseases, which is why the company is founded. There is an allergic and an inflammatory autoimmune component to asthma, the inflammatory disease of the lung. Both cystic fibrosis and bronchitis are involved in the inflammation of the lung. Although they are not autoimmune diseases but they were in scientific interest of these fellows.

6.2.1(c) *Social Networks*

Hill et al. (1997) suggest that one particularly important source of new venture ideas and entrepreneurial opportunities may be entrepreneurs' social networks. Singh et al. (1999) extend the idea by commenting that people within the entrepreneurs' social network can help expand the boundaries of their rationality by expanding their knowledge and information levels. This can lead to the identification of more ideas and the recognition of more opportunities. Similarly, Mr B. Chandrasekhar explained the deal of his company (Bigtec) with KooPrime (Singapore) in this way:

> There were personal friends of mine and they had contacts with NUS. Subsequently when we met them, they talked about KooPrime that it has been spun out from there. We started to talk to them and it seemed to match our needs. That was the good reason to partner.

Thus, social networks not only lead to the identification of an opportunity but also facilitate the realisation of a potential opportunity.[6] When talking about how Company A got a deal from Company B, Dr X said:

> I suppose that Dr Y (from Company A) was doing some consulting work with Company B and he knew some people who were quite high in pharmaceutical R&D and we got to meet some people when they were here. They were travelling to Australia and we got the blessings from one of the guys who is quite high up. It was interesting, as the guy who was Project Manager for Company B for the deal was one of my old colleagues from Company C. I worked with him quite closely when I was in Company C. He worked in US and I worked in France. He came to stay with us and we worked together. I think that helps—i.e., if you know people personally. It probably helped us as a small company in Australia.

There are several other examples from the case studies where social networks played a constructive role in opportunity recognition and opportunity realisation.

6.2.1(d) *Search – Active, Directed or Both*

Lily Taylor has rightly observed that 'Doors of opportunity don't open, they unlock; it is up to you to turn the knob.'[7] Opportunities don't generally fall in one's lap by themselves; they have to be actively searched. Lee et al. (2001) also suggest that proactiveness is a crucial organisational process because it entails a forward-looking perspective.[8] Dr Jenny Harry described how Proteome Systems was able to get many deals:

> As the company progressed, we thought and looked around and spoke to people and identified the areas in which there was a great need in the world and where proteomics probably was a good technology to apply to that problem.

The actions of active searches are generally more favourable when the search is more directed. For example, a directed search by Norwood Abbey resulted in the TAP deal and Peplin's focused search led to the deal with Allergan.

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[6] Social networks are a function of management's previous industry and technical expertise, as was shown by McGee and Dowling (cited in Autio, 1999:339) in their research.

[7] Hhttp://quotations.home.worldnet.att.net/opportunity.htmlH, accessed 12 September 2006.

[8] Lee et al. (2001) state: 'Being a pioneer by anticipating and pursuing new opportunities and participating in emerging markets is a hallmark of entrepreneurship.'

6.2.1(e) *Serendipity*

Vesper, cited in Corbett (2005), notes that, in a study of nearly 100 founders, many these individuals cited serendipity as the main reason for finding the opportunity that eventually became their business. However, Vesper went on to show that work experience was the true factor in these founders recognising business opportunities. This may be true in many cases but not always. When talking about their spin-off company, Norwood Immunologics, Mr Bernie Romanin said that the spin-off was very different from Norwood Abbey's core business—drug delivery—and was the result of serendipity:

> Very different! And that's why we have actually put it into a separate entity because it was so different. It was serendipity. We were looking at potential drug targets that required a drug delivery…that could be a drug delivery opportunity. We identified this particular class of drugs, GNRH analogues, which are the cornerstone of immunology. That took us to some very interesting research that was being done here at Monash. Researchers were looking for somebody to help commercialise the research as well as continue to fund the research. We looked at the project and said that this is much more than a drug delivery opportunity.

But it must be noted that even though serendipity may have led to the recognition of this opportunity, Norwood Abbey still carefully evaluated it before finally committing itself.[9]

6.2.1(f) *Unexpected*

Problems and opportunities that were not expected may be recognised. Problems usually arise unexpectedly. There may be some expected problems; in those cases, decision-makers would normally have thought of something to deal with them. Unexpected problems lead to major disturbances and changes of strategy. Professor Chris Parish (Biotron) described the delays in his project due to unforeseen technical problems related to one of the widely used instruments:

[9] The business opportunity of immunology for Norwood Abbey occurred in a serendipitous way as the company was in the business of drug delivery, not drug discovery (which is a very different business.) However, the recognition of the potential of GNRH in immunology was the result of the dedicated research of Professor Richard Boyd of Monash University.

> We were using mass spectrometry. At that point of time, it was quite feasible to expect that mass spec would become in use in pathology companies within a certain amount of time. That has not happened for various reasons… So, we had technical problems. We have not been aware that we had much bigger problem than what we had thought of. It has turned out that one of the overseas companies had run into a similar problem with their protein based mass spec… But based on what we knew about mass spec at that time, I think our choice was fair enough. It is just that since then we had realised that mass spectrometers are not as reliable as the manufacturers claim. And others have found the same thing.

Similarly, Stephen Goodall talked about his experience of raising initial funding for CBio:

> The thing that knocked us around the most was that sales [of the prospectus] started about August 2001 and then September 11, 2001 somebody crashed a plane and all the financial world closed. And this made a big hole in the ground and we took about a year to close that up.

Both problems and opportunities may be unexpected. Opportunities may occur due to some success that the company has achieved or it may be just pure luck or chance. When talking about chance, Professor Barrie Finnin (Acrux) said:

> What actually happened—and I think in all these stories there are things that are chance or just good luck. I had a friend who was in the investment community. At that time when we were going through this issue of how we were going to fund this… I actually went for a football with him. At the football, I was telling him the story where we were at and what he thought and what could be done. He said that he has got a very good friend and has just done exactly what I was talking about with another company called Starpharma, and so he proposed to set up a lunch with him. So I went and had lunch with this chap, who happened to be Ross Dobinson, who is now the director of Acrux. He was then at that stage working in a merchant bank but had previously worked with stockbrokers. So he knew all about the investment baking. Over the lunch I explained to him what the situation was and what we had. He then said that the best thing to do for us is to set up a start-up and raise this money through this initial round with high net worth individuals.

Similarly, Dr Andrew Wilks (Cytopia) described the initial deal and subsequent takeover of Myometrix, which was quite fortuitous:

> They approached the Ludwig Institute for some inhibitors for one of our enzymes. [People at] Ludwig said, 'Well, you better talk to Cytopia as they have the patents.' They talked to us and realised that they couldn't actually go anywhere without our patents. We realised that they had access to a big market, which is cardiovascular disease. So it seemed very

> obvious that we could work together to develop that market. We spent a long time testing the patents and the proof of principle of the patents with our molecules and became satisfied that it was good. So we then decided to merge with the company.

Lotus Labs, on the other hand, had an unexpected offer from one of its clients, Actavis, for a buyout. However, this was only after they had successfully completed some projects for Actavis (as they did for their other clients). Mr Sudhir Pai explained:

> Actavis started as one of our clients. They visited our facility and they started giving us some trials. They realised that we are good. They were in an acquisition spree. They have acquired 31 companies in the last four years. They have huge requirement for bioequivalence studies...so they thought that it would be good to take over and do all their studies here. It would be kind of integration for them. It would save them a lot of money in their trial costs as well.

Strand Genomics also had its share of luck due to its hard earned success. Professor Vijay Chandru explained:

> By the end of the year we had about 20 per cent of market share for Asia-Pacific. We used some pricing strategies. We set up benchmark against the competitor whose software was the leading software in the market and played some pricing game. That's how we managed to get in. Two things happened as we started getting visibility in the market. We found a Japanese pharma consulting company in informatics area. They noticed us and approached us. They were interested in product that we were selling for microarrays and in technology that we were developing for ADME and toxicity… Medibic actually invested in Strand and took 10 per cent equity position and a board seat. In that process they valued Strand at about 75 per cent premium to what series A valuation had been. [10]

6.2.1(g) *Unfavourable Environment*

An unfavourable environment may be either due to the generic business environment or be specific to a company. This can also lead to the recognition of a problem. Dr Wayne Millen reasoned about the change in conditions or timing for an IPO for Epitan because of the Sydney Olympics:

[10] It is, however, noted that this unexpected event had its genesis in a social network because one of their scientific advisory board members knew one of the business development people at Medibic's US office.

> Well, it was for August 2000, whatever date it was. In September, the Olympic Games were on. Everybody was just out of town. The financial people just went for the games. All the money was spent on Olympic Games. If you look into the companies listing of any nature between July and December, there were almost none. I then produced a supplementary prospectus, which said the same thing. And we listed on February. So there was six months delay. The stockbrokers didn't get interested. As simple as that!

Another company was forced to go for an IPO as the CEO failed to convince its biggest shareholder. He said:

> So it was really our main investor saying, 'It's time; you have grown enough, so get out.' So that's basically what triggered the event. We needed the cash, so we went to the market to get it, which is what happens to most Aussie biotechs.

6.2.1(h) *Summary – Recognition*

From the above discussion, one can conclude that recognition can occur in many different ways. A prior success or even prior failure can lead to the recognition of something new. Likewise, deliberation and formal analysis can lead to the recognition of a problem or opportunity. In fact, recognition can take place at any time in the decision process; there have been many examples of this in this research.[11]

Long and McMullan (cited in Gaglio, 2004) suggest that in order to realise the potential of an opportunity, a significant amount of preparation is required. The opportunity is elaborated and evaluated before a decision is made whether to proceed. During this 'strategic elaboration stage', the opportunity may be honed and modified to better fit the market and to maximise profit potential. Not only an opportunity but also any potential issue or problem is elaborated. Some decisions are not evaluated much and may not even require detailed evaluation. They may primarily involve intuition or guesswork ('not much thinking') for decision-making. Such cases will be discussed in later chapters. The aim is to show a general model of the decision

[11] These suggested ways are different from where they actually get the ideas. Hartman et al. (1994) identify many sources of ideas: observing customers, observing products, observing competitors, imagination, reading trade journals, reading government documents or reflecting on mistakes et cetera.

The list of factors leading to recognition that is suggested here is more broad-based and is related to why and how one gets an idea rather than by what methods one gets an idea (of a problem or an opportunity).

process. How often deliberation and formal analysis are used in entrepreneurial decision-making is left for discussion in later chapters.

6.2.2 Deliberation and Formal Analysis

Mintzberg et al. (1976) write that 'design' (associated with evaluating and refining a problem or an opportunity) is the most important element of the decision process yet is the least understood. Many researchers have looked into the various styles of planning (discussed in Chapter 3) to understand how people evaluate their problems or potential opportunities. As discussed in Chapter 3, there is usually some level of logic or rationality involved in any particular decision, although the concept of rationality is closer to 'bounded' rationality. This logic or rationality associated with a particular decision is basically derived from the decision-maker's interpretation of the problem or opportunity and his or her approach to that situation. Decision-makers may follow a logical and rational process within the framework of their knowledge and their understanding of the problem or opportunity (i.e., their 'personalised' rationality).[12] Such a process may involve deliberation and formal analysis.

6.2.2(a) *Deliberation*

As stated in Chapter 3, deliberation is a method where decision-makers rely on their own knowledge[13] and/or that of advisers or experts. Based on this definition, deliberation will be used almost throughout the decision process. However, the quality of such deliberation varies widely. It is also the quality of deliberation that is important and that contributes to the result of any decision. However, the focus in this chapter will be on the various types of deliberation. (Which type has what sort of outcome will be the subject of the following chapters.) Some types of deliberations identified are: active and conscious thinking; careful thinking; creative thinking; discussions; and planning.

- *Active and conscious thinking* by decision-makers about what decisions need to be made, what the important dimensions of a particular decision are and

[12] 'Personalised' in this case doesn't mean that it is of one person; it can be the shared thinking of a group of decision-makers.
[13] It is noted that the experience can be of various types: directly relevant to the decision, indirectly relevant to the decision or generic in nature et cetera.

what trouble spots there are (if any) is very important generally and even more so at critical times. For example, Dr Igor Gonda said that due to the not-so-favourable market in 2003, Acrux decided to postpone its IPO:

> We then came to conclusion that we would not be able to raise the amount of money we wanted and we wouldn't be able to raise at the price we wanted. It was impossible. We also knew that there were valuable events coming to the company and in order to convince the market there will be good justification then to raise the money that we wanted. So we said, 'Look, we are not starving. We have cash in the bank and we have cash from QIC.' So there was no reason to do a bad IPO and raise less money than what we need and raise it at a price that we didn't like.

Awareness based on the decision-makers' and others' knowledge of an area is vital. For example, Dr Gautham Nadig (Metahelix) described their understanding of GMO crops as they started their business when there was a public outcry against GMO crops worldwide (especially in India):

> Yes, there was a huge cry against genetically modified foods because people were not aware of what it actually was. They thought that it was a monster waiting to wipe out plant species. Obviously as scientist you know what the reality is because you work with them. And you know what are the issues related to safety. Science doesn't beat common sense. Though the government had not yet deregulated transgenics, we know it would come. There was no other option. It is just a matter of time. When we started the company, there was still no crop out there in the market. The trials were underway. Fairly soon, by the end of 2001, it got released.

In the above examples, the decision-makers had a very clear idea of what they were doing and why they were doing it. This understanding was not based on any extensive analysis, planning or discussions with experts. Their decisions were based on their own understanding derived from active and conscious thinking. Of course, their assumption might still have been wrong and affected the decision.

- *Careful thinking* by decision-makers about key aspects of a decision is another form of deliberation. Dr Brett Charlton, when talking about Pharmaxis acquiring rights to technology leading to an asthma diagnostic, said:

> It is the earliest to market. So it is quicker to market and revenues are useful. But probably revenue is not the primary driver. The technology is related to the therapeutic, which is following behind. You are gaining

information that is useful. So for the development of diagnostic, you are establishing a network, which is going to be the same network...which is going to be the same network you need for development of a therapeutic. You are going through a process, which is the same process, as you have to go through for a therapeutic. And at the end of the day you will have something that will generate revenues. It is not just to generate revenues; we looked at all other value gained at various levels.

- *Creative thinking* by decision-makers can also lead to an interesting opportunity or can avoid problems. In the following example, Dr Gautham Nadig explained the reason Metahelix started a seed business, which was very different from their initial idea of conducting contract research (in agri-biotechnology) and developing intellectual property to be licensed to seed companies:

  Nobody suggested [starting a seed company]. It was just our understanding of what is critical to biotechnology, especially agri-biotechnology. If you didn't have a seed business, you will be at the mercy of seed companies and it would be very difficult to sell your technology. So we said that at least for the time our biotech products come to market, which is about five to six years, and if we had a seed company that had a small market share of key crops, it would be an ideal to introduce our biotech products into them and that can grow our seed business substantially. On the other hand, since we had a seed company and we are giving the seed company a lot of traits, competitors will also be interested in these traits because they would see in it a definitive competitive advantage and a bunch of these companies will also come and partner with us for the technology. That was the hypothesis, which is now really happening.

- *Discussions* can have many positive effects if they lead to an increase in the required information that is key not only to discovering ideas but also to exploiting them (Fiet et al., 2005; Kaish & Gilad, 1991; Shane, 2000). The discussion can be among decision-makers themselves in a brainstorming session. For example, Dr Villoo Patell explained that her decision to spin off companies came after Avesthagen's management team discussed it endlessly internally. The idea of creating a seed business by Metahelix was also the result of internal discussions. Jay Hetzel, while talking about the decision by Genetic Solutions to make a product called SureTRAK, said:

  In a small company you share ideas and you interchange them. I know that the methods of making it happen was basically something I designed, but who suggested this idea of DNA based meat traceability…I think it was

just something that we were throwing the ideas around for a while, but I guess as managing director at that time, I decided that this will be what we develop.

Discussions with people who are actually going to implement the decision can be very fruitful. Dr Michelle Miller, discussing the capital raising of December 2004 for Biotron, said:

Michael and I spent quite a lot of time [at the] end of last year going to the brokers talking to them…especially the brokers that we know and trust, not many of them…but couple of opinions that we do value, who have known us for a while and who are sensible. Really, their advice to us was to do a shareholder plan.

Discussions with your potential clients can also be quite useful. Mr Mohan of Helix Genomics explained how discussions early on with their potential clients helped improve their product:

We have picked up couple of universities in India and UK and also some of the friendly companies. It is always good to go to a friendly company... They will at least be interested as we have approached them. They will at least try the product and sincerely give back their comment. This we have done both for industry as well as academia. All the algorithms that we have written, all the modules that we have developed…everything was tested.

- *Planning* as part of deliberation is not same as the concept of formal planning in traditional management literature. Here it is more related to thinking for the future (on what, why and how you do or shall do) and usually involves internal people. This can be a mental schema or something simple and tangible like general budgeting (not the type of long-range budgeting done by government bodies or large companies).

Dr Gerard Davis (Genetic Solutions) explained why they established their US office in Denver:

The reason we were in Denver in Colorado is that…if you plot where the major feedlots are in the United States, where cattle are fed…and you then plot where the major breed societies are, so all the breeding organisations…then Denver is right in the middle of them…. There would be a dozen of them within a day's drive, the breeding organisations. Most of them are in Denver. So [Denver is] quite central for the breeding sector.

In terms of feeding companies…again within a day's drive there is a large proportion of them…

Dr Wolf Hanisch (CBio) described the way they make decisions about clinical trials:

> It is as simple as putting a project together. Everything that needs to be done… Here is a clinical trial, we need material for that, and we just work backwards.

When Dr Alan Robertson talks about the thinking behind the IPO of Pharmaxis, it is very easy to see their forward thinking:

> We listed the company publicly in November 2003 and we raised $25 million. The company had grown to a certain level. We still had about $8 million in the bank then, so we didn't actually need the money as such. From the financial projections, there was still 18 or 24 months of cash available, but you can't go seeking money when you have got no money in the drawer. People will just not invest and you will be on your knees and you then pick it up at a much cheaper price. The company had got to a certain level and we needed to go to the next level. We need a substantial amount of funding. There was a lot of clinical work that needed to be done. We listed at a valuation of $50 million after the money was in.

Planning also helps make better informed and faster decisions whenever there is a crisis. For example, CBio was in a difficult position when BresaGen went into voluntary administration soon after signing a contract with CBio to manufacture their lead compound (which was to be used for clinical trials). Earlier planning helped them to make a fast decision to acquire BresaGen. Dr Wolf Hanisch said:

> We had budgeted over the next two years to spend $6 million on a similar kind of facility as we were in phase II and looking forward for phase III. So it was purely an insurance policy. So we then moved our money forward in the budget. We acquired the control of BresaGen.

In many cases, it is difficult to distinguish between planning and other deliberation methods simply on the basis of retrospective interviews. Greater refinement in research methodology may lead to clearer distinctions among various types of deliberation.

6.2.2(b) *Formal Analysis*

An empirical study by Smith et al. (1988) has revealed that the comprehensiveness of decisions (as defined in Chapter 2) is positively related to performance among entrepreneurs and managers. For the purposes of this research, formal analysis is considered to encompass a formal business plan, a formal approach to planning and the use of professional external consultants.

Business Plans and Formal Planning: The majority of the new ventures in the sample had a formal business plan. Putting together an information memorandum to obtain financing or writing a prospectus for the purpose of an IPO are standard procedures.

Formal planning for the purpose of this research was the use of formal methods to evaluate or discern an opportunity or a problem. For example, Mr Bernie Romanin explained how Norwood Abbey goes about managing regulatory issues in a very systematic and structured way:

> We were an Australian company; we were required to have a US based representative. So we contracted with somebody who had a lot of regulatory and clinical experience…just to validate the path we were going down. And then we were preparing our submission because FDA submission… Our philosophy was to try and answer as many questions as you could before you go in because it is a lot quicker than having to answer pages and pages of questions after you have submitted. So second thing we did was that we identified with FDA on submission. So whilst we were preparing our submission, we employed them for a number of months with the sole objective of helping us identify, in their words, 'what the potholes were' and 'where the dark alleys were.' So we would then be able to ensure that we had data whatever we needed for submission. So that when FDA looked at it…with FDA they have a checklist and they just go along…look at something and tick…. Oops! Not there—a question… And as it turned out, we got a few questions from FDA, but they were all relatively easy. What we also did was that we went to FDA before we did trials, so that we had FDA review our protocol. They commented on the protocol…made some suggestions. We incorporated those suggestions so that when we went in we could show that 'You asked us to do this and we did what you asked us to do.' So there was a lot of consultation.

BioDiem conducted detailed and comprehensive planning before they licensed in the potential drug candidates.[14] Professor Robert Borland explained:

> A number of issues [were looked into]. Is there a gap in the market? Are there lots of competing products in the marketplace? How good are they? Second one is the nature of the product—how good the nature of research strikes you. Thirdly, wherever possible that the products have been into humans…proof of concept, if you may say. Those would be the key issues. The next one would then be: how strong is the patent protection? How powerful is it? The nature of the deal that you can strike… Can the company acquire the product rather than just the licence of the product? Preferably it has to be that it belongs to you. Primarily it would also be the developers of the product—the scientist, their standing in the international community. We looked into a lot of products across a range of institutions. It wasn't that these were the first products. You do a lot of studies. We use a lot of expertise over here or overseas to take their opinion. I think those were the sort of key issues.

Professional consultants holding complementary knowledge can be very useful in providing specific knowledge to help on certain issues (Helms & Renfrow, 1994; Ottesen, 2005). In fact, they can also be used to check any unwarranted optimism and bring in a reality perspective (Courtney & Lovallo, 2004). For example, several case study companies (such as Acrux, Epitan and Evogenix etc.) used executive search firms to suggest suitable candidates to hire. Similarly, using patent attorneys is very common in the biotechnology arena. New ventures (such as Iliad Chemicals and Norwood Abbey etc.) hired consultants for market analysis. It is also not uncommon for new ventures in biotechnology (such as Acrux, BioDiem and Peplin etc.) to hire consultants to facilitate deal making. Other instances when new biotechnology ventures hire professional consultants are while raising funds and conducting a valuation of the company.

But there can be other reasons to hire professional consultants. Dr Keats Nelms (Phenomix) said:

> And actually we hired McKinsey to come and do our market analysis. It's a very expensive venture but it is a kind of stamp of approval at the kind of depth venture capital look at before they put in a significant amount of money.

[14] Of course, there have been many instances of the use of deliberation to come to a conclusion on many sub-decisions that were part of this comprehensive planning.

Rightly, then, Yaniv and Milyavsky (2006:1) observed:

> The rationale for soliciting advice is straightforward. Real life decisions are often not self contained. The range of possible options for choice and their descriptions are often not fully specified.

Decision-makers solicit advice to gain information, help them frame their decisions, refine their preferences and create options beyond those available to them at the moment. At times, people may seek advice for other reasons, such as self-affirmation or for sharing responsibility due to concerns about accountability to others (Kennedy, Kleinmuntz & Peecher, 1997).

6.2.2(c) *Summary – Deliberation and Formal Analysis*

There is some level of rationality when a decision is made. This rationality may be the outcome of any of the more or less formal methods discussed above. The informal ways discussed in deliberation are similar to the heuristic approach described by Miller et al. (1960:164-166)[15]:

> When subjects are put under pressure to find a concept in the smallest number of questions, they may try to keep track of the entire set of hypotheses through which they are really searching. The important thing to note, however, is that there are many different heuristic plans a subject may use. All involve the risk of failure, but some are more risky than others… Each person has his own style, his own tricks, his own heuristic Plan for discovering the concept. Some people tackle the problem

[15] Many researchers (Busenitz, 1999; Busenitz & Lau, 1996; Manimala, 1992; Nutt, 1977; Schwenk, 1984) have studied heuristics. Almost all of them consider that heuristics are very commonly used in decision-making, especially by entrepreneurs. Schwenk (1984) has shown the application of heuristics in various stages of the decision-making process. This is not unexpected. Gavetti et al. (2005) explain it:

> The managers we consider discover new positions neither by reasoning from first principles of economics nor by undertaking unguided local search. Rather, when faced with a new and complex setting, managers identify the features of the setting that seem most pertinent, think back through their experiences in other settings with similar features, and recall the broad policies that worked well in those settings. These broad policies then form the starting point for a local search process.

Because heuristics represents a quite informal way (Nutt, 1977) of thinking and planning, many researchers, such as Busenitz (1999), call it 'non-rational decision-making.' However, while I agree on the informality associated with heuristics, I tend to disagree that it is non-rational. Of course, it is non-rational according to the traditional definition of rationality. However, given how I have dealt with the concept of rationality in this research, heuristics may be quite logical and rational. Nonetheless, there are subtle differences between applying heuristics, applying biases or preconceived notions that don't have any basis and simply using gut feeling. The primary difference between the first two is based upon relevant experience.

> verbally, symbolically; others want to manipulate the objects, to group them perceptually this way and that; a few can alternate between the abstract and the perceptual strategies. Most people devise rather elaborate mnemonic Plans for remembering which objects are in which class, positive or negative.

Thus, it can be seen that deliberation and formal analysis both aim to develop a better understanding of the relevant issue. But deliberation and formal analysis also help in generating options for a decision. These options can be common approaches that are normally used, or a common approach can be modified for the specific situation, or a completely new approach can be identified.

6.2.3 Generating Options

Simon's satisficing theory suggests that individuals search for a solution to a problem and, rather than consider all the alternatives in a total solution set, simply accept the first satisfactory alternative (Fiet et al., 2005). Such behaviour may not necessarily be optimal or even acceptable (Fiet et al., 2005) in the case of important and high stakes decisions. In fact, Russo and Schoemaker (2002:60) emphatically state that without good alternatives to choose from, it is impossible to make a good decision. In such cases, decision-makers would rely on a variety of information gathering activities depending on their resources. Alexander (1979) suggests the following two not necessarily mutually exclusive views on the generation of alternatives:

> The development of alternatives as a process of search and discovery: the solution to the problem is there. This is termed here the *common approach*.
>
> The development of alternatives as a process of design or creation to a significant extent—i.e., solutions do not pre-exist but have to be generated by conceiving, designing, or creating new ideas, or processes. This approach is termed *contriving*. This would combine high levels of both creativity and search, where the latter might range from formal systematic search, through informal search, down to passive search based mainly on participants' memories and experience.

By having more than one choice at a time, decision-makers are able to make a better-informed decision. It also lessens the time taken if choices are assessed simultaneously rather than sequentially. Having multiple options may also give one more confidence and leverage to negotiate better deals. Dr Villoo Morawala Patell

spoke about how Avesthagen talks to different clients at any given point in time so as to spread the risks:

> First, it was Suven, Dr Reddy's, Glenmark, and Ranbaxy. While we were doing cell line projects with these four companies, we also went and tapped other companies like Nicholas, Cipla and others.

Explaining the breadth of business development activities of Phenomix, Dr Keats Nelms said:

> Well, not just US. We have gone to Europe to talk to companies. We talked to…there are quite a few fairly large pharma companies based in France and Spain and Italy. They were not the ones that you usually hear about but they have got a lot of money because they sell these generic drugs or 'me too' drugs or they have got one drug that they specialise in. They may not be marketed in US, but they make a lot of money, so they have got a lot of money for research. So we talked to quite a few in France. We talked to one in Spain. Oh! Where else? England. Everything is multinational now. Most of the major ones are based in US, so that's fine…we focus there.

6.2.3(a) *Common Approach*

The term 'common approach' is used for that approach or choice that is widely used in a given type of situation. For example, a new venture going for listing early in the stage to raise capital is very common in Australia but is not common (and is in fact rare) in India.[16] 'Common approach' has a broad meaning. It means the usual way a decision is implemented (i.e., the method taken). It also means common options/choices/solutions that would lead to a decision. Despite the fact that each of us uses common approaches widely, this style of generating options has attracted the interest of few researchers.

Common choices or solutions are readily available answers to a question. For example, when it comes to partnering or selling their products, most of the new biotechnology companies decide to set up a base in the USA because more than 60 per cent of the world's biotechnology market is there. Many firms in this study (BioDiem, Genetic Solutions, Norwood Abbey, Proteome Systems and VRI Biomedical etc.) have taken this approach. Even though Genera Biosystems had no

[16] However, it may have to do with different business models that companies follow. In India, most biotech companies are either bioinformatics companies or CROs/clinical trial companies whereas most companies in Australia are either drug discovery or technology development companies.

presence in the USA (at least when the fieldwork interviews were conducted), the CEO, Dr Karl Poetter, said:

> No matter what market you are dealing with, 65 per cent of the market is going to be Europe or US... Doesn't matter what you are talking about. People who put the money down, who buy your product…65 per cent of them are going to be European or American. So if you guide your business plan for Japan, China, Thailand, Singapore and India…you are dealing with just 35 per cent of the world market, even though they have lot of people.

Even the choices of preferred partners in a given area may be the same for companies in a given area. This may be because of the specific nature of a product; it is of interest to only a few companies and so there may be limited and common options for partnering in that specific area. For example, Dr Marc Wilkins commented on the choice of potential partners for an instrument that Proteome Systems developed:

> But what we have been doing were some interactions for a long time with different scientific instrumentation companies. There are relatively few in this area that you can have discussions with. It is pretty simple. You can talk with BioRad. You can talk with Brooker. You can talk with Amersham. You can talk with Shimadzu Biotech. There are only about five or six companies. It was a small space.

Similarly, Mr Bernie Romanin, while talking about potential partners for one of Norwood Abbey's products, an old molecule in new drug delivery system, said:

> It is a pretty simple one. The number of companies who had the compound or the drug was limited. There was only about four to five.

Similar to common choices is a common method, which is a general method by which a decision is implemented. For example, there is a very well established way one goes about marketing in a biotechnology company. Dr Igor Gonda (Acrux) described the process very succinctly:

> Well, business development is a multi-strat activity in any good company. Firstly, scientists who go out in the conference create interest in the technology and the product early on. So a lot of early development contacts come from scientific presentations and this kind of develops appetite globally for your technology and products. It also builds your reputation. This is very important. Then you have business development people who usually get introduction by the scientists as well as

> introduction through their own knowledge and their own contacts. They will approach business development departments or they will be introduced to the business development departments. They will then go and introduce them to technology and products and say, 'We will like to discuss with you if you are interested in licensing the technology for specific products or using the technology for a range of products in the company.' And then on top of it if you don't have the resources—and in the early days we didn't have resources in the company—we will also hire consultants, particularly for United States. Those consultants will be identifying opportunities and in some cases they will actually go and travel to seek potential partners. Then you go to business development conferences and again you do the same thing. And when a potential partner will express an interest, you will then go and talk about what you really want through the collaboration and find out what is that they want out of the collaboration. Clearly it is very important that you have got multiple parties interested in the same product and same technology so that there is some sort of competitive tension. That is a much better position than having a single potential licensee for your product. You then negotiate on the term sheets. And when you are done with term sheet, you go on to negotiate for full commercial agreement. It is a pretty straightforward path.

In most other companies, the generic approach to business development is similar to the one Dr Igor Gonda outlined. What may differ is how it is actually put into practice and under what conditions. One can find some general pattern in many other areas of decision-making (such as approaching VC funds).

There may be a 'single' common approach to some issues but in other areas there may be multiple options available. A decision-maker may go ahead with a common approach or may choose to modify it.

6.2.3(b) *Contrive*

A common approach may lead to a contrived solution. For example, for an IPO decision, hiring underwriters is a standard approach. But how one hires an underwriter can be specific to a company. Some firms may specifically use the services of their networks, such as Peplin. Mr Michael Mullins said:

> Of the 40-odd investors that we had brought in our private equity round, probably 16 to 20 of them were from Morgan. So they wanted to make their dollar. So it was a matter of loyalty back to the people who had given us private equity. We did it together through Morgan's.

The above is an example of a single common approach leading to a single contrived solution. But there can be multiple contrived solutions as well. For example, quotations may be sought from several underwriters. Every single negotiation process will be unique, leading to multiple contrived choices, of which one has to be chosen.

The above examples are of cases where common approaches have led to contrived options. But there may be instances where decision-makers directly develop contrived options (choices that are not common). For example, Dr Villoo Morawala Patell discussed how Avesthagen put in place the structure of a joint venture with Cipla (a leading Pharma company in India):

> So it is going into a joint venture. The first two products are going to be ready in 2006. So we formed a joint venture with Cipla. It is called 'Avestha Biotherapeutics', which is a 50.1 and 49.9 per cent division. It has to be announced. We both are putting equal amount of money and that is solely for manufacturing. We have 50.1 per cent. So the structure is like this. Cipla funds Avesthagen. It funds R&D up to cell line expressions. After that, that line is licensed to Avestha Biotherapeutics for some nominal success fees. Then Avestha Biotherapeutics is the owner. Then the manufacturing goes on. The product is sold to Cipla. So Avestha Biotherapeutics makes a neat profit. Cipla markets it and pays 12.5 per cent royalty to Avesthagen Headquarters for their know-how and also our management.

Similarly, Dr Wayne Millen (Epitan) discussed his decision to transform his small biotechnology company to a mini pharmaceutical company specialising in dermatology:

> Biotechnology companies spend money. They consume investors' money on the hope that they will produce a result that will be beneficial to the original investors. Investors in Australia and everywhere deep down want to see money coming in and not going out. And with that as background, you have to ask the question: where do we have to go with Melanotan? Well, we wanted to be a product to get money in. It is most likely that we will end up having an alliance in Europe or in America with a major company. Even if we do it ourselves, how can we market this drug if it is as big as I am suggesting? I am hoping… We don't have enough people selling on this road to dermatologists. We can't do it. That means we will license in some ways… or in alliance with other companies overseas. We want to keep the Australian and New Zealand market purely for ourselves because we think we can handle it. But what does that mean? It means that we need to have a structure. We have to have marketing people and sales people who are actively selling to pharmacy and dermatologists and so… And what does that mean? What business are we in? We are in the

> business of dermatology. We are not just in R&D or clinical trials or a simple biotechnology company. We are a little embryonic pharmaceutical company majoring in dermatology and this is a niche area that we have identified. We are the only company listed in ASX which focuses entirely on dermatology. So what we are saying? We are saying, 'Let's get ready for the launch of Melanotan by having this division called Epipharm. Expand.' We are not going to wait for Melanotan; we are going to get ready for Melanotan. And we have now got distributors around Australia selling these other drugs and we are getting more… And we are getting a cash flow in. So we are doing several other things. We are showing our investors that we can generate cash. We are showing them that we are a dermatology company and we are showing them that we are already ready for Melanotan. When Melanotan gets registered on Friday night, we will be ready on Monday morning to sell it. And not wait. Distributors, salesman, representatives… So this is what we are doing. We are planning ahead. One day we would be a pharmaceutical company in the main with other projects.

6.2.4 Decision End Point

Alexander (1979) argues that decision-makers narrow down the options (if many) and evaluate them by applying criteria of differing degrees of formalisation.[17] Nutt (1998a, 2000, 2002) explored how decision-makers evaluate alternatives to make strategic choices. He proposed four types of evaluation: analytical, subjective, judgement and bargaining. 'Choice' is essentially similar to the decision end point in this research. It generally marks the final phase of the decision process. It is here a go/no-go choice is made. (This choice is different from choice of options). This final go/no-go choice is dependent on many variables. As discussed below, for many strategic type decisions a formal authorisation will be required. The way this has been shown in the framework also typifies the decision (to some extent), as has been done by Nutt (1998a, 2000, 2002). Thus, one can naturally understand some of the characteristics of the decision. Nutt (1998a, 2000, 2002) used only these four categories to characterise decisions and was not interested in the decision process per se. For the present study, the classification of decision end points is essentially part of

[17] Alexander (1979) also discusses 'blending', when more extreme options are subtly changed to narrow the range of alternatives into the domain of the acceptable. In some cases, alternatives are eliminated almost intuitively, applying informal selection criteria. As a result of these factors, he says, we do not observe a process of unconstrained alternatives development generating a broad range of options for formal evaluation.

the decision process. For example, whether a decision is analytical or not will be reflected in the decision process by the use of deliberation and formal analysis. However, identifying types of decision end points based on their characteristics may prove to be important, as some kind of decisions will be more positively related to the performance while other may not (Nutt, 1998a, 2000, 2002).

6.2.4(a) *Natural Choice and Trust Decisions*

When one option is the preferred option by all or most of the decision-makers and each one of them has given their consent for it, it becomes a natural choice. When one option is the only feasible or suitable option in a given situation, it also becomes a natural choice. For example, Mr Michael Mullins spoke about the decision for Peplin to go to the market soon after the first private equity funding:

> Probably there was private equity money around and we could have got it but probably at not a huge increase in value than what we bought in at… There was hardly anybody with any bandwidth in the VC area that could talk to us. Then there was an IPO market that loved biotech. So it wasn't really a difficult decision.

Similarly, Dr Alan Robertson talked about Pharmaxis's decisions to license-in two projects and to give them preference vis-à-vis the ongoing project:

> We have got a basket of things. We are all working together on common purpose, which is to make the company successful and not to push an individual project…And the investor here, when we raised $9.35 million, indicated that they would like most of their money spent on developing Aridol and Bronchitol. So there is no point in time when you say, 'We will now make this No.1 focus.' We were running respiratory diseases and autoimmune disease in parallel fashion. But the nature of research itself is ahead of the other… and the more close you are to the market, the more valuable you are. Obviously, then, that is the place where you put most of your financials and capital resource.

Trust decisions are those that become the natural choice because of high-level faith among the decision-makers (and the facilitator, if any). Dr Gautham Nadig (of Metahelix) said that their decision to take seed money from Mr Raghavan was purely based on trust:

> The credibility of Raghavan, Infosys and Marti Subramaniam, we didn't have to go anywhere else. It was instant.[18]

6.2.4(b) *Opportunistic Decisions and Unexpected Good Luck*

There may be occasions when one comes across a really good opportunity that is usually not expected and decides in favour of it. For example, Dr Andrew Wilks said that Chemicon (a reagent company) approached Cytopia with a proposal to sell reagents that were under Cytopia's patents for JAK kinases. This was not an area of direct interest for Cytopia, so they took this opportunity to make it a bigger deal for them and allowed Chemicon to do even the legal policing. Similarly, a CEO explains how they got the contract to make a product called X from Company A, their partner on another product called Y:

> We only got going on the Y programme and they came back and said that we needed an earlier product… So they said that there is another product that you can build, that you can finish more quickly. And the X was the product that we felt the need for… We ended up doing the deal for X.

Opportunistic decisions may not always work out in long run and may be even harmful to the company. For example, the deal of Proteome Systems with Charles River Laboratories to set up a joint venture CRO in the USA had some benefits for Proteome Systems, but in the long run it did not work well. The opportunity that seemed large initially did not turn out to be that large. Later, when Charles River broke the joint venture, it had a very negative impact on the listing of Proteome Systems.

Quite similar to opportunistic decisions is unexpected good luck. The difference between the two is that an opportunistic decision is unexpected, not part of the original plan and expectations, whereas unexpected good luck is where something was expected but one doesn't expect its fulfilment so easily. For example, Dr Gautham Nadig said that Metahelix was quite lucky in its first round of funding, usually the toughest thing for a biotechnology start-up:

> The next thing was to seek funding. We went to an agency for funding and they almost agreed to fund us. We didn't take that up for some reasons and

[18] Mr Raghavan was one of the founders of Infosys, one of the biggest IT companies in India. Professor Marti Subramaniam is in Stern Business School and on the board of directors of Infosys. Dr Suri Venkatachalan, one of the founders of Metahelix, also knows him through a family connection.

> then eventually we were advised to meet N.S. Raghavan. We met him and we got the money the easiest way. I don't think anybody will ever get money like that. We never signed an agreement until after six months of drawing money. It was based on trust and relationship. Typically VCs do a whole bunch of arguments before they give you money. We did after a few months.

6.2.4(c) *Easy Decisions*

Easy decisions are those decisions for which not too much is at stake. An easy decision will also not involve (major) extra expenditures. An opportunistic decision can also be an easy decision. An example is the deal of Cytopia with Chemicon discussed earlier. The deal of Proteome Systems with Shimadzu for Xcise, also discussed earlier, is best labelled as opportunistic as there are costs associated for both parties. Another example of an easy decision could be Evogenix's deal with BresaGen, in relation to which Dr Greg Coia said:

> This other technology that we had we could come up with a protein that would be used to find a binder. The only problem was that the amount that we could make was very low. So what we required was somebody with a technology that would be able to make these things at a very high level. BresaGen at that time could produce proteins. That's why we approached them. That was not something we were working heavily on. It was just an experimental basis to see if this company could actually make at high levels. If they could, then we would develop that technology a little bit further. But we were going down this protein improvement path more than this high-level expression.

6.2.4(d) *Need Based Decisions*

Need based decisions are basically adaptive decisions to overcome a problem. For example, CBio was in a peculiar situation when BresaGen went into voluntary administration soon after signing a contract with them to manufacture protein that CBio had to take to clinical trials. Dr Wolf Hanisch explained:

> Couple of days after we signed the contract, they went into voluntary administration. Their board recognised that beyond six months they could not meet their obligations, so they went into administration there and then. So, from our perspective, we couldn't afford to let them go under because then that would cost us another year. We had budgeted over the next two years to spend $6 million on a similar kind of facility as we were in phase II and looking forward for phase III. So it was purely an insurance policy. So we then moved our money forward in the budget.

The above decision was important because otherwise it would have meant looking for another partner or building the facility, and both those outcomes would have delayed the clinical trials for which all the preparations were already made. Similarly, Mr C. Devender Reddy of Genotex International had a shortage of funds when his idea to sell extracts of *Aloe vera* did not take off and his other products (reagents) were not performing well. He then came up with an idea:

> I wanted to sell [*Aloe vera*] as raw material, but that raw material is not selling in India as no-one is using aloe vera. People say so many things but no-one is using, so I thought to make some products (like shaving cream, shampoo, face wash, cream etc.) by using that gel and started to market. I do not have any regrets.

6.2.4(e) *Negotiation and Compromise*

Negotiation and compromise almost always seem to go hand in hand. Whenever there is a difference in expectation about a decision between two individuals or parties, it is quite obvious that each will try to negotiate to get the best deal. Each party then has to find an amicable solution, which will partially fulfil the needs of both parties. This concept is close to the idea of bargaining, as used by Nutt (1998a, 2000, 2002). The compromise solution will generally be a win-win situation for both parties, but that doesn't mean that the agreement reached will always be in the middle ground; one party may get a better deal. This may happen more often than expected.

Dr Keith Williams (Proteome Systems) had to lower his expectations about his deal with Shimadzu:

> We offered Shimadzu this [the complete platform]. We said that we can build proteomics effectively at that stage, although it was very poorly conceived at that stage. And it is going to cost that much. And they said, 'Nah, nah, nah…it's too expensive.' So we said, 'Fine.' We ended up with ChiP, which was very innovative programme. It was a three-year programme. So we cut a deal on ChiP initially.

In the above example, there were negotiations and Dr Keith Williams had to compromise on his expectations (but maybe not too much) for the agreement to make ChiP. Dr Keats Nelms talked about the difficult negotiation process with VCs and the compromises that had to be made:

> They start trying to devalue what you are doing, so that they get more of your company for less of money. So that negotiation process can get very difficult. All these things were very difficult. So they take compromises and a lot of work. I think that entire process is very difficult… And there is difference between investors. One investor thinks that he deserves more (share of the) company than the other and one wants a board seat that didn't get a board seat. So it's very personality and ego driven at that point. And, again at the end of the day, everyone believes that the company is worthwhile doing, they keep that in focus and ultimately get to resolution.

6.2.4(f) *Persuasion*

When there is no natural consensus, reaching a decision end point may require persuasion. The difference between persuasion and negotiation and compromise is that in the former usually there is nothing that is compromised. The individuals are influenced by dialogue to approve an option or approach which they were not in favour of before.[19] For example, it was through persuasion that Ocimum Biosolutions (a new venture) got contract work from Dow Agro, outbidding a formidable rival, Accenture. Dr Anuradha Acharya said:

> We were bidding against Accenture. Accenture said that they will send two people for six months to do the initial study of the process and then they will do. We gave them a better price and timeline compared to what Accenture was giving them. They took a chance with us.

6.2.4(g) *Ad hoc Decisions*

A decision taken without working through the essential modalities and without knowing the important facts is termed an ad hoc decision. Instantaneous decisions based primarily on instinct and of an intuitive or guesswork nature will be ad hoc decisions. Many opportunistic decisions, as discussed earlier, are also instantaneous and intuitive in nature. Hence, opportunistic and ad hoc decisions are very similar. In practice, an opportunistic decision is based on an informed choice[20] on at least the important variables. On the other hand, ad hoc decisions are more guesswork (i.e., without any relevant experience) or based on, at best, partial knowledge of even the most important factors associated with the decision. For example, diversification of business into an area where it lacks proper experience or knowledge can be

[19] This is similar to an idea by Nutt (1998b).
[20] Informed choice may be due to experience or real-time information etc.

dangerous. It can be fatal if even the basic preparation is not done. But with some good luck, it may work as well.

6.2.4(h) *Forced Upon by Business Environment*

There will be instances where a decision is made not by choice but because of the unfavourable business environment. In a way, it can be said to be forced upon the enterprise. The theoretical difference between this category and need based decisions is primarily that, in this case, one has to make that decision and there is no other alternative, which is not the case with the latter type. For example, Dr Wayne Millen initially delayed the IPO of Epitan because of an unfavourable market due to the Sydney Olympics. However, later he could no longer postpone even though there was a continuing slump in the market. He said:

> The people who had put their money in my company [during private equity raising] had only put it in on the basis that there would be an IPO… So by that time…and we need to move forward…our investors were getting a bit edgy. So we ended up listing, not for money but for their exit. We needed to spread the shareholding. We only had 20 or 30 shareholders in mezzanine, but you need 400. So we raised only $1.8 million at the float just to get 400. We didn't care about money, as long as we got the spread so that our first investors could exit, if they wanted to.

6.2.4(i) *Conflict*

Conflict can come when there is a genuine divergence in interest among the parties or politics amongst the actors. The former can be often resolved by negotiations or persuasion. However, if left unresolved, it can be very damaging. The latter is generally damaging and difficult to resolve. For instance, VRI Biomedical suffered due to a conflict among its board members that led to two groups with very different interests and opinions. The company suffered until one group completely won and forced most members of the other group to leave the board.

6.2.4(j) *Edict*

There were very few examples of edict decisions (Nutt, 1998b) among the case studies. This is surprising because the literature on entrepreneurship depicts entrepreneurs as 'control freaks' and the sole decision-maker (at least in the initial days). But the reason for the rare occurrence of edict type decisions is not hard to find.

Biotechnology new ventures require huge capital investments, so per force the entrepreneur or the entrepreneurial team (in the majority of the cases) has to look for capital investments. Any private equity investment means an increase in the number of people with major stakes. This makes edict decisions (at least for important issues) almost impossible without the fear of a crippling conflict.

6.2.4(k) *Procrastination or Managed Procrastination*

Procrastination or managed procrastination was not observed very often in the case studies. The reason for this almost certainly lies in the fact that politics is generally minimal in a small venture because there is usually a small group of decision-makers and a new venture can lose too much if decisions are not made in time. However, there may be instances where it is actually in the interest of the new venture to observe a 'wait and watch' policy. For example, a drug discovery company's valuation increases as they are able to successfully take their lead molecule to different phases of clinical trials. It makes sense for them to try to keep raising successive rounds of funds in order to do clinical trials, which are hugely expensive. So a drug discovery company will generally try to delay a partnership (with a big pharmaceutical company) for their lead molecule as long as they can afford. For example, Dr Michelle Miller provided the following reasons for delaying a final decision on the business development activity of Biotron:

> We are continually doing that. There were several companies whom we had to visit a number of times. Some went to CDA, exchanging a lot of information. Still this is such a slow process. Sometimes I don't mind that because I don't know if I really want to do a deal. But when we have finally got…wait until phase I/IIa trials, then it is not that we start from scratch. Who were these guys? You have been here for years developing your relationship with these people.

Similarly, Dr Andrew Wilks said of Cytopia's plan for the stage of partnership:

> It was a flexible business plan. You can take it to the clinic but not into the clinic and you could partner at that stage. Or you could take it to the clinic at much greater expense and add value to your new drug. We projected that we would certainly develop our drugs to the point where they were clinical entities. We projected further that if the effect was good, we can raise more money and take it even further.

6.2.5 Authorisation (and Involvement)

Generally in a new venture (at least informally), the authorisation will occur at the same time as the choice is made. This is again because there is usually a small group of decision-makers and politics is generally minimal due to continuous interaction among the key decision-makers (which includes major investors). But there usually will be a formal ratification at least of decisions that are crucial, if not all decisions.

There will also be instances when either there are too many private investors or the company has publicly listed (which is quite often the case in Australia). In those circumstances, the final choice, at least on decisions of an important nature, will generally be made by involving key decision-makers, including majority shareholders. Formal ratification of the decision will still be a must. Involving key decision-makers at least while making the final choice avoids the feeling of marginalisation that may well be one of the sources of conflict or politics. This, however, doesn't mean that there won't be differences of opinion; it only means that this approach will resolve such differences more amicably.

For most decisions of an operational nature (such as contracting with a hospital for clinical trials), authorisation at the board level may not be needed, but it definitely is a good idea to involve people who are associated with that decision. Such involvement helps achieve a higher degree of agreement and better implementation.

6.2.6 Decision Facilitators

Some of the decision facilitators that have been mentioned previously are: relevant experience, using expert advice, networks[21], and involving key people. Other common decision facilitators are:

Having resources: Resources can be the skill set of the company, available time to make a decision and sufficient capital. For example, it was the availability of cash that facilitated the decision by the board of Acrux to not list the company in an unfavourable market environment and wait for an opportune time. Similarly,

[21] The network has been shown to be useful for recognition, but it is in general useful to get the information that is required throughout the decision process. (For the purpose of this research, the benefits of networks in getting needed resources or capable people are included in 'recognition of opportunities').

Pharmaxis decided to go for an IPO when they had sufficient cash in the bank and thus could negotiate better terms with underwriters. They had also achieved a few credible milestones.

Having customers and revenues prior to the start or in the very initial stages: Early cash flow is a significant asset for a new venture. Plantic Technologies (a Melbourne based company making eco-friendly plastic) already had Cadbury's as an assured customer during pilot testing of the technology. Similarly, Strand Genomics had a steady stream of revenue that allowed them to develop ambitious products.

Known Competitive Advantage: This can be due to an above average skill set that a company has or an extra advantage that their products or services give and that is easy for the customer or investor to see. Dr Keats Nelms (Phenomix) provided the following example:

> Well, you know…you contact companies and say…either through people you know or through their business development people, 'Are you interested in us?' And based on people who are in our company, they are usually very interested because the expertise we had, the scientific background…that the whole company. People knew that we were a smart bunch of people, that management team was very good, scientific team was very good. So they all were very interested.

Professor Vijay Chandru mentioned an advantage that Strand Genomics had over other companies as a result of which they were able to get third party certification as a vendor by Affymetrix:

> Affymetrix puts out software that has to do with their technology and their particular probes. When you contact them to become a third party vendor, they will give you all of these pieces of software and codes without guarantees. Then they ask you to integrate them in your tool. What many companies do is just put a wrapper of some sort and plug it into their software. What we did was that we tested each of those models carefully, and some of them were open source, so we were able to look at the quality of source codes. We found that while they were very intricate and clever algorithms, they had not been optimised because Affymetrix is not a software company. Software is just a support function for their hardware. We actually decided to rewrite those algorithms and optimise them. We have actually rewritten those softwares in a way that it runs much more efficiently. I think that is something that Affymetrix has appreciated. Probably not many of the other companies have taken that trouble.

Support of influential people: This is of great help in troubled times. For example, Dr Z (Company E) had to seek help from the chairman (Dr T) of the company (a very renowned scientist). Although Dr Z was the founder of the company, Dr Z had to forgo the post of CEO at the insistence of the investors. When the new CEO resigned, the investors again tried to install another CEO, who demanded that Dr Z also forgo a huge equity share in his favour. Dr Z said:

> I went and met Dr T. I said, 'Dr T, I am sorry, but I control this company. I own almost 73 per cent of the company and I am taking over. This is my baby and I am not going to let it be killed. I am going to take over. I am appointing myself as CEO and you have to back me.' He agreed. In the next board meeting I was appointed CEO.

Similarly, Phenomix was able to raise an impressive $US32 million in the first round of funding (which is usually very difficult, especially in Australia) because of the well-known people involved with the venture:

> So the three advisors were Peter Schultz, who is the head of that institute (Genomics Novartis Foundation) and is also the founder of Affymax and Affymetrix. He knew a well-known venture capitalist, John Diekman, who found Bay City Capital and had been CEO of Affymetrix and a number of other different companies. So he was an advisor. The third person was Denise Gilbert, who had been CFO of Affymax and had quite a bit of financial experience.

Strategic Coherence: This is important to keep a company focussed. It also sometimes facilitates decision-making. Dr Wolf Hanisch explained that the reason CBio took over the troubled BresaGen was primarily to help them with the bulk manufacture of their lead molecule for clinical trials and not for other activities that BresaGen was involved with:

> We got rid of the stem cells. We merged it with a company called Cythera, which then merged with a company called Nervecell. We cleaned all other intellectual property. We just wrote it off the book. Bits and pieces of investee companies and bits and pieces of IP that were carried on the book as assets or intangibles have disappeared. We now stripped it down to basics, which is a contract manufacturing company and contract R&D… We bought it strictly for the purpose of manufacturing our materials.

Even though the benefits of strategic coherence cannot be gainsaid, one must be careful that strategic coherence doesn't become strategic inertia, where one fails to change direction even when the direction is proving harmful to the company.

The above factors are some that were shown to have positive effects on the decision process whenever present. These are factors that decision-makers have some control over.

6.3 Does a Decision-Making and Decision Implementation Dichotomy Exist?

Three types of decision process were found in this empirical study. Some decision processes involved only decision-making, some were only decision implementation and some had both decision-making and decision implementation. This is, however, not to say that there is no element of decision-making in 'decision implementation' types and vice versa. The difference arises when one aspect clearly overshadows the other.

The difference depends primarily on what one sets as the unit of analysis. For this study, a decision is the unit of analysis. But, even within this approach, different researchers have different boundaries for what they consider to be a decision. For this research, a decision is one that can stand as a discrete and important unit in itself. Chapter 5 gave the example of a decision by a company to go to an IPO. This decision may include several sub-decisions: for example, the timing of the IPO, deciding market cap or choice of underwriters et cetera. If IPO is the unit of analysis, these several sub-decisions get subsumed in the bigger decision process of the IPO. But, in making these sub-decisions, one is also implementing the decision made earlier—i.e., to go for an IPO. In this research, the approach followed is that of Mintzberg et al. (1976) and takes the overall 'going to the IPO' as the decision. Decision-making then becomes very enmeshed with decision implementation. If one took each of these sub-decisions as a unit of analysis, things would be different. For example, deciding the timing of the IPO is basically decision-making.

6.3.1 Decision-making

There will be many occasions when making a decision will dominate its implementation in a decision process. A few examples will show this.

CBio taking over BresaGen: Initially, CBio had contracted BresaGen to be the bulk manufacturer of the lead molecule they required for phase II clinical trials. While they did this, they had earmarked a budget to build such a facility in-house by the time

they started phase III clinical trials. However, soon after the contract, BresaGen went into voluntary administration and could not honour the contract. This meant that CBio either had to look for another manufacturer or build the in-house capability early. The latter would have significantly delayed the trials for which all the preparation was done and the former was not looking feasible as other manufacturers either were not TGA approved or were non-committal on the required timelines. The other option was to invest in BresaGen to bring it out of voluntary administration and at the same time become majority shareholders. This option looked feasible as it was within budget. They made a decision in favour of it. Of course, they had to involve the board of BresaGen to reach a decision point. Some researchers may consider this stage as an implementation of their decision made to get majority control of BresaGen. A decision process that involves two different parties will naturally involve a discussion between them. Even in this case, the decision would not have been actually made had the dialogue between the two parties not led to the recognition that CBio's budget was adequate to gain a majority share. This dialogue could very well be part of this decision-making. In the researcher's view, the implementation part of this decision is related to how CBio fulfilled the objectives vis-à-vis BresaGen. Both the companies being small, this wasn't too complicated once they reached the stage of decision-making. They had thought about such issues.

Biotron's December 2004 capital raising: Out of several options to raise money, Biotron decided to raise money by a share purchase plan. In this case, once the board made the decision, the implementation of it wasn't too complicated.

Cytopia acquires Myometrix: Initially Myometrix licensed some patents from Cytopia because those patents were important for them to make progress in their research on the development of a lead molecule for cardiovascular related diseases. Later the opportunity came for Cytopia to acquire Myometrix about the time when they were about to raise money and were also looking for a US presence. The opportunity seemed more attractive because of the important area of research that Myometrix was in—i.e., cardiovascular diseases. After the due diligence by the two parties, an agreement was reached. The implementation details were also discussed. However, in this case, decision-making overshadowed the real merger (i.e., the implementation). The reason is simple: implementing a merger where the merged entity is a small

group of people (i.e., four to five people) is not a huge task, but reaching an agreement (i.e., making a decision) is because this small group controls valued IP.

Genotypic Technology's decision to follow a 'mixed' model: When faced with a shortage of working capital due to the lack of interest on the part of VCs, Genotypic Technology decided to provide services in order to get cash for the development of its products. This is a common approach that companies take when facing a lack of funds. In this case, deciding what to do is taken as the decision unit for analysis. This makes it look like an only decision-making type. However, it could be argued in this case that the decision will have a significant implementation component. What needs to be clarified is the appropriate boundary for a decision unit. If the implementation is included in this case, it will include why and how they put different services and even how they implemented these services. In itself, this can be a sufficiently large decision unit for micro-level analysis.

Metahelix's decision to start a seed business: Metahelix decided to start its own seed business because its contract research for seed companies was not taking off and it was necessary for it to generate revenues for its own R&D. Like other companies, it had various other options (including VC funding) to choose from. It came up with an interesting choice—to start its own seed business. It started a company called Dhaanya Seeds as a 100 per cent subsidiary of Metahelix. It had a unique rationale (discussed in the section on 'Deliberation' in this chapter). However, its decision-making involved not only the choice but also the implementation of the choice. Dr Gautham Nadig explained:

> We started a small-scale breeding program when we started Metahelix. Our strategy was to license in material from various sources in the country—various companies, breeders and public sources et cetera. Then we had to ramp up our breeding program to recreate these products. Right now we have a very large breeding program when we have a phenomenal amount of materials for testing and evaluation every year. And we have a sales and marketing team deployed all over India. We have the seed production organised in a lot of places. We have a running engine. Once our biotech product is approved, these seeds will carry the traits.

In this case, the boundary for the decision unit was around the decision whether to start the seed business. This decision will have a large component of implementation. But if that is included, the decision unit becomes so big that it

becomes an analysis at firm level—i.e., analysis of the evolution of Dhaanya Seeds. By delineating the boundary around the start of Dhaanya seeds, the decision unit becomes a manageable unit of analysis at the micro level. The latter statement by Dr Gautham Nadig simply reflects the robustness of decision-making; that is, they thought of how to implement the decision while they made a decision.

6.3.2 Decision Implementation

In new ventures, the business environment effectively prescribes many decisions. The decision-makers are required to carefully implement such decisions. In highly competitive environments, good execution may be as important as the strategic choices managers make (Rousseau, 2006). For example, a decision to look for partners usually after the lead molecule of a drug discovery company has reached phase III clinical trials is almost standard for a small biotechnology company. This is because it takes huge resources to do phase III clinical trials, complete FDA procedures and finally market a product across the globe. This is usually beyond the capability of a small biotechnology company. Similarly, drug discovery companies have to conduct clinical trials. They do not need to decide whether to do it; they have to focus on its implementation. During that implementation they have to make many sub-decisions. In the following section, some of these decisions are discussed in detail.

Helix Genomics hiring patent attorneys: Once Helix Genomics decided to obtain worldwide patents for their software, the search was on to find a credible patent attorney. It is almost a standard feature that biotechnology firms hire professional patent attorneys (if they do not have one in-house) to take care of their patent applications. To hire patent attorneys is hardly a decision to be made. Helix Genomics started looking for a patent attorney suitable to their requirement—less expensive and specialised in the life sciences. During their search, they met patent attorneys from two different firms—Reedsmith (for USA) and Boehmart and Boehmart (for Europe). Upon discussion with them, they found them to be suitable and hired them. So it is the implementation of the decision (i.e., how to hire a suitable patent attorney) that is more important here.

IPO of BioDiem: Senior management of BioDiem did not have to make a decision to go for an IPO. It has been a general trend in Australia to have the company listed as early as possible. Investors of BioDiem wanted the same. However, BioDiem's partner for their flu vaccine (Merck) had decided to end the collaboration during that time. At the insistence of their shareholders, they had no choice but to initiate the process for an IPO. In order not to take any chances, they hired two different underwriters—one to manage retail investors and the other to manage institutional investors. The former was the same company that managed its first round of investment, which involved investments by a number of wealthy investors. They decided the time, valuation and share price et cetera in consultation with their underwriters. However, on further assessment, the underwriters concluded that their assessment of the valuation of the company was high and it would not be possible to get the investors interested at that price. This was primarily due to the end of the collaboration with Merck, notwithstanding BioDiem's other achievements. So BioDiem, in consultation with the underwriters, had to revise their expectations (as postponing the IPO was not an option for them) before they went for an IPO. In this case, as one would notice, several sub-decisions were taken while implementing the IPO decision.

Peplin's search for a partner: Peplin's search for a partner began quite early. They did not have to make a decision for the stage of partnership. Mr Michael Mullins said, 'Partnering with a pharmaceutical company was always the plan because we just didn't have enough capital resources.' However, what was important was how they searched for a suitable partner. To a large extent, even implementation in this case is a standard procedure and they did not need to decide on that front. To a certain extent, these procedures are almost the same across most companies: attend conferences, employ professional consultants for deal making, initiate contacts with select companies in their area, sign confidentiality statements and conduct several rounds of talks et cetera. Peplin did these things. What differentiates one company from the other is the management of the implementation. The difference lies in the sub-decisions associated with implementation (e.g., how they hire professional consultants, who they hire, who they choose to target and on what basis etc.). These processes are unique to individual companies.

Mr Gary Redlich initially started to think of prospective companies that they could target for partnership. Soon he hired Burrill and Co. (based in San Francisco) as a consultant. The consultant helped him to narrow down the initial choice of 15 companies to five companies. Later, after further discussions and evaluation, that reduced to three companies. This led to a concerted effort on just three companies. Finally, the deal was struck with Allergan.

6.3.3 Decision-making and Implementation

Decision-making and implementation usually go hand in hand, as can be seen from the above discussion. The decision process types outlined here are based on what is dominant: decision-making or implementation. When decision-making and implementation are equally important to a decision process, it is better to acknowledge that as a 'decision-making and implementation' type. A few such decisions are discussed below.

Phenomix's 'initial' organisational structure: The importance of an early organisational structure was clearly evident to the founders of Phenomix. Dr Keats Nelms explained:

> We had that pretty much mapped out before we went out to raise money. Steve was going to be chief technology officer. Chris was going to be chief scientist and I was going to be director of operations and everything else here in Australia. The first step…it was thought that as soon as we could, we would hire a CEO. So that structure was already there. All we need was someone to come in and help grow the business. So we had science covered but we needed someone to come in and help build the business.

It was then that they began their search for a CEO. They had about five to six potential candidates from either their own networks or from an executive search firm. All the major investors along with the founders interviewed the potential candidates. It was then that Dr Laura Shawer was finally chosen as the CEO.

In this decision process, both decision-making (to hire a CEO to build a robust organisational structure) and the implementation of it are important. It may be argued that the CEO is a standard post in all companies. However, the founders themselves

coming to such a conclusion (i.e., hiring an outsider as a CEO) is unique. Dr Keats Nelms said:

> Everyone agreed. I mean, none of us wanted to be CEO. We knew that it was not going to be appropriate. It was not going to be what the company needed. So from that point of view we were lucky because none of us had ego problems about someone saying that 'I want to be CEO' when they shouldn't be.

Helix Genomics's development of their product: The idea to develop software originated from the drawbacks that the founders of the company identified in the software they used in projects. But the decision about which type of software to develop did not emerge in the first instance. They refined the idea for their product continuously for four successive years before they developed their Biological Operating Software. Mr. Mohan said:

> Initially there was no idea. Initially it was only that there were a lot of requirements in the domain, so we were studying that. In 1998-99, we thought that there has to be an operating system for biology. There has to be novel and comprehensive software that can do any 'query analysis' in biotech. Then 1999, 2000, 2001 and, to a large extent, 2002 has been for development. Also, these years, we have also been studying different software and different companies.

The development of a product is usually a decision unit that involve decision-making (i.e., what product) and decision implementation (i.e., how to make that product). Together, they make one unit of analysis because the product will change as it is designed. In other words, decision-making and decision implementation overlap.

Hence, decision-making and decision implementation are not always two distinct activities independent of one another. It depends on the decision and the decision process as to whether one can clearly distinguish between them and identify them as independent activities. But by identifying which activity is the dominant activity, it may be appropriate to distinguish between them. Nevertheless, particular care has to be taken in putting boundaries around the decision unit for analysis.

6.4 Patterns of Decision-Making: Lessons Learnt

Following Mintzberg et al. (1976), decision process diagrams of more than 50 decision processes were constructed. After clarifying the decision unit, a careful

qualitative analysis was carried out to identify the elements of the decision process in that decision unit. A flowchart of the decision process was then drawn.

Decision processes were categorised based on the three types: decision-making only; decision implementation only; and decision-making and implementation. Decision processes for each type were then superimposed in order to identify patterns and to identify any marked differences among the three types. This approach did not generate any clear generic patterns or lead to identifying any marked difference among the three types.

Complex decisions were compared with those that were relatively simple (i.e., less variable). The former had more iterations, which is not surprising. Decisions that had encountered unexpected difficulties or some problems were different from those that did not face any such obstructions. In the former, there were more iterations and in the latter there were markedly fewer, even for the complex decisions.

The analysis did not generate any common patterns, and hence did not generate 'typical' patterns that could be called entrepreneurial decision-making styles or patterns. This led to a reassessment of the types of decision processes that Mintzberg et al. (1976) had identified. While they were able to generate seven groups out of 25 decision processes, it is likely that they would have come across many more groups had they studied more decision processes. They also mentioned that the 25 decision processes could be represented in terms of seven basic models 'with minor additions which do not appear to be common' (1976:268). The fact is that there is a great deal of variation among individual decisions and possibly a large number of groups or models of decision-making processes. This level of variance greatly reduces the analytical value of visual process diagrams. Consequently, the analysis moved from the generation of patterns and types to an analysis of difference between successful decisions and failed decisions. This analysis will be discussed in Chapter 7.

However, this attempt to make diagrams of decision processes was not without gains. It led to a greater understanding of their use and limitations:

- It can be difficult at times to pictorially show decisions that have taken a long time to evolve. The true depiction of that process can be very tricky

and is many times not possible. For example, it can be very difficult to show the marketing strategy of a company that has taken a long time to evolve (due to a new market, novel products, etc.). Sometimes even the initial idea on which a company was formed may have evolved in stages— something very difficult to show convincingly by a decision process diagram.

- Closely related to the above point is the difficulty of showing a decision process in such a way that by looking at the diagram one can differentiate between whether it was a one-time decision or an evolving decision.
- Sometimes it is very difficult to construct the boundary of a decision unit. Two different decisions may be so closely intertwined that it becomes difficult to represent them individually or even in a combined way. For example, Company F raised $13.2mn, but their decision process to raise this amount was closely related to their decision process to appoint a new Chairman.
- It is also difficult to show ingenuity or smartness (on the part of decision-makers) that is related to some decision processes. To represent such ingenuity without losing the essence of it is a challenge.
- Quite closely related to the above point is the problem of bringing forth the quality of certain elements (such as deliberation or formal analysis) that may be key to the outcome.

Decision process diagrams can at best provide an overview of the decision process of a particular decision because the decision process is constructed by making use of major decision points as the signposts and then giving them the shape of the decision process.

Chapter 7

Decision-making and Decision Outcomes

Effie Jones: Failing to plan is a plan to fail.

Confusion and controversy related to the true nature of entrepreneurial decision-making was one of the main motivations for this research. The controversy is primarily related to the nature of evaluation during the decision process. It is the nature of evaluation that has been used by researchers to characterise decision-making by entrepreneurs. In Chapter 6, elements of generic decision processes were identified and discussed. An attempt was made to find which combination of these elements (i.e., which patterns of decision-making) were more prevalent and, thus, could be called an entrepreneurial style of decision-making. This attempt, based on diagrammatic methods, did not identify any clear patterns within this sample of decisions.

This preliminary analysis cannot produce a basis for concluding that there is not an entrepreneurial style of decision-making in the sample firms without making another serious attempt to analyse the evaluation style of entrepreneurs. It is even more important to assess whether the evaluation style has an important role to play in determining whether a decision made by an entrepreneur will be successful. This chapter is concerned with the analysis of evaluation styles and the relationship between these styles and the outcomes of the relevant decision. The approach involves segregating successful and unsuccessful decisions and then comparing their characteristics across the main elements related to evaluation and selection in the decision process.[1] Through this analysis, doubts regarding the nature of entrepreneurial decision-making are also resolved. A further attempt will be made to find any diagrammatic patterns, based on the performance of decisions taken by entrepreneurs or entrepreneurial teams.

7.1 How Do Entrepreneurs Evaluate: Deliberation or Formal Analysis or Both?

This section is concerned with three questions:

- How often do entrepreneurs evaluate their decisions?
- Does more evaluation have any effect on the outcome of decisions?
- What means do entrepreneurs use most frequently to evaluate their decisions?

[1] Refer to section 4.2 in Chapter 4 to understand the basis of the classification of decisions as ‘successful’ or ‘unsuccessful’.

These questions are approached through the analysis of 48 decisions made by the entrepreneurs in the case study firms. This analysis is developed through four stages:

- types of deliberation (7.1.1)
- the use of formal analysis (7.1.2)
- the creation and assessment of options (7.1.3)
- styles of decision-making (7.1.4).

7.1.1 Deliberation

In Chapter 6, various types of deliberation were identified. These can be categorised into three groups (see Table 7.1):

- deliberation styles;
- non-deliberative styles; and
- aspects that will facilitate deliberation styles.

The sub-elements within each category type are almost self-explanatory and are those that one uses in day-to-day life. They have also been explained in detail (along with examples) in Chapter 6.

TABLE 7.1 HOW FREQUENTLY DO ENTREPRENEURS DELIBERATE?

	Successful	Unsuccessful
	(Number of Decisions= 34)	(Number of Decisions= 14)
Deliberation Styles		
Deliberation[2]	42* (1.235)**	6 (0.429)
Logic	24 (0.706)	8 (0.571)
Planning	14 (0.412)	0
Expert advice	7 (0.206)	0
Internal expert advice	2 (0.059)	1 (0.071)
Total	**89 (2.618)**	**15 (1.071)**
Deliberation Facilitators		
Involvement of experts across functions	2 (0.059)	0 (10)
Knowing one's limitations/partner/technical environment	11 (0.324)	2 (0.143)
Prior relevant experience	3 (0.088)	0 (0)
Decision facilitator	9 (0.147)	1 (0.071)
Symbiotic	3 (0.088)	1 (0.071)
Total	**28 (0.824)**	**4 (0.286)**
Non-Deliberative Styles		
Convictions	6 (0.177)	5 (0.357)
Deliberation-partial	0 (0)	1 (0.071)
Not directed search	0 (0)	0 (0)
No experience	1 (0.029)	9 (0.643)
No expert advice	1 (0.029)	8 (0.571)
Very broad idea	0 (0)	2 (0.143)
Total	**8 (0.235)**	**25 (1.786)**

Note:* The number (not within brackets) indicates the total number of that particular sub-element found in either category (i.e., 'Successful' or 'Unsuccessful'). ** Because the number of decisions assessed within each category is different, it is more prudent to compare the average incidence of sub-elements in each category. The same method (and logic) has been used in the following tables. Also refer to the Coding Style discussed in Chapter 5.

7.1.1(a) *Deliberation Styles and Deliberation Facilitators*

The data in Table 7.1 summarises the analysis of 48 decisions: 34 successful and 14 unsuccessful. The table shows the frequency of occurrence of each type of deliberation as an aggregate number of occurrences and as a frequency per decision. The table shows marked differences in deliberation styles between successful and unsuccessful decisions. Successful decisions are deliberated more than twice as

[2] 'Deliberation' is used to denote active and conscious thinking, careful thinking, creative thinking and discussions. It doesn't include logic and 'knowing thy area'. The former approaches are considered to be more proactive whereas the latter approaches are more passive.

frequently as unsuccessful decisions. Decisions that are discussed more have much higher chances of being successful. Similarly, decisions that are planned (even though informally) are more likely to be successful.

Entrepreneurs used simple logic very often in the decision process; typically this occurred when either rapid decisions were to be made or things were quite obvious. Here is an example.

Mr Michael Mullins explained Peplin's decision first to go for an ADR (American depositary receipt) raising and then not to proceed:

> The idea was that there may be international investors who would be interested in the company. If we are using ADRs, then we can create a market for our stocks offshore, which potentially could see people value our stock like it was listed in NASDAQ rather than the ASX in a hope to improve the valuation. We thought that we would be able to raise more money with less dilution. Then a few other things like the Iraq war started. We felt, after looking at other companies, that this will not achieve an outcome that we expected. So it ceased to be a priority for us.

It may not be wise to make such important decisions based purely on logic, especially if one doesn't have relevant experience. For example, it is hard to know what the response would have been had they listed Peplin on NASDAQ without having listed first in the home country. This consideration suggests that logic can be an adequate approach if experts in the area use it. For example, the stock of Peplin not only had a good debut on its listing in the ASX but continued to rise even though their product was not then advanced in the development process. Mr Michael Mullins explained:

> We were targeting at a price of $0.50, but on the advice of our brokers we went out at $0.40 and at the end of the day we were at $0.50. We pitched at somewhat lower. The logic was that if you got to the market at $0.40 and at the end of the day you are $0.30, then it is very hard to get back to $0.40 and beyond that. If you go out at $0.40 and it gets $0.50 and moves up, then it is good. That's what happened to us.

Important decisions made only on the basis of logic can have serious implications, especially if the context is new for the decision-maker and there is no expert advice from people who know the context. For example, Dr Richard Fry's decision to clone horses may seem quite logical, but he had to face public furore,

especially from those who loved horseracing and saw that the selective cloning of race-winners might destroy the charm of the game. He said of his decision:

> Because they are worth a lot of money and we saw the market for horses would be in geldings. Geldings are very good horses whether they be racehorses or for any other purpose. Geldings are very good horses, but they have got no breeding value because they have been castrated. So we saw that there could be a niche market for cloning.

Other aspects that facilitate the deliberation process are also found more often in successful decisions compared to unsuccessful decisions (see Table 7.1). Simply knowing about one's limitations, the technology environment, the prospective partner or about anything else that may affect a decision is likely to be fruitful. For example, Dr Alan Robertson said that they decided to publicly list Pharmaxis even though they had sufficient money in the bank, and this was based on their understanding of the capital market:

> We didn't need it then, but we knew that we will need it in the future. And there are funding cycles. There are times when you can raise money… there is an investor interest in your sector.

However, this prior knowledge should be directly related to the specific decision. Care should be taken that knowledge about those aspects of a decision that are well understood is not extended to other aspects that are not understood. For example, the CEO of Company A talked about their decision to build platform technologies for research in area X:

> We also knew that in those early days of 1999 there didn't exist sufficient technology in the world to do this at the level that was going to be required and so as the company whose founders were very well renowned for their technology expertise and innovation in this area, we decided that we need to capitalise on that rather than other companies do it… There are things called core facilities in the world where most universities in the world doing biomedical research will have…you will expect that those core facilities, those who have been involved in lot of genomics or some of those types of services will have actually adopted this technology. It was very natural progression. It was a trend, if one could say.

In this case, the senior management team of Company A knew about the technological trends and the core facilities used in the research area. While they were quite well versed on the technological front, however, they did not know the market dynamics and they generalised to wider markets their experience as scientists in the

use of their technology. Indeed, their technology was superior and saved time. Academics in other core facilities could afford delays but not huge costs because of budgetary constraints that are typical of the academic set-up. In short, they generalised their relevant experience, related to the technology, to market contexts in which they were not experienced.

Decision facilitators can help make choices. A decision facilitator may occur as a result of an event that makes a choice easier. For example, Dr Igor Gonda explained that Acrux favoured going to an IPO in 2003 but they were not getting the desired valuation. They then decided against listing because Acrux had sufficient money and a cooperative VC to back them. As such, there was no reason to do a bad public offering. The support of the VC facilitated that decision. Later in 2003 they again decided to start the process for an IPO. In this case, achieving certain milestones facilitated this decision. Dr Gonda said:

> I think there were a number of key milestones. From the point of external perception, the key milestones were commercial agreements. We got three commercial agreements done. We got Lilly deal done. We got the two commercial deals with Vivus. They certainly were the triggers. We also were making good progress in getting license deals in Australia. This eventually ended up in two deals with CSL. So we knew that there was in interest in Australia. Multiple companies were interested in the product. Commercial deals at that time were the main kind of validation that we believed the market will recognise and that investors will gain confidence.

Similarly, certain options get a more favourable treatment because they are in keeping with the previous 'already decided' strategies or they generate clear win-win situations for the parties involved or both. For example, Cryosite entered into partnership with ATCC because that was in keeping with their earlier business and both the involved parties had something for themselves.[3] Mr Gordon Milliken said:

> Because being a semi-government organisation in America, they are not very good in dealing with the rest of the world. So they provide extremely

[3] ATCC is a global non-profit bio-resource centre. Their mission is to acquire, authenticate, preserve, develop and distribute biological materials, information, technology, intellectual property and standards for the advancement, validation and application of scientific knowledge. (Hwww.atcc.orgH)
Cryosite is an Australian biotechnology company meeting the growing demand for secure off-site, ultra-low temperature and cryogenic storage. (Hwww.cryosite.com.auH)
ATCC licenses/sells its culture cells to laboratories around the world. This requires getting clearance of the local Quarantine department and logistics to handle the transport and maintenance of the cell cultures. It is for this reason that ATCC seeks local distributors.

> core service to individual clients. And also Australia has got some very stringent quarantine restrictions in the world. They couldn't deal with the Australian quarantine system. We can deal with them. ATCC, as part of their business plan, has appointed distributors around the world. To solve their problem, they decided to set up a network of distributors and we were the third last ones to join as their distributors.

7.1.1(b) *Non-Deliberative Styles*

Some styles of deliberations are more frequently associated with unsuccessful decisions (see Table 7.1). Some of the more common types of deliberation styles are discussed in this section.

Decisions that are based on convictions (and/or partial deliberation) are more likely to fail. 'Conviction' was used at an average of 0.357/decision in the 'unsuccessful' category and only 0.177/decision in the 'successful' category. For example, one of the respondents who based his decision on his (and his group members') convictions said:

> We decided that we have the best idea for some of the issues that we needed to address, some of the questions that we were asking related to biological programmes. What we knew was we were going to revolutionise our area, and that was enough because I just figured that you can do all the work you like, it's all bullshit because none of us know where it is going. Now that's what an entrepreneurial business has to do, I think. And I guess our conviction was that the IP that we developed and articulating that into products was going to help transform things, but we had no real idea about how much money it is going to make at that stage.

Without doubt, the result of the above decision was a disaster. While one can sympathise with decision-makers that it is difficult to assess markets for a new product, an entrepreneur can get a feel of the market by talking to potential customers regarding various product dimensions. If a large-scale market assessment cannot be taken, one can do a small study. Helix Genomics is an example of a deliberative approach. Mr Mohan said:

> There is a lot of test marketing, validation and core group identification that took place in this first year. We have picked up a couple of universities in India and UK and also some of the friendly companies. It is always good to go to a friendly company. They will at least be interested, as we have approached. Yes, we do a lot of foot-printing. What is the current man-hour going at the director level? We take interventions at

> various levels, like director, manager, programmer et cetera. We calculate accordingly and fix certain standards in comparison with the IT industry.

Similarly, being attentive to the current business environment can provide insights that inform decisions. Mr Gary Redlich (Peplin) talked about a market related issue for a skin cancer treatment product:

> Then there were questions about whether or not it is possible to change dermatologists that treat skin cancers from the treatment paradigms of abrasion using liquid nitrogen and scalpels for these cancers rather than treating it with a topical cream drug. For that respect it was fortunate that a topical immunomodulator called Aldara owned by another pharmaceutical company and developed for genital warts showed some efficacy in skin cancers…was proceeding through clinical trials and ultimate registration. So we had both the dermatology industry and FDA being prepared for a much more potent drug by this earlier but less potent drug called Aldara. That was a relief to see that starting to happen and to me the uptake of sales in Aldara proving that the market really wanted a less invasive treatment for skin cancer than that it was getting.

The frequency of unsuccessful decisions is high where the issue is complex or the decision-makers have little or no relevant prior experience and do not take expert advice or do thorough planning/formal analysis by themselves (see Table 7.1). A majority of the decisions in the case study firms that failed had these characteristics.

7.1.2 Formal Analysis

How often do entrepreneurs use formal analysis for decision-making, and what is the impact of these decision-making processes on decision outcomes? These two issues are discussed in this section.

TABLE 7.2 HOW FREQUENTLY DO ENTREPRENEURS USE *FORMAL ANALYSIS*?

	Successful	Unsuccessful
Formal Analysis	(Number of Decisions= 34)	(Number of Decisions= 14)
Business Plan	5 (0.118)	0 (0)
Formal planning	3 (0.088)	0 (0)
Professional consultants	16 (0.412)	2 (0.143)
Total	**24 (0.706)**	**2 (0.143)**
Lack of Formal Analysis[4]		
Limited analysis	1 (0.029)	1 (0.071)
No planning	1 (0.029)	5 (0.357)
Total	**2 (0.059)**	**6 (0.429)**

7.1.2(a) *Formal Analysis*

Approaches to decision-making are considered to be types of formal analysis if they involve making business plans[5]; using formal planning methods; and using professional consultants.

Table 7.2 summarises data for the frequency of formal analysis used in 48 decisions. It shows that formal analysis approaches were frequently used (about 26 times in 48 decisions) by the entrepreneurs, but not as frequently as 'deliberation'. In fact, even the professional consultants that are often hired are used more for the purpose of deliberation—that is, giving expert advice—than conducting a formal study. Formal analysis was used about five times as often in successful decisions as in failed decisions (see Table 7.2).

Professional consultants are often used for legal opinions related to IP. During the process of an IPO, they are also hired for various purposes—for example, as external auditors or underwriters. Some may even use their services to write a robust initial business plan so that it gives confidence to investors. They are also used for advising on deal making and for facilitating deals. Professional consultants may also

[4] The difference between 'limited analysis' and 'no planning' is subtle. 'Limited analysis' is where an issue was analysed but the effort was low relative to the complexity and significance of the issue. 'No planning' is used when an issue required some evaluation but nothing was done.

[5] There is not much incidence of writing a business plan, but one must not jump to any conclusions based on this. This is primarily because here an assessment is being done of a decision, and business plans are not written for every decision. The reporting of business plans is also related to decisions/incidents that may have triggered the writing of business plans (like initial funding). In Chapter 8, business plans are discussed and their relevance evaluated.

be hired to advise on operational issues such as clinical trials. In short, professionals are quite often used to provide advice that helps in making a decision or implementing it in the right manner.

Formal planning methods were rarely used to come to a decision-point but, when used, were associated with successful decision-making. For example, after Norwood Abbey signed a deal with Ferndale, it conducted focus groups to get a detailed understanding of its target market. This approach found a potential market that was better than the initial target market. Mr Bernie Romanin (Norwood Abbey) said:

> When we went out there and did some focus groups…we did some market research and some positioning. That's when the market segmentation was done in terms of who is the target market…. Is it doctor or nurse? …all these sorts of things…. So we did a number of focus groups across the US to determine what would be the key factors. So in the end it turned out that the biggest opportunities were in areas where Ferndale did not have an active field force. So we took that ourselves, and that's where the business really is.

Situations, however, arise when planning or formal planning cannot provide all the answers (or cannot reduce significant uncertainty). For example, Dr Wolf Hanisch (CBio) commented on the turn of events soon after he had signed a contract with BresaGen:

> We knew that they were running into trouble at that point of time but firmly believed that they would not be in trouble for another six to eight months, so that makes about three batches. A couple of days after we signed the contract, they went into voluntary administration. Their board recognised that beyond six months they could not meet their obligations, so they went into administration there and then.

Planning cannot remove risk, particularly in circumstances of uncertainty, but it can help to identify and assess the key areas of risk and uncertainty.

7.1.2(b) *Lack of Formal Analysis*

Faced with complex and important decisions, comprehensive analysis and formal methods help to understand the situation better, as can the advice of an expert or a professional consultant (particularly when there is no in-house expertise on the issue).

This analysis shows that failure to do any of these in such situations is likely to increase the probability of an unsuccessful decision.

Table 7.2 shows that, among the 48 decisions, eight were characterised by an absence of formal analysis in situations where careful deliberation might be expected. Of the eight, six (75%) were in unsuccessful decisions.

7.1.3 How Innovative Are Entrepreneurs in Considering and Creating Options?

Do entrepreneurs typically identify and assess a range of options before they make a decision? It is likely to be preferable to have many options, but it is also important that one assess these options simultaneously so that an informed choice can be made in what is often a limited time. The data presented in Table 7.3 shows that successful decisions were more likely to be those where there were more options to choose from—that is, decision-makers at a point in time were looking for multiple options. In 34 successful decisions there were 11 cases when more than one option was considered; that was only the case twice with unsuccessful decisions. For example, in talking about Phenomix's impressive first round of fundraising, Dr Keats Nelms said:

> We presented to probably 20 different VC firms in California. Ultimately, Sofennova Ventures led the investment around including Bay City Capital, CM Capital, Rothschild as well as few others. So we ended up with a consortium of really strong VC firms.

Similarly, Dr Keith Williams said that he was pursuing a number of prospective partners before Proteome Systems signed a deal with Shimadzu:

> We talked at that time with Hewlett Packard; we talked with BioRad; we talked with Brooker; we talked with Applied Biosystems; we talked with Perceptive, who were subsequently acquired by IBI; we talked with Thermo Finnigan…we talked with everyone.

TABLE 7.3 GENERATING AND CONSIDERING OPTIONS

	Successful	Unsuccessful
	(Number of Decisions= 34)	(Number of Decisions= 14)
Looking for multiple options simultaneously	**11 (0.324)**	**2 (0.143)**
Contrive	**6 (0.177)**	**0 (0)**
Common Approach		
Common approaches	13 (0.382)	5 (0.357)
Rule of Thumb	1 (0.029)	0 (0)
Total	**14 (0.412)**	**5 (0.357)**

As shown in Table 7.3 entrepreneurs often pursue a variety of options at any given time. Multiple options were also considered more in successful than in unsuccessful decisions. But how innovative are the entrepreneurs in identifying options or approaches? As summarised in Table 7.3, the analysis shows that entrepreneurs usually rely on approaches that are common (traditional) to an industry when it comes to decision-making or decision implementation. The analysis suggests that in many cases entrepreneurs don't really make a choice; they follow the standard procedures. They often take a common approach, with the view that 'it is the way things are done'. This approach may give them and other stakeholders a sense of security (the perception of reduced uncertainty). For example, trying to get VC funding in the early stages of a venture is a standard approach (at least in biotechnology). The approach to get VC funding is almost always the same. Mr David MacInnes (Plantic Technologies) explained the approach:

> Normally what happens is that you put together an information memorandum, and that information memorandum is used as a basis for discussions for raising capital. Then if a group is interested, they will then put down a term sheet. That term sheet will include all the terms and conditions of investing in the company. And part of that is due diligence as well. It is quite a detailed process. If you satisfy all the due diligence questions, they commit to give you the money. So we went down that route.

Similarly, it is almost a standard practice in Australia to go for public listing after a couple of private equity rounds. For example, Dr Igor Gonda (Acrux) gave this generic view of the IPO process:

> Well, you invite a number of potential advisors who have the experience of doing a number of IPOs with companies in their sector. You tell them who you are, what is the stuff you are developing, who are the people et cetera. After this you say that you want to do an IPO and tell them about the parameters that you are looking at. You then ask them to tell if they would be interested and how will they take and what it would cost. You then wait for proposal and then build a syndicate with the leader of the syndicate. So that's the process. Then there is a due diligence process. You hire the consultants and build the IPO material.

Likewise, there appear to be relatively standard practices for how to approach prospective pharmaceutical companies (which can be a prospective partner). The extent to which these entrepreneurs resort to standard approaches is surprising. Standard approaches may be appropriate for standard situations. Charismatic, capable and experienced entrepreneurs can often manage when non-standard challenges arise. But complex challenges require complex deliberation.

7.1.4 'Selection' Styles of Entrepreneurs

The different types of 'selection' styles were discussed in Chapter 6 (where they were termed *decision end points*) and are listed in Table 7.4. In this section, these styles are grouped into two categories:

- styles that are generally seen to be constructive in nature and considered; and
- styles that are generally not seen to be constructive or well considered.

The analysis assesses whether there is a relationship between the outcome of a decision and the selection styles that characterised the decision-making.

The decision-making process in the 48 decisions involved 98 instances of specific decision-making styles. Some decisions were characterised by one decision style (e.g., an opportunistic response to new circumstances or a decision forced by an investor) while other more complex decisions involved a combination of styles. Overall, the constructive selection styles are more often observed with successful decisions, and the less constructive and considered selection styles are more often observed with unsuccessful decisions. In fact, in unsuccessful decisions, these latter styles are more than three times as frequent as in successful decisions; constructive styles were more prevalent (about four times more frequent compared with risky styles).

TABLE 7.4 'SELECTION' STYLES OF ENTREPRENEURS

	Successful	Unsuccessful
	(Number of Decisions= 34)	(Number of Decisions= 14)
Select - Constructive and Considered		
Natural Decision	12 (0.353)	5 (0.357)
Opportunistic	12 (0.353)	2 (0.143)
Negotiation	11 (0.324)	1 (0.071)
Persuasion	5 (0.147)	0 (0)
Easy Decisions	5 (0.147)	3 (0.214)
Involvement	8 (0.235)	1 (0.071)
Unexpected Good luck	6 (0.177)	0 (0)
Compromise	2 (0.059)	2 (0.143)
Need based- Business forced	4 (0.118)	0 (0.071)
Trust decisions	1 (0.029)	0 (0)
Total	**66 (1.941)**	**14 (1.0)**
Select - Not Constructive or Considered		
Ad hoc	1 (0.029)	2 (0.143)
Conflict	5 (0.147)	2 (0.143)
Politics	1 (0.029)	0 (0)
Business environment forced upon	0 (0)	3 (0.214)
Deliberate risk taking	0 (0)	1 (0.071)
Forced Upon	0 (0)	3 (0.214)
Total	**7 (0.206)**	**11 (0.786)**

Ad hoc decisions were an exception rather than the rule; opportunistic and easy decisions are far more common. (The subtle difference among them is discussed in Chapter 6.)

It is surprising to note that the average incidence of conflict is similar in both successful and unsuccessful decisions, although the numbers here were too small to be analysed. However, it should be noted that conflict often did have a serious negative impact on the company, even if it was eventually resolved and a particular decision process could turn out to be a success.[6] Conflicts in the decision process may be due to politics within the company or a variety of reasons, including different viewpoints.

The average incidence of natural decisions is similar in both successful and unsuccessful decisions; there was an average frequency of about 35 per cent. This is in part because the definition for a natural decision (see Chapter 6) is very broad. A

[6] There were usually divergent viewpoints on a subject, but conflict was due more to vastly different viewpoints arising out of different interests. It takes more time and effort to resolve conflicting viewpoints than diverging viewpoints.

natural decision can be a deliberated or a non-deliberated decision. It can be a simple decision that does not need the involvement of all stakeholders or it may be a complex decision that involves all the decision-makers. It might also have to be formally authorised. It can also be an opportunistic decision. It simply means that there is a high degree of consensus on that decision and it is the preferred option. However, it should be noted that there is a relatively high degree of involvement of the key decision-makers in successful decisions compared with failed decisions. The picture gets clearer when the natural decision is associated with involvement. Almost all the instances of involvement were associated with natural decisions and almost all of them led to a successful outcome. Most of those decisions with involvement were complex and strategic decisions that had a significant impact on the respective venture. Examples include the first round private equity funding for Phenomix; the IPO of Acrux; the licensing of the Aridol and Bronchitol projects by Pharmaxis; and an early IPO decision for Peplin et cetera. A natural decision with the involvement of all the stakeholders doesn't guarantee a successful outcome, but it does seem to facilitate the decision process.

Negotiation and persuasion are more often seen in successful decisions. In those cases, there was more discussion and thinking on issues related to a decision among the stakeholders and decision-makers.

Similarly, forced decisions generally have a negative outcome. Few instances of these were identified. It is generally believed that founder entrepreneurs dominate the new venture, and so it might be expected that they individually take most of the decisions. However, this is not the case in biotechnology ventures because entrepreneurial teams (and not an individual entrepreneur) usually form them. As such, the involvement of most members is common. In view of this, it is not surprising to find that edict type decisions are also not common.

7.2 Are There Any Patterns to be Seen?

7.2.1 Visual (Diagrammatic) Patterns

A further attempt was made (see Chapter 6) to identify patterns of decision-making through diagrammatic analyses, in this case based on the performance of the decision.

Diagrams of the decision-making process in cases of successful decisions were grouped, as were similar diagrams for unsuccessful decisions. No generic diagrammatic patterns were found through this method. An alternative approach was tried by: first dividing the patterns in the different types of processes that were discussed in Chapter 6 (decision-making; decision implementation; and decision-making and implementation) and then separating decisions that were successful and unsuccessful. This led to six categories. Unfortunately, it still was not possible to convincingly say that there were generic diagrammatic patterns for each group. This approach to analysis based on diagrammatic patterns (as used by Mintzberg et al., 1976) was consequently abandoned.

7.2.2 Non-Visual Patterns (Statistical Analysis)

Nevertheless, the data in Table 7.1, Table 7.2, and Table 7.4 suggest that there were clear distinctions between successful and unsuccessful decisions. Successful decisions appeared to be more thoroughly deliberated or analysed and associated with positive styles of decision end points or selection. This suggests that entrepreneurial decision-making, at least in these cases, was not a unique style of decision-making, as is often assumed.

Residual maximum-likelihood (REML) was chosen as the statistical analysis method because the data was unbalanced with respect to the positive versus negative elements of the decision process. For the model, there were four positive categories (deliberation, deliberation facilitators, formal analysis, and select—constructive and considered), and only three negative categories (non-deliberative styles, lack of formal analysis, and select—not constructive and considered). Table 7.5 summarises the outcome of the REML analysis. It indicates that there is a significant interaction between the approach to decision-making and the successfulness of the decision (p= 0.007).

TABLE 7.5 DOES THE APPROACH TAKEN DETERMINE THE OUTCOME?

Fixed term	Wald Statistics	d.f.	Wald/d.f.	Chi pr
Decision Process Elements (DPE)	4.60	2	2.30	0.10
Result (Success/Failure)	0.24	1	0.24	0.625
Approach (+/-)	1.68	1	1.68	0.195
Result.Approach	7.26	1	7.26	0.007

TABLE 7.6 TABLE OF PREDICTED MEANS OF APPROACH.OUTCOME

	Positive Approach	Negative Approach
Success	1.454	0.167
Failure	0.557	1.000

The predicted means of the interaction between approach and outcome is given in Table 7.6. The average SED (standard error of difference) is 0.4559. Table 7.6 shows that there is a significant relationship between the decision-making process and the successfulness of the decision and that the greater the use of positive approaches to decision-making, the higher the likelihood (about 1.454/0.557= 2.61 times) of a successful decision. Similarly, the greater the use of negative approaches to decision-making, the higher the likelihood of failure (about 1.0/0.167= 5.99 times).

7.3 Discussion[7]

As discussed in Chapter 2, the vast majority of researchers in the field of entrepreneurship define an entrepreneurial style of decision-making with words like 'ad hoc', 'opportunistic', 'intuitive' and 'judgmental'. The use of these words for entrepreneurial decision-making is so common that they are seen as trademarks for entrepreneurship.

Chapter 3 outlined how the rational approach to decision-making had been criticised for not adequately taking into account bounded rationality and emergent strategies. One researcher argued that top executives rarely use a 'rational' decision-making analysis and that their approach would come closer to 'what people call 'intuition'' (Mowen, 1993:230). Mowen (1993) further added that other researchers have found the same phenomenon: the higher up one goes in the organisation, the more decision-making appears to be intuitive rather than rational. It is therefore not a

[7] The extent to which these findings can be generalised outside of the biotech sector is discussed in Chapter 10.

surprise that entrepreneurial decision-making is considered to be intuitive. This is because during the early stages of a new venture, founders, along with the initial senior managers, are the top executives responsible for decision-making.

Mowen (1993:216) writes that researchers may be quite right about the decision-making styles of top executives because 'rationality does not necessarily lead us to any particular conclusion; rather, it is the key to avoiding logical errors for reasoning.' He quotes an unnamed authority on decision theory who observed that rationality 'dictates what *cannot* be concluded, *not* what can' (p. 216). Mowen (1993) explains that once the options reach top executives, they have been so analysed that the bad options have already been filtered out. Those that are left have so little cost-benefit difference that, at that point, judgment and wisdom are what is required.

This explanation is not relevant to the case of decision-making in new ventures. This is because top executives in new ventures do not have the same filtering process to depend upon. The results presented here and in Chapter 6 show not only that careful deliberation had a major role on the decision-making of these entrepreneurs but that such an approach was positively related with successful decisions.

Russo and Schoemaker (2002:102) have also observed that '[m]anaging uncertainty doesn't mean accepting vague projections, making wishy-washy recommendations, or abandoning planning… The challenge for decision-makers is not to eliminate all surprises, but to anticipate—and prepare for—them.' They caution that the successes of intuitive choice are exaggerated and its risks greatly underappreciated. Fiet et al. (2005) also propose that entrepreneurs should avoid defining subjective probabilities for problems about which they do not already possess prior knowledge. The risk is greater when the decision is important and complex and has to be made in an uncertain environment. Such decisions should be evaluated systematically to increase an understanding of the options (Russo & Schoemaker, 2002:142). It is not surprising that this analysis finds that successful decisions have a relatively higher frequency of deliberation and formal analysis.

Systematic evaluation need not be exhaustive. In fact, most of the time, new ventures have resource and time constraints on decision-making. They then have to

rely on simple probes and improvisation techniques (Brown & Eisenhardt, 1998:47). Real-time communication is very useful because it lessens the time constraint (Brown & Eisenhardt, 1998; Eisenhardt, 1989). Managed effectively, obtaining real-time information is less expensive than the traditional formal means of information gathering. Entrepreneurs rely on their social networks and other simple and quick methods (such as conferences, exhibitions and trade journals etc.) to get information. They also often make use of professional consultants for many complex assessments and when their own understanding in a particular area is limited. They also seek to employ (full-time or part-time) industry experts with current knowledge in the required domain area as soon as the need arises and they have the resources to do so. This also gives them quick information. So the observation made by Brown and Eisenhardt (1998:33) that '[i]n the managerial situation, improvisation is about extensive, real-time communication in the context of a limited structure with a few sharply defined responsibilities, strict priorities, and targeted deadlines' is very appropriate.

Formal analysis can be quite time consuming and even expensive. Because of this, it should be used for complex and important decisions, 'especially those that are now-or-never and can't be reversed or substantially revised later' (Russo & Schoemaker, 2002:157). For example, in some arenas, such as those related to investments in emerging technologies, early stage R&D and entry into new foreign markets, uncertainty will be sizable. Therefore, it is suggested that decision-makers commit to planning even though some uncertainty will always remain (Russo & Schoemaker, 2002:66).

It is also equally important to generate a variety of options to choose from. Eisenhardt (1989) found from her empirical study that successful entrepreneurs looked for several options simultaneously that greatly hastened the decision-making process. Russo and Schoemaker (2002:60) observe that 'without good alternatives to choose from, it is impossible to make a good decision.' It is the understanding of the full range of options early in the decision-making process that puts one on a stronger footing in later stages (Russo & Schoemaker, 2002:70-71).

Once the alternatives are generated, they should be evaluated, which can be done by deliberation, formal analysis or both. Nutt's (1998a) empirical results also

demonstrate that success and adoption rates are higher for quantitative and qualitative assessments than for subjective assessments. An expert's advice and prior relevant experience can quicken that evaluation. Russo and Schoemaker (2002:157-158) suggest that even formal decision weighting models can be built quickly by using one's judgment (particularly if it is based on prior knowledge and not just gut feeling) to assign the importance of weights. They add that 'thinking first and then guessing is better than blind guessing' (p. 88). They further suggest that if one resorts to judgement as a decision tool, it is a good idea to improve on it by using the judgement of many people.

This study shows that ad hoc decision-making is unusual, if not a rarity. Entrepreneurs are more likely to involve other stakeholders and decision-makers. This is more often the case when it is an important and complex decision, and it is also more often the case in successful decisions. Apart from that, involvement (especially of board members) most often leads to a natural decision because, according to Coch and French (cited in Nutt, 1998b), people react more favourably and become more committed when they participate in the decision process.

Entrepreneurs also involve key players related to a decision with persuasion and negotiation. Persuasion is often accompanied by a more formal means of analysis, including the support of professional consultants and experts, to back up claims (Nutt, 1998b). Similarly, negotiations are also used to come to a decision. Both persuasion and negotiation were associated more with important and complex decisions and were more likely to occur in successful decisions. This may be because they generate positive feelings of involvement; stakeholders feel 'listened to' and develop a greater understanding, which leads to their accepting the decision.

Quite contrary to the image of entrepreneurs as dominating individuals, edict type decisions were not observed. Similarly, decision-making processes dominated by politics were not observed much in the new ventures. It perhaps because of this that the elaborate 'micro-politics' of the decision-process, as outlined by Narayanan and Fahey (1982), were not observed. Whenever there was politics, it had a detrimental effect on the health of the new venture. The absence of politics, however, does not mean that there are no divergent viewpoints. There may well be divergent viewpoints, but they can often be resolved by involving people.

One important aspect of the decision process, especially when the context is dynamic and complex, is real-time learning and correcting. This calls for a real-time evaluation of the outcome. This leads to iterations that feed into the decision process continuously until the desired results related to a decision are arrived at. Adaptiveness, in conjunction with approaches to decision-making that produce successful decisions, seems to be ideal. Brown and Eisenhardt (1998:12, 34) explain it in the following way:

> The edge of chaos captures the complicated, uncontrolled, unpredictable but yet adaptive (in technical terms, *self-organized*) behaviour that occurs when there is some structure but not very much…. The chaos trap arises when managers go too far and demonize structure as the anathema that stifles freedom, flexibility, and innovation.

In summary, good decision processes are the best hope for good decision outcomes (Russo & Schoemaker, 2002:161). Mowen (1993:233), quoting other researchers in judgement and decision-making, makes a similar observation:

> Intuition is fine for small decisions—where to buy groceries, how to organize your filing cabinet…but…you can develop procedures that will make your decision better than your own unaided intuition. If you follow sound procedures, you will have a better chance of achieving your goals than if you just make a choice because it 'feels right.'

Chapter 8

Does Relevant Experience Make a Difference to the Decision Process?

Chinese Proverb: Fool me once, shame on you; fool me twice, shame on me.

Start-up characteristics not only determine start-up performance (Reuber & Fischer, 1999) but also lay the foundation for a stable business which can be expected to grow (Brown & Eisenhardt, 1998). The initial strategy and structure of a venture affect performance over the longer term, according to many authors, because organisations usually tend to change only incrementally or to remain unchanged rather than to change radically (Reuber & Fischer, 1999). One of the most important decisions that the entrepreneurial team takes is to start a new venture. Along with the decision to start a new venture are two very closely associated decisions: what will be the business, and how to raise funds for it.

In this chapter, the 'initial start' is analysed as one single major decision[1] and the decision process is related to the experience of the entrepreneurial team. This is because in the very early stages (pre founding and just after founding) the entrepreneurial team is a key resource and asset for a new venture, on which to a very great extent success or failure is based.

The differences (if any) are assessed between decision processes where people with relevant experience were involved and those where people without any relevant experience were involved. This will highlight the importance (if any) of 'relevant' experience for decision-making and implementing. This should be seen as an extension to the previous chapter. This chapter begins with a review of prior studies that directly address the issue of experience and decision-making. It then presents and analyses the relationships between experience and decision-making in the case study ventures.

8.1 Prior Research on the Role of Experience

In Chapter 7, it was shown that deliberation is frequently used in the decision process, even in a new venture context. This is perhaps due to the need for real-time information gathering in making a choice. Gavetti et al. (2005) says that

[1] In this research, the 'initial start' decision is considered to have ended once the new venture has got the first round of external funding because, in some ways, this can be taken as the approval of the business concept. In a few cases, the external funding was either not sought or could not be raised. In that case, a near stability in business concept was taken as the end of the 'initial start.'

The 'initial start' is not actually a decision; not even by the definition used in this thesis. It is a conglomerate of several decisions. For the purpose of this study, 'initial start' is one decision process to study various elements of the decision process that were associated with the whole process.

entrepreneurs' reasoning for choices is based neither on first principles of economics nor on unguided search. Rather, it is based on thinking back through their experiences and reflecting on them.[2]

Mitchell (1997) has argued that experience is central to the entrepreneurial process. Frederickson (cited in Hambrick and Mason, 1984) found that the decision processes of experienced managers differed markedly from those used by inexperienced managers because experience allows managers to test and finetune a cognitive model that produces more successful decisions. It appears that experts' recall of information is less biased and they focus more than novices on inconsistencies in the 'stimulus material' (Fiske et al., 1983). Novices tend to organise knowledge around literal objects and surface features explicit in a given problem statement. Experts, on the other hand, have a process schema derived from knowledge of the subject matter (Lord & Maher, 1990). Chi et al. (cited in Lord & Maher, 1990) argue that experts achieve a high level of competence because their organised body of conceptual and procedural knowledge can be accessed and integrated with superior monitoring and self-regulatory skills. It is these traits of an experienced decision-maker that are likely to help address uncertainties related to a decision (due to the many contextual factors, which were discussed in chapters 2 and 3). Mowen (1993:37) says that 'with experience comes the ability, even under circumstances of extreme uncertainty and risk, to make high-stakes decisions in your personal and particularly in your professional life—judgement calls that will measure up to the highest standards of competence and withstand the test of time.' Mowen gives several examples to make his point. One example is provided in Box 8.1.

Experience as generally perceived not only is a function of time duration but also depends on the type of experience (e.g., function). Hitt et al. (1982) and Hitt and Ireland (1985, 1986) found relationships between the importance placed on certain functions (distinctive competencies), strategy and performance. Smith and White (1987) found a relationship between a firm's strategy and the career specialisation of top executives. For example, the study by Hambrick and Mason (1984) also supported

[2] Understanding the effect of 'experience' has had a profound effect on management science. Rumelt et al. (1991) earlier observed that the 'experience curve' was the first wedge driven in the split that widened between the study of management process and the study of competitive action and market outcomes. In fact, the logic of experience-based competition was not imported from economics but was developed within strategic management and exported to economics.

the viewpoint that executives' experience and functional knowledge moderate the relationship between objective criteria and strategic evaluation. According to Aldrich (cited in Politis, 2005), people tend to start businesses in industries in which they were previously employed because their employment experience allows them to take advantage of information about the exploitation of opportunities gathered from their previous employment. Politis (2005:406), quoting Shane and Shepherd et al., says that this may be because 'entrepreneurs often face uncertainty about the value of the goods and services that they plan to produce, [so] it seems fair to assume that also industry-specific experience can have a strong influence on their development of entrepreneurial knowledge.' Deakins and Freel (1998) emphasise that entrepreneurs start enterprises in sectors where they have some contacts and existing expertise. This is especially the case in the biotechnology industry. It is also important to be aware that this is often the case because biotechnology is a very technology intensive business which is beyond the scope of most entrepreneurs unless they are expert in the domain area involved.

Box 8.1 An Example of an Experience-based Decision

Mowen (1993:242):

'A couple of years ago, I interviewed a number of executives in independent oil firms that had made it through the great oil bust of the 1980s. What I found was a group of mature, older individuals. They averaged well over twenty years each in the oil business. They had seen the good times and the bad. Previous experience had taught them that booms are followed by busts. They had learned that the worst thing an 'oilman' can do is highly leverage his company. Those who lost it all when the boom ended were most frequently the less experienced who had seen only the good times of the exploding oil prices of the 1970s. They took on massive debt loads in order to expand with the times, and when the plunge occurred, they crashed and burned.'

In a high technology new venture it is not only industry specific technology experience that matters but also management experience. Prior management experience, according to Shane, and Lorraine and Dussault (cited in Politis, 2005:404), 'provides entrepreneurs skills that are needed for coping with the liabilities of newness, such as selling, negotiating, leading, planning, decision-making, problem solving, organizing, and communicating.' And it is all the better if that management

experience is in the industry concerned. Lorraine et al. (1992) showed empirically that both previous management experience and previous industry experience were significantly and positively related to performance in each of the five industries they studied. A wonderful example is 'Parable of the Kitchen Spindle,' which was first published in the *Harvard Business Review* in 1962 but is cited by Russo and Schoemaker (2002) to explain the advantage of relevant experience. The example is about how a restaurant manager tries to solve a problem by talking to experts in different fields (such as anthropology, sociology and business administration etc.) but actually finds a simple workable solution from an employee who had worked in restaurants all his life.

Cooper, et al. (cited in Politis & Gabrielsson, 2005) had individually come to the conclusion that a variety of experiences in different functional areas was an indicator of better new venture performance. Gavetti et al. (2005) reach a similar conclusion. The rationale for this can be deduced from the observation by Dearborn and Simon (1958) that 'executives define problems largely in terms of the goals and tasks in their respective functional areas.' This implicitly means that a wider breadth of experience will lead to a more holistic understanding of an issue.

It is reasonable to assume that an entrepreneur or an entrepreneurial team with varied experience in a range of functional areas will have a better chance of survival. The link between type of experience and performance is explored in the following chapter. However, in this chapter, the analysis focuses on whether there is an observable difference in the decision process in a venture having access to a diverse set of skills (especially business skills, as technology skills are taken to be given in a biotechnology company).

8.2 Are 'Experience' and 'Expertise' the Same?

According to Reuber (1997), 'experience' is a broader construct than 'expertise'. For example, a person may have had an experience of a start-up but have an expertise only in managing technical projects and not in raising funds for a start-up. Reuber argues that there are various definitions of 'expertise' based on two distinct views:

- A *cognitive-based view* defines expertise as the 'possession of an organized body of conceptual and procedural knowledge than can be readily accessed and used with superior monitoring and self-regulation skills.'
- A *performance-based view* defines expertise as the 'ability, acquired by practice, to perform qualitatively well in a particular task domain.'

Reuber (1997), however, draws attention to the fact that these two views of expertise are not inconsistent. She explains that 'the first definition emphasises and measures cognitive attributes, presuming that they lead to superior performance, whereas the second definition emphasises and measures performance, presuming that it is a consequence of cognitive attributes' (p. 51).

Expertise, then, is related to excellence gained in a narrow task-specific domain that is acquired by in-depth experience in that particular domain (Mitchell, 1997; Reuber, 1997).

8.3 What is More Useful for a Start-up: Experience or Expertise?

Most new ventures have only one or a few key managers at their core and relatively few levels of internal hierarchy (Mintzberg & Waters, 1982). The potential for individual characteristics to influence firm behaviour is therefore especially great in new ventures (Forbes, 2005). On the basis of these observations, it is reasonable to think that it will be more valuable for the entrepreneurial team (composed of a small number of people) to have experience on various tasks rather than in-depth expertise in a few (Reuber & Fischer, 1994). This is not to say that experience is more desirable than expertise in the core function. In fact, it is desirable to have a wide array of experience-based skill sets along with expertise in the core functions (e.g., expertise in a technology area which forms the basis of the new venture).[3]

Reuber (1997) says that the most effective managerial skills are specific to particular contexts, such as industries and organisations, rather than generalisable across contexts. One would expect that a broader set of experiences (even if they are specific to a context such as an industry) would be relevant at higher managerial

[3] It is, however, important to be aware of the types of expertise that are available externally and what capabilities are required internally to know, assess and use this external expertise.

levels where there is less structure and more discretion. Indeed, a much broader set has been investigated in the entrepreneurship literature (Reuber, 1997). Knowledge of particular jobs, organisations and industries is likely to be more consequential for the development and demonstration of management expertise than task specific knowledge.

Chandler and Hanks (1994) have also argued that managerial competence is more important than experience. Their characterisation of managerial competence seems similar to expertise (as defined by Reuber & Fischer, 1994). Of course, as noted above, there is no doubt that expertise will most certainly be more useful than just experience (in a given area). However, new ventures are unlikely to have the full range of necessary expertise. It is preferable for them to have a breadth of skills with expertise in core areas only rather than expertise in a few and not much experience in many other areas.

8.4 Impact of Relevant Experience on the Decision Process – 'Initial Start' as the Decision Unit

In any high technology venture (and biotechnology is no exception), the two required skill sets can be generically categorised as 'business' and 'technology.'[4] Decisions, even in new ventures (and especially important ones), are rarely made in isolation. Most biotechnology companies (including those in this research) have been started by more than one individual. As biotechnology ventures have to source early financing, stakeholders and key senior management people (who may not be founders) are in place from an early stage. Hence the need to discuss experience (in Chapter 8 and 9)

[4] Reuber and Fischer (1994) suggest that expertise in one area may be related to, or required for, expertise in another. For example, an entrepreneur requires expertise in strategic planning in order to exhibit expertise in financing. It was not possible to sort out these finer details and relationships with the data collected, so a broader category was used.

in terms of the entrepreneurial team.[5] Where there is a single entrepreneur as the only key decision-maker, he or she will also be taken as an entrepreneurial team.[6]

Because all the new ventures in this study had at least one individual with relevant technology experience (i.e., a technology expert in the domain area of the new venture) in the entrepreneurial team, it was assumed that business related skills were likely to make the difference.[7] Chandler and Hanks (1994:77) have emphasised the importance of management and argue (while quoting others) that 'those who finance new ventures consider the 'quality' of the management to be a significant factor in financing decisions.' Therefore, in order to operationalise these distinctions, entrepreneurial teams were sorted into three categories: having relevant business experience; having non-relevant business experience[8]; and having no business experience.[9] The differences, if any, in decision process style among these three categories are explored in the following section.[10]

[5] Vanaelst et al. (2006) say that entrepreneurial teams are often investigated within a static framework—i.e., teams that are founded during the very early stages. They say that the dynamic construct of entrepreneurial teams while investigating decisions should consider the new members that join the team and are part of decision-making for a particular decision. However, the construct of 'entrepreneurial team' is used here as the one that was set up quite early. This is because this set of people, on the basis of their experience, determine who to hire, when to hire and why to hire. The need to recognise new team members was operationalised by having the code 'internal expert advice' when there was the key involvement of a person who had joined later.

[6] Team size would definitely matter, but that is not the direct focus. The two important issues related to size are: breadth of experience and ease of communication. The former is manifested directly in this research. The second construct, ease of communication, is addressed in the 'select' phase of decision process (like conflict, involvement, etc.).

[7] Srivastava and Lee (2005) have noted the importance of education of the TMT (top management team) and the team size. It is to be noted that people who are well qualified founded most of the biotechnology start-ups in this sample. Higher education is taken as given in a biotechnology start-up, as has already been stated in Chapter 6.

[8] Cooper et al. (1994) and Kor (2003) have shown that industry-specific experience makes a lot of difference to the new venture in terms of survival and growth.

[9] Vanaelst et al. (2006), quoting several researchers, say that 'when new ventures apply for early stage venture capital funds, the question of a well-balanced team with sufficient business experience is often raised by the potential investors to evaluate a project.'

Berry (1996) concludes that in the small high-tech ventures where the skills of the technical entrepreneur are balanced and complemented with those of managers from other functional areas, a multidisciplinary approach to the formulation of corporate strategy is apparent and the concerned entity is more market-led.

[10] The initial start of 27 new ventures was discussed in detail. Of these 27, nine ventures had relevant business experience in their entrepreneurial team; 12 had no business experience; and six had business experience skill sets, but the experience was not in the pharmaceutical and biotechnology industry.

8.5 Effect of 'Relevant' Experience on the Decision Process

The question of whether relevant experience makes any difference to the decision process will be explored in this section. This is explored through an examination of the difference in 'average' counts for entrepreneurial teams with different experience on each of the elements of the decision process: deliberation styles; non-deliberative styles; deliberation facilitators; formal analysis; lack of formal analysis; select—constructive and considered; and select—risky and not considered.

8.5.1 Deliberation Styles

An entrepreneurial team that has relevant business experience uses deliberation styles twice as often as teams that have no business experience or have no relevant business experience (see Table 8.1).

TABLE 8.1 PRIOR BUSINESS EXPERIENCE AND DELIBERATION STYLES IN DECISION-MAKING

→ Prior Experience	**Relevant**	**No**	**Non-relevant**
→ Number of Entrepreneurial Teams	**9**	**12**	**6**
Deliberation Styles			
Deliberation[11]	22 (2.444)	11 (0.917)	6 (1.00)
Logic	11 (1.222)	7 (0.583)	5 (0.833)
Planning	5 (0.556)	2 (0.167)	5 (0.833)
Expert Advise	4 (0.444)	7 (0.583)	0
Internal expert advice	5 (0.556)	2 (0.167)	0
Directed search	1 (0.111)	1 (0.083)	0
Total	**48 (5.333)**	**30 (2.50)**	**16 (2.667)**

Note: The first number in each column (not within brackets) indicates the total number of that particular sub-element found in various categories (i.e., 'Relevant,' 'No, 'and 'Non-Relevant' experience). Because the number of decisions assessed within each category is different, it was more prudent to compare the average of incidence of sub-elements in each category. The same method (and logic) is used in the following tables. (Refer also to the coding style discussed in Chapter 5.)

[11] 'Deliberation' is used to denote active and conscious thinking, careful thinking, creative thinking and discussions. It doesn't include logic and knowing thy area. The former approaches are considered to be more proactive whereas the latter approaches are more passive.

8.5.1(a) *Deliberation*

'Deliberation' is the style most favoured by all three types of entrepreneurial team. However, the intensity (i.e., frequency) of deliberation is highest in entrepreneurial teams with relevant business experience. Such teams seem to be thinking and discussing more issues more often and in greater depth. Entrepreneurial teams with no or no relevant experience have a much lower average frequency of deliberation. Their lack of knowledge in business matters may result in their recognising fewer issues to deliberate upon.

It is interesting to note that most of the deliberation takes place on issues related to the development of the product and on fundraising issues. This should not be too surprising because biotechnology ventures are generally known to focus on IP development; the marketing of end products (especially of therapeutics) is generally beyond them due to the huge resources that are required to even be able to complete the product development. But even in building value by developing IP, the resources needed to keep R&D going is the biggest issue. Deliberations related to the development of technology are not related to technological issues per se but features that may affect its successful commercialisation. For example, Mr Gary Redlich (Peplin) talked about some decisions related to their product:

> For a period of time we were considering the question of whether or not a less purified fraction from the plant might be marketable as a complementary product across the counter for skin cancer and other diseases and it became clear that it will unduly complicate the potential licensing program for the single molecule to a pharmaceutical company. So we decided to do the safe thing first, which was to license the pure molecule first and then think about what we might do with less pure fractions when we figured out what the licensing conditions are going to be for our first deal.

He further elaborated on another dimension—the cost of the product—which could have a major impact on the commercial benefits of their product:

> There were questions all along regarding the cost of goods. How will you manufacture something that will always be a plant derived purified molecule and not ever be something that can be synthetically manufactured? So we spent a lot of time and a lot of effort and money resolving the question of production to the point where we were confident that we can make and sell this drug at a price that will make it an attractive licensing prospect.

However, if the biotechnology venture is selling products or services, it is important that they carefully look into different aspects directly related to their prospective customers. Simply having a superior technology may not lead to success. Dr Marc Wilkins (Proteome Systems) talked about their deliberation effort:

> We did ask ourselves questions. Is it a valuable offering? What is the best way to really capture that value? Well, I guess traditionally people will look it as: 'Here are 10 different components; what is the price of all these? And you pay the price for what these 10 things are up to.' Another way of looking at it is: 'OK, the sum of these components in terms of its value is greater than the cost of each of the bits and pieces that are added up.' So the question was that how do we make sure that the value is appropriately reflected in the price and at the same time having to make sure that the customer understands the value and is comfortable with a platform that is going to cost a little bit more than just the sum of 10 different components.

8.5.1(b) *Logic*

Simple logic is also used quite often during the decision process, however at only about half the average frequency of deliberation. Yet again, it is entrepreneurial teams with relevant business experience that seem to use it more often than those who have no or non-relevant business experience (see Table 8.1).

It is observed that entrepreneurial teams use simple logic in the decision process when the subject matter is a simple choice or the choice is very obvious. Simple logic is also used to arrive at a certain option. However, if the option is related to an important and complex decision, that should be verified before committing to it. Due diligence is essential. Committing to an important decision based only on logic can be dangerous. For example, one respondent (who was primarily an academic) talked about the reason for collaborations, which seemed quite logical. However, alliances based on this simple logic and not due diligence meant that quite a few partnerships did not work:

> The reason we are successful in discovery is because we had an excellent technology and excellent technologists. And it is also because we have excellent scientists, so it is all those things. But we certainly couldn't have been experts and innovators in our field without the technology. So we need to continue to innovate and develop new technologies; we can't afford to do all these in-house. So we need to partner around those

> opportunities. So we are very proactive in seeking potential partnerships with companies that are interested to co-develop or fund the development of certain technologies that then would have sales and marketing rights.

On the other hand, Dr Sudhir Pai (an experienced pharma industry professional) of Lotus Labs talked about how he accidentally came across an idea for a new venture that logically made sense. Due diligence processes were still undertaken to confirm it. The decision turned out to be very successful. He said of his idea:

> We then also realised that a lot of Indian pharma companies are getting into US and European market, which will have requirement to conduct something like this [pharmacokinetics and clinical trials]. And all of the studies that they were doing were conducted in either US or Europe, which was very expensive. We thought that we could start something like this here and make it as good as any European or US company in terms of quality. We then had good chance of making big.

8.5.1(c) *Planning*

Table 8.1 shows that entrepreneurial teams with business experience that is not of direct relevance use planning more often than those that have either relevant business experience or no business experience. However, in view of the difficulty in distinguishing between different deliberation styles, including planning, no definite conclusions should be drawn from this (see Chapter 6). Most of the planning done was of a fairly simple nature with a bit of forward thinking and was useful for the teams to fill the necessary gaps. For example, Dr Richard Brandon (Genetraks) said of their decision to hire a chief financial officer (CFO) before fundraising:

> Well, the next step was to bring in Stephen Hendricks, who was pretty much the chief financial officer. We had got only three people. We all were chiefs but he was doing finances. He has got an accounting background and an MBA background as well. So he knew all of those things and he had a lot of experience in running his own business and also in attracting finance to other people's business by acting as consultants. Once we got to a certain stage, so he came in and did that part of the business.

There is, however, no particular single decision or an aspect of a decision for which planning is done or favoured. It appears to be used for many types of decisions.

8.5.1(d) *Expert Advice*

Entrepreneurial teams with no business experience rely on external expert advice more often than entrepreneurial teams with either relevant business experience or non-relevant business experience. A closer look reveals that most such advice concerns fundraising or drafting a robust business plan. Even when entrepreneurial teams with relevant experience use expert advice, it is usually for fundraising or IP issues. In many cases, it occurred just prior to a person having relevant business experience joining the team. For example, Dr Andrew Wilks (founding scientist, Cytopia) spoke about getting the help of Dr Kevin Healey to write a business plan. That was just before Medica Holdings, a pooled development fund formed by Dr Kevin Healey, funded Cytopia and Dr Healey became CEO of Cytopia. Similarly, Dr Alan Robertson advised Rothschild (a VC firm) on the business plan of Pharmaxis and was later hired as CEO soon after Rothschild decided to fund it.

While there was a higher incidence of the use of external experts by entrepreneurial teams with no business experience, entrepreneurial teams with relevant business experience tended to rely more often on an internal expert, if there was one.

8.5.2 Non-Deliberative Styles

There was a much higher incidence of not seeking the advice of experts (even when it seemed to be clearly warranted) by entrepreneurial teams that did not have any business experience or had non-relevant business experience (see Table 8.4). For example, one of the respondents spoke of the initial fundraising in this way:

> I suppose one of our real problems was that we wanted the company to remain in our hands and we wanted to remain the major shareholder of it. And the big people that we approached like Macquarie Bank and other… I can't remember the names but there were quite a few of them. The main problem was that they also wanted to be the major shareholder, maybe have five per cent, and we were not prepared to do that. So that was really the big stumbling block. And once we got used to this idea of making it a public company and then it seemed…it is much better way to go.

In fact, it went further when they did not take expert advice for even the public listing of their company:

> Mr X was talking to a lot of people and I think he got a businessman called Mr Y, and then he spoke to some of his mates and they quickly arranged for it at that stage. We got totally disillusioned trying to get funding from other sources. Mr Y, who was involved in mining company…

TABLE 8.2 INCIDENCE OF NON-DELIBERATIVE STYLES DURING INITIAL START

→ Prior Experience	**Relevant**	**No**	**Non-relevant**
→ Number of Entrepreneurial Teams	**9**	**12**	**6**
Non Deliberative Styles			
Convictions	2 (0.222)	4 (0.333)	2 (0.333)
Deliberation-partial	1 (0.111)	0	1 (0.167)
Not Directed Search	1 (0.111)	0	1 (0.167)
No expert advise	1 (0.111)	14 (1.167)	10 (1.667)
Not clearly defined idea	2 (0.222)	3 (0.25)	3 (0.5)
Total	**7 (0.778)**	**21 (1.75)**	**17 (2.833)**

It is again entrepreneurial teams with no or non-relevant business experience where convictions and not clearly defined ideas more frequently occur in decision-making.

8.5.3 Deliberation Facilitators

Entrepreneurial teams that have relevant business experience and those that have no business experience are more attentive to what they know and what they do not know (see Table 8.2). They are attentive to their strengths and weaknesses across a range of issues. However, those who do not have relevant business experience seem to be particularly attentive to their limitations and their strengths and weaknesses related to their technology (which may not generally include the business dimension of their technology).

TABLE 8.3 INCIDENCE OF DELIBERATION FACILITATORS DURING INITIAL START

→ Prior Experience	**Relevant**	**No**	**Non-relevant**
→ Number of Companies	**9**	**12**	**6**
Deliberation Facilitators			
Knowing ones limitations/partner/technology environment	12 (1.333)	13 (1.083)	1 (0.167)
Prior relevant experience	3 (0.333)	1 (0.083)	0
Decision facilitator	4 (0.444)	4 (0.333)	1 (0.167)
Symbiotic	1 (0.111)	0	1 (0.167)
Formal business training to be more efficient	0	2 (0.167)	1 (0.167)
Second opinion	0	3 (0.25)	2 (0.333)
Predisposition to the idea	1 (0.111)	2 (0.167)	0
Very defined idea	1 (0.111)	0	0
Total	**22 (2.444)**	**25 (2.083)**	**6 (1.00)**

Some of the entrepreneurial teams with no business experience had thought about their limitations and had been proactive in undertaking formal business training. Similarly, entrepreneurial teams with no business experience or non-relevant business experience sought second opinions on some of their choices. For example, one of the respondents said he took the advice of his business acquaintances (who did not belong to the biotechnology industry) on whether to start a biotechnology business:

> I always had a lot of friends and colleagues in the business sector as well as in pure science. I had a lot of encouragement from them to take this step…take this jump, really. They basically said that the business side is potentially challenging but someone who had actually established a research group…. In my case, I had actually built a research centre from scratch. I also managed a research program that ended up being quite a big one. They said that you had necessary skills to move and manage a business and indeed to establish a business.

Entrepreneurial teams with relevant business experience do not seek second opinions. This may simply be due to the perception that it is dangerous to make important choices based on second opinions.

8.5.4 Formal Analysis

Business plans were common across all the entrepreneurial teams. However, the majority of teams made business plans to raise capital, which is one of the first things

on the agenda either just prior to setting up a new venture or just after. Therefore, not having a business plan was more the exception than the rule.

TABLE 8.4 HOW MUCH FORMAL ANALYSIS DID ENTREPRENEURIAL TEAMS WITH VARYING BUSINESS EXPERIENCE DO?

→ Prior Experience	**Relevant**	**No**	**Non-relevant**
→ Number of Entrepreneurial Teams	**9**	**12**	**6**
Formal Analysis			
Business Plan	9 (1.00)	10 (0.833)	5 (0.833)
Formal planning	7 (0.778)	0	0
Professional consultants	11 (1.222)	9 (0.75)	2 (0.333)
Total	**27 (3.00)**	**19 (1.583)**	**7 (1.167)**

The term 'formal planning' is used to emphasise that the nature of planning was more structured and comprehensive in nature. However, being structured and comprehensive doesn't necessarily mean that it was elaborate, time consuming or required large resources. A small formal planning effort can also give a good understanding of the market. For example, Dr Sudhir Pai (Lotus Labs) said:

> We had no other comparison in India to start with. There were only one or two companies but not publicly listed, so we could not gather any data from them. We discussed with a few pharmaceutical companies who were giving out these studies—i.e., they were doing these studies outside. So when we checked up with them…for example, the cost of a particular study if you do it in USA is Rs 10 million, but when we worked it out it could probably be done at Rs 3-4 million. So we could see a huge gap there; the only trigger was when we checked with other pharma companies about costing involved. We also looked at the market size. We also looked at number of patented products that are going out of patents between 2001 and 2008. That number was huge. So we could see a market and we could also see India getting into some kind of patent regime. All of these big companies will then have to probably shut shops if they don't look for avenues to grow. All of them started looking at US and Europe generic market. So then we thought, 'OK. If these many compounds are going off patent and there are these many companies in India and each company will come out with three to four products every year, then we have good opportunity.' We also realised that there were so many companies in US and Europe and so many biotech companies coming up and slowly India had started looking at opening up for biotech and clinical trail activities.

Only entrepreneurial teams with relevant experience used formal planning methods during the initial start of their company (see Table 8.3). However, all entrepreneurial teams used professional consultants more frequently than they engaged in formal planning. Of the various types of professional consultants, lawyers

and accountants were most often used at the start of new biotechnology ventures. This was closely followed by management consultants, especially major management consultancies, who were hired to write a robust business plan. Again, entrepreneurial teams with relevant business experience took the lead in seeking advice from consultants.

8.5.5 Lack of Formal Analysis

There is very clear evidence that entrepreneurial teams that do not have any business experience are more vulnerable to incomplete analysis and planning. Such entrepreneurial teams also don't make as much use of expert advice or professional consultants. This may simply be due to their lack of knowledge of the full range of issues that are important to a particular decision. For example, one respondents said:

> Our business plan was never… We never really went to a venture capitalist, so it didn't have to be as perfect as you would probably expect from somebody who is starting out fresh and has to approach a VC. We did not have that pressure. We did our projections, but it was more for our own purpose. We never had to pursue it with somebody. We never were under pressure to reach that target. It was good that for first two years we did not have any pressure as we got time to understand the market and react accordingly.

In the above example, the respondent had enough capital to start and sustain a new venture so never felt the need to have a robust business plan. Such instances of self-sufficiency in capital are rare.

TABLE 8.5 INCIDENCE OF A LACK OF FORMAL ANALYSIS DURING INITIAL START

→ Prior Experience	**Relevant**	**No**	**Non-relevant**
→ Number of Entrepreneurial Teams	9	12	6
Lack of Formal Analysis			
Limited analysis	2 (0.222)	4 (0.333)	0
No planning	0	5 (0.417)	1 (0.167)
No Business Plan	0	1 (0.083)	0
Total	**2 (0.222)**	**10 (0.833)**	**1 (0.167)**
Planning limitations	**3 (0.333)**	**2 (0.167)**	**1 (0.167)**

However, there are always going to be some issues associated with a decision for which it is genuinely hard to come to any definite conclusion. In such cases, the only answer relies in taking a calculated risk based on expert advice (and/or prior

experience). For example, Dr Andrew Wilks (Cytopia) spoke about some genuine risks related to the development of therapeutics (especially the medical areas on which they were working):

> There is no question that both of those areas are incredibly competitive. When you do NPV analysis of any drug at an early stage in either of those, they can be worth nothing or can be worth billions. It just depends on the risk adjustment and probability of success that can be anything from 0 to 100 per cent depending on how crazy or stupid you might be. [I]t is a roll of a dice exercise. If you feel that your science is comparatively new and that you are in an area that is very competitive…that is where it depends on how confident you are on your science. So you might do your SWOT analysis and competitive analysis but unless there is somebody already in clinic with exactly what you have got, you are not going to not do it. Competition is probably something that you just accept and go along with it.

8.5.6 Contrive and Common Approach

Entrepreneurial teams resort to common ways of doing things more often than designing or contriving new ideas or approaches. However, entrepreneurial teams that deviate from common approaches may do so due to creative thinking that had its genesis either in their choice to do things differently or in response to an adverse business environment.

TABLE 8.6 WHICH TYPE OF ENTREPRENEURIAL TEAM WAS MORE INNOVATIVE IN DECISION-MAKING?

→ Prior Experience	**Relevant**	**No**	**Irrelevant**
→ Number of Entrepreneurial Teams	9	12	6
Looking for Multiple Options	**10 (1.111)**	**12 (1.00)**	**7 (1.167)**
Contrive	**3 (0.333)**	**1 (0.083)**	**0**
Common Approach			
Common approaches	12 (1.333)	5 (0.417)	4 (0.667)
Thumb rules	0	1 (0.083)	0
Total	**12 (1.333)**	**6 (0.5)**	**4 (0.667)**

Surprisingly, all types of entrepreneurial teams had an almost equal propensity to look for multiple options simultaneously. When the stakes are high, relying on one option may be too risky.

8.5.7 Select – Constructive and Considered

Each type of entrepreneurial team had a similar average incidence of constructive and considered styles of selection in decision process (see Table 8.7).

TABLE 8.7 WHICH TYPE OF ENTREPRENEURIAL TEAM HAD MORE POSITIVE DECISION STYLES?

→ Prior Experience	**Relevant**	**No**	**Non-relevant**
→ Number of Entrepreneurial Teams	9	12	6
Select – Constructive and Considered			
Natural Decision	6 (0.667)	2 (0.167)	1 (0.167)
Opportunistic	3 (0.333)	5 (0.417)	0
Negotiation	3 (0.333)	2 (0.167)	4 (0.667)
Persuasion	0	3 (0.25)	2 (0.333)
Easy Decisions	0	2 (0.167)	0
Involvement	2 (0.222)	0	1 (0.167)
Unexpected Good luck	4 (0.444)	3 (0.25)	0
Support of influential people	2 (0.222)	3 (0.25)	1 (0.167)
Managed procrastination	0	1 (0.083)	1 (0.167)
Need Based Decision	0	2 (0.167)	2 (0.333)
Trust decisions	0	2 (0.167)	0
Total	**20 (2.222)**	**25 (2.083)**	**12 (2.0)**

However, entrepreneurial teams with relevant business experience had a much higher incidence of natural decision whereas entrepreneurial teams with no or no relevant business experience had to take up the challenge to persuade or negotiate for desired options. For entrepreneurial teams with no or no relevant business experience, it appeared more difficult to convince someone to put money in the venture or to hire a reputable person. For example, Dr Villoo Patell (Avesthagen) recalled the days when she started her company from a rented house and it was difficult to convince investors:

> So all investors would come to look at Sarkar Nagar office. I used to say, 'We are raising the money to build labs. You are not going to see anything fancy over here. That's why I am with you. If I had a fancy lab and it would have been running, then why would I be with you?'

However, persuasion is also required when people have different viewpoints, especially in the case of important decisions. Professor Richard Boyd recalled his meeting with the senior management and board of directors of Norwood Abbey so that he could persuade them to fund his project:

> It wasn't a unanimous decision. There were guys on the Board who were not happy about investing their money with immunology when they were primarily a medical devices company. But thankfully…. If they eventually voted against it, I couldn't tell you but I would imagine one or two saying, 'No, I don't think it is priority for us.' But there were enough people on the Board who said yes. So, they signed on the budget. So, yes we had to convince these two guys who were not happy about it but I think in the end they probably thought [it was OK].

New ventures (especially in biotechnology) are always short of capital, and this makes them more vulnerable to unfair or lopsided deals. The entrepreneurial team needs to be careful of this and to try to negotiate a good deal. It is not surprising that entrepreneurial teams with no or no relevant business experience are offered an unfair deal more often due to information asymmetry. This leads to negotiations. The number and intensity of negotiations will depend on several contextual factors, such as knowledge of the entrepreneurial team, their monetary situation et cetera. For example, one respondent said that venture capital was interested in investing in the company provided that they had only contract services in the business model, which was unacceptable to the entrepreneur. They reached a decision point when the development of IP (the entrepreneur's wish) was kept intact but the funding amount was restricted:

> They were very stupid. I kept telling them. They said that if you don't build this business model, you won't get funded. They were telling me to forget IP. I was saying, 'For three years there won't be any money, so we have to have Rs 15 crores.' But they fixed me into Rs 8 crores model. It was insufficient. There was no money to play for other two years. So January-February 2002 I started raising new funds.[12]

It is not surprising that an entrepreneurial team, especially one with no or no relevant business experience, will often fail to get an acceptable deal and will be forced to look for an alternative due to their pressing needs for funding.

Opportunistic and unexpected good luck decisions, while infrequent, appear to be equally common to every type of entrepreneurial team. This is expected because good luck can happen to anyone and is beyond anyone's control.

[12] 1 crore = 10 million

8.5.8 Select – Not Constructive or Considered

As discussed earlier, each type of entrepreneurial team, irrespective of its business experience, had the same propensity to choose selection styles that were constructive and considered. However, entrepreneurial teams with no or no relevant business experience had a much higher incidence of selection styles that were risky and not considered (see Table 8.9).

TABLE 8.8 WHICH TYPE OF ENTREPRENEURIAL TEAM HAD A MORE RISKY AND NOT-CONSIDERED STYLE OF SELECTION?

→ Prior Experience	**Relevant**	**No**	**Non-relevant**
→ Number of Entrepreneurial Teams	9	12	6
Select – Not Constructive or Considered			
Ad hoc	0	3 (0.25)	3 (0.50)
Conflict	1 (0.111)	3 (0.25)	3 (0.50)
Politics	0	2 (0.167)	0
Decision in frustration	0	3 (0.25)	3 (0.50)
Deliberate risk taking	0	0	0
Forced Upon	0	0	0
Edict	0	2 (0.167)	0
Total	**1 (0.111)**	**13 (1.083)**	**9 (1.5)**

The entrepreneurial team with non-relevant business experience had a much higher incidence of selection styles that were risky and not considered. This may be due to their applying inappropriate business principles or overconfidence about their knowledge. (Otherwise they would have sought expert advice). This seems to be the case because they had a higher incidence of ad hoc styles of decision-making. For example, one respondent spoke about the vastly different and non-related projects that were initiated within the company during the early stages:

> It is our absolute intention and focus of our company that the objective of our company is to use this technology to produce products in life science, primarily in human medical area. But it doesn't mean that we wouldn't do things in ag[riculture] or veterinary science or whatever. But we have tended to specialise in the human area and that happened because partly we received funding to do that and as a consequence of those funding partnerships we have developed a lot of expertise in respiratory disease and in neurodegenerative disease. So they have become our signature areas. But we do have other programs in-house under much lower level but where we believe our technology could make a difference. We believe that we have right clinical partners to be in a position to generate an

> edge…like generating some IP and some partnering gives us strong position in negotiating a deal within different groups in the area of cancer and infectious disease.

The entrepreneurial teams with no relevant business experience were also seen to get into trouble more often, which led to decisions that were not optimal or desirable. One respondent spoke about their decision to go for a public offering because they were not able to raise equity funding due to their inclination to control the company:

> And they went around, saw various contacts of theirs and tried to get some funding. And that ended up being more difficult than what we had thought earlier. But in the end they decided to go ahead with the public float, which wasn't what we wanted initially. We wanted the company to retain control of ourselves but it turned out that probably is unrealistic, so we went with a public float.

8.6 Discussion[13]

The analysis in Chapter 7 showed that the process for successful decisions differed from that for unsuccessful decisions. This chapter reports the results of the analysis of the patterns of decision-making of entrepreneurial teams with varying degrees of business experience.

Thomas and McDaniel (1990) suggest that past experience and prior knowledge create frameworks that are used to reduce ambiguity and create meaning. The emphasis is on the notion that what people know influences what they can know. The knowledge of context is a factor of individual managerial characteristics that in turn will influence firm decision behaviour. Because there is a high level of managerial discretion in new ventures, the effect of individual managerial characteristics (in this case, relevant experience) on the decision process can be substantial. The analysis suggests that this was indeed the case.

[13] The extent to which these findings can be generalised outside the biotech industry is discussed in Chapter 10.

TABLE 8.9(A) THE CONTRIBUTION OF EXPERIENCE TO THE DECISION-MAKING APPROACH: WALD TEST (SEQUENTIALLY ADDING TERMS TO FIXED MODEL)

Fixed term	Wald Statistics	d.f.	Wald/d.f.	Chi pr
Experience	0.62	2	0.31	0.734
Approach (+/-)	8.88	1	8.88	0.003
Decision Process Elements (DPE)	3.99	2	2	0.136
Experience.Approach	6.73	2	3.37	0.035
Experience.DPE	1.35	4	0.34	0.853
Approach.DPE	0.34	2	0.17	0.844

TABLE 8.9(B) THE CONTRIBUTION OF EXPERIENCE TO THE DECISION-MAKING APPROACH

Fixed term	Wald Statistics	d.f.	Wald/d.f.	Chi pr
Experience	0.92	2	0.46	0.63
Approach (+/-)	13.29	1	13.29	<0.001
Decision Process Elements (DPE)	5.97	2	2.99	0.05
Experience.Approach	10.07	2	5.04	0.007

The data for relevant experience were unbalanced with respect to the a priori determined positive versus negative elements of the decision process. For the model, there were four positive elements (deliberation, deliberation facilitators, formal analysis, and selection—considered and constructive) and only three negative elements (non-deliberative styles, lack of formal analysis, and selection—not constructive and considered). It was therefore necessary to examine the effects of the factors using residual maximum likelihood (REML). Table 8.9(a), which illustrates the Wald statistics obtained from the analysis, shows a large main effect due to approach (p= 0.003) and a significant interaction between approach and experience (p= 0.035). This analysis was re-run omitting the non-significant two factor interaction terms. The results, presented in Table 8.9(b), show that the main effect for the two terms was enhanced and highly significant (p<0.001), as was the interaction for approach and experience (p= 0.007).

TABLE 8.10 TABLE OF PREDICTED MEANS OF EXPERIENCE.APPROACH

	Positive Approach	Negative Approach
Relevant Experience	3.108	0.37
No Experience	1.921	1.222
Non-relevant Experience	1.567	1.5

The predicted means of the interaction between experience and approach is shown in Table 8.10. The average SED (standard error of difference) was 0.6233. Table 8.10 clearly shows that the high value of positive approach and relevant experience is the main contributor to the significance of the interaction between experience and approach.

The analysis shows that entrepreneurial teams with relevant business experience tend to make much more thoughtful decisions than entrepreneurial teams with non-relevant or no business experience. The former type of team tends to use more deliberation and formal analysis for any particular decision. It is also possible that decisions by entrepreneurial teams with relevant business experience are more holistic in nature. Indeed, entrepreneurial teams with relevant business experience made fewer ad hoc decisions and had fewer instances when they had to make a decision under unpleasant circumstances.

Entrepreneurial teams with non-relevant business experience were more susceptible to so-called negative styles than entrepreneurial teams with no business experience. Similarly, teams with non-relevant business experience used positive styles (such as professional consultants) with less frequency than teams with no business experience. This may possibly be due to their 'half knowledge.' They know that it is important to plan and deliberate on commercial issues (related to both technology and business), but they do not know issues that are specific and vital in biotechnology. For example, a person with business experience (such as from an IT industry) will be familiar with the process of fundraising but may not be completely aware of nuances (such as the evaluation approach) that are very typical in the biotechnology industry. This type of individual may therefore have unreasonable expectations.

Chapter 9

Does Relevant Experience Make a Difference to the Outcome?

Norman Vincent Peale: Empty pockets never held anyone back. Only empty heads and empty hearts can do that.

Leonardo da Vinci: Experience does not err. Only your judgments err by expecting from her what is not in her power.

In Chapter 7, the outcome of a decision was shown to be associated with some characteristics of the decision process. Chapter 8 explored the relationships between the decision process and the experience of the entrepreneurial team. This chapter takes the next step by analysing the relationships between the type of experience of the entrepreneurial team, the respective style of the decision process and the outcome.

Does relevant experience make a difference to the decision process? Do these differences lead to a better outcome? If there is clear evidence of such relationships, it will be of great significance for decision-makers, policymakers and academics.

Some researchers have made an attempt to link experience to performance. However, careful empirical assessment requires that the experience which makes a genuine difference to the decision process be clarified and the characteristics of the decision process that affect the outcome are identified.

9.1 What Scholars Have to Say on the Effect of Experience on Performance

Reuber and Fischer (1994:365) see experience playing a central role in new venture formation:

> [P]rospective business owners would have some criteria against which to assess their own readiness for start-up, to identify areas in which they might want to gain further experience, or to gain insights on ways to capitalize on the experience they do have, such as entering particular industries.

Reuber and Fischer (1994) report that even though it would be logical to think that entrepreneurs' experience affects firm performance, empirical research has yielded mixed results. (See the summary of their literature review in Table 9.1.) Reuber and Fischer (1994) conclude that this variation in results may be due to great variety in the experience and performance measures used and in the definition of 'entrepreneur'. For their own study, Reuber and Fischer (1994) constructed 17 measures of performance covering a wider set of dimensions.

TABLE 9.1 LITERATURE REVIEW BY REUBER AND FISCHER (1994) - RELATING EXPERIENCE TO FIRM PERFORMANCE

STUDY ↓	Industry Examined	Management Experience	Industry Experience	Small Business Experience	Owner and/or Start-up Experience	Educational Experience	Performance Measure(s)
Bates (1990)	Many	**x** previously been a manager (Y/N)				+ level achieved	Business survival
Keeley and Roure (1990)	Technology-based	**x** general management level (Y/N)	**x** previous firm in same industry (Y/N)			**x** level achieved	Discounted returns to investors
Cooper, Woo and Dunkelberg (1989)	Many	+ level managed (workers, managers)		**x** small (100 employees) and large firm experience (Y/N)	+ previously owned a business (Y/N)	+ level achieved	Initial size of firm
Sandberg and Hofer (1987)	Many	**x** managerial experience in a related industry (Y/N)	**x** management experience		**x** owned and/or started other firm (no/was a success/not success)	**x** level achieved	Return on equity
Duchesneau and Gartner (1989	Fresh juice distributors	+ familiarity with 7 functional areas					Profits, salaries
Stuart and Abetti (1990)	Technology-based	+ highest management level in previous firm			+ composite of number of start-ups, roles, success	- level achieved	Composite of growth and profit
Dyke, Fischer and Reuber (1992)	Five different industries	+ composite variable of number of years previous management experience and number years of previous experience with similar products	+ management experience		+ number of previous start-ups **x** number of years Previous business ownership	**x** level achieved	Sales; profit; employees; growth in sales, profit, employees; business stage
Van den Ven, Hudson, and Schroeder (1984)	Educational software		**x** number of years in software industry	- small business experience (Y/N)		+ level achieved	Growth (sales, employees, customers) subjective assessment

+ denotes a significant and positive relationship with performance; - denotes a significant and negative relationship with performance; **x** denotes a relationship with performance that was not significant.

While research into the experience-performance interaction has not produced clear outcomes, venture capitalists and other investors clearly value prior management experience (Reuber & Fischer, 1994). In fact, Reuber and Fischer (1994:366) go to the extent of saying that '[e]ven authors who do not find a relationship between the experience of the entrepreneur and firm performance are hesitant to conclude that experience, or lack of experience, is inconsequential.'

Reuber and Fischer (1994) and Reuber (1997) ascertain that certain types of experiences were more closely related to firm performance than others. Experience in strategic planning, developing a business plan, developing global markets/operations, financing and strategic alliance formation was found to be positively related to performance.[1] Significantly, these authors also found a significant negative correlation between start-up experience and R&D expertise. They reason that this may be because those who had spent more time in R&D would have spent less time in start-up activities or their management.

Reuber (1997) found that prior industry experience was significantly correlated with expertise in the areas of R&D, feasibility analysis, developing global operations/markets and inventory control. She concluded that tacit knowledge of the owners' own sector was related to firm performance and that knowledge of any other sector was related to neither tacit knowledge in the owners' own sector nor performance.[2] She also found that there is more benefit from having smaller amounts of different types of previous experience than having larger amounts of one type of experience. Gavetti et al. (2005) and Politis and Gabrielsson (2005) reached similar conclusions in their empirical research.

9.2 Operationalisation of the Study

Whilst Reuber and Fischer (1994) and Reuber (1997) have provided an understanding of relationships among experience, expertise and performance at a micro level, the

[1] Reuber and Fischer (1994) have defined these as expertise, not experience. The difference between experience and expertise was discussed in Chapter 8.

[2] Brockmann and Simmonds (1997), in their empirical research, found that only experience in the industry was significantly related to the use of tacit knowledge by CEOs. Similarly, McDaniel et al. (1988) found a positive correlation between job experience and job performance. It is no surprise that in the Barringer et al. (2005) study, 76 per cent of the founders had prior experience in the same or a closely related industry.

approach in this research was less detailed. In analysing the relationships between experience and performance, the decision process was used as an intermediary construct. The research assesses the differences between the decision process of a person having relevant experience and one not having relevant experience and then relates the characteristics of the process to the performance.

The 'initial start' has been taken as one decision, as in the previous chapter, and for similar reasons. It is difficult to isolate performance on particular activities from the performance of particular individuals (Reuber, 1997). The first question (i.e., performance related to a decision) was addressed by taking into consideration only those initial starts for which one could make a clear judgment on whether they were a 'good' start or a 'troubled' start. By taking initial start as a decision, one can take into account the performance of particular individuals because there are only a few key decision-makers during the very early stages of a start-up. Importantly, for this analysis it is the performance of the entrepreneurial team and not each individual, unless the entrepreneurial team had just one individual assessed.

Only those firms among the case study firms on which a clear judgment could be made regarding performance were included in this analysis of the relationships between decision-making, experience and performance. Due to peculiarities related to biotechnology, many constructs related to performance—sales, earnings, profit and market share et cetera—that are generally used by researchers cannot be used. In the majority of the cases, a biotechnology company's value will be based on its IP and it takes a lot of resources to develop a product. Put simply, business models in biotechnology are vastly different from those in other industries.

The selected companies all started between 1998 and 2002. They had a range of business models. In this situation, it would not have been wise to use one common measure of performance (Chandler & Hanks, 1994). This is because a contract research biotechnology company doing well may have lesser market capitalisation and ROE (return on equity) than an average drug discovery company. There was also

a need to be sensitive to the business environment, as the sample includes companies from Australia and India.[3]

In operationalising the performance indicators of the initial start, the suggestion of Venkataraman and Ramanujam (1986) to use both financial and operational indicators is useful. This was made feasible by judging the achievements of the company on its prior determined objectives (which were gathered from secondary sources).[4] Using this approach to characterise the performance of a venture at the initial start was not difficult. Nevertheless, for the analysis of the performance outcomes, only those companies were used where the evidence for performance was very clear. This did tend to leave out those cases where the company was performing (or seem to be performing) in the middle range—i.e., performing neither particularly well nor badly.

9.3 Does Experience Make Any Difference to the 'Initial Start' Outcomes?

Seven of the case study companies had a troubled start and eight had an impressive start. Of the seven companies that had a troubled start, six had entrepreneurial teams that did not have any business experience (TN) and one had an entrepreneurial team with non-relevant business experience (TI). Of the companies that had an impressive start, seven had entrepreneurial teams with relevant business experience (IR) and one was found to have no business experience (IN).

This suggests that there is a strong relationship between relevant experience and performance (at the decision level). The majority of companies having entrepreneurial teams with relevant business experience were doing very well. By contrast, a majority of companies having entrepreneurial teams with non-relevant business experience had troubled starts.

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[3] Merz et al. (1994) quote Hoy et al. to emphasise the need to measure growth (and so the performance) of a venture by keeping context in perspective. However, it is unclear whether they themselves have followed this advice; it is not mentioned in their research methodology and, if they used it, it is not clear how they operationalised it. They only give broad outlines of the industries they were looking into: business services, manufacturing, construction and wholesaling. It is unclear whether their markedly different conclusions were influenced by their research design. For example, they found that unfocused entrepreneurs were significantly more likely than the others to perceive themselves to be operating in a hostile business environment.

[4] This approach is useful because otherwise, according to Brush and VanderWerf (cited in Brush, 1992), there is no consensus among researchers on the construct of entrepreneurial success.

The next step in this analysis was the assessment of the relationships between the decision process, prior experience and performance. This was achieved by examining the differences in 'average' counts on each of the elements of the decision process (deliberation styles; non-deliberative styles; deliberation facilitators; formal analysis; lack of formal analysis; select—constructive and considered; and select—risky and not-considered) for TN, TI, IR and IN.

9.3.1 Deliberation Styles

There was a very large difference in the frequency (or number) of deliberation styles used by new ventures that had a troubled start compared with those that had an impressive start. The latter use positive styles of deliberation as much as 3.33 times more than the former. In fact, only one company had an entrepreneurial team with no business experience that used deliberation styles much more than others. Perhaps this can explain their impressive initial start (see Table 9.2).

TABLE 9.2 DELIBERATION STYLES LINKED TO THE TYPE OF EXPERIENCE AND PERFORMANCE

	Troubled Start			**Impressive Start**		
→ Prior Experience (No. of Firms/Entrepreneurial Teams)	**No – TN (6)**	**Non-relevant – TI (1)**	**Total (7)**	**Relevant - IR (7)**	**No – IN (1)**	**Total (8)**
Deliberation Styles						
Deliberation[5]	3 (0.500)	0	**3 (0.429)**	12 (1.714)	3	**15 (1.875)**
Logic	2 (0.333)	0	**2 (0.286)**	8 (1.143)	2	**10 (1.25)**
Planning	1 (0.167)	0	**1 (0.143)**	3 (0.419)	0	**3 (0.375)**
Expert Advise	1 (0.167)	0	**1 (0.143)**	4 (0.571)	2	**6 (0.75)**
Internal expert advice	2 (0.333)	0	**2 (0.286)**	5 (0.714)	0	**5 (0.625)**
Directed search	0	0	**0**	0	1	**1 (0.125)**
Total	**9 (1.500)**	**0**	**9 (1.286)**	**32 (4.571)**	**8**	**40 (5.0)**

Note: The number (not within brackets) indicates the total number of that particular sub-element found in various categories (i.e., TN, TI, IR and IN). Because the number of decisions assessed within each category is different, it is more prudent to compare the average of 'incidence' of sub-elements in each

[5] 'Deliberation' is used to denote active and conscious thinking, careful thinking, creative thinking and discussions. It doesn't include logic and knowing thy area. The former approaches are considered to be more proactive whereas the latter approaches are more passive.

category. The same method (and logic) has been used in the following tables. (Refer also to the coding style discussed in Chapter 5.)

9.3.1(a) *Deliberation*

On average, new ventures that had an impressive start deliberated 4.37 times more frequently than those with a troubled start. The TN group deliberated about 3.428 times less than IR, and there was no sign of deliberation in the lone TI case. The IN group, in contrast, deliberated most and nearly twice as much as IR and six times as much as TN. A closer look at the data shows that all the instances of deliberation seen in TN were found in one company (i.e., the remaining five did not have any known instance of deliberation). Even the TN company that deliberated on various issues did so superficially, missing several key variables related to the market and regulations.

Unlike the TN group, the IR group of companies was more likely to undertake deliberation that led to an in-depth understanding of issues related to a decision. For example, with regard to a decision related to organisational structure of Phenomix, Dr Keats Nelms said:

> We worked through that a lot with our lawyers. We had a corporate lawyer who was helping us with corporate structure and taxation…PWC, there was a guy there. The biggest question was what was the best structure from a taxation point of view. So we had all this money that we were going to be getting. It was essentially that Phenomix Corporation was the one that was giving it to us. We would then be taxed on it. So how do we transfer money from the US company to the Australian subsidiary without having a huge tax burden? We did this by placing a collaboration structure in place. Essentially we were collaborating and they were paying us for the work we do plus 10 per cent. So we were making a 10 per cent profit even though it is an internal company transfer. Essentially it is a collaborative agreement that Phenomix Corp pays us for the work we do. So that's also why two independent companies were formed. That way we minimise our tax burden.

One respondent from the IN group said that they deliberated endlessly not only on the business model but also on regulatory issues. They even took advice from an expert on how to raise capital. Getting an expert's opinion on the latter aspect proved to be the key to success:

> It was a chance meeting. One of the co-founders knew Professor XYZ through family connection. We had almost agreed to sign a term sheet by a venture fund, but we wanted some advice by someone who knew things

> better. He [Professor XYZ] suggested that he is not in a position to advise because he is not aware of the ground realities in India, but somebody he knew knows better, and that was Mr ABC.

9.3.1(b) *Logic*

Simple logic was widely used to develop an understanding of a decision to identify options and to reach conclusions. However, it appeared to be used less often than deliberation in both types of ventures—i.e., both 'troubled starts' and 'impressive starts.' Even then, the latter used it 4.37 times more frequently than the former. This may be due to the wider experience and knowledge base of the latter group. In most cases, logic was either used for simple decisions or was backed by extensive experience in that area or else followed by a careful analysis.

9.3.1(c) *Planning*

Instances of planning were less frequent than deliberation in both kinds of ventures. This may be due to the fact that during the very initial stages, the concern is more about getting started and with issues such as funding. Only after its foundation does a company start to plan ahead on different fronts. For example, financial needs were taken care of very early in the formation of Phenomix. Once secured, the directors planned to build facilities. Dr Keats Nelms stated:

> So I was primary operational director here and Steve Kay was the primary person in the US, and we both began hiring teams of people in both sides. Chris Goodnow was also an employee as CSO, but he retained his position at ANU. So he was limited to the scientific side of things. I was more the operational person here. That's when we started developing facilities. We started at John Curtin School by renting the lab space. I looked at a lot of places for alternative animal lab space. We ended up fitting at Innovations Building after convincing ANU to do that. In the meantime, Chris had recently written this major national research facility grant to build this building. He and I then convinced ANU to build a third level on that building, where we are sitting now, for Phenomix.

9.3.1(d) *Expert Advice/Internal Expert Advice*

The results indicate that IR group of firms use the services of expert advisers 2.57 times more often than the TN (see Table 9.2). That expert advice may come from an internal team or it may be derived externally. The IR group could be expected to use

internal experts more frequently than external experts. However, these more experienced teams were likely to use services of external experts whenever required. For example, Professor Barrie Finnin (Acrux) said:

> One of the things that we did when we moved past the technical stage was to bring to the board of Acrux people with pharmaceutical industry experience. For example, we now have Ken Windle on the board. Ken was previously the CEO of Glaxo Wellcome for Asia. So he had a real big pharmaceutical company experience. We brought on to the board a person by the name of Jim Foght. Jim was the ex-managing director for DuPont Pharmaceutical in Europe. He then later went into venture capital for biotech. Although he is based in Chicago, he has real industry experience. Now as we are getting to more mature stage, that's the sort of expertise you need to be able to draw on. But with regard to the original understanding of what was required to develop the drug product; we at the university over here had a very good handle on it.

9.3.2 Non-Deliberative Styles

Non-deliberative styles of decision-making occurred five times more frequently in the group of firms having a troubled start than in those that had an impressive start (see Table 9.3).

TABLE 9.3 NON-DELIBERATIVE STYLES LINKED TO THE TYPE OF EXPERIENCE AND PERFORMANCE

	Troubled Start			**Impressive Start**		
→ Prior Experience (Number of Firms/Entrepreneurial Teams)	**No - TN (6)**	**Non-relevant – TI (1)**	**Total (7)**	**Relevant – IR (7)**	**No – IN (1)**	**Total (8)**
Non-Deliberative Styles						
Convictions	3 (0.5)	0	**3 (0.429)**	1 (0.143)	0	**1 (0.125)**
Deliberation-partial	0	0	**0**	0	0	**0**
Not directed search	0	0	**0**	0	0	**0**
No expert advice	8 (1.333)	3	**11 (1.571)**	0	1	**1 (0.125)**
Not clearly defined idea	3 (0.50)	1	**4 (0.571)**	2 (0.286)	0	**2 (0.25)**
Total	**14 (2.333)**	**4**	**18 (2.571)**	**3 (0.429)**	**1**	**4 (0.5)**

While firms in the TN group appear to use convictions more often than those in the IR group, their use is the most infrequent of any group. Among the TI and IN firms, no decision was based on convictions.

The group of firms that had troubled starts made relatively little use of expert advice, even when they lacked in-house experience or capabilities. For example, one respondent whose company (in the TN group) had a troubled start said:

> Neither of us had any business background, even not in our families. So you really don't know what to anticipate. You really don't know what your cash flows will be; what you need to invest in and where not to invest in; how many people we need to take et cetera. These kinds of details are not easy to plan without prior experience. We gathered that information over a period of time. We had even planned to get some instruments from outside, but they got stuck at Customs because they were second-hand instruments.

In contrast, new ventures with an impressive start were more aware of their needs and would seek advice from experts or professionals. Within the group of firms with troubled starts, those that had non-relevant business experience were surprisingly reluctant to seek expert advice. The data shows that except for one instance involving regulatory guidelines, expert advice could have been useful for business related issues such as financing and business models et cetera. This suggests that TI firms were more prone to overconfidence related to business matters and were oblivious to the fact that many business rules are industry specific.

It may not be unusual that an entrepreneurial team has only a broad understanding of the idea during the initial start. However, it surely helps to have a clearly defined idea. The data reveals that two TNs did not have clearly defined ideas. However, one became very focused after a person with relevant experience joined it as its CEO. Similarly, the only IR to start with a less defined idea became more focused after a person with relevant business experience joined them. Later, they also drew on the help of professional consultants. One respondent from this group said:

> When we started out, we did not know exactly what that niche was going to be, but we knew we had skills needed to go and figure that out. That time we weren't thinking too clearly about the distinction between biology and chemistry or small molecule chemistry versus biologics. I think as we built the technologies we have been more aware of these distinctions. Our emphasis so far has been on genomics and small molecule chemistry.

9.3.3 Deliberation Facilitators

Just being aware of the business environment and limitations helps to not only facilitate decisions but also provide real-time information that in turn may be helpful in making quick decisions. The IR firms appeared to be better informed about their business environment and limitations (see Table 9.4). For example, one respondent said that they were always aware of their business environment without having to expend too many resources on it. In fact, knowing how to be always informed without expending too many resources is equally important and may give competitive advantage:

> Certainly you have to follow on what the competition is. We were fortunate in that. We got in and there was really nobody else. We had, I think, pretty good advice from patent attorneys when we framed the claims on the patents. We believe that we have a got a very strong patent position. Now that doesn't mean that there won't be threats from alternatives that are completely different, and you have to be sure that you are aware of them. I think the ways by which you could know your competition is that you obviously have to monitor the patent literature and you also have to monitor the scientific literature. A lot of that is done not only by printed material but also by word of mouth in conferences and so on. So that's why networking is so important. Even though people won't disclose confidential information, very often you get a lot of warning about what company is looking at what drugs and what products and so on. You shouldn't have things come out of blue.

TABLE 9.4 DELIBERATION FACILITATORS LINKED TO THE TYPE OF EXPERIENCE AND PERFORMANCE

	Troubled Start			**Impressive Start**		
→ Prior Experience (Number of Firms/Entrepreneurial Teams)	**No - TN (6)**	**Non-relevant – TI (1)**	**Total (7)**	**Relevant - IR (7)**	**No – IN (1)**	**Total (8)**
Deliberation Facilitators						
Involvement of experts across functions	0	0	**0**	0	0	**0**
Knowing one's limitations/ partner/ technology environment	1 (0.167)	0	**1 (0.143)**	7 (1.0)	4	**11 (1.375)**
Prior relevant experience	0	0	**0**	2 (0.286)	0	**2 (0.25)**
Decision facilitator	1 (0.167)	0	**1 (0.143)**	3 (0.429)	0	**3 (0.375)**
Symbiotic	0	0	**0**	1 (0.143)	0	**1 (0.125)**
Formal training to be more efficient	0	0	**0**	0	0	**0**
Second opinion	1 (0.167)	1	**2 (0.286)**	0	0	**0**
Predisposition to the idea	1 (0.167)	0	**1 (0.143)**	0	0	**0**
Very defined idea	0	0	**0**	0	0	**0**
Total	**4 (0.667)**	**1**	**5 (0.714)**	**13 (1.857)**	**4**	**17 (2.125)**

Certain incidents or information may prove to be critical in facilitating a decision. While these may happen at any time and to anyone, they are not completely dependent on chance. For example, one respondent said that he was allowed to retain his tenure as professor in the university and still carry out his entrepreneurial activity. This facilitated his decision to start a venture. But this cannot be said to be pure chance; it is more a case of opportunity coming to the prepared mind. This is because (in this case) if the concerned person had not taken the initiative to start a venture and make a request to the university, he would not have the option. He said:

> We got approval from the highest body of the council of the university that we could start putting the venture together. By October, we had concluded things regarding equity, structure and so on. End of October and early November is actually when the company started up. So things moved very fast after I got back from sabbatical. Within a few months we were up and running.

It is observed that the TN and TI groups of firms sought a second opinion more often than the IR group. As discussed earlier, getting a second opinion is not a robust form of deliberation and was generally not favoured by a person having relevant experience.

9.3.4 Formal Analysis

There does not seem to be much dispute about the use of business plans among TN, TI, IR and IN firms. Almost all of them seem to have a business plan. Differences in the quality of the business plan would be expected, but that was not part of this study. As such, a definite comment on the quality of each firm's business plan cannot be made.

TABLE 9.5 FORMAL ANALYSIS LINKED TO THE TYPE OF EXPERIENCE AND PERFORMANCE

	Troubled Start			**Impressive Start**		
→ Prior Experience (Number of Firms/Entrepreneurial Teams)	**No - TN (6)**	**Non-relevant – TI (1)**	**Total (7)**	**Relevant - IR (7)**	**No - IN (1)**	**Total (8)**
Formal Analysis						
Business Plan	4 (0.667)	1	**5 (0.714)**	7 (1.00)	1	**8 (1.00)**
Formal planning	0	0	**0**	7 (1.00)	0	**7 (0.875)**
Professional consultants	4 (0.667)	0	**4 (0.571)**	10 (1.429)	0	**10 (1.25)**
Total	**8 (1.333)**	**1**	**9 (1.286)**	**24 (3.429)**	**1**	**25 (3.125)**

The main difference between new ventures having a troubled start and those with an impressive start can be seen with respect to the use of formal planning methods and professional consultants. The former seem to be completely oblivious to the use of formal planning (at least during initial start) and the rigour that it can bring to any decision process. One respondent said:

> We had an algorithm for ranking projects. The key things in it were market size, the total cost to develop the product, the chance that we can develop the product—i.e., technical feasibility. I think the total cost for the development of product is the key thing because that depends on the regulatory procedures—i.e., if we can do an abbreviated development program from the regulatory point of view. And also the other key thing is the advantages of that product.

The IR group of firms tend to use professional consultants twice as often the TN group (see Table 9.5). Such consultants were generally used (at least during initial start) for two reasons: guidance on patents (patent attorneys) and guidance on business plans/models (management consultants).

9.3.5 Lack of Formal Analysis

Instances of a lack of formal analysis were much more frequent in the group of firms that had a troubled start than those that had an impressive start.

TABLE 9.6 LACK OF FORMAL ANALYSIS LINKED TO THE TYPE OF EXPERIENCE AND PERFORMANCE

	Troubled Start			**Impressive Start**		
→ Prior Experience (Number of Firms/Entrepreneurial Teams)	**No – TN (6)**	**Non-relevant – TI (1)**	**Total (7)**	**Relevant - IR (7)**	**No – IN (1)**	**Total (8)**
Lack of Formal Analysis						
Limited analysis	1 (0.167)	0	**1 (0.143)**	1 (0.143)	0	**1 (0.125)**
No planning	4 (0.667)	0	**4 (0.571)**	0	0	**0**
No Business Plan	1 (0.167)	0	**1 (0.143)**	0	0	**0**
Total	**6 (1.0)**	**0**	**6 (0.857)**	**1 (0.143)**	**0**	**1 (0.125)**
Planning limitations	**1 (0.167)**	**0**	**1 (0.143)**	**3 (0.429)**	**1**	**4 (0.50)**

It is unusual not to have a business plan in a biotechnology start-up. Only one of the 15 firms reported that they did not have a business plan. However, despite these formal plans, there was a more frequent lack of adequate foresight in the TN group. This may be due to a lack of adequate knowledge about the subject, as is reflected in response of one respondent:

> At that time I don't think it was a very logical and well thought out process. I came to the conclusion that I wanted to start a company and I guess, come what may, that was what I was going to do.

New ventures often face genuine planning limitations because of the unpredictable nature of many variables. However, it pays to take small steps and plan ahead, always bearing in mind the contingencies involved. Examples of such planning limitations, such as assessments related to the efficacy of prospective therapeutic molecules in pre-clinical stages, have been discussed previously.

Among the 15 selected firms, planning limitations were found more in the ventures with impressive starts than in those with troubled starts. One possible explanation for this is that such firms were more aware of the various issues and variables associated with decisions. The more aware one is, the more information one seeks. There may also be more instances when one is not able to obtain the desired information. Conversely, if one is aware of only a limited set of issues, there may be fewer instances of limitations in the required information.

9.3.6 Select – Constructive and Considered

There was a marked difference in the frequency of positive decision styles between those firms with impressive starts and those with troubled starts. In fact, the former group had five times the frequency of positive styles (see Table 9.7).

Ventures where the founders had relevant prior business experience and were successful (the IR group) had a much higher frequency of natural decisions compared with the TN group. It may be that prior relevant experience facilitates decision-making. There were cases where even decisions that would seem to be complex and critical were taken without much hesitation, if decision-makers were experienced. One respondent discussed their decision to raise money themselves and to not accept any VC funding:

It was a pretty easy decision, really, that we raise the money ourselves from the outside world, and we are happy to take the responsibility to run the business ourselves.

TABLE 9.7 'SELECT - CONSTRUCTIVE AND CONSTRUCTED' LINKED TO THE TYPE OF EXPERIENCE AND PERFORMANCE

	Troubled Start			Impressive Start		
→ Prior Experience (Number of Firms/Entrepreneurial Teams)	No – TN (6)	Non-relevant – TI (1)	Total (7)	Relevant – IR (7)	No - IN (1)	Total (8)
Select – Constructive and Considered						
Natural Decision	1 (0.167)	0	**1 (0.143)**	5 (0.714)	0	**5 (0.625)**
Opportunistic	2 (0.333)	0	**2 (0.286)**	2 (0.286)	1	**3 (0.375)**
Negotiation	0	0	**0**	2 (0.286)	0	**2 (0.25)**
Persuasion	0	0	**0**	1 (0.143)	0	**1 (0.125)**
Easy Decisions	0	0	**0**	1 (0.143)	0	**1 (0.125)**
Involvement	0	0	**0**	2 (0.143)	0	**2 (0.25)**
Unexpected Good luck	0	0	**0**	4 (0.571)	1	**5 (0.625)**
Support of influential people	0	0	**0**	2 (0.286)	0	**2 (0.25)**
Managed procrastination	1 (0.167)	0	**1 (0.143)**	0	0	**0**
Need Based Decision	0	0	**0**	0	0	**0**
Trust decisions	0	0	**0**	0	1	**1 (0.125)**
Total	**4 (0.667)**	**0**	**4 (0.571)**	**19 (2.714)**	**3**	**22 (2.75)**

Many other entrepreneurs will find this to be a critical decision and perhaps would spend a lot of time discussing alternative routes to VC funds. In fact, most people would think of other options only after they had failed to draw the attention of VCs, as was the case with some examples in the study.

There were low levels of negotiation and persuasion in both troubled and impressive starts. One would normally expect more negotiation and persuasion, especially while sourcing funds from VCs. This may be due to respondents hesitating to talk about their negotiations and persuasions. Alternatively, they may have conveyed such decisions as natural decisions, thinking that minor negotiations are part of all such kinds of decision-making and there is nothing particular about it. Respondents generally only talked about negotiations or persuasion when a decision did involve a lot of negotiation and persuasion. For example, one respondent said:

> Oh, Yes! There was a lot of healthy discussion. There were some very strong supporters and there were those who probably were concerned… But the decision was taken and it was the right decision.

Another surprising thing to note is that unexpected good luck occurred relatively frequently in new ventures that had an impressive initial start. It did not occur in troubled ventures. Half of that good luck is related to funding that happened because of a strong social network or because the idea proved to be unique but its full significance was not gauged earlier. One respondent said:

> Thus, we foresaw some scope, but definitely we did not realise that we will grow so much. We have been growing at almost 100 per cent every year. If I look back at my projections when we started off with this idea, we would have probably done about 40 to 50 per cent of what we have actually done today. That's the kind of growth we have seen. It has turned out to be a fantastic idea.

However, it is to be noted that the scientific or business ideas that resulted in 'above expectation' gains rested on strong foundations and systematic research and on people who had a tremendous amount of experience in that area. Often such 'above expectation' gains would have been hard to achieve despite the experience of the decision-makers and systematic research. That's why they have been called unexpected.

There were few instances of 'involvement' because, in the initial days, it was often a single entrepreneur or a very small entrepreneurial team. It was only after initial fundraising and/or an extension to the entrepreneurial team with a few senior managers (in the early days) that involvement became important.

The support of influential people always helps, and most certainly during the initial start, which is a defining period for any new venture. The two instances where this occurred were both ventures where the founders had relevant prior experience and the new venture secured above average funding.

9.3.7 Select – Not Constructive or Considered

There were few instances of what could be termed ill-considered decision-making in the group of firms that had impressive starts. This was in marked contrast with those ventures that had troubled starts (see Table 9.8).

TABLE 9.8 'SELECT - NOT CONSTRUCTIVE AND CONSIDERED' LINKED TO THE TYPE OF EXPERIENCE AND PERFORMANCE

	Troubled Start			Impressive Start		
→ Prior Experience (Number of Firms/Entrepreneurial Teams)	No – TN (6)	Non-relevant - TI (1)	Total (7)	Relevant – IR (7)	No – IN (1)	Total (8)
Select – Not Constructive and Considered						
Ad hoc	2 (0.333)	2	**4 (0.571)**	0	0	**0**
Conflict	0	0	**0**	1 (0.143)	0	**1 (0.125)**
Politics	0	0	**0**	0	0	**0**
Decision in frustration	2 (0.333)	1	**3 (0.429)**	0	0	**0**
Deliberate risk taking	0	0	**0**	0	0	**0**
Forced Upon	0	0	**0**	0	0	**0**
Edict	0	0	**0**	0	0	**0**
Total	**4 (0.667)**	**3**	**7 (1.00)**	**1 (0.143)**	**0**	**1 (0.125)**

The ad hoc style of decision-making generally does not involve systematic assessment and is not based on relevant experience or expertise. Decisions made in such a way can have serious negative consequences immediately or later. One TI case study respondent provided this example:

> I guess it started when we went to meet friends in Sydney and they asked how the research was going. Professor Z said that it's going well and we had started getting results [and] that we get [equity] funding [now]…because at that stage we were not eligible for ARC funding. That has changed. I am going back probably to 1998-99. And these people were business people that had started a variety of companies in multimedia and various other things. And basically they wanted to set up a biotechnology company.

The decision that followed from this situation was made in haste without much due diligence on the projects involved. In fact, the concerned businessman wrote a business plan later but without taking the help of any person with relevant experience. It is not surprising that they failed to raise any private equity. This led to a situation where they had no resources. Cornered and frustrated, they decided to go for public listing, even though the projects were very early stage projects. This led to a very low valuation and impaired future funding.

The above example shows that a lack of relevant experience can have a debilitating effect on the firm because decision-makers might be more prone to ill-considered decision-making. Such decision-making may lead to poor decisions that, in turn, can create vicious circle.

9.4 How Significant is the Effect of Experience on the Decision Process and Its Performance?

The data for the performance of the decision (which was found to be related to the relevant experience) were unbalanced with respect to the a priori determined positive versus negative elements of the decision process. For the model, there were four positive elements (deliberation, deliberation misc, formal analysis and selection) and only three negative elements (non-deliberative styles, lack of formal analysis and selection—not constructive and considered). It was therefore necessary to examine the effects of the factors using residual maximum likelihood (REML). Table 9.9, which presents the Wald statistics, shows that there is a large main effect due to approach (p<0.001) and a significant interaction between approach and the performance of the initial start of the venture (p<0.001).

TABLE 9.9 DOES APPROACH MAKE A DIFFERENCE TO THE PERFORMANCE OF THE DECISION PROCESS?

Fixed Terms	Wald Statistic	d.f.	Wald/d.f.	chi pr
Start	5.27	1	5.27	0.022
Approach (+/-)	12.12	1	12.12	<0.001
Decision Process Elements	11.3	5	2.26	0.046
Start.Approach	24.39	1	24.39	<0.001

TABLE 9.10 TABLE OF PREDICTED MEANS OF PERFORMANCE.APPROACH

	Positive Approach	Negative Approach
Troubled	0.39	2.241
Impressive	2.676	1.057

* Average Standard Error of Deviation = 0.6582

Further analysis based on predicted means for the start.approach interaction (Table 9.10) shows that positive approach leads to a better start for a new venture,

which is more likely seen among people with relevant experience. By contrast, a troubled start by a company (mostly seen when people with no or no relevant business experience) is found to be related to a negative approach to the decision process.

9.5 Conclusion[6]

This analysis clearly shows that among these ventures relevant experience made a difference to the outcome. The analysis also provides strong evidence that the way it makes a difference to the outcome is by affecting the decision-making process. There was a consistent pattern of decision-making that can be associated with each of the two broad groups, entrepreneurial teams having relevant business experience and those that did not have relevant business experience. In both cases, the relevant technology experience was effectively a prerequisite and was taken as a given.

Entrepreneurial teams having relevant business experience appeared to deliberate and analyse issues and decisions more often than those that did not have relevant experience.[7] In that way, their decisions tend to have a double advantage, first, due to their relevant experience and, second, because they draw on more information. It is no wonder that they have a greater chance of being successful.

The implicit assumption in this interpretation is that the possession of the right set of information related to a decision is key. Casson (1982), with his theoretical modelling, and Fiet et al. (2005) have emphasised this dependence. Having the right information for decisions is dependent on the right set of experience and use of appropriate decision processes.

Experienced entrepreneurs are more likely to search for information within a specific domain of business ideas (Politis, 2005; Fiet et al., 2005) while novice entrepreneurs have fewer benchmarks to assess whether the information they have gathered is appropriate. It has also been shown that successful entrepreneurial teams

[6] The extent to which these findings can be generalised outside the biotech industry is discussed in Chapter 10.

[7] Many researchers—e.g. Cohen & Dean (2005)—have shown that the top management team (TMT) plays an important role and is related to performance, as evidenced by good evaluations of a company. This research takes an additional step to show which type of TMT has a better chance of giving better performance.

use different types of deliberation methods more often than formal planning methods.[8] This indicates that relevant information can also be obtained in real time and without being elaborate. Professional consultants and experts are shown to play a key role in decision processes that have superior outcomes. In addition, entrepreneurs' social network also helps to expand the boundaries of their rationality by increasing their knowledge and information (Singh et al., 1999). Therefore, an entrepreneurial team with broader experience is likely to have a wider (more varied) social network and more chance of being well-informed across all domains. The entrepreneurial team will be less likely to benefit from cooperation or information gained from network partners if it does not possess the necessary knowledge and the capacity to absorb information (Witt, 2004).

Formal analysis is more related to planning in a systematic and comprehensive manner. This need not be very elaborate (Russo & Schoemaker, 2002:157-158). It simply means that important variables have been thought about and an informed choice made. Relevant experience helps in such instances when resources are limited and the cost of an elaborate search is prohibitive. Experts and people with relevant experience can tap into their social networks to provide inexpensive and trusted information (Forbes et al., 2006). If there is still a deficit of information, they can seek to overcome this by a formal study that has a definite limited scope and could be carried out within the available means. Even such limited studies may be good enough to give an expert or an experienced person insight on the specific issues. They can then make a reasonably good choice by using limited information gained from such formal means.

Brown and Eisenhardt (1998) and Eisenhardt (1989) have emphasised the importance of real-time information in decision-making in a dynamic industry. This is because decision-making has to be fast but robust in a dynamic environment.[9] This

[8] This is in keeping with an observation made by Hambrick and Crozier (1985) that successful firms are in the habit of using all available channels for acquiring crucial information: outside board members, professional associations, consultants, suppliers, customers and others. They also maintain that successful high-growth firms even bring in one or more senior level executives with big company experience to complement the owner-founder(s).

[9] According to Forbes (2005), 'the study of Judge and Miller supports Eisenhardt's view on the significance of a dynamic environment context, but the study by Baum and Wally suggested that these issues were important across a range of environment contexts.'

research shows that this is indeed the case. The research goes further in suggesting how that real-time information is gained and what facilitates the process. It has been shown that 'people with domain-relevant experience are likely to spend less time gathering information in a decision situation, because they will already have a stock of applicable knowledge' (Forbes, 2005:358). According to Forbes (2005:358), 'when people with domain-relevant experience do seek information, they are likely to gather it faster, because they are more familiar with the sources of information available in that domain' and their domain relevant experience helps them to analyse information more quickly. Lord and Maher (cited in Forbes, 2005) found that experienced people possess a relevant organising framework or 'schema' that facilitates the storage, recall and interpretation of data. So while an inexperienced person may find a situation difficult, an experienced person may find it relatively easy (Ganster, 2005).

All the above factors, when put together, give an experienced person or expert an edge over an inexperienced person in problem and opportunity identification and evaluation. They are able to discern the key variables associated with the decision or issue.[10] Most importantly, they are able to perceive the issue in the right context. It is through this advantage that they are able to find a way through the deficient areas of information and seek their rectification in a judicious manner. Therefore, their ability to make relatively quick decisions is not a sign of ad hoc or ill-considered processes (Ganster, 2005).

A closely linked feature to the above observation on relevant experience is the breadth of the relevant experience. The importance of diversity of experience was discussed earlier when it was emphasised that the presence of technology experience was taken as a given in a biotechnology venture. As such, the analysis focussed on the presence or absence of relevant business experience. Reuber (1997) and Reuber and Fischer (1994) sought to relate various aspects of business management to performance. They also put forward the idea that a broader set of experience would be relevant at a higher managerial level. Following this, it might reasonably be expected that business experience in a relevant sector would expose a person to all the facets of

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[10] Courtney and Lovallo (2004) state that decision-makers can make rigorous early stage R&D investment decisions in even the most uncertain environments by identifying 'what they would have to believe' to support that investment. It is on the basis of these beliefs that they assess the relative value of the current project with any of the (historical) reference cases.

the business, although his or her expertise will be focused on some areas. On the basis of his or her breadth of business experience, an entrepreneur would be able to usefully contribute to, or at least bring to light, diverse aspects related to an issue or decision. An entrepreneurial team having a mix of relevant business experience and relevant technology experience will stand a better chance of growth and survivability. This seems to be the case in this research.[11]

This discussion has focussed on how entrepreneurial teams can greatly improve the decision process. It is equally important to emphasise that they are also able to greatly reduce their mistakes by avoiding decision process styles that are counterproductive. In fact, the difference is more striking when one compares the relative instances of negative styles associated with entrepreneurial teams with no relevant experience and the positive styles used by entrepreneurial teams with relevant experience.

This research shows that entrepreneurial teams with no relevant experience tend to make less informed decisions. They were often simply unaware of issues and various dimensions associated with issues and decisions. It is perhaps for this reason they often neither seek the help of experts or professional consultants nor deliberate and analyse adequately. This is not to say that they make ad hoc and intuitive decisions. Ad hoc styles of decision-making were found to be an exception rather than the rule. None of the types of entrepreneurial team favoured ad hoc styles. This is an important conclusion that will be discussed further in the next chapter.

The analysis has shown that relevant experience does make a positive difference to the decision process, which then has an impact on performance.

[11] Papadakis et al. (1998) say that a TMT's aggressive strategy is directly related to more information and cross-departmental involvement. Using this line of thought, one would expect that given the need of a high-tech venture to be aggressive (and for that purpose duly informed), an entrepreneurial team with 'mixed' experience (taken here as a parallel construct of 'cross-departmental' experience) would be more suitable.

Chapter 10

Key Findings: Discussion

Philip Green: I am brave, but I take a view. It is an educated view. I am careful. I am not reckless.

The debate on the characteristics of entrepreneurial decision-making has been continuing with no definite resolution. Most researchers characterise entrepreneurial decision-making as opportunistic, intuitive and ad hoc. Other researchers regard it as no different to any other decision-making. This research was undertaken to explore empirically the characteristics of entrepreneurial decision-making in a specific context. In this research, the process of individual decisions taken by the entrepreneurial team was analysed. An effort was also made to link the process to its outcome. This chapter summarises the findings of this research, discusses their significance and suggests future directions for research.

10.1 Key Findings

Contrary to the dominant belief, this research has found that, among a large group of entrepreneurs in a high-tech sector, there was little evidence of successful entrepreneurial decision-making that could be characterised as opportunistic, intuitive and ad hoc. The entrepreneurs were found to make decisions in a way any other person would make them. The analysis included successful and unsuccessful decisions. Intuitive and ad hoc styles of decision-making occurred more frequently in unsuccessful decisions. Successful decisions were generally carefully planned, made use of expert advice and involved decision-makers with relevant prior experience.

In a new venture, an individual or a set of individuals has to deal with a large set of variables that ordinarily in a bigger company are dealt with by a larger set of individuals who have resources (human and material, if not always time) at their disposal. In the new venture context, along with the many variables, the entrepreneur/entrepreneurial team often has to deal with a fast-changing business environment. This only accentuates the challenge for a single entrepreneur or a small set of people with limited resources. Having to make decisions in such an environment and still be successful tends to give the impression of their having a godly gifted sixth sense. This study, however, reveals that entrepreneurs do plan in most cases (especially if it is an important decision), particularly for successful decisions.

Box 10.1 Contributions of this Study

Research Questions

- Is there such a thing as 'entrepreneurial' decision-making?
  - If yes, what are its characteristics?
  - If not, then does/do an entrepreneur/entrepreneurial team make(s) decisions?
- Is the performance of a decision made in a new venture related to the way it has been made?
- Is there any relationship between the experience of the entrepreneurial team and the initial start of the new venture?
- Is there any relationship among the experience of the entrepreneurial team and the way they make decisions and the performance of the new venture?

Key Findings

- Entrepreneurial decision-making is not a distinct style of decision-making with special characteristics—i.e., different styles of decision-making are seen in different types of decisions.
- Decision processes in successful new ventures are seen to be function of the nature/characteristics of the decision.
- Decision processes in successful new ventures are seen to be function of the context of the decision.
- Good decision processes will increase the chances of expected decision outcomes.
- The experience of decision-makers plays a major role in how a decision is made. For example, more positive aspects of a good decision process are observed when the entrepreneur(s)/entrepreneurial team have relevant experience.
- Decision processes in successful new ventures are a function of the relevant experience of the entrepreneur/entrepreneurial team.

Methodological Contributions

- An empirically grounded conceptual framework for examining the decision process in a new venture.
- Suggestions related to methodological aspects of empirical research at the micro level where a 'decision' is the unit of analysis.
- Research design to relate the performance of an individual decision at the 'decision' level.

Their planning is, however, not the 'traditional' sort of planning, as used in the strategic management literature. Their planning is most often in the form of an elaborate mental plan or schema[1] of what to do, when to do it and how to do it. To an observer (and in the traditional sense), their style might seem to be unsystematic and ad hoc. However, they may actually be 'unsystematic in a clever way' (Miller et al., 1960:160). Such a mental plan or schema, if not understood properly, might be considered intuition or a gut feeling (in the popular sense). In Chapter 2, an example from Mowen (1993) showed how decisions based on a schema, if not well understood, can easily be termed as a 'gut feeling' decision. Another example from this research is given in Box 10.2. On probing, it is seen that intuition as used by this decision-maker is not similar to intuition as used in the popular sense but is closer to the definition used by Mitchell et al. (2005) (Refer to Chapter 2).

[1] Busenitz and Lau (1996) have also talked about the importance and popularity of the use of schemas.

Box 10.2 Excerpts of a Conversation with Mr Gordon Milliken (MD, Cryosite)

DS: And how did you actually validate that this concept [of providing service for storing cord-blood cells] would work in Australia, more from marketing point of view?

GM: Intuition.

DS: This is indeed interesting because I haven't come across a [business] concept like that.

PF: Well, the concept exists in US. In fact in the early days, the consultant that we talked about… he talked about cord blood storage companies in the US. So it was really there that this was one possibility that we can do…from the early days of information memorandum. I think I should dig out information memorandum. I think it was mentioned. But I can't remember. But it was certainly there as a possibility but no-one had driving passion to do it. I think Theo saw it as a way of getting short-term cash flow, which is important. And we didn't have to convert big institutions to do it because we have got market for individuals. You can spend a lot of money in trying to assess the market, but we took the view that if it worked in America and was acceptable in America, then it would work here.

DS: How did you go about assessing the actual market size?

GM: That's easy. There are about 250,000 births in Australia a year. Our target client base is the people who have a private obstetrician… not necessarily but probably have their baby in a private hospital. And that's about 60,000. Our stated objective was to have 2 per cent of all births in Australia, which is 5,000, or about 100 a week. So we worked out how good the business would be if we choose that and we achieve that. We did the sensitivity analysis for different percentages. So the market size is quite easy to work out, but then you have to subtract people who can't afford it, people who don't want to do it and people who don't know it. And then you are left with quite a less number of it.

DS: And how did you decide on this magical figure of 2 per cent?

GM: We just heard that there is about 2 per cent market penetration in the US. And we said that that's good enough for us. I have just come back from US and they are still sticking to the fact that at least 2 per cent of all births and not 2 per cent of all private births. You will figure out that 2 per cent of all births is about 8 to 9 per cent of private births, which will be quite good for us. There is quite a lot of attraction because the cord blood business and the traditional sample storage business are current income businesses. It means that you send the bills every month or every year for doing no work. That's what our major investors like about the business. With cord blood you get to the point where if you are successful and you continue to get increased numbers for every month forever, the company will survive just on the income of that. So you need to keep the doors open.

So the appropriate question to ask is not related to planning per se but to the quality of the planning. The quality of a decision will be influenced by the decision-makers' understanding of the issue—what the issue is; what information is required; what information is available or not available; and from where to get the information. This research found that entrepreneurial teams that had relevant experience in both technology and business were more likely to make successful decisions than teams that lacked such experience. Why? 'Probably the major source of new Plans is old Plans' (Miller et al., 1960:177). Miller et al. (1960:178) suggest that what is remembered is not the exact plan related to the specific details of the problem or opportunity but a 'metaplan' from which a large number of different plans can be generated as needed. It means that the decision process is a function of relevant experience that leads to a more holistic understanding of the situation. It is perhaps because of this that experienced entrepreneurs and teams are more aware of their strengths and deficiencies—i.e., the relevant experience makes one realise the limits to one's analogical thinking. This awareness perhaps also encourages them to seek to remove deficiencies, to the extent it is possible. Relevant experience may result in the development of a 'schema' and 'metaplan' (and an appreciation of their fallibility), but where prior experience is much less relevant, such a schema may be misleading. Box 10.3 shows how a schema based on non-relevant experience can prove to be destructive.

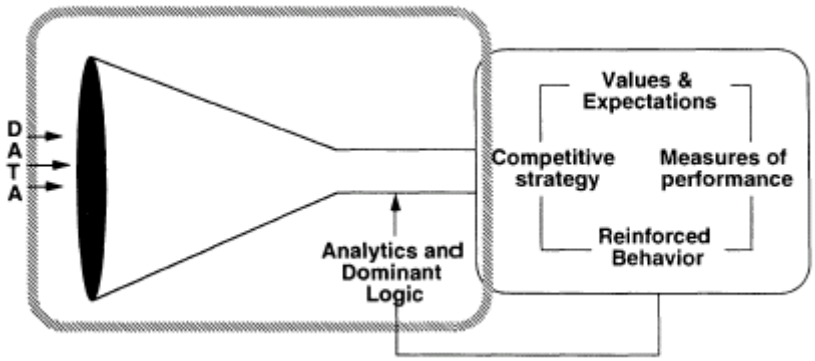
Box 10.3 Schema Based on Non-relevant Experience

Gavetti et al. (2005:694):

'Many factors contributed to Enron's startling failure, but headlong diversification based on loose analogies played an important role. After apparent success in trading natural gas and electric power, Enron executives moved rapidly to create markets for other goods ranging from coal, steel, and pulp and paper to weather derivatives and broadband telecom capacity. Analogical reasoning seemed to drive the expansion. Executives looked for markets with certain characteristics: fragmented demand, rapid change due to deregulation or technological progress, complex and capital intensive distribution systems, lengthy sales cycles, opaque pricing, and mis-matches between long-term supply contracts and short-term fluctuations in customer demand (Salter, Levesque, and Ciampa, 2002). On the broadband opportunity, for instance, Enron Chairman Kenneth Lay said:'[Broad-band]'s going to start off as a very inefficient market. It's going to settle down to a business model that looks very much like our business model on [gas and electricity] wholesale, which obviously has been very profitable with rapid growth' (*Gas daily*, 2000). However, the analogical reasoning failed to appreciate important, deeper differences between the market for bandwidth. The broadband market was based on unproven technology and was dominated by telecom companies that largely resented Enron's encroachment. The underlying good, bandwidth, did not lend itself to the kinds of standard contracts that made efficient trading possible in gas and electricity. Perhaps worst, in broadband trading Enron had to deliver capacity the 'last mile' to a customer's site, an expensive challenge that gas wholesalers did not face.'

While deficiencies in the basis for decision-making may occur due to a specific issue or a specific variable in a particular issue, there may also be higher order deficiencies due, for example, to the lack of a person in the team with relevant business experience. If the entrepreneur(s)/entrepreneurial team are aware of such general deficiencies and seek to remove that deficiency early by hiring an individual with the required skill set, they can make their collective schema fuller, which improves decision-making abilities. It also becomes an issue of willingness on the part of decision-makers to be able to realise and accept those deficiencies (specific or higher order) and seek to overcome them.

Cohen and Dean (2005) observe that top management teams (TMTs) play an important role and have an effect on the performance of the firm.[2] The quality of TMT in a new venture context is largely a function of the nature of experience of the entrepreneur/entrepreneurial team. That experience provides the basis for gauging the importance and priority of each decision. More importance means more care vis-à-vis that decision. A higher priority also means immediate attention and a relatively quick decision on that front.



Source: Bettis and Prahalad (1995)

Figure 10.1 How Experience Plays a Role

This study supports the empirical findings of Dean and Sharfman (1996) that more information leads to a more accurate perception of environmental conditions. More information also leads to a more accurate perception of the concerned decision. This study supports their contention that 'in unstable environments, top managers who fail to systematically collect and analyse information about environmental trends and constraints will be much more likely to lead their organisations in nonviable strategic directions.'

This study found strong relationships among the experience of the decision-makers, the decision process and the outcome of the decision. Figure 10.1, derived from Bettis and Prahalad (1995), shows how experience feeds back into shaping the processes of information assessment. The model could be interpreted to show the important constructs of a decision process: information (data), deliberation and formal

[2] Many researchers have worked on TMTs (top management teams) from many different angles. A quick search on Hhttp://scholar.google.comH and ProQuest results in many articles. However, this was not central to this research so was not pursued.

planning (analytics), nature of experience of the entrepreneurial team (dominant logic), values and expectations, options/choices/approaches (competitive strategy), measures of performance, and iterations (learning).

But how exactly does a new venture with limited resources overcome drawbacks and bring robustness to the decision process? Entrepreneurs or entrepreneurial teams, because of their limited resources, seek to overcome deficiencies, which are typically related to 'good' information. They use a variety of methods to enable reasonably good answers within the constraints of time and money. A critical issue is the methods used and their appropriateness. Previous experience and social networks[3] play a key role in accessing and assessing the required information to make a decision, which is influenced by the nature and context of the decision (see Figure 10.2).

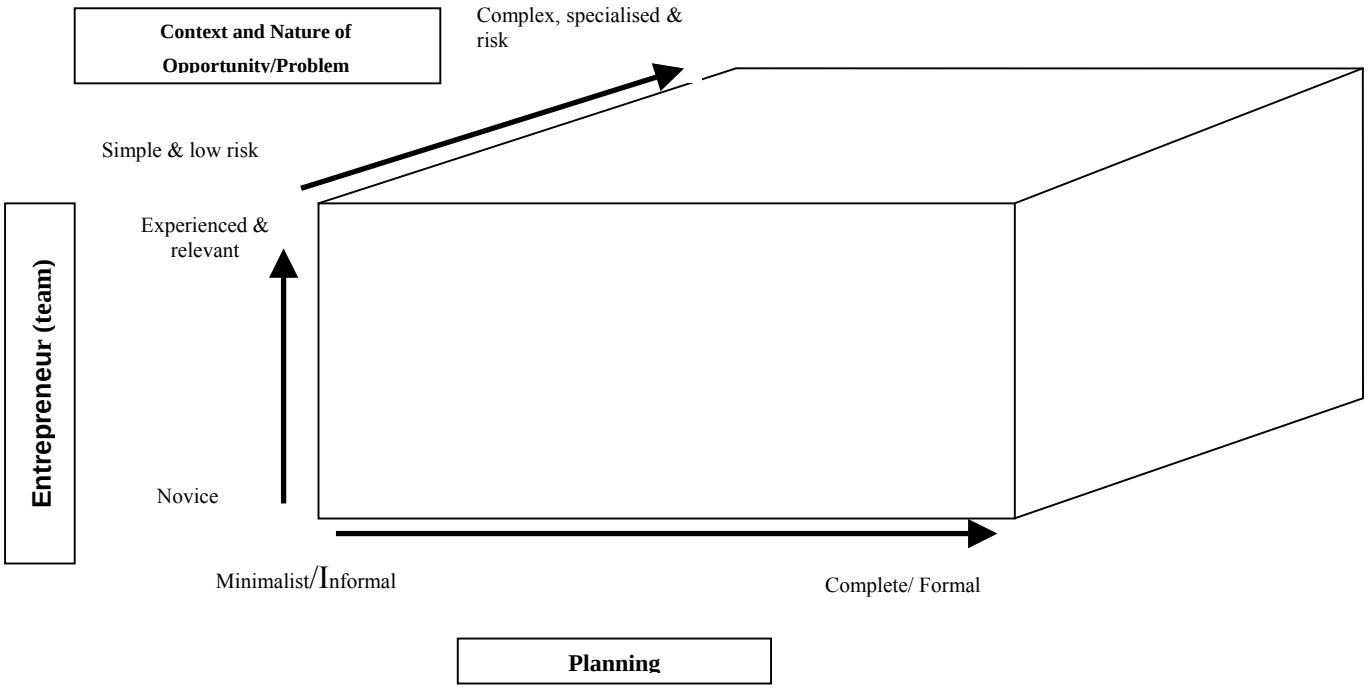


Figure 10.2 The Effect of Context, Nature of Decisions and Experience on Planning

[3] It is not social networks per se that help; the quality (and relevance to needs) of social networks is more important.

In order to overcome their limitation of time and resources, entrepreneurs more often do critical point planning. This is similar to the following observation by Miller et al. (1960:166): 'When subjects are put under pressure to find a concept in the smallest number of questions, they may try to keep track of the *entire* set of hypothesis through which they are really searching.' Critical point planning seems to give them the confidence of having dealt with major 'known' issues. The entrepreneurs were more inclined to use deliberative styles, the experience of their staff and the services of an expert or consultant.

Formal planning methods were not used often but when used seemed to have a considerable impact on the success of the decision. Formal planning is definitely more robust (Dean & Sharfman, 1996), but is used more sparingly. This is because 'perfection has its price, and value analysis should be reserved only for the most complex and important decisions, especially those that are now-or-never and can't be reversed or substantially revised later' (Russo & Schoemaker, 2002:157). These were more often seen in successful decisions that were important in nature and successful ventures in general. Even for 'big bet' decisions, decision-makers can improve their chances by using simple techniques that may be either formal or informal (Brown & Eisenhardt, 1998; Courtney & Lovallo, 2004; Russo & Schoemaker, 2002 etc.). It is not strange that Nieuwenhuizen and Kroon (2003) found in their empirical research work that small industrialists take 'calculated risks'—i.e., considered action.

Experience in a relevant field underpins both access to networks and the assessment of issues. Experience provides a guide to what, when and how much of the information is sourced from whom. Therefore, the quality of relevant experience is the foundation for much entrepreneurial decision-making.

An entrepreneurial team with the required set of relevant skills will be more likely to know the gravity of a decision. Wherever information gaps are present for taking a reasonably informed decision, they will seek further information. In such instances, the use of experts or professional consultants, with complementary insights, can be very useful (Ottesen, 2005). In addition to using experts and consultants, they may even be prepared to conduct a formal study. Such a study would generally be to give broad trends rather than prove a hypothesis beyond doubt. Of course, any decision-maker would prefer to be in the latter category, to make a completely

informed choice. However, such an ideal condition is hard to achieve (in new ventures and in large companies).

This study shows that entrepreneurs often seek multiple options for a decision and assess them simultaneously. This process is not one of developing complex models but more of identifying and exploring the key issues and proximate questions.

An entrepreneurial team will not be innovative in every decision. In fact, most decisions made in a new venture are based on common approaches. This is similar to the process of innovation that typically involves a high level of knowledge reuse. For some types of decisions, there are certain standard procedures to follow, as discussed in previous chapters. In some cases, a common approach or option will be modified to suit the needs of a venture. However, sometimes an option or an approach will be taken that will not be so common. One can then call that option or approach innovative. For example, Metahelix (an agri-biotech company) opted to start a seed business with the purpose of not only generating immediate cash (a common approach) but also not being dependent on another company to bring to market the traits they were developing for certain crops. This also meant they might reap higher returns by keeping more of the value chain to themselves. However, the study found that such innovative options or approaches were not common.

Often it is the common approach implemented efficiently which best fits the requirement that makes the difference to an outcome. The process of implementation then becomes more important. This inevitably involves micro-level managerial decisions rather than strategic decisions. The results of this study show that the entrepreneurs/entrepreneurial teams that had requisite skill sets and experience (in both business and technology) generally fared well. It appears that relevant prior experience not only helps develop a more informed schema but also helps facilitate proper implementation.

In short, this study suggests that, in contrast to the simplistic views of many authors (as discussed in Chapter 2), it is imperative to take a balanced approach to understanding decision-making. For example, Busenitz (1999) says:

> Some authors have argued for ways to improve one's decision-making by protecting against the influence of biases and heuristics (Bazerman, 1990;

Russo and Schoemaker, 1989). However, *in the entrepreneurship context, the use of biases and heuristics may be potentially advantageous [Italics added]*.

Of course, heuristics may be more commonly seen in entrepreneurship. However, as shown in previous chapters, important decisions based only on heuristics can be dangerous. Heuristics must be used intelligently because working models are open to change.

In addition to the emergent approach to decision processes, the study has shown the importance of a systematic and comprehensive approach (as used in this research) to analyse a situation (problem and opportunity). However, it is essential to emphasise that the comprehensive approach referred to here is closer to the construct of a holistic schema and is not akin to the 'algorithm' type of approach (Miller et al., 1960:164) of a major investment study by large corporations. The capabilities of the decision-makers and the nature of the decision process are inevitably interrelated: while neither wholly substitutes for the other and strength in both is ideal, some counterbalance is often effective.

10.2 Directions for future research

This study points to a more realistic framework for understanding decision-making and provides a useful foundation for advising decision-makers. However, further research can develop the framework.

10.2.1 Framework and Research Methodology

The study involved various types of research methodologies. Future research that improves upon the research methodology used in this study would be very useful. It would be particularly interesting to see what findings other researchers could obtain with a similar or an improved methodology.

The following note of caution, however, needs to be provided:

- The findings of empirical analysis of the decision process in the new venture context should not be compared to similar studies of decision processes in large organisations. This would be bound to lead to misleading conclusions.

- The characteristics of the specific concerned decision (e.g., important or less important, urgent or not urgent) should be taken into account (Papadakis et al., 1998) when research is being carried out to the decision level.
- When the unit of analysis is the decision, performance (if in the research design and part of the study) should be related at that level.

Langley et al. (1995) have shown how different decisions are interconnected or intertwined with one another. They advise to analyse 'issues' rather than 'decisions'. While that suggestion may have merit, this study followed the advice of Krippendorff (1980) to set a boundary on the unit of analysis. This worked reasonably well. Researchers should be careful to set boundaries for their unit of analysis, regardless of whether they focus on 'issues' or 'decisions.'[4]

10.2.2 Decision Process Framework

There have been many attempts to develop a generic framework for the decision process. (A few are discussed in Chapter 3.) This research made a similar attempt but one more specific to a new venture context.

The research led to the observation that one can make a generic framework for the decision process. However, this has its limitations. One can develop a broad understanding of deliberation and formal analysis methods but putting that in a framework remains a challenge—i.e., the inside of the deliberation and formal analysis box. It is perhaps because of this that Dutton et al. (1993) say that '[t]he process of data interpretation is not as systematic, sequential and unidirectional.' However, systematic research and concerted effort are still needed to determine whether that statement is true or s simply reflects the current lack of understanding of the process.

10.2.3 The Framework and Generalisability of the Conclusions

Stebbins (2001:44) states that 'one problem frequently faced by exploratory researchers is the need to qualify, often extensively, their generalizations, which are rarely simple and

[4] For example, raising funds by an IPO can be called a decision process and can be analysed as a unit. It can also be called a funding issue or an IPO issue. Setting up a credible boundary for analysis is more important than its labelling.

straightforward; they must usually be qualified, put in context, and related to other generalizations.'

The generalisability of this study is limited by the focus on:

- new ventures
- the biotechnology industry (a high technology, risk prone, long gestation and dynamic environment)

Notwithstanding the necessity for a careful approach to generalisation, the framework developed here is an extension of the ideas of other researchers, especially Mintzberg et al. (1976). The framework integrates in a systematic manner the concepts involved in the decision process and was designed to be a useful generic decision process framework. Further testing of the framework in other contexts will assess its usefulness.

More studies across different industries and countries will develop more insights into the nature of the decision process within new ventures, their performance and their relationship with the experience of the entrepreneurial team, which are clear and strong in the case of these biotechnology ventures. It may be that biotechnology ventures and entrepreneurs have specific characteristics that differ from, for example, software ventures. For example, the general requirement in biotechnology ventures to seek external funding may promote a more rigorous approach to planning and decision-making. The complexity of the technology and the requirement for careful codification of the research, IP and product development may also encourage a more considered approach to decision-making.

10.2.4 Extension of this Research

One focus for the future work could be the assessment of quality and levels of quality for various constructs. For example, it would be very useful to consider the quality of deliberation with an expert by looking at the quality of the expert. Similarly, the quality (level of relevance and depth of experience) of prior experience could be

examined.[5] The issue of quality was raised during many fieldwork discussions in this research.

This research has shown that process is important and must be researched within a context. Future research can show how different contextual variables affect the process and with what impact (result).

10.3 The Practical Importance of this Research

Langley et al. (1995) highlight the ideas of Simon and March and many other researchers in cognitive psychology and organisational theory when they portray the decision-maker as 'passive, a receptacle to whom things happen: problems arise, opportunities appear, choices are forced, interruptions occur.' Many researchers seem to have applied the same ideas to entrepreneurship. This approach simply dissociates the actor from the action. This study has shown the significant association between the actor and the action. As such, it helps to open up the lid of the 'black box' of decision-making in new ventures. Complete rationality, complete comprehensiveness and a completely systematic approach have been shown to be a myth. Strategy, as the combined effect of significant decisions, is always emergent due to the ever-evolving context. Similarly the actors (i.e., the entrepreneurial team) are also emergent in the sense that they are continuously learning.

From a practical standpoint, this study will be useful to entrepreneurs/entrepreneurial teams to assess their readiness to start a new venture. It will also help investors, because it provides clues about what to expect from a certain entrepreneur/entrepreneurial team vis-à-vis their approach to the decision process and behaviour. This gives potential investors and board members an idea of what needs to be done to increase the effectiveness of the decision-making behaviour.[6]

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[5] For example, this study has taken into account very broadly the industry experience. It would be helpful if researchers could show the impact of variables on the quality of industry experience—whether the business experience gained was in the same country as that where a new venture is located; whether the business experience was in a pharma MNC or a biotech new venture etc.

[6] While this study has emphasised the importance of process, some specific personality dimensions (such as motivation or achievement) are clearly significant. This has also been brought to focus by Ucbasaran et al. (2001:61),

> Why, when, and how certain individuals exploit opportunities appear to be a function of the joint characteristics of the opportunity and the nature of the individual (Shane & Venkataraman, 2000). Venkataraman (1997) highlighted three main areas of difference between individuals that may help

Last but not the least, the study indicates that the analysis of the decision processes of a firm can be a potent indicator of the performance (or expected performance) of the firm. As has been concluded by Hart and Banbury (1994:265), 'strategy making processes are significant predictors of firm performance.' One can assess the quality of the decision process of a sample of decisions taken in a new venture to get a general feel about the quality and nature of the decision process of that new venture. The performance of the assessed decision process can also be judged (based on the decision specific criteria). This can be supplemented by traditional measures of performance (that can be operational, financial or both) for a new venture. (The context needs to be borne in mind.) An assessment of a company with a two-pronged strategy is bound to be more accurate and holistic than an assessment using only traditional performance measures, which management analysts or academic researchers have been using. However, it must be noted that the operationalisation of this approach may be difficult.

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us understand why certain individuals recognize opportunities while others do not: knowledge (and information) differences; cognitive differences; and behavioural differences.

Chapter 11

Who Learns What?

W. Edwards Deming: Learning is not compulsory but neither is survival.

If entrepreneurship is a process of learning[1], 'a theory of entrepreneurship requires a theory of learning' (Minniti & Bygrave, 2001:7). Rae and Carswell (2000) call for a better theoretical grasp on entrepreneurial learning through the development of better frameworks to understand learning in the entrepreneurial context. But according to Cope (2005), there is a lack of relevant empirical analysis and we know surprisingly little about entrepreneurial learning.

This chapter is about who learns what from the new venture experience. Cohen and Levinthal (1990) argue that an organisation's absorptive capacity will depend on the absorptive capacities of its individual members. These individuals stand at the interface of the firm and the external environment. As the context changes, the goals of a firm often have to be reformulated. This reformulation depends on learning by the individuals involved in the process. This individual learning is shaped by the particular history of each person. This is because 'knowledge is cumulative' and '[w]hat is learned in one period builds upon what was learned in an earlier period' (Minniti & Bygrave, 2001:7). However, Corbett (2005) suggests that individuals acquire and transform their experience (learn) in different ways due to 'learning asymmetries'. This means that each individual in a new venture may have a different learning experience due to both their specific role in the venture and to their prior experience (Deakins & Freel, 1998).[2]

This study is based on the analysis of entrepreneurial learning of 32 founder-directors/senior managers in 23 new biotechnology ventures in Australia and India. In the following section, how various authors have approached the issue of entrepreneurial learning is discussed. Drawing on this literature helps to develop a conceptual framework for this study. This recognizes, however, that the main study was designed to focus not on the analysis of entrepreneurial learning but on entrepreneurial decision-making.

[1] According to Sanchez and Heene (cited in Honig, 2001:22), '[k]nowledge is located in the beliefs held by an individual or individuals within a group, while learning is defined as the process that changes the state of knowledge of a particular individual or organisation.'

[2] According to Politis (cited by Rae, 2006:42), it is important to take into account the 'context' to develop a better understanding of entrepreneurial learning. This is because the content—what is learned—is inevitably affected by the context.

11.1 Learning in Entrepreneurship

In today's dynamic business environment, organisations must constantly review their strategies and adapt. This involves a constant, if uneven, process of learning. In this light, organisational learning is as important as decision-making. In fact, the ability to learn is one of the most important sources of sustainable competitive advantage (Feurer & Chaharbaghi, 1995). How useful, then, are the principles of organisational learning for understanding learning in the new venture context?

Reuber and Fischer (1999:32), based on a review of the literature, propose that organisational learning is 'a group concept signifying a shared cognition among top managers.' But they argue that 'for small and young firms dominated by a single individual, the cognitive process of the firm's dominant logic will be similar to that of the dominant individual' (p. 32). Deakins and Freel (1998) conclude from an empirical study that 'the learning process especially in SMEs is a crucial part of their evolution, as *the entrepreneur*, through experience, acquires the ability to learn.' In the new venture context, the emphasis is on an individual (or a few individuals) responsible for most of the decision-making and implementation. In this context, the limited formal structure gives them more freedom to act based on their personal knowledge. In contrast, in the more formal structure of large organisations, individuals matter less; individuals are part of the structure and not 'the' structure.[3] Concepts such as learning communities or collective memory that play a key role in organisational learning theories are less appropriate when applied to the entrepreneurship process and the growth process in small firms (Deakins & Freel, 1998).[4] While Reuber and Fischer (1999) and Deakins and Freel (1998) agree that the concepts of organisational learning cannot be directly applied to entrepreneurial learning, nevertheless learning in new ventures will not necessarily rest with only one individual. In new ventures with multiple founders, the learning of the firm during its early days will be the cumulative learning of these individuals. While entrepreneurial

[3] For a succinct understanding of organisational learning, refer to Huber (1991) and Levitt and March (1988).

[4] Take, for example, the concept of 'collective memory.' In large organisations, there is a time lag between the action and the learning that later may take the form of routines/procedures, whereas in a new venture context, action and learning are almost simultaneous.

Matlay and Mitra (2002:10) have also discussed differences between the nature of learning in a big and a small organisation.

teams play an important role in establishing new organisations, learning by an individual might not always lead to team learning.

Entrepreneurs who have been involved in starting up a new venture tend to be more successful in starting up and managing their second and third ventures (Feurer & Chaharbaghi, 1995; Wright et al., 1997).[5] Kolb (cited in Feurer & Chaharbaghi, 1995:40) defines learning as 'the creation of knowledge through the transformation of experience'. But to increase our understanding of entrepreneurial learning, we need to know more about how and what entrepreneurs learn from past experience.

There have been some attempts to analyse the entrepreneurial learning process. One approach to assessing the significance of entrepreneurial learning involved comparing the relative difference between entrepreneurs' 'total stock' of experience at a given point of time and then relating this stock of experiences to variations in new venture performance (e.g. Bailey, 1986; Lamont, 1972).

Another approach involved demonstrating change in the total stock of experience (Busenitz & Barney, 1997). Kaish and Gilad (1991) extend this idea further, giving it a cognitive dimension. They propose that an individual's ability to combine existing concepts and information into new ideas plays a central role in the process of entrepreneurial learning. According to Minniti and Bygrave (2001) and Reuber and Fischer (1999), there have been relatively few attempts to study the type of knowledge that is developed through entrepreneurs' career experiences. Even less attention has been directed towards the intermediate process where these experience are transformed (the 'how' of learning) into such valuable expertise and knowledge.[6] Nevertheless, there have been attempts to understand the how of entrepreneurial learning, including work by Corbett, (2005), Erikson, (2003), Feurer and Chaharbaghi, (1995), Politis, (2005), Politis and Gabrielsson, (2005), Sarasvathy,

[5] Surprisingly, the results of research by Westhead and Wright (1998) did not support their hypothesis that firms owned by portfolio and serial founders performed better than firms owned by novice founders.

[6] Corbett (2007), in his article based on extensive empirical research, equates learning with experience. In this article, he sought to relate human capital to opportunity recognition. He states that 'knowledge asymmetries exist because learning asymmetries exist' (p. 18).

For the purpose of this research, experience was not same as learning. It is proposed that experience affects the type of learning, which in turn will have affects the new knowledge of the individual, making it his or her unique experience. It is through sense making of the experience that learning happens (Rae & Carswell, 2001:157). Erikson (2003) has theoretically suggested eight different categories of entrepreneurs based on the nature of their experience.

(2001) and Warren, (2004).[7] Sexton et al. (1997) identify the 10 most frequently mentioned learning needs of entrepreneurs. It is not clear how generalisable these findings are because the results are not linked to a particular context. Cope (2005) argues that much of the content dimension of the entrepreneurial learning task (i.e., what entrepreneurs have to learn about) is context-specific and, hence, learning priorities may vary according to the industry. Lamont (1972) found that first-time entrepreneurs do more contract type work but later endeavor to focus more on the development of products. He suggests this indicates that a learning process is operating.

Clearly much needs to be done to understand who learns what and, in doing so, to relate content in entrepreneurial learning to the context. The context for entrepreneurial learning has at least two key factors: prior knowledge and the circumstantial need for new knowledge or capabilities. The latter is often associated with a significant incident that has an effect on the new venture (Cope, 2005; Deakins & Freel, 1998; Rae & Carswell, 2000) and the task role the concerned individual performs within the venture.

11.2 Analysing Learning in the Case Study Ventures

The work reported here is part of a larger study of decision-making in new ventures. In pursuing the study of decision-making, information on entrepreneurs' prior experience was acquired. Individual entrepreneurs were asked (during interview) about their key learning experiences from their present venture. Hence, the information the study acquired about individuals' key learning is what those individuals thought was their most important learning.[8]

This information was analysed to assess whether there were relationships between prior experience and the characteristics of learning. The analysis was extended to consider the effect both of the specific task roles of the individual and the composition of the entrepreneurial team on individual learning.

[7] Honig's (2001) empirical study is valuable because it shows different learning processes used by intrapreneurs and entrepreneurs.
[8] Therefore, there is no attempt to arrive at a comprehensive assessment of all learning by these entrepreneurs.

It is important to note that Warren (2004:8) argues, based on previous literature, that 'the articulation of the learning process may be very difficult for entrepreneurs, given that much of entrepreneurial learning has been characterized as both unintentional and accidental…and that they may be unused to reflecting on such issues.' However, Bailey (1986), based on his research, argues that entrepreneurial learning should be regarded as an experiential process in which entrepreneurs develop knowledge through four distinctive learning abilities: experiencing, reflecting, thinking and acting. For Bailey, the role of reflecting and thinking means that entrepreneurs are completely aware of their learning[9]. Sexton et al. (1997) have a similar perspective and argue that entrepreneurs have very definite ideas about what they want to learn. Krueger (2007), based on his literature review, also argues that it is not the experience per se but the lessons learnt from it that is more important.

In the following section, the types of people who are usually involved in forming biotechnology ventures and the major functional roles they have are discussed.

11.3 Approach to the Research

Biotechnology is a highly knowledge intensive area, so it is vital to have a credible scientist in the scientific domain of the new venture. The scientist (or scientists) can be associated with the company in various capacities. Usually in biotechnology start-ups, key scientists are the founding team or part of the founding team. This is because, notes Zucher et al. (cited in Murray, 2004:645), 'the performance of many early entrepreneurial biotechnology firms [is] dependent upon a close relationship with certain star scientists because they [hold] the 'key' to tacit knowledge….'

In addressing the 'who' dimension of who learns what, three categories of entrepreneurs were identified: those with primarily 'non-relevant' business experience (i.e., not in the same industry); people with primarily science/technology experience (and no business experience); and those who have either research and business (i.e., mixed) experience, or relevant business experience.[10] Of the 32 entrepreneurs in the

[9] This is a position similar to that of Senge (1990).

[10] Two individuals had primarily a business background but had been in the pharmaceutical/biotechnology industry for more than 20 years and in very senior positions. While they were not technologists, they had a very good working knowledge of the science. They were grouped in

study, three had only business experience, 20 had only technology experience and nine had mixed experience.[11] The characteristics of these three broad categories of experience are summarised in Table 11.1.[12]

In a biotechnology business, the capability to apply knowledge and use technology to provide services or develop products is vital. As funding for research is usually a major requirement, knowledge of various fundraising mechanisms is also vital. Knowledge of markets, project management and often product development is usually essential. To some extent, the entrepreneur or the entrepreneurial team can draw on extended knowledge or even outsource some activities, but the key decisions must be made within the venture.

Four major functions need to be taken care of while managing a new venture to growth: raising and managing finance; attracting, selecting, and managing people; technology strategies (for product development or service provision); and planning (in general, and the need to have good business model that couples technology with the market needs). It also helps a great deal if the entrepreneur or the entrepreneurial team understands the basic and general rules of business (which will include such things as the importance of vision, good deal-making techniques etc.). Collectively these five areas constitute the 'what' dimension in this study[13].

Once the key learning of each individual entrepreneur was obtained, it was content analysed and categorised according to the functional areas (discussed above). Possible relationships between types of entrepreneur (the 'who') and categories of learning (the 'what') were tested by ANOVA. The average scores in two-way tables were analysed using an analysis of variance.[14]

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the 'mixed' experience category. Whereas people with only non-relevant business experience will simply be termed as 'people with only business experience.'

[11] All the entrepreneurs belong to new ventures set up between 1998 and 2003. The entrepreneur team in this research means founder(s) along with senior management people during the very early stages.

[12] Due to the sample size, it was not feasible to use more differentiated categories.

[13] The 'what' of learning raised by the entrepreneurs in response to an open-ended question about key learning fell largely unambiguously into these categories.

[14] It is possible to test for the main effects of these categorising factors because the interaction between them is used as the error (residual) to test for these main effects. It is assumed that this interaction is a reasonable estimate of the residual variation. In some situations, it was possible to subdivide the degrees of freedom for one factor into simple degree of freedom contrasts that were a priori of particular interest or importance.

TABLE 11.1 GENERAL CATEGORIES OF TYPES OF EXPERIENCE AND ASSOCIATED ASSUMPTIONS

CATEGORY	CHARACTERISTICS	ASSUMPTIONS
Primarily 'non-relevant' business experience	o Managerial experience of working in 'non-technology' functional areas—finance, accounting, sales, marketing, strategic management, and general management. o No managerial experience of working in a biotechnology/ pharmaceutical/life science related company.	o Expertise in their functional area, and understanding of other 'related' areas of management/business. Or a firm understanding of 'general management.' o Well-developed understanding of general principles of business. o Poor understanding of the biotechnology industry and peculiarities related to it.
Primarily science/technology experience	o Primarily involved in research-based work either in a commercial or an academic organisation o Well-developed understanding of the science and the technological aspects of the core area based on which the new venture is founded. o General understanding of the technological aspects that are related to the core.	o Expertise in their area, and understanding of other 'related' areas in science. o Little understanding of the 'general' principles of business and the process of commercialisation. o Little understanding of 'specific' functional areas in business and even the importance of each.
'Mixed' experience	o Reasonable (if not well-developed) understanding of the science and the technological aspects of the core area based on which the new venture is founded. o Managerial experience of working in 'non-technology' functional areas—finance, accounting, sales, marketing, strategic management and general management. o Managerial experience of working in a biotechnology/pharmaceutical/life science related company.	o Good understanding of the concerned segment of the biotechnology industry. o Overall understanding of the commercialisation process and the important dimensions of various functional areas. o Understanding of the relevant science, the commercialisation process, and management functions leading to a holistic understanding of the business.

11.4 Does Experience Affect an Individual Entrepreneur's Learning?

Table 11.2(a) shows that there is little significant difference (p= 0.053) in the 'amount of learning' (i.e., the number of total learning experiences or 'lessons' cited) among the three categories The influence of prior experience on the amount of an entrepreneur's learning is, however, observed when these individuals are categorised into two main groups—those with relevant business experience (i.e., mixed experience); and those with no or non-relevant business experience—and compared. As shown in Table 11.2(b), the nature of prior experience seems to have a significant influence on the total amount of learning by an individual (p= 0.019). The means for this effect are 0.697 for the group with no or non-relevant 'business' experience and 0.266 for those with relevant business experience. The SED is 0.1475. Individuals with 'mixed' prior experience have the least frequency of cited new learning. This may be because they already would have undergone quite a lot of learning in both technology and business.[15] On the other hand, people with only science experience or non-relevant business experience have a similar 'total' average frequency of learning (albeit in different domains), so no source of variation was observed for the total learning between these two groups (p= 0.678).

TABLE 11.2(A) THE EFFECT OF EXPERIENCE ON KEY LEARNING

Source of Variation	d.f.	s.s.	m.s.	v.r.	F pr. (p)
Experience	2	0.63066	0.31533	4.35	0.053
Area	4	0.03619	0.00905	0.12	0.969
Residual	8	0.58009	0.07251		
Total	14	1.24695			

***** d.f. – degrees of freedom; s.s. – sum of squares; m.s. – mean square; v.r. – variance ratio; and F pr - F probability (which determines significance level).

[15] According to Argote (cited in Haas, 2006:1173),

> [P]rior experience moves team members up their own learning curves, helping them to build on past successes and avoid past mistakes when interpreting and applying external knowledge rather than repeating those mistakes.

An empirical study by Haas (2006) found that the performance of a project is enhanced when the capabilities and experience of the team members are more relevant to the 'focal organisation' rather than if it is of 'non-specific nature.'

TABLE 11.2(B) THE EFFECT OF EXPERIENCE ON KEY LEARNING

Source of Variation	d.f.	s.s.	m.s.	v.r.	F pr.
(Business Exp. or Technology Exp.) Vs. Mixed Exp.	1	0.61719	0.61719	8.51	0.019
Business Exp. Vs. Technology Exp.	1	0.01347	0.01347	0.19	0.678
Area	4	0.03619	0.00905	0.12	0.969
Residual	8	0.58009	0.07251		
Total	14	1.24695			

On further analysis, it became evident that individuals with different experience also learn differently. (See Tables 11.3(a) and Table 11.3(b)). Table 11.3(b) shows that the biggest contributors to the residuals (in descending order) are due to remarkably different learning preferences shown by individuals with only business experience and individuals with only technology experience. For people with prior experience only in technology, the key learning is in understanding general business concepts. For people with prior experience in business only, the key learning is more specific to finance and hiring people. This is understandable, because individuals with business experience who are new to the industry will have to learn about the industry-specific technology/commercialisation strategies and technologists will have to develop skills in project management and understanding and developing products/services in a commercial context. People with prior business experience only, however, learn very little about general business principles, and individuals with only technology experience in general show little enthusiasm for learning about finance.

TABLE 11. 3(A) WHAT IS THE KEY LEARNING OF WHOM?

	Business Experience Only	Technology Experience Only	Mixed Experience	Average
Key areas of learning	(No. Of People= 3)	(No. Of People= 20)	(No. Of People= 9)	No. Of People= 32
Technology Strategies	**0.667**	**0.75**	**0**	**0.531**
Finance	**1**	**0.35**	**0.444**	**0.438**
People	**1**	**0.6**	**0.222**	**0.531**
Plan	**0.667**	**0.7**	**0.222**	**0.563**
Business General	**0.333**	**0.9**	**0.444**	**0.719**
Total	**3.667**	**3.3**	**1.33**	**2.781**

***** Figure shown for each given category is its respective 'average,' which is obtained by dividing the total instance of key learning in the respective category by the total number of individuals for the given type of experience.

TABLE 11. 3(B) WHAT IS THE 'KEY' LEARNING OF WHOM? – ASSESSMENT BASED ON 'RESIDUALS'[16]

	Business Experience Only	Technology Experience Only	Mixed Experience
Key areas of learning			
Technology Strategies	**0.0145**	**0.1709**	**- 0.1855**
Finance	**0.2219**	**- 0.3547**	**0.1329**
People	**0.2125**	**- 0.1141**	**- 0.0985**
Plan	**- 0.0428**	**0.0636**	**- 0.0208**
Business General	**- 0.4061**	**0.2343**	**0.1719**

[16] Assessment based on the residual shows the contribution of individual factor to the total residual. The higher the value (positive or negative), the higher the contribution. This suggests the occurrence is not by chance only. For example, people with business experience only show much less learning related to general business. See Table 11.3(a). Its contribution to residual is the highest, which means the occurrence is not merely by chance.

11.4.1 Learning Related to Technology (for Products/Services)

As biotechnology is a technology business, it is to be expected that people with only (prior) business experience will develop some functional knowledge of the technology (especially commercially relevant aspects of it). In two cases, the individuals talked about having a learning experience related to technology. Surprisingly, perhaps, both arose from things they got right. Mr Kim Slatyer (VRI Biomedical) talked about an optimum mix of early and late stage products:

> One of the things that I like about our business plan now is that we have products that generate revenue in short term but we also have projects that might be longer term and have a lot of blue sky.

Mr Gary Redlich (Peplin Biotech) talked about the imperative to have a clear product idea that, according to him, many small biotech companies don't have:

> And another learning experience, and this is not because we got it wrong in Peplin but because we got it right and in fact, I have seen it gone wrong in far too many companies in Australia. Having a very clear vision of what the ultimate product is going to be from the very start and being able to put your energy where you need to make choices and to put your energies to behaviours that are going to direct you to that product rather than direct you to other outcomes, be it scientific credibility or publications, be it political glory or anything else.

People with scientific experience only seemed to learn more about product development or services provision. Almost two-thirds of those with prior experience only in science reported learning experiences related to this domain.[17]

Quite a few entrepreneurs who had prior experience only in science point to learning about the market/business side of the product or services. For example, one respondent commented:

> We had a product that could be sold primarily to research biologists. It was a product which was less priced, about $5,000 to $10,000 per desktop. To sell the product, it required more effort than almost the selling price, particularly in the beginning when one needs to give a lot of discounts.

[17] However, one individual identified six 'tech strategies' learning experiences. Notably, this individual was, at the start of the venture, a recent PhD graduate in life sciences. This observation is important from an experience perspective (i.e., less experience, more learning).

In terms of the impact of this observation on the conclusion and analysis, even if one takes this aberration into account, this group has had a relatively high learning experience in technology strategies.

> For example, a $5,000 product has to be sold for $3,000. At $3,000, if you are going to engage them for two months discussion, show them demos and maybe visit them all the way to America, then the sales strategy doesn't work. [I]f it would have been $50,000 product, then it would have been simpler to put our own sales effort and get that initial kick-start to the revenues. That is why we had to completely change strategy with gene expression stuff. In terms of sales, we had to look for distributors. It was not viable to do it ourselves. From that perspective, it would have been better to start with $100,000 or at least $50,000 + products. And the technology we were creating, we were pretty agnostic… Whether it was gene expression or chemistry or clinical, it didn't matter much.

A few entrepreneurs with prior experience only in science also emphasised the benefits of having a platform technology. Dr Andrew Wilks (Cytopia) said, 'I don't believe in one-hit wonders or single technology company. You have to build a platform and from that platform you have to have multiple opportunities for discovery.' Dr Andrew Humberstone supported that view and added that it is easier to sell products based on a platform technology than platform technology per se. Dr Villoo Patell (Avesthagen) extended this line of thought by emphasising the need to be a multi-product company. Objective assessment related to the development of products also seems important. One respondent puts this quite clearly:

> And I think one of the things that I have learnt is that you have to be a bit more ruthless on technology development in terms of saying, 'This is not going to work.' And then putting it to one side. You might come back to it later on but you got to… The development of the product development process adds a lot of rigor and robustness in the system. And I think prior to that we invested too much for too long for things that were dogs and were never going to make it. We should have been rigorous about it and cutting it off earlier.

For new ventures in the therapeutic or diagnostic arena, it may be useful to take into account the twin needs to have a credible proof of concept earlier (so that if it has to fail, it fails early) and to engage regulatory authorities early. Dr Andrew Humberstone (Acrux) reflected in this way:

> You [have] got to get human data as quickly as possible. You shouldn't spend too much time and money on developing a product before you have got that data to show. It is nice to have lab data to show flux across skin, but what does that mean? I think the key to get big pharma company interested is to have some human data. We have really focused hard on getting very efficient, low-cost development programs to that stage.

Entrepreneurs who had a mixed experience did not list any technology related learning experience. It is likely that, having worked in the business environment, they would be well aware of the need for careful planning and for aligning research endeavours with the market.

11.4.2 Learning Related to Finance

Cash is king for any business. As the biotechnology business is capital intensive, it is imperative for the entrepreneur or entrepreneurial team to manage capital raising and expenditure. It is vital to at least understand the mechanism for raising finance. Because resources are usually scarce compared with the tasks that need to be completed, properly managing finance is as important as raising it.

TABLE 11.4 SOME KEY FINANCIAL LEARNINGS

	Learning type	Quotes
	Better financial training	'I would prefer to have financial training before starting again.'
	Learning about VC process	'You learn about the venture capital process and the things that they want to hear.'
	More careful of time to raise money	'I will choose the timing differently. I wouldn't raise money when there is about to be a stock market crash. I think I will follow the cycles a bit more and when there is a boom, I will be out raising money.'
	Proper budgeting	'I don't know if Company X is on your list, but with X they were able to raise a lot of money at a time when money was plentiful and that makes it easy to grow out of control. So you grow to an unsuitable level and all that happens is that when times are tight and money is tough, you got to cut programs and look like you have failed.'
	Realistic valuation	'You've got to be realistic in your valuation that you are doing.'
	Be honest with brokers	'You have to be honest with your brokers. You shouldn't mislead them. There is always a temptation from the press to over- or under-estimate your technology; that's going to happen. We have to make sure that whenever we are talking, we know the limitations of what we are talking.'
	Streamline cash flows	'Streamline cash flows will be the second important thing.'

The incidence of reported learning related to finance varies among the three categories (see Table 11.3(a)). Learning related to finance seems to be particularly high for people with prior experience only in business. A closer examination of the data reveals that all the incidences are related to one type of learning: taking the company to IPO very early is a bad strategy as it puts enormous amount of administrative burden on a very small company (and even restricts future capital raising).

Individuals with prior experience only in science or with a mixed experience identified very few instances of finance related learning (refer to Table 11.3(a)) as their key learning.[18] This suggests the need to more clearly specify the role of the individuals in the venture and, hence, the nature of their experience.

11.4.3 Learning Related to the Hire and Management of People

The most valuable resource for a new venture is its people, especially the key people, who are usually also the decision-makers. It is imperative for the entrepreneur or the entrepreneurial team to assemble an appropriate team. This can be challenging for a new venture.

It was found that people with mixed prior experience had the lowest reported level of key learning related to hiring and managing people while people with only prior business experience had the maximum key learning experience in this area (see Table 11.3(a)). A closer examination showed that all three cases of such learning in the latter case were by one individual who did not have any previous background in the pharmaceutical/biotechnology industry. In discussing the need to recruit the right set of people, this individual talked about being careful while forming the board (i.e., instead of recruiting high profile people, recruit people with a relevant background) and problems related to having a major shareholder who doesn't understand business.

[18] It may be that in the former case either their prior knowledge inhibited their understanding of that subject or it was out of their functional domain, even in the new venture. For people with 'mixed' experience, such learning would have already taken place.

People with prior experience only in science had a relatively high frequency of key learning episodes in this area. For example, Dr Bernard Flynn (Iliad Chemicals) suggested:

> You really need to put in place management capability within the company, that you have to work with investors as they have to agree to a point where management capability has to be expanded even though there is desire to put more money into science. You need to work that as well to put in place management capabilities so that you are not drawn along into too many different pathways.

Dr Keats Nelms of Phenomix drew different lessons from his experience:

> Hiring high-level key people immediately rather than hiring technical people. It may seem that you need someone at a low level, but it is better to hire someone who is going to recruit and train those people than it is to hire entry level people first. So I think the sequence of order of hiring people will be very specific.

It is vital to have a balance of all skill sets and to ensure that technology and business people understand each other's perspective and contribution. The diversity in skill sets is important not only for senior management but also for the board. One respondent commented:

> We were too heavily weighted toward science. We had got too many like-minded people on our board. So we will try and get more variety on board early on.

It is not only hiring senior people that is important; it is equally important to get the right people at the junior level who are going to implement the project. Managing such staff is also important. Dr Keats Nelms (Phenomix) said:

> I think the bigger [challenge] is related to hiring staff and managing the staff. Because there are so many different things that I am having to manage that I haven't had to manage before, even very low-level technical people. That's something that you get better at the more experienced you are.

11.4.4 Learning Related to Planning

Efficient planning can be one of the key factors on which the success or failure of a decision will depend. It becomes more important for a biotechnology new venture in which high investments have occurred and the stakes are very high. It is not surprising

to find that all the key learning experiences observed by the respondents with prior experience in business (whether only in business or in both business and technology) talked not about planning per se but about planning realistically:

> [I learnt that] most companies really don't have a sufficiently crisp plan to ensure commercial outcome. And it would invariably take much longer and many more dollars than what they have expected because everyone takes very enthusiastic and very optimistic [viewpoint] from outset. This means that companies generally find them selves undercapitalised and they have to go back to the market for money.

Individuals whose prior exposure was limited to science/technology and those with previous business experience had almost the same frequency of key learning in relation to planning. However, people with prior experience only in science/technology talked more about having a plan per se rather than having realistic plans.[19] One respondent said:

> [T]o have a plan. And, even if that plan was not a formal MBA class business plan, make sure that you always have plans.

An important lesson for some was to identify risks and plan for how to deal with them:

> We went from initial discussions to a closed deal within six months because it made so much sense. But what we didn't do at that time was to ask what the risk factors were there and how do we mitigate against those risks. One of the risks being that the venture capital company can pull their money if they want to. So I think we did not see all the risks. We saw all the upside but we never looked what the potential downsides were. And we ended up having to back our way out of it. We did, fortunately, but it was a pretty traumatic process.

Some people who had only prior science/technology experience also emphasised the importance of having a good project management system and assessing different options carefully.

[19] This may be because learning occurs in small steps. It may also be that once technical people know about the benefits of planning, their plans are realistic by themselves because they know better about the facts related to working in their technical field.

11.4.5 Learning Related to Business in General

The category 'business in general' includes all the other types of learning that affect the business. It is perhaps not surprising that there is almost no difference in the frequency of reported learning among those with business only and mixed prior experience (see Table 11.3(a)). However, those whose prior experience was only in science/technology had a much higher relative frequency of reported learning about business in general. For example, Professor Barrie Finnin (Acrux) said:

> I think from a personal experience that what I have learnt and continue to learn is that when you get into different areas like commercial laws or intellectual property or so on… The jargon is very different, so you need to learn the jargon.

Similarly, Dr Keats Nelms (Phenomix) also emphasises the need to keep learning:

> For the most part, everything that we have done from the beginning till the end has been… there has been some learning that has helped. But really with every new step there is a new learning. Just keep going up the learning curve.

TABLE 11.5 SOME KEY GENERAL BUSINESS LEARNINGS

	Learning type	Quotes
	Be better informed of business environment	'I think the understanding of limitation of Australia is a very important thing. Understanding the requirements of a good investment and understanding the way the entrepreneurial approach needs to deliver that. You got to know your stuff.'
	Better time management	'Product launch was delayed a little bit so we were hurt. I think there we have delayed a little bit, perhaps due to inexperience.'
	Efficient decision-making processes	'We started as a very consensus company. Everyone in the company was involved in making decisions, but very soon you can't sustain that. You have to have processes for making decisions for projects.'
	Negotiate with pharmaceutical companies for risks	'I think the other big learning would be that you negotiate the best sort of deal you can. You want to ensure that you not only get your product back but any other development that they did [if the collaboration is off]. You get access to that preferably without cost. So, you just have to protect yourself as best as you can.'

Other reported general business learning (see Table 11.5) was having flexibility in working procedures and efficient decision-making processes; better time management; being less of a risk taker; correcting mistakes quickly; being better informed about the business environment; and taking into account cultural diversity.

11.5 How the Nature of the Present Role in the Current Entrepreneurial Team Affects Individual Learning

The analysis in the previous section assessed whether there was a relationship between the prior experience of entrepreneurs and what they learned from the experience of a new venture. In this section, the effect of two intermediating factors—the functional roles of the entrepreneur in the entrepreneurial team and the composition of entrepreneurial team itself—will be explored to gain further insight on who might learn what and why.

In order to be consistent, the same sample was used. In the first instance, the three earlier categories—non-relevant business experience only, science/technology experience only, and mixed experience—were broken down on the basis of the role in the entrepreneurial team of an individual with a particular prior experience. This resulted in four categories. (See tables 11.6 and 11.7.) People with mixed experience (M) or prior non-relevant business experience only (B) generally serve the business in a general management (GM) role.[20] The category of science/technology experience only (T) was further segregated into two, as some individuals with this background took on the role of business management within the company.[21] Others in this category had continued to be technologists only, completely leaving the running of the business to other members of the entrepreneurial team. These four categories were divided further (see Table 11.8) by taking note of the composition of the team the entrepreneur was part of. There were three types of entrepreneurial teams[22]: ones with

[20] Again, broad categories were used. In this study, the function in a new venture was separated into two— running the business (general management), and developing the science and technology.

[21] This category can be further subdivided, but the small sample prohibited doing so to make any reasonable conclusion. Three main categories within this category are: technologists running the business completely by themselves, having completely left the science part to other colleagues; technologists running the business completely by themselves and overlooking the science area; technologists only partially involved in running the business (in association with other team members) and at the same time involved with science in the company.

[22] The said individual may be the sole entrepreneur behind the new venture or just one of the entrepreneurial team. As said before, even senior managers who joined very early are also considered to be part of the entrepreneurial team.

primarily technology experience, (N); those that had both research and relevant business (i.e., mixed) experience, (M); and ones that had experience in business but not so relevant experience in the specific industry, (UBZ).

The results in Table 11.6 show that total learning is significantly affected (p= 0.041) by the interaction of prior experience and the current job. It is observed that when individuals' current role was similar to their prior experience/role, they had a lower frequency of learning compared with those who were in a different role.[23] The means for this effect are 0.686 for the group of individuals in a role dissimilar to their previous experience and 0.266 for those whose present job matched their previous experience. The SED is 0.1835.

Table 11.7(b) shows that the biggest contribution to the residual is from those groups where the current role diverges most from the previous one (such as B-GM and T-GM). The largest contributors to the residual mean square are not chance occurrences. Some of the largest contributors in descending order are: T-GM, showing very low learning in finance; T-T, showing very high learning in technology strategies; B-GM, showing much less learning related to general business principles; T-GM, showing very high learning related to general business principles; B-GM, showing high learning in finance; and T-T, showing low learning related to hiring and managing people.

TABLE 11.6 DOES PREVIOUS EXPERIENCE AND PRESENT FUNCTIONAL ROLE AFFECT INDIVIDUAL LEARNING?

Source of Variation	d.f.	s.s.	m.s.	v.r.	F pr.
(Exp. relevant to present role) Vs (Exp. Non-relevant to present role)	1	0.6607	0.6607	5.23	0.041
Interaction within (Exp. Non-relevant to present role)	2	0.0237	0.0118	0.09	0.911
Area	4	0.056	0.014	0.11	0.976
Residual	12	1.5158	0.1263		
Total	19	2.2561			

In taking into account the specific roles of individuals in the venture, the discussion first concerns entrepreneurs with prior experience only in science/technology. Table 11.7(a) shows clearly the differences in key learning

[23] Researchers whose prior experience was in a research organisation were considered to be in a different role if they were part of the entrepreneurial team in a new venture.

between such individuals in the present roles of technologist (T-T) and those in general management (T-GM). The former report learning more about technology strategies whereas the latter report learning more about people, planning and business in general.[24] However, those with only prior science/technology experience and in a science/technology role (T-T) report greater learning about financial aspects in comparison with the T-GM group.[25]

TABLE 11.7(A) WHO LEARNS WHAT?

	B-GM (3)	T-GM (9)	M-GM (9)	T-T (11)	Average (32)
Key areas of Learning					
Technology Strategies	**0.667**	**0.333**	**0**	**1.091**	**0.531**
Finance	**1**	**0.111**	**0.444**	**0.545**	**0.438**
People	**1**	**0.889**	**0.222**	**0.364**	**0.531**
Plan	**0.667**	**0.889**	**0.222**	**0.545**	**0.563**
Business General	**0.333**	**1.222**	**0.444**	**0.636**	**0.719**
Total	**3.667**	**3.444**	**1.333**	**3.182**	**2.781**

Note: The first letter stands for prior experience and the second stands for the present role. For example, (B-GM) is a non-relevant business experienced person in a general management role. The figures in the brackets indicate the number of individuals in that category.

TABLE 11.7(B) WHO LEARNS WHAT? ASSESSMENT BASED ON RESIDUALS

	B-GM	M-GM	T-GM	T-T
Key areas of Learning				
Technology Strategies	**-0.0079**	**-0.2079**	**-0.2974**	**0.5132**
Finance	**0.3228**	**0.2338**	**-0.5216**	**-0.035**
People	**0.2291**	**-0.0819**	**0.1626**	**-0.3098**
Plan	**-0.0659**	**-0.0439**	**0.2007**	**-0.0907**
Business General	**-0.4779**	**0.1001**	**0.4556**	**-0.0777**

An entrepreneurial team's overall prior experience does seem to make a difference to the learning of individual members. Table 11.7(a) shows that technologists who took on a role in general management had more key learning experiences, but even more so if they were part of an entrepreneurial team that had business experience (see Table 11.8). The more relevant the experience of the team, the more they learnt (T-GM-M > T-GM-UBZ > T-GM-N). Similarly,

[24] In an earlier section, it was highlighted that one recent PhD graduate (within T-T) alone accounted for six key learning experiences in technology strategies; the observation here doesn't change much even if this is taken into consideration (and adjustment done).

[25] Due to insufficient data, it is difficult to identify the reason for T-T reporting more learning about financial aspects than T-GM.

scientists/technologists in the role of technologists in a venture having a 'mixed' experience entrepreneurial team had more learning compared with those in a venture with an entrepreneurial team that lacked relevant business experience (T-T-M > T-T-UBZ).[26] The key learning reported by T-GM-M and T-GM-UBZ are mainly related to people and general business whereas the key learning reported by T-GM-N is a bit more evenly spread, with a maximum concentration in planning and business general. It is possible that the breadth of jobs they had to take care of (even though they had never done them before) would require them to learn the basics first. Without a person with business experience within the team, T-GM-N individuals would have had to learn the basics the hard way. This experience would have been their key learning.

TABLE 11.8 SHAPING INDIVIDUAL LEARNING: PREVIOUS EXPERIENCE, FUNCTIONAL ROLE AND THE ENTREPRENEURIAL TEAM

Key Learning	B-GM-UBZ (3)	M-GM-M (9)	T-GM-M (3)	T-GM-UBZ (2)	T-GM-N (4)	T-T-M (6)	T-T-UBZ (5)	Average (32)
Technology Strategies	0.667	0	0	0.5	0.5	1.333	0.8	0.531
Finance	1	0.444	0	0	0.25	0.833	0.2	0.438
People	1	0.222	1.333	1	0.5	0.333	0.4	0.531
Plan	0.667	0.222	1.333	0.5	0.75	0.5	0.6	0.563
Business General	0.333	0.444	1.333	1.5	1	0.833	0.4	0.719
Total	3.667	1.333	4	3.5	3	3.833	2.4	2.781

Note: The first letter stands for prior experience, the second stands for the present role and the final stands for the type of entrepreneurial team. For example, (B-GM-UBZ) is non-relevant business experienced person in general management role in a team that has non-relevant business experience. The figures in the brackets indicate the number of individuals in that category.

* In both tables (11.7(a) and 11.8), the figure shown for each given category is its respective average, which is obtained by dividing the total instance of key learning in the respective category by the total number of individuals for the given type of experience.

Similarly, the interplay of prior experience, current role and the type of team is best seen when the key individual learning of B-GM-UBZ and T-GM-UBZ are compared. While both groups reported similar frequencies of learning about

[26] The ANOVA did not lead to a significant difference (p= 0.324) between (T-GM-UBZ + T-GM-N) and (T-GM-M). Similarly, no significant difference (p= 0.137) was observed for (T-T-M) and (T-T-UBZ). However, a definite conclusion would be inappropriate until and unless confirmed in a similar study with a larger sample size. The 'simple numbers' (in Table 11.8) also portray a different picture.

technology strategies and planning, the former had much more key learning in finance and people whereas the latter experienced the same in business in general. This shows the effect of prior experience on the individual learning if the other two (nature of present role and type of team) are the same.

A comparison of T-GM-M and T-T-M shows that the former had a far greater frequency of key learning in people, planning and business in general whereas the latter learnt relatively more about technology strategies.[27] Therefore, it appears that the present role has a great effect on individual learning if the nature of prior experience and type of team is the same.

11.6 Discussion

11.6.1 Conclusion

This study explored the impact of prior experience, current role and the entrepreneurial team composition on the individual entrepreneur's learning. Given that due to the sample size and focus on a single sector the analysis can only be suggestive, some propositions can be advanced.

The prior experience of an individual entrepreneur affects how much and what they recall as their key learning. It is the entrepreneur whose experience is most directly relevant to the requirement to run the new venture who has the lowest frequency of learning experiences.

The specific role that an individual plays in the venture shapes their specific learning needs and opportunities. For example, a businessperson (with non-relevant experience) in a similar role in new venture learns more about finance, people and planning (albeit with reference to the new context/industry).

Who learns most? *It is the entrepreneur with the most distant prior experience (vis-à-vis their role in the venture) when that entrepreneur is part of an entrepreneurial team that has relevant heterogeneous skills and experiences.* For

[27] Again, for the cautious reader, it is imperative to bring to light the incidence of a recent PhD graduate (here, part of T-T-M) alone accounting for six key learning experiences. Taking this into account, the observation doesn't change *relatively*. In absolute terms, however, (after adjustment) the learning for T-T-M would be more evenly spread across different functions.

example, Table 11.8 shows that T-GM-M learns most while M-GM-M learns least. T-GM-M is closely followed by B-GM-UBZ and T-GM-UBZ in terms of the maximum (total) key learning experience. This is understandable if one takes into account that mentoring by a person with relevant business experience can be particularly valuable. It is no wonder that T-GM-N had relatively fewer key learnings. Researchers have stressed the experiential role of learning—the 'doing' in entrepreneurial learning. This research supports the importance of doing as a key mechanism for learning. It shows that a carefully nuanced approach to both prior experience and new venture experience will be necessary in future research. This research also strongly suggests that learning by mentoring/coaching may be an important mechanism for entrepreneurial learning and a key complement to direct experience.

11.6.2 Limitations and Future Directions

The analysis in this study has been limited by the sample size. Therefore, a larger scale study would be likely to provide a stronger test of relationships and further insights.[28] However, it may be worth undertaking similar small-scale studies in different new venture contexts before embarking upon a large study. Additional small-scale studies would also enable further development of the analytical categories.

One dimension of the entrepreneurial experience that requires further specification is that of the nature of managerial experience. This applies to both prior experience and the role in the new venture. The specific functional roles, the level of managerial experience (e.g., prior responsibility for decision-making) and the context of that experience (e.g., small firm or large firm, or established firm or new venture), all require careful specification.[29]

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[28] However, in most studies, some categories will always be small in comparison with other categories. For example, there will be few individuals with absolutely no relevant/related (either science or business) experience venturing into biotechnology.

[29] There have been a few attempts to develop studies along these lines. For example, Westhead et al. (2005:413), in their empirical research, concluded 'streams of experience accumulated by novice entrepreneurs are not the same as those reported by serial and portfolio entrepreneurs.' [The study by Westhead et al. (2005) was based on an extensive survey (using a structured questionnaire) of novice, portfolio, and serial entrepreneurs in Scotland.]

Another dimension that might be incorporated in future research is that of the quality of learning. Cope (2005) suggests that from whom entrepreneurs learn has a significant impact on the quality of their learning. The research reported here also suggests that interaction with a strong and experienced entrepreneurial team can provide an effective learning environment. However, this will first require the establishment of sharper and well-defined criteria for determining levels of 'quality.'

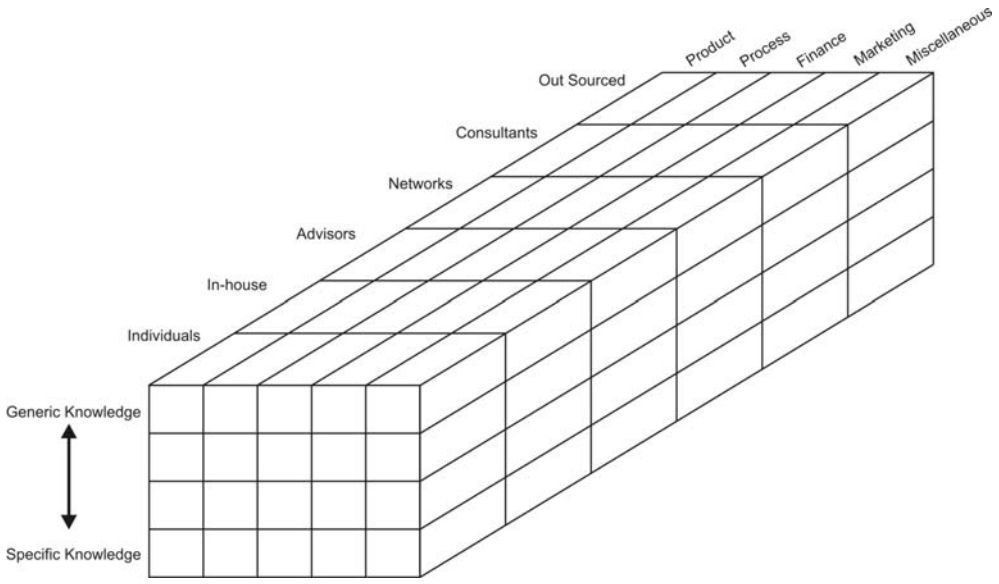
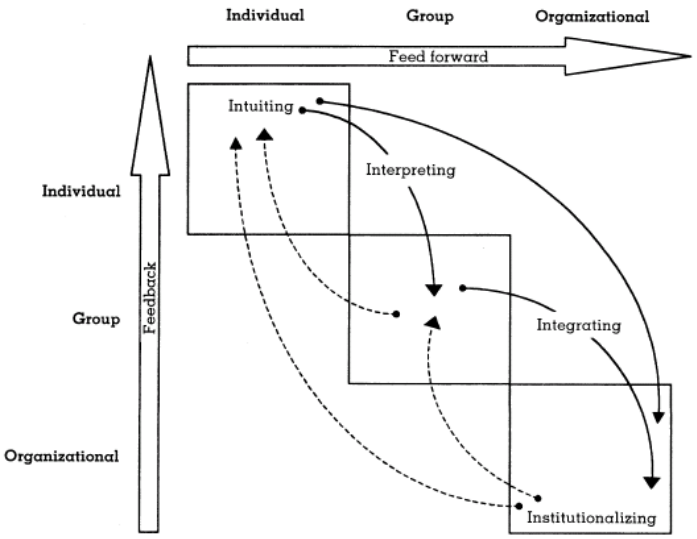


Figure 11.1 Entrepreneurial Learning

It is important to emphasise that the process of new venture development and the experience of entrepreneurial learning depend significantly on not only the sector but also the wider context. Many regions now provide an increasingly rich milieu for new venture development through the supply of specialised and experienced business support (e.g., intellectual property advice and strategic consulting), opportunities for outsourcing (e.g., product development, product trials, purification of compounds and marketing) and access to vital resources (e.g., capital, managers with relevant new venture experience and business angles). Therefore, while decision-making remains largely the role of the entrepreneur (while the board supports the entrepreneur), learning is an increasingly distributed activity reflecting the increasing division of labour. While an entrepreneur will require less 'know how' and 'know why' in these distributed new venture/learning systems (Figure 11.1), there will be a need for 'know what' (although less so with the rise in knowledge intensive business services), 'know

who,' and 'know when'. As such, what entrepreneurs learn, what they need to learn, how they learn and from whom they learn will be highly context specific.



Source: Crossan et al. (1999:532)

Figure 11.2 Learning as Dynamic Process: Integrating Levels

The suggestions from this research on the role of the entrepreneurial team in facilitating learning and Cope's (2005) ideas about generative learning at the entrepreneurial team level point to the importance of integrating the analysis (and practice) of entrepreneurial learning with new venture learning (i.e., at an organisation level). One useful direction for future research will be exploring how the individual/team develops the foundation of new venture learning. Crossan et al. (1999) have addressed this issue. Their work contributes to integrating entrepreneurial learning (seen usually at an individual level) with 'organisational learning.'

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Appendix A

Who was Interviewed

List of Australian Companies

	Name of the Company	Name of the Person	Job Title (at the time of Interview)
1	**Phenomix**	Dr Keats Nelms	Senior Director
2	**Biotron**	Dr Michelle Miller	CEO
		Prof Chris Parish	Founder + Board Member
		Prof Angela Dulhunty	Founder
3	**Proteome Systems**	Dr Keith Williams	CEO + Founder
		Dr Marc Wilkins	Founder
		Dr Jenny Harry	Founder + Director (Discovery and Diagnostics)
4	**VRI Biomedical**	Dr Peter French	Managing Director
		Mr. Kim Slatyer	CEO + Founder
		Prof Patricia Conway	Chief Scientist
5	**Cryosite**	Mr Gordon Milliken	Managing Director + Founder
		Dr Peter French	Board Member + Founder
6	**Cytopia**	Dr Kevin Healey	MD + CEO + Founder
		Dr Andrew Wilks	Chief Scientist + Founder
7	**Acrux**	Dr Igor Gonda	CEO
		Dr Andrew Humberstone	Director (Pharmaceutical R&D)
		Dr Barrie Finnin	Founder + Chair (Scientific Advisory Board)
8	**Norwood Abbey**	Mr Bernie Romanin	Sr. Vice president (Corporate Dev.)
		Assoc. Prof Richard Boyd	CSO (Norwood Immunology)
9	**Epitan**	Dr Wayne Millen	Chairman
10	**Plantic Technologies**	Mr David MacInnes	MD + CEO + Founder
11	**Clone International**	Dr Richard Fry	CEO + Founder
12	**Evogenix**	Dr Merilyn Sleigh	CEO
		Dr Greg Coia	Research Manager + Founder
13	**Iliad Chemicals**	Dr Bernard Flynn	Director + Founder
14	**BioDiem**	Prof Robert Borland	Director + Founder
		Mr Tom Williams	MD + Founder
15	**Genera Biosystems**	Dr Karl Poetter	CSO + Founder
16	**Pharmaxis**	Dr Brett Charlton	Medical Director + Founder
		Dr Alan Robertson	CEO

17	**Genetraks**	Dr Richard Brandon	Founder + Bioscience Director
18	**CBio**	Dr Wolf Hanisch	Founder + CEO
		Mr Stephen Goodall	Founder + Director
19	**Peplin**	Mr Gary Redlich	Founder + ex-CEO
		Mr Michael Mullins	ex- Company Secretary
20	**Genetic Solutions**	Dr Gerard Davis	Founder + Managing Director
		Dr Jay Hetzel	Founder + Scientific Director
21	**Tissue Therapies**	Dr Zee Upton	Founder + CSO
22	**Prana Biotech**	Professor Colin Masters	Exec. Director + Chairman (Scientific Advisory Board

List of Indian Companies

	Name of the Company	Name of the Person	Job Title (at the time of Interview)
1	**Ocimum Biosolutions**	Ms Anuradha Acharya	CEO + Founder
2	**Genotex International**	Mr. C Devender Reddy	Managing Director + Founder
3	**Bigtec Pvt. Ltd.**	Mr. B Chandrasekhar	Director + Founder
4	**Jalaja Technologyis Pvt. Ltd.**	Mr Raja Seevan	Director + Founder
		Mr Ramapathi	Director
5	**Metahelix Life Sciences Pvt. Ltd**	Dr Gautham Nadig	Director + Founder
6	**Strand Genomics**	Dr Vijay Chandru	Chairman + CEO + Founder
7	**Avesthagen**	Dr Villoo Morawala Patell	CEO + Founder
8	**Thinkgen**	Mr Rama Subramaniam	CEO + Founder
9	**Lotus Labs**	Mr Sudhir Pai	Managing Director + Founder
10	**Genotypic Technologies Pvt. Ltd.**	Dr Sudha Narayanan Rao	Director + Founder
11	**Helix Genomics**	Dr B V L S Prasad	Director + Founder
		Mr Mohan	CEO + Founder

Appendix B

Questionnaire

Firm Identification[♣]

1. Name of the Firm ……..
   Street Address ……...
   City, State, Postal Code …….
   Category of Firm[1] ……
   Year Established ……
   Current Revenues ……
   Current Profits ……...
   No. Of employees …….

Entrepreneur Identification

2. Founder(s) Name ……
   Present designation ……..
   Age …….
   Sex …….
   Educational Qualification(s) …….
   University obtained from ……
   Previous employment institute(s) ……
   Position(s) held ……..
   Family background ……

[♣] Try to get information related to Revenues and Profits by Annual Reports or by Primary resource.

- Antibiotics
- Diagnostics
- Vaccines
- Enzymes and Speciality Chemicals
- Bioinformatics
- Aquaculture
- Biofertilisers/ Biopesticides
- Veterinary
- Environmental
- Agriculture
- Life Science Instruments
- Others …….

Conception of Idea[♠]

3. When did you first think of starting up your own business?

    - How serious were you then about starting a new venture?

4. What were the ideas (on types of business) you were contemplating with?

    - Why did you find these ideas worth considering? (Ask about each idea)

5. From where did you initially get these ideas?
    - A discussion with colleague or clients or suppliers during previous employment
    - Formal market survey reports
    - Research Publications
    - Overseas visit
    - Seminars, Exhibitions, Trade Shows
    - Informal network outside office
    - News items in business magazines, newspapers, etc.
    - Others (Please specify) …….

6. How much knowledge you had about being in this business (Use 5 point Likert scale)?

    - Were you aware of the government rules and regulations set up by DBT, Ministry of Environment, Ministry of Health and Ministry of Chemical and Fertilizers? If yes, how were you aware of? Did you personally read those documents?
    - Were you aware of your potential clients? If yes, how did you come to know about them? Did you discuss your concept with your potential clients?
    - Were you aware of the patent laws of the country? To what extent did you have knowledge about patent laws? How were you aware of?
    - Knowledge about 'generic' industry practices like payment modes, profit structure, technology licensing rates, etc?
    - The knowledge about technological field related to your business idea?

[♠] This is the time prior to establishment of the new venture (i.e., taking a formal office space). It starts from the initial days when different ideas start coming up in entrepreneurs' mind to the stage when s/he has finally made up his/her mind to commit to one or two specific ideas (i.e., just prior to taking final step of setting up an office).

- Did you have any formal/ informal training in business administration? How?
- Were you keeping track of generic national trend, generic sectoral trend (both national and international)? How?

7. Of the several ideas in your mind, what did you finally decide on?

    - Why did you decide to go for it and not others?
    - Whom did you first discuss your idea with; whom you think was competent enough to at least be able to understand your concept? What was s/he doing then?

8. What were your main concerns when you were making final decision regarding start-up of a new venture based on your final choice of the idea?♦ (In priority order. Use Prompts!)

    - *Were these concerns due to lack of complete information that couldn't be gathered comprehensively? If yes, why was it difficult to gather?*

    - ***Or were there any other particular reasons for these concerns of yours?***
    - How did you choose to mitigate these concerns before moving forward in decision-making?
    - Did anyone help you? Who? What help did s/he provide you?

9. What were the resources that you had readily disposable at your hand? (Talk about **Finance**, Technological equipments, Expert advise on various things)

♦ **Vital factors:**

- Difficulty in hiring qualified staff
- Difficulty in retaining qualified staff
- Substitutability of product/ services
- Many competitors or likelihood of new competitors
- Difficulty in gauging market needs
- Lack of competitive supplier market
- Keeping clients satisfied
- Reputation of the firm
- Seeking new markets (domestic or foreign)
- Quality of product/ service + Efficient production
- New Government regulations
- R&D to offer new services or products
- Financing
- Lack of customer responsiveness
- Lack of government incentives (tax credits, income tax holidays, R&D grants, technology support, soft interest bank loans, venture funding, etc.)
- Co-operation with other institutes or firms
- Location

10. What was the triggering point that prompted you to take the final plunge to realize your idea? (i.e., any particular reasons that it happened then.)

    - When was it?

11. Did you think about opportunity costs (i.e., this option vis-à-vis other possible options) of your endeavour?
12. How defined was your business at the point when you started your business? Did you have a formal business plan[2] then?

    - If no, why did you not feel its importance then?
    - Do you think that if there would have been a serious attempt to write a business plan, many concerns that you raised earlier would have been lessened and you would have been surer about the efficacy of your decisions?
    - WHEN DID YOU THINK OF HAVING ONE? WHY THEN?
    - What were the sections that were part of it?
    - Who drafted your business plan? How much help of others were taken? How much were you involved in that?

13. Of the things (vital as well as not so important) that were there in business plan, how was the information collected for it? (Specially probe with respect to 'Concerns (listed earlier)' that were due to lack of information- were these concerns included in Biz Plan?)

    Looking back to this stage what were the most vital decisions that you think are to be made? Of these, which do you think are difficult to make? What makes them difficult?

[2] Formal business plan has to be a written document and an effective device of communication with the outer world.

Incubating[♥]

Infrastructure

14. Where did you first set-up your office?

    - How did you decide on it?
    - Any changes thereafter? Why?

Finance

15. In what stage of development was your 'proprietary' technology/ product at the time of the start (if not a CRO)?
16. Did you think in advance about a stage[3] of your 'proprietary' technology/ product in which you thought of initiating to reap commercial value out of your technology? Which stage was that?
17. Were you aware of minimum required fixed costs to start your business?

    - Were your aware of recurring costs that has to be borne before you reached the stage, in which you were to start exploiting it commercially.

18. In order to take your venture forward, what different routes did you choose to mobilise funds?[4] What factors did you take into account in making your opinion regarding these routes? Who were involved in this decision?
19. When did you finally decide to take this route?[5]

    - How long did it take to implement it?
    - Is this the usual time?
    - Did you face any obstacles?
    - What measures did you take to rectify it?

♥ Incubating can be defined as the stage in which initiatives are taken across several different functional areas that are of importance to business in concern, once an organisation has formally come into existence. This stage comes to an end when a semi-formal shape has been given to the organisation and first mile has been covered across all dimensions by garnering support by convincing important 'others' about the concept. (Ideally ask the entrepreneur, when had he reached this time and discuss the issues related to different functional units within this time period).

[3] Be it somewhere in the middle or taking it forward all alone.

[4] Both in terms of raising funds or doing consultancy, providing services, etc.

[5] In terms of raising funds, talk about the very initial two to three ways (be it bank loans, angel investor, government funding, VC or even an IPO).

- Retrospectively, do you think that it was possible for you to avoid these obstacles?

R&D and Technology Capabilities (Physical Infrastructure)[6]

20. Did you have R&D collaboration[7] with any other institute during early stages of your company?

    - Why did you choose to collaborate with them?
    - Who else helped you in deciding for the choice of appropriate R&D partner?
    - What were the major criteria that were looked into before making a decision?
    - Pick an example, and discuss more. Were you sure about the appropriateness of the decision at the time of decision? If not, why were you unsure? Why could those uncertainties be mitigated?

21. What were the technology capabilities and equipments that you had in-house when you started off?

    - Why did you decide on them?
    - Who suggested?

22. Were there any other technologies (or equipments) that were of importance but you couldn't afford to get them in-house? How did you manage them?
23. Did you later get these technologies in-house? When? Why then?

Suppliers

24. Before buying any equipment(s)/technologies, did you search for other competing technologies and other suppliers?

    - How did you get information about other suppliers? (Who did it for you?)
    - Did you ask for quotes from other suppliers?

25. Did you involve anyone else in making these 'buy' decisions (e.g. technology experts, someone who can get discounts[θ], etc.)?

[6] Get as much information as possible from the company website regarding their technology competencies and check what sort of equipments/ technologies are required for that.
[7] Background information from Factiva and the company website.
[θ] Who helped in negotiating the deal?

- Were they in-house or part of informal network or formal consultation or mix? (If in-house, when were they appointed and how were they appointed?)

26. What were the major criteria that you scrutinised most before making any important 'equipment/ technology' purchase from a supplier?
27. Did you ever feel that you didn't get the most competitive deal that you could have got? Explain.
28. How do you decide on the suppliers for lab material that are needed on regular basis?

Intellectual Property[⊗]

29. Were there issues like your proprietary technology development being dependent on proprietary technology of someone else, or someone else claiming so?
30. When did you realise that?
31. What measures did you take to guard your proprietary technology?

    - Who advised you on that?
    - How long did it take to reach a conclusive decision?

32. Did you go for global patent or specific to few countries?

    - Why only those specific countries?
    - How did you decide on them?

Planning: Scalability, Marketing and Pricing (this includes Alliances[⊕])

33. Did you look into scalability issue of your proprietary technology in order to make it profitable commercially?

    - How did you look into that?[∅] (how ideas about them were obtained, *assessed on what factors*, any conflicting situation, *means to reach resolution for the conflict*)

    - Who were involved in it?
    - How long did it take to come up with your scalability road map?

[⊗] Try to get as much information as possible from secondary sources about intellectual property owned by the company and in which places. (Use Factiva.)
[⊕] Quite a bit of knowledge, especially related to alliances, can be obtained at the company website and Factiva.
[∅] What were different issues that you took into consideration while analysing this aspect? (Issues like proto-type testing, a step prior to setting up manufacturing or large-scale operation).

34. When did you make the first attempt to identify the growth of revenues over a period of time (i.e., revenue projections)?
35. Who were involved in bringing forth these projections?
36. What issues were considered to come up with those projections?

    - How big is the market?
    - How fast is the market growing?
    - What share do you intend to capture over a period?
    - Who are the competitors?
    - Is it attainable? Is the market capacity full or does it have scope?

37. How the relevant information for revenue projections were obtained?
38. What did you plan to bring your product/service to the market?

    - How did you decide on the route[▽] that you are going to follow? (Criteria taken into account; people involved; any conflict and its resolution)
    - When did you finally decide on this? How long did it take to decide[⇑]?

39. If it were to involve building 'alliance' or 'strategic partnerships', when did you start looking for partners?

    - How many 'potential' partners were you talking to? Were you considering them simultaneously or one after the other (i.e., after talks with previous didn't materialise)?
    - How did you come to conclusive decision regarding the efficacy of decision to partner with X vis-à-vis others[⇓]? (Please explain different stages through which this decision went through, including imp. aspects that were looked into and how these were looked into and who were involved at each stage?)

40. When was market roll out strategy formulated?

    - Who was involved in developing market roll out strategy? (In what capacities?)
    - What was the basis of your market roll out strategy? (Factors[◊] taken into consideration and how decision about each factor was attained?)

[▽] Going solo or licensing or joint venture.
[⇑] From the point of having known this idea to finally giving it a shape.
[⇓] Ask for an example with which talk for alliance was going on but eventually broke down.
[◊] Example: price of your service/ product, revenue projections etc.

- Did it delineate explicitly how much percentage of market you were targeting and over a period of time how much will be attained?
- Were there different viewpoints for the market roll out strategy?
- How the final decision was achieved after these different viewpoints were raised?

- How long did it take it take to come up with this strategy?

41. How did you decide on the pricing?

    - Who were involved?
    - When was it decided?

    - Were there different viewpoints for pricing?
    - How the final decision was achieved after these different viewpoints were raised?

42. How did you get your lead customer(s)? When was this?

    - Did your lead customer prove useful later in furthering your market by giving positive references?

43. Were you flexible in your approach to pricing to generate more revenues?

    - When was that decision taken?
    - Why was that decision taken?
    - Was it worth (in long run and short run)?

Management[□]

44. When did you have the Board of Directors for the 1st time? Who were they? What role did the Board play in decision-making?
45. Was there anyone in Board of Directors, who was not a shareholder? Why was s/he? How did you decide? Whose consent did you take before nominating him/her?
46. When did you have the Scientific Advisory Committee for the 1st time? Who were they? What was the significance of the Board for you then?

    Find about the major appointments during this stage by Factiva and then probe why they were appointed then; how they were appointed; any immediate changes

[□] Many things regarding this can be obtained at the company website and Factiva.

associated with their appointment; etc. (If it can't be found out in Factiva or Co. website, then ask about it in the end).

Demonstrating[Ψ]

Finance

47. Please explain different funding that you got at various points of time in order to keep you further going?
48. Did you face hurdles in any of the occasions?
49. Did you expect those hurdles? If yes, how did you know about them? (Take an example.)

    - What precautionary measures did you take? How did you know about these measures?

50. Take an example of the hurdle you faced. What was it?

    - Why was it?
    - What was done to rectify the situation?

51. Who were involved during each successive round of funding and what was their role?
52. Did at any point of time were you being compelled to change your operational ideas or goals in order to receive those funds? Give an example.

    - Did you agree?[δ] Why or why not?
    - Did the change mean a big shift from what you were doing?
    - How long did it take to finally decide on the change?

Revenue

53. Were there instances when you were not able to achieve revenue targets?

    - How often did you miss these targets?

[Ψ] Demonstrating is a stage when the organisation has managed to pass through birth pangs but is still surviving on life support systems. The whole stage is dedicated to making the organisation healthier to be go to the next stage of growth and development without support. (Ideally, ask the entrepreneur when had s/he reached this time and discuss the issues related to different functional units within this period.)

[δ] While one might be compelled into making few decisions but still big strategic changes, one is expected to hold ground based on logical thinking and rationality. Does this logic apply? Probe on these lines.

- During which time period?

54. Did it lead to crisis like situation anytime?

    - Why did that situation arise?
    - Did it lead to major strategic change? What were they?
    - How long did it take to make these decisions?

55. How did you come to conclusion about benefits of change?

    - Did you face any resistance?
    - If yes, how did you overcome it?

56. Did it bear fruit in ameliorating the condition?

    - If not, why?
    - How further you refined it?

Market and Sustainability

57. Did you have rethink of your market rollout strategy? When?

    - Why?
    - How was this reassessment done? (*Different strategies considered*, how ideas about them were obtained, *assessed on what factors*, any conflicting situation, *means to reach resolution for the conflict*)
    - How much time did it take to reach decision?
    - Did it have a positive outcome?

58. Were you aware of your major competitors reaction (given your target clients/markets)?
59. Did you think about probable competitors reaction to any of your moves?

    - How did you come to those conclusions?
    - What were your potential strategies to ward them off?
    - How were decisions on those potential strategies taken?

60. What were the factors that you thought will keep your advantage for long?[↑]

- When did you realise advantages of your service/ product?
- How did you come to these conclusions?

61. Was there a change in strategy (like introduction of new product/service outside your earlier technology domain) in order to keep growing or even to preserve the desired status?[↓]

- What was the change?
- Why was the change?
- Who first discerned that change is needed?
- Was it easy to make others see the need for change and the efficacy of the proposed solution?
    - If not, how did the situation was managed?
- How long did it take to finally approve of it? When?
- Were there other alternatives that were considered? Were they considered one by one or efficacy of each was considered simultaneously?
- Do you feel that any potential alternative was left because of lack of complete information?

Operations (also includes Alliances)

62. When did you start your scale-up for operations? Why?

- Did your plan to scale-up your operations move as per the scale-up assessment done earlier?

[↑]

- Good relation leading to repeat buy
- Govt. Protection
- Not too attractive market for big players and new players not being a threat because of first mover advantages
- Cost competitiveness
- High quality standards
- Strong Patents
- Continuous introduction of new products/services in the related technology domain
- R&D in-house capability
- Relationship with major R&D Institutes
- Others (specify) ……..

[↓] Does this question complement Qs 56-58 in (Revenue) or is it repetitive?

- If not, were the changes drastic in nature?
    - If yes, how did the efficacy of these were ascertained before you proceeded with the change (i.e., learning by doing, planned due diligence, expert opinions, etc.)? – An example
    - If it was a minor change, how did you decide on the efficacy of changes (i.e., learning by doing, planned due diligence, expert opinions, etc.)? – An example
- If there is a conflict of opinion, how the decision is made on the desirability of those conflicting opinions? – An example **as above**.

63. While broadening your operations, were you looking forward to new strategic alliances (apart from the ones' previously discussed)?

    - When did you start thinking of new alliances?
    - What were the reasons for it?
    - How the decision on the desirability of an alliance was looked into? (i.e., factors taken into account)
    - Who were involved in this decision-making in its various stages?
    - Were there any counterviews at any stage? If yes, what action was taken towards it?

64. When did 'quality' become a concern for you?

    - How did this 'quality' concern come into being?
    - Was 'quality' a concern for you prior to this?
    - Who were involved in the process to obtain quality standards par excellence?
    - Were there any sorts of impediments in the way to obtain desired 'quality' standards?
        - What were these?
        - How was it overcome?
    - How long did it take put the desired quality standard in practice?

Management[Θ]

65. When were different top management[Δ] appointments?[⊥]

[Θ] Almost all questions can be answered by the person concerned themselves.

- Why were they appointed at that point of time?
- Who were involved in their appointment decision?

66. How did you manage to convince him/her in joining your company?
67. Were they involved in any crucial decisions that changed strategy of the company in a major way as compared to before their joining?

    - How were they able to impress stakeholders including you?
    - What was the time gap between their joining and change in strategy?
    - Was it effective?
    - If not, how soon was it rectified?
    - Explain the procedure from detection of not so fruitful results and redesigning the 'changed' strategy?
    - Who else were involved?
    - Did that particular functional department exist just prior to the recruitment of that particular top management?
        - If yes. Who was heading?
        - Was there a bit of resistance, if the person in charge obtained to remain with the company?
        - How was the problem managed?

[Δ] COO, Director (R&D), Director (Marketing), Director (Finance), Director (Accounts), Others (if any)

[⊥] Many appointments can be found at the company website and Factiva. Their impact in the form of immediate decisions can be also be found in Factiva.

Appendix C

Aide Memoire

(an example)

Aide memoire for Pharmaxis

Decisions	Recognition	Deliberation	Formal Analysis	Common Approach	Contrive	Decision Selection
Dr William Bill Cowden/ Dr Brett Charlton						
Origin of idea						
Initial Funding- Seed investment by Rothschild						
Market Potential etc….						
Initial diseases when started (Praxis)						
Diseases being added steadily later on						
Asthma, Cystic fibrosis, COPD, Autoimmune diseases						
Asthma **diagnostic** by 2005 (From drugs to diagnostic)						
$ 9.35 mn Raise- Round B Funding						
Price of the share:$2.50/share						
Who was assisting?						
Ardiol market potential could double						
Dr Alan D. Robertson/ Mr Gary Phillips						
$ 9.35 mn Raise- Round B Funding						
Price of the share:$2.50/share						

Who was assisting?						
IPO						
Price per share:$0.50/ share						
Why this is much below share price for Round B?						
Timing						
Underwriters: Wilson HTM Corporate Finance (see 11/11/03)						
Money to be raised $ 21mn						
Valuation/ Market Cap						
Manufacturing facility in Frenchs Forest						
Growth Strategy to take individual product ahead.						
Market strategy: to target specialist respiratory physicians						
Any Product Strategy/ R&D strategy						
ADR Level 1						
Any other style of raising funds						
Timing						
Bank of New York						
Projections						
Asthma diagnostic by 2005						
Marketing approval for bronchiectasis with TGA by 2006						

Appendix D

Informed Consent Form

'Informed Consent' Document

Name of Researcher: Mr. **Deepak Sardana** **Title:** PhD student
Research Address:

National Graduation School of Management
The Australian National University
The Sir Roland Wilson Building (120)
McCoy Circuit, Acton
Australia. ACT0200
Tel:+61 2 6125 9837
Fax:+61 2 6125 4895
E-mail: deepak.sardana@anu.edu.au

Thank you for your participation in this research. Should you have any questions, you are encouraged to ask at any time. Your queries are regarded as important to me; you are welcome to contact me at any time via the contact details provided above.

Brief Project Description:

The objective of my research is to explore the process by which successful entrepreneurs established their new venture in particular to understand decision-making process in the early stages of formation. The purpose is to improve the framework used to understand early stage decision-making. The study will be limited to entrepreneurs in biotechnology industry and are based in Australia and India.

Detailed statement regarding consent and confidentiality:

I (the participant) understand that I am being briefed on the research purpose and methods. The researcher had informed me that his research would include the information provided by me with the possibility of quotations of this information. I (the participant) understand that participation in this research is voluntary. I (the participant) am aware that I have the rights to choose not to participate, and that by choosing to participate (i.e., to answer the questions put forth by the researcher in an interview) I do so wilfully and that absolutely no coercion, inducement or influence is involved. In addition, there is nothing that impairs my decision to participate in this interview. I (the participant) also understand that I can withdraw from this at any time and the data provided to the researcher prior to withdrawal can be used unless otherwise stated by me. I (the participant) do understand that I can review the information provided by me at any point of time as I (the participant) will be provided a copy of the final report of the interview prior to publication in any form. I (the participant) also confirm that I have knowledge that I can exercise any of the following options regarding the use of information provided by me and I can change my choice related to it during any point of time.

The researcher had briefed to me that the information provided by me shall be dealt in one of the following ways as approved by me:

1. I allow all the information to be used completely and in quotes identifiable to me if it is desired, as I believe that there is no such information that will affect me adversely. (……..)
2. I allow the selective information to be used in the form of quotes identifiable to me and these are not liable to affect me adversely. The rest of the information should be used as per confidentiality clause put forth in point 3 given below. The information to be considered confidentially will be conveyed to the researcher by me. (……)
3. I want the researcher to use information provided by me, such that my real name or the name of the firm shall not be used in the written report. (……..)
    a) The researcher has assured me that all information provided by me shall be treated as confidential and that no one will have access to this information (both in raw data and published format).
    b) If granted permission to audiotape, the tape record will be kept secure and that only researcher shall have access to it.
    c) I (the participant) will receive access to a copy of the final report of the interview prior to publication in any form, so there is the opportunity to offer any changes to the report, if necessary.

As the researcher has assured me of all the above conditions; I have willingly provided him with requisite information and allowed the researcher to tape-record the interview session.

Participant Sign:…… Researcher Sign:……

Participant Name:……. Researcher: **Deepak Sardana**

Date:……... Date:……

<u>If you have any other queries, please contact:</u>
Human Research Ethics Committee
Research Services Office
Chancelry 10B
The Australian National University
ACT 0200
Tel:+ 61 2 6125 2900
Fax:+61 2 6125 4807
E-mail: Human.Ethics.Officer@anu.edu.au

Appendix E

Evolution of the Framework

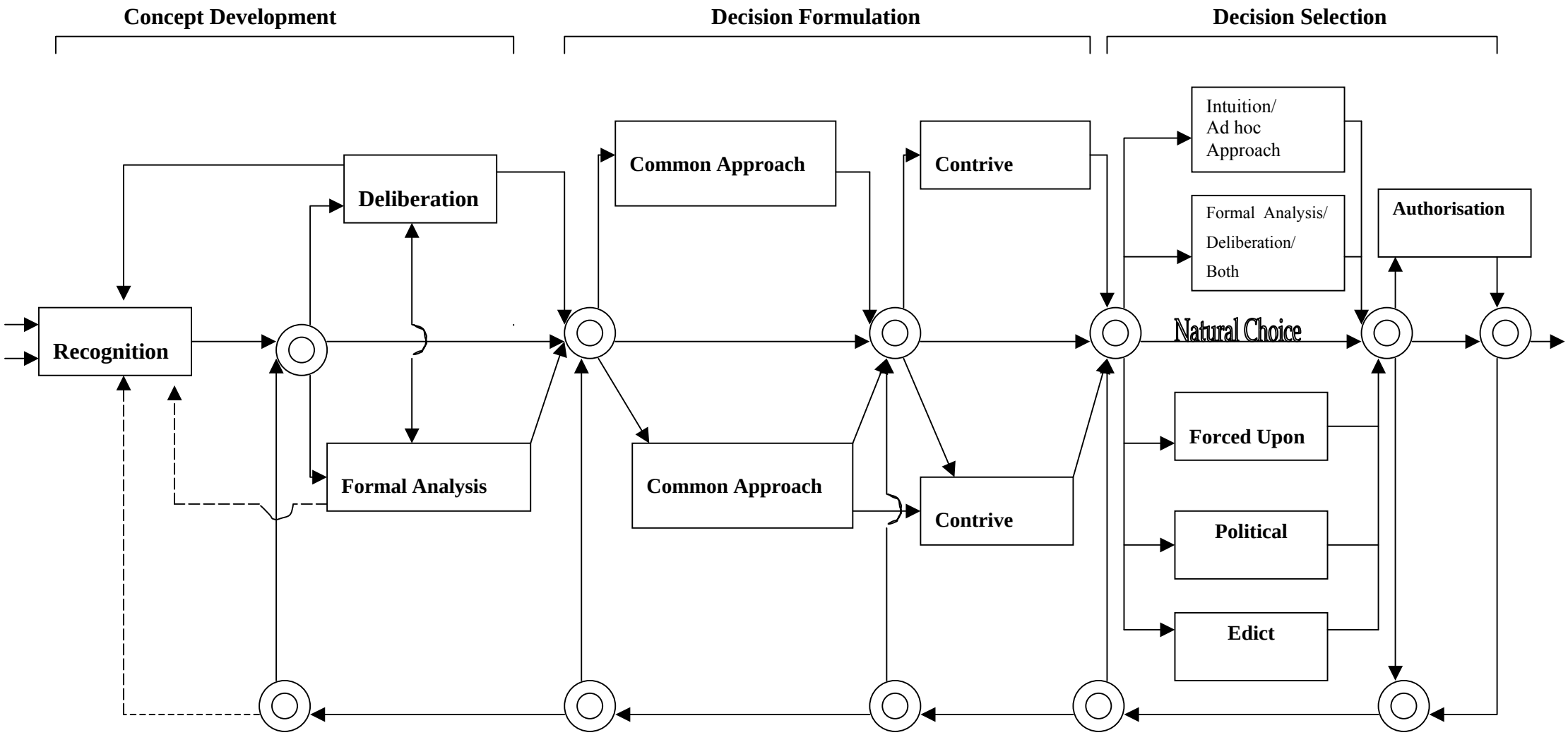

Figure. Generic Framework for Decision Process in New Ventures - Post Pilot Fieldwork & Analysis

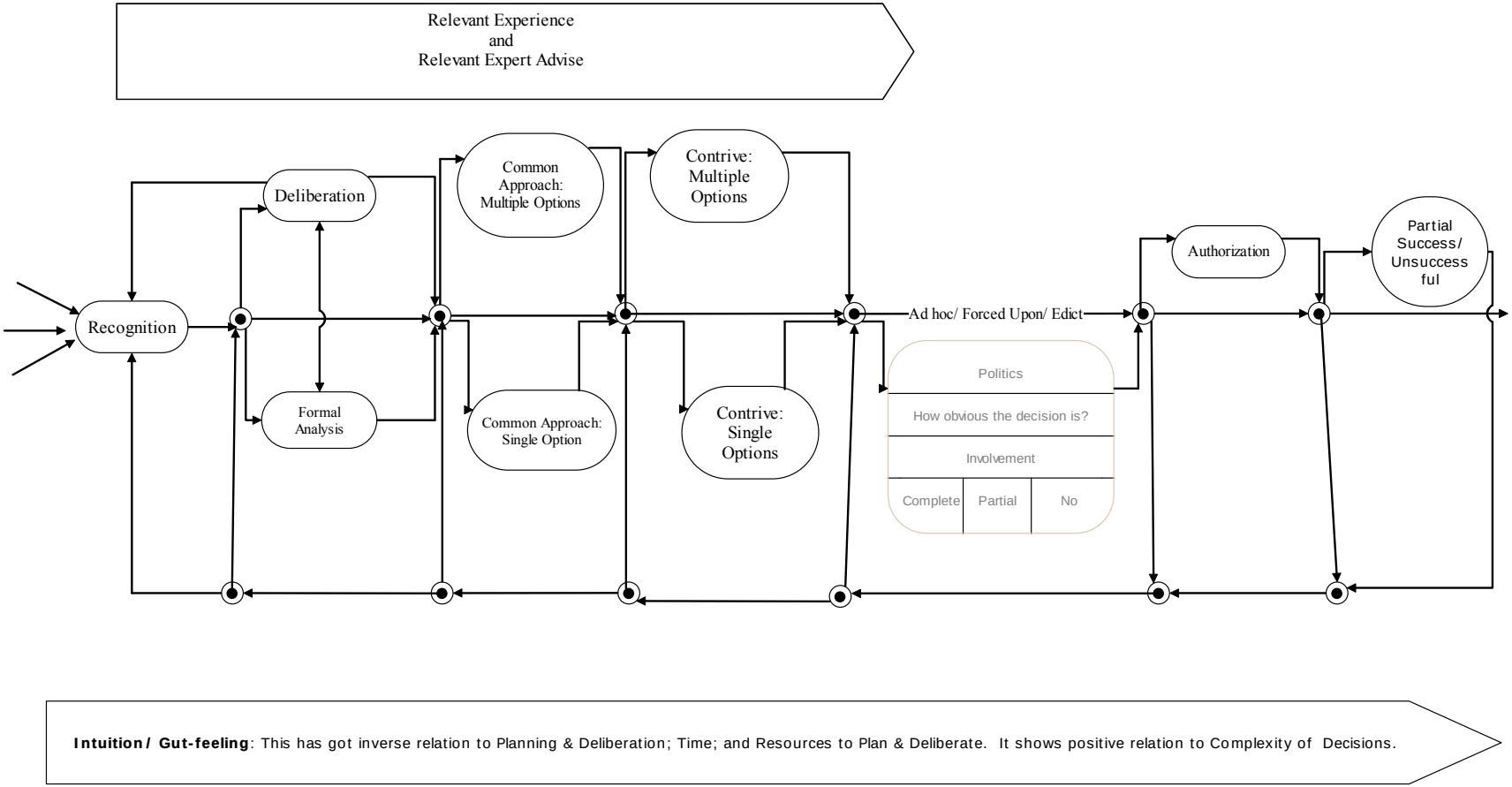

Figure. Generic Framework for Decision Process in New Ventures - Post-Fieldwork and First Round of Analysis