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Commercialisation and Innovation Strategy in Small Firms

Learning to Manage Uncertainty

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Preface

The purpose of this book is to examine the process of commercialisation within innovative small firms (ISFs) with a view to understanding the factors that influence their success and failure. Our research has drawn upon the foundation work pioneered by Professor Michel Santi from HEC Paris, and Professor Sophie Reboud from ESC Dijon, Bourgogne France in the early 2000s. This work continued from 2003 with collaboration between Sophie Reboud and Professor Tim Mazzarol from UWA, and a global network of researchers from Austria, Australia, Belgium, Canada, France, Germany, Italy, Spain, Singapore, Switzerland, and the United States, which collected data from 567 ISFs, examining the perceptions of these firms' managers as to the value they anticipated would flow from their commercialisation, and their approaches to systematic management of new product development (NPD), and commercialisation. This work was initially published as an edited book, *Strategic Innovation in Small Firms: An International Analysis of Innovation and Strategic Decision Making in Small and Medium Sized Enterprises* (Mazzarol & Reboud, 2011).

In developing this current book, we drew upon this foundation work, but focused specifically on several key areas relating to the commercialisation process of ISFs. The first of these is the initial decision to innovate and the firm's ability to assess the future potential value that future investment in the innovation's commercialisation might yield. The second is how to screen opportunities across the commercialisation process, using NPD tools and techniques to aid decision making. The third is the ability to design, develop, implement and re-engineer business models that can form a key part of the ISFs' commercialisation strategy. Fourth, is the importance of learning how to manage uncertainty, which is an essential aspect of commercialisation. Fifth, is the firm's ability to build and develop the capabilities to facilitate growth as the firm scales-up to realise the full value of the commercialisation. This involves building a *Capabilities Architecture*, comprising knowledge, skills, and competencies necessary for the successful execution of a commercialisation strategy. Sixth, is the role played by strategic alliances to assist the firm in accessing resources, skills, and knowledge. Finally, there is the firm's ability to create and maintain isolating mechanisms that will enable the firm to protect its competitive advantage.

A key part of our analysis are nine case studies which provide valuable insights into how ISFs engage in the commercialisation process. We wish to express our gratitude to their founders for agreeing to share their stories with us for this research. In this respect we thank the following people. Brianne West, founder of Ethique, a New Zealand based producer of environmentally sustainable beauty products. Roland Butcher, founder of Live Technologies, an Australian firm focused on commercialising an innovative digital lens filter for HD cameras. Guy Howard-Willis and Roland Alonzo, founders of the New Zealand based Manta5, a pioneer in hydrofoil bikes. Alison Coutts, CEO of Memphasys Ltd., and Australian bio-medical start-up focusing on in vitro fertilisation technology. Peter Beck, founder of the US-New Zealand based business Rocket Lab, producers of small satellite launch and spacecraft systems. Peter Clarke, CEO of the Australian-based Scanalyse Pty Ltd, a pioneer in the application of 3D Laser scanning technologies within the mining sector. Ned Montarello, founder of ThinkSmart, and Australian and British firm focused on point-of-sale financing for small business. Peter Malone, Leo Fung and Craig Piercy, founders of Skin Elements Ltd., an Australian firm specialising in natural sunscreen, skin care, and anti-viral cleansers. Finally, the owners of Martinot SA, a specialist precision machinery manufacturer in France.

What our work shows is that commercialisation is not well-understood within the academic literature and has been under researched with respect to small firms. Given the importance of small firms to the world's economies, it is essential that we understand the factors that enhance and restrict ISFs in their commercialisation process. This book seeks to address a gap in the literature and provide academic researchers, entrepreneurial managers, NPD project teams, and both government officials and professional services advisors new insights into the process of commercialisation within these firms.

Crawley, Australia — Tim Mazzarol
Dijon, France — Sophie Reboud
Hamilton, New Zealand — Delwyn Clark
Callaghan, Australia — Monique Moore
Crawley, Australia — Peter Malone
Crawley, Australia — Geoffrey N. Soutar

Reference

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About the Authors

Tim Mazzarol is a Winthrop Professor at the University of Western Australia where his research focuses on entrepreneurship, innovation, small business management, marketing, strategy, commercialisation, and the co-operative and mutual enterprise business model. He is as Qualified Professional Researcher with the Australian Research Society, and the Coordinator of the Co-operative Enterprise Research Unit (CERU), at UWA. Tim is also the founder and Director of the Centre for Entrepreneurial Management and Innovation (CEMI), and a founder Director and Company Secretary of the Commercialisation Studies Centre (CSC) Ltd., a not-for-profit public company dedicated to encouraging best practice in commercialisation. He is also a Director and past president of the Small Enterprise Association of Australia and New Zealand (SEAANZ). He is the author of several books on entrepreneurship, small business management and innovation. His research into has been published internationally. He holds a Ph.D. in Management and an MBA with distinction from Curtin University of Technology, and a Bachelor of Arts with Honours from Murdoch University, Western Australia.

Sophie Reboud is professor of Entrepreneurship, Strategy and Management of Innovation at the Burgundy School of Business in Dijon, France, and an honorary Research Fellow at the University of Western Australia. She has twenty years of experience as a researcher and consultant in the field of management and strategy of small firms. Originally trained as an agronomist she served as a research engineer for École Nationale Supérieure des Mines de Paris for five years and completed her Ph.D. there. Sophie's research interests are in the strategic management of innovation and creativity. This includes firms in the food sector and low-tech industries with specific focus on intellectual property and strategy in small firms.

Delwyn Clark was a Professor of Strategic Management at the University of Waikato Management School, Hamilton, New Zealand until she retired in June 2021. For three decades her research agenda and teaching focussed on how to improve the performance and competitiveness of organisations. Specific research interests

included theoretical and applied projects on strategic management, innovation, and entrepreneurial processes. Her research leadership roles included serving as Associate Dean Research for fifteen years with responsibility for research policy development and Performance Based Research Fund (PBRF) processes. Delwyn received a Life Fellow Award from the Australian and New Zealand Academy of Management (ANZAM) in 2009 in recognition of her intellectual and service contributions.

Monique Moore is a Business Development Manager in the Research and Innovation Division of the University of Newcastle, Australia. She has recently completed a Ph.D. focusing on the intersection between business, law, and commercialisation of scientific discoveries at the University of Western Australia. She is a trained lawyer with a global industry experience in law and business, currently undertaking collaborative research with the Law School at the University of Newcastle, Australia researching emerging innovation in the legal industry.

Peter Malone is a doctoral student from the University of Western Australia completing his research thesis into innovation and commercialisation within innovative small firms, with specific focus on the Entrepreneurial Innovation Value (EIV) model that he has developed. His research is at the forefront of understanding commercialisation value in entrepreneurial SMEs. He is also an experienced entrepreneur who has successfully founded and commercialised numerous ventures. These includes his role as a founder director and Chair of Skin Elements Limited, a fast-growing biotech firm which formed one of the case studies used in this book. Peter is also Chair of the Commercialisation Studies Centre Ltd., a not-for-profit applied learning centre which he helped to found. He has 15 years' experience as a researcher and consultant in the fields of innovation and entrepreneurship having taught at the University of Western Australia, delivered presentations at Curtin University and the University of Notre Dame Australia. Peter holds in addition to current doctoral studies an MBA from the University of Western Australia and a Bachelor of Architecture from Curtin University.

Geoffrey N. Soutar is an Emeritus Professor at UWA, who retired in 2020. During his long career he held senior roles at Curtin University, Edith Cowan University (ECU) and UWA, and was Dean of the Business School at ECU. He was a Winthrop Professor and the Nancy Keegan and Don Voelte Distinguished Scholar in the UWA Business School, as well as a Fellow and Life Member of the Australian and New Zealand Academy of Management (ANZAM), and one of three Inaugural Fellows of the Australian and New Zealand Marketing Academy (ANZMAC). In 2015 he was granted ANZMAC's Distinguished Researcher Award and made a Fellowship in the Academy of the Social Sciences of Australia. He was the first business academic appointed to an expert panel of the Australian Research Council

(ARC). Professor Soutar has supervised more than 70 doctoral graduates to completion and has published more than 200 journal papers across a broad range of management and marketing areas, including in the fields of co-operative and mutual enterprises, consumer perception of value, personal values, service quality measurement, small business management and tourism. He was also a founder director of the Commercialisation Studies Centre (CSC) Ltd.

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Chapter 1
Innovation and Commercialisation in Small Firms

Tim Mazzarol

1.1 Introduction

> Small Technology Firms (STFs) are currently facing increased competition characterised by product and market uncertainties, the internationalisation of markets, transfer of technologies and large amount of knowledge and information. In this environment, the ability of firms to rapidly create and commercialise new products has posed considerable challenges for the STFs. (Pellikka & Virtanen, 2009, p. 268)

Throughout the world most businesses are small, with the majority being single owner, non-employing, *nano* enterprises (OECD, 2016). These small firms are not only the most numerous of all businesses, but they also make a significant contribution to employment, value adding and, if adequately supported, innovation and commercialisation (OECD, 2010a). Despite their importance, small firms have been largely ignored by academic researchers, who have focused much of their attention on the rare and atypical high-growth firms that have been labelled as *Unicorns* or *Gazelles* (Aldrich & Reuff, 2018). This is particularly the case for innovation and commercialisation, where much of the focus has been on large firms, or the atypical high-growth and/or high-tech start-up ventures (Welter et al., 2017).

In addition to the lack of attention given to such firms by academic researchers, there are also problems in how government policy is formulated and implemented in relation to small firms. Governments have long been interested in stimulating their growth to increase job creation and economic prosperity since at least the 1980s (Birch, 1987). However, government policy relating to their innovation and commercialisation activities remains fragmented and underdeveloped due to a lack of any clear understanding of the challenges that such firms face.

Although *small to medium enterprises* (SMEs) comprise around 99% of all businesses, employ about two-thirds of the workforce and generate more than half the industry value added across most of the world's economies, the majority (70–95%) are nano or micro firms with either a single owner-manager (e.g., nano), or fewer

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than 5–10 employees (e.g., micro) (OECD, 2010a, 2016). Further, most small firms do not seek to grow rapidly or create significant numbers of new jobs, and only a few are found in the high-tech or tech sector, which is itself poorly defined. An increasing view within academic researchers is that too much attention has been given to high-growth entrepreneurship. Indeed, as Acs et al. (2016, p. 16) note:

> Few new firms enter to innovate, and very few entrepreneurs hire anyone except themselves and have no interest or ability to expand after creating a job for themselves. In conclusion, supporting people to become entrepreneurs would mostly support one-man, me-too shops in low-growth, low-margin industries where there is little, or no innovation undertaken.

Despite this rather dismal view of small firms as a potential engine room for innovation, economic and employment growth, their role within the *National Innovation System* (NIS) remains important. However, it is their potential that is of most significance, and that is the focus of this book. It is our view, based on the authors' experience as academics and entrepreneurs, that the latent potential of the small firm as a source of innovation and commercialisation remains largely untapped. This potential can be unlocked with appropriate attention to building the knowledge and networking capacity of their owners and managers. It can also be facilitated by targeted government support and focused academic research, across a wider base of entrepreneurial innovation and commercialisation in low, mid, and high-tech sectors, as well as including both products and services industries (Hirsch-Kreinsen et al., 2005; Reboud et al., 2014).

The ability to understand small firms, and how they engage with innovation and commercialisation, has been impeded by the lack of clear definition, not only as to what a *small firm* is, but also how to define and measure concepts such as *entrepreneurship*, *innovation,* and *commercialisation.* This chapter examines the nature of small firms and how they contribute to the NIS within their economies. It also addresses issues of definition and reviews the academic research that has been undertaken into small firm innovation and commercialisation. In doing so it outlines the research problem that this book sets out to address and provides a context for the chapters that follow.

1.1.1 The Research Questions Guiding the Study

A series of research questions guided the development of this book, and in this chapter and those that follow, we address these questions to provide insights into the way in which small firms undertake the process of commercialisation these questions are listed as follows:

1. What are the key attributes that define innovative small firms that engage in commercialisation?
2. What are the key attributes that define the commercialisation process?
3. What knowledge and motivation are needed to identify a potential opportunity?

4. What assessments should entrepreneurs make of an identified opportunity to decide whether it represents an opportunity for them specifically?
5. What influence does feedback from the exploitation of a current potential opportunity have on identification and assessment of subsequent potential opportunities?
6. What is the role of the business model in commercialisation of innovations by small firms?
7. What does the new product development (NPD), commercialisation pathway look like for innovators? and
    a. How do they manage this commercialisation pathway?
    b. What role do existing concepts, systems (e.g., StageGate®), play in facilitating this commercialisation pathway? and
    c. How do SMEs address value identification and capture from their intellectual property assets?
8. What roles do organisational learning and capabilities play within the innovative small firm where resource scarcity is a key strategic consideration?
9. How important is knowledge management within the top management team and their key employees?
10. What is the importance of third-party networks and complementary actors?
11. What is the role of strategic alliances in successful commercialisation of ISFs?
    a. What role do third party actors "innovation champions" play in the commercialisation process?
    b. How important is their commitment to the commercialisation project to success?
    c. How do SMEs seeking to commercialise, "de-risk" the project for such third-party actors?
12. What is the role of isolating mechanisms in commercialisation of innovations by small firms?
13. What does successful commercialisation look like for an innovative small firm?

1.2 What Are Small Firms?

In this book we have deliberately chosen to use the term *small firms* to describe the primary unit of analysis for our investigation, and the term *innovative small firm* (ISF). The challenge of defining what constitutes a small firm is surprisingly difficult and complex (Headd & Saade, 2008). One of the most common terms used is *small and medium enterprises* (SMEs), or more recently *micro, small, and medium enterprises* (MSMEs) (IFC, 2016; OECD, 2010a). However, there is no universally accepted definition of what a small firm is, nor is there agreement about the boundaries for SMEs or MSMEs (Kushnir et al., 2010; Storey, 1994; Tonge, 2001; Zhang, 2013). Indeed, the field of entrepreneurship and small business management remains

adversely affected by a lack of definition and measurement (Bouckenooghe et al., 2007; Nightingale & Coad, 2014; Tan et al., 2009). The most common measures used to define small firms are the number of people they employ, annual turnover, total assets, and whether they are independent in their ownership and operations, rather than being subsidiaries of larger organisations (ABS, 2005; ASIC, 2015; OECD, 2004).

1.2.1 The Problems of Definition

This lack of clarity over the definition of a small firm is important for several reasons. First, from a research perspective, unless the unit of analysis (e.g., the firm) can be appropriately defined, it is difficult to undertake any meaningful study from which comparisons can be made. For example, given the diversity found within the small firm sector, it is unlikely that all such firms will have the same characteristics, behaviour, problems, and needs. The number of employees the firm has, the industry it operates in, the level of innovation that it undertakes, and the characteristics and ambitions of its owners and senior managers are all important criteria. They are likely to determine what the firm will do, what problems it might face and the type of support it might need. Research into small firms in the United States, undertaken by the Small Business Administration (SBA), found mixing data on firms of different size, or type (e.g., employing versus non-employing), led to distorted results in relation to rates of growth, business structures, employment and ownership patterns and financing needs (Headd & Saade, 2008).

A second problem is the impact this lack of definition of the small firm has on government policy and regulation. How a small firm is defined influences how it is regulated and whether it will be subject to such things as taxes, compliance costs, workforce or labour laws, privacy and environmental regulations, or the receipt of government assistance (ASIC, 2015; Keefe et al., 2005; Productivity Commission, 2013). For example, a review of how federal government legislation impacts small firms within the United States, found that while small businesses were officially recognised in many federal statutes and programs, the definitions of what such a firm was varied widely. For example, within workplace and labour laws the criteria included employment, but with ranges from under 11 employees to under 100 employees. Within economic and financial laws, the criteria focused on a range of industry and annual turnover metrics. However, no common definition for *small business* was found (Keefe et al., 2005).

> *The study concluded, …* Given the wide range of thresholds that exist under different regulatory regimes, there is no simple answer to the question of how regulation impacts small business. The review raises an obvious question of how regulatory thresholds are determined and whether the threshold is appropriate or effective. (Keefe et al., 2005, p. 43)

A third problem relates to how academics and governments, have focused their attention onto small firms. Academics researching small firms, generally rely upon

Table 1.1 OECD, EU and IFC definitions of small firms

	Employees	Annual turnover	Assets
EU/OECD definitions			
Micro-enterprise	1–9	<€2 million	<€2 million
Small enterprise	10–49	<€10 million	<€10 million
Medium-sized enterprise	50–249	<€50 million	< €43 million
Large enterprise	> 250	>€50 million	>€43 million
IFC definitions			
Micro-enterprise	1–9	<US $100,000	<US $100,000
Small enterprise	10–49	<US $3 million	<US $3 million
Medium-sized enterprise	50–299	<US $15 million	<US $15 million
Large enterprise	>300	>US $15 million	>US $15 million

Sources OECD (2004, 2010a), IFC (2012)

official government definitions and classification systems when defining what they are studying (Al-Qrim, 2005; Audretsch, 2002). As a result, the problems created by a wide range of definitions leads to potential confusion and problems of establishing the validity of research findings across jurisdictions and studies. Governments are aware of this issue and there has been some work done to develop greater consistency in how small firms are classified (IFC, 2012; OECD, 2004, 2010a; Zhang, 2013). For example, the European Union (EU), the Organisation of Economic Cooperation and Development (OECD), and the International Finance Corporation (IFC) have sought to provide standard definitions for small firms. These are outlined in Table 1.1, where measures of employment, annual turnover, and assets are used to classify firms into the micro, small, medium, and large categories.

However, while these measures—the EU/OECD definition—are becoming more common, the range of definitions used by governments remains diverse and problematic when seeking to undertake research. Perhaps more worrying, is that there appears to be a relative lack of concern within academic circles over how small firms are defined. For example, an examination of 217 research papers from 20 academic journals that specialise in entrepreneurship and small business management, found little consistency in how small firms were defined (Reboud et al., 2014). The most common (but not the majority) of papers used the EU/OECD definition. Employment was the most numerous markers for the definition, but this proved highly variable, ranging from under 9 employees to less than 791 employees. Sales turnover was less common, as were size and ownership structure, the age of the firm, and assets. A concern was the finding that a high proportion of papers (31%) did not provide any definition at all. This included research published in some of the best-regarded academic journals and seems to reflect either a rather cavalier approach to research by the authors, a lack of attention by reviewers and editors, and/or a lack of understanding of the importance of definition by all.

1.2.2 The Challenge of Defining the Innovative Small Firm

In addition to the problem of inadequate definition for small firms is the challenge of defining the nature of what an *innovative small firm* (ISF) is. Numerous titles have been given to firms that are innovative and growth oriented these include labels such as *Unicorns*, *Gazelles*, *Born Global, New Technology-based Firms,* and *Start-ups.* Table 1.2 lists several of the more the common types of small, entrepreneurial, and innovative firms that have been the focus of academic research, popular media, and government policy in recent years.

The attention given to these specific types of small firms is due to their potential to generate significant returns to their investors, create employment, and make a major contribution to economic growth if they can successfully commercialise their innovations and scale-up. From a government policy perspective, interest in innovative and high-growth small firms can be traced back to the publication of a report *The Job Generation Process* (Birch, 1979). This longitudinal study of the 5.6 million American firms in the Dunn & Bradstreet database over the period 1969–1976 found that the primary driver of job generation were small firms rather than the large firms. This finding came at a time when the United States, like many of the world's advanced economies, was experiencing declining or stagnant economic growth and rising unemployment (Irvin, 2011).

Birch (1979) recommended that to stimulate employment growth, government policy should focus less on the large established firms, and more on small firms, start-ups, and self-employment, while encouraging immigration through targeted programs. Birch (1987) subsequently examined job creation data for the years 1981–1985 and found that firms with less than 20 employees generated around 88 % of all employment growth. He noted that most of this net-new job creation was being driven by a small number of high-growth firms he labelled *Gazelles.* However, Birch (1979) did caution that such firms were not only small and independent, but also highly volatile. As a result, it was difficult to predict the emergence of such firms and government policymakers were advised to go hunting for them with a rifle rather than a shotgun, reflecting the need for carefully targeted programs.

Birch's work has been criticised for lacking a strong theoretical foundation and having some methodological flaws (see, Davis et al., 1994; Tuerck, 1990). However, it captured the attention of governments seeking solutions to the high rates of unemployment and provided an impetus for research and public investment into new venture creation, small business, and entrepreneurship (Landström, 2005). Subsequent research has generally supported Birch's findings (e.g., Clayton et al., 2013; EDSE, 2016; Hendrickson et al., 2015; Neumark et al., 2011). *Gazelles* and high-growth firms are not only high-tech businesses, but can be found in all industry sectors, and are also quite rare, typically representing only 1%, or perhaps 3% of all firms (Hendrickson et al., 2015; OECD, 2010a). Yet such firms are typically innovative, growth-oriented, often export focused and good at exploiting their intellectual property (IP) assets, as well as being well-networked, and able to secure access to financial resources to facilitate their growth (OECD, 2010b). However, despite

Table 1.2 Definitions of innovative, high growth and/or high tech small firms

Type of firm	Definition	Sources
Unicorns	Start-up businesses with a stock market value (or estimated value) of at least $1 billion	Aldrich and Reuff (2018)
Gazelles	High-growth companies, particularly those that have increased their revenues by 20% or more annually over a period of four or more years	Birch (1987), Aldrich and Reuff (2018)
Born Global Firms	Small business that begins exporting within the first two years of foundation, export at least a quarter of total production, invest in value adding and are owned by founders who from the outset view global markets as their objective	Rennie (1993), Oviatt and McDougall (1994), Knight and Cavusgil (1996)
New Technology-Based Firms	A young, independently owned business less than 25 years old, based on the exploitation of an invention or technological innovation, led by founders who are willing to take substantial technological risks	Storey and Tether (1998), Patton and Higgs (2013)
High-Tech SMEs	Small firms that invest higher than average (typically more than 5%) of total annual turnover into R&D and employ a higher-than-average number of qualified scientists and engineers than other firms	Butchart (1987), Hirsch-Kreinsen et al. (2008), Reboud and Mazzarol (2017)
Entrepreneurial Start-Up	A business founded with a repeatable, scalable business model, specifically focused on growth, possessing strong innovation and commercialisation potential	Blank (2010), Stevens (2018)
Generic Start-Up	A new business, that is actively employing at least one person, and is independently owned and operated. Also, a business venture created to pursue and exploit an opportunity	Luger and Koo (2005), Drnovšek et al. (2010)