

Innovation and Small Business - Volume 1

Brychan Thomas; Christopher Miller; Lyndon Murphy



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Innovation and Small Business

Volume I

Innovation and Small Business: Volume I
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Foreword

With a modern society that is seeing fast changing social, economic, political and cultural developments never before has innovation been more important for small businesses. As a consequence the study of innovation is a fast developing area with publication of a number of leading texts. These however tend to investigate innovation management activities in large businesses with limited consideration of the small business area. This is disproportional to the amount of research activity that is being undertaken in the small business field. These seminal texts into innovation management in large organizations have previously considered popular, as well as requisite, concepts such as disruptive technology and more recently open innovation and the “fuzzy front end”. Moreover, innovation is seen in terms of creativity and the generation of new ideas. It is evident that whereas large companies are good at implementing innovation, small companies are better at generating new ideas although research tells us that only around 10% will be commercially viable. Contributing to this innovation activity there will also be different forms of innovation including product, process and service innovations and also radical and incremental innovations.

In response to this gap this volume considers innovation and small business with particular reference to the innovation process. Here an approach appropriate to small businesses is taken by considering the distinction between invention and innovation as well as research and development in the context of the small firms. In addition, technology diffusion, clusters and knowledge flows, higher education spin-offs, global start-ups and innovation performance indicators are also considered with particular reference to the small business sector.

The second volume considers industrial settings and essentially attempts to apply the theory considered in volume one. Furthermore, this volume recognizes the contributions of small firms to these industries, firmly establishing the pivotal role they play in future economic development and prosperity. This is achieved by investigating a number of industries such as agri-food, health, energy, construction and heritage. In particular there is consideration of innovative and sustainable solutions, the assessment of research and development, technology and multimedia knowledge management systems.

Whilst it is recommended to read volume one before progressing to volume two, each volume has been constructed so that they can be read independently of one another. Given this exciting and new approach it is a pleasure to commend this text not only to students, researchers and scholars of small business but also to policy makers, small business practitioners and owner managers.

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Preface

In modern technological society small businesses are expected to have an innovative role in the emerging knowledge economy, especially at an international level (EC, 2005; BERR, 2008). In fact the effective use of technological innovation is considered to be a prerequisite for small business survival (Packham, 2002; Packham et al, 2005). It has long been recognised that the small business sector is important for economic growth and it has been noted that there is a need for an international focus on small businesses having access to international markets (OECD, 2005). Within this context it has been acknowledged that small business development programmes and assistance should enable them to take advantage of innovative global technologies (OECD, 2005). Although significant opportunities are presented to small businesses through the adoption of new technologies there needs to be awareness to the barriers of implementation and this has led researchers to focus on adoption factors (Parasuraman, 2000). Indeed, there has been little success linking the determinants of adoption in small businesses with expected outcomes such as innovation, apart from specialised research and development (R&D) intense sectors (Thomas and Simmons, 2010).

Small businesses with an above average absorptive capacity tend to exhibit experience, knowledge, a skills base, knowledge creation and sharing processes (Cohen and Levinthal, 1990; Zahra and George, 2002; Gray, 2006). Their effective use of networking and an optimal use of technological innovation are the focus of this first volume. It is therefore hoped that this volume will provide a greater understanding of these innovation processes for small businesses.

References

Cohen, W. and Levinthal, D. (1990) Absorptive Capacity: A New Perspective on Learning and Innovation, *Administrative Science Quarterly*, 35(1), 128-152.

Department for Business, Enterprise and Regulatory Reform (BERR) (2008) *Business Plan 2008–2011*, June, London.

European Commission (EC) (2005) Implementing the Community Lisbon Programme – Modern SME Policy for Growth and Employment (COM) (2005), 551 final, November, Brussels.

Gray C. (2006) Absorptive capacity, knowledge management and innovation in entrepreneurial small firms, *International Journal of Entrepreneurial Behaviour & Research*, 12(6), 345-360.

OECD. (2005) *Small to Medium-Sized Business (SME) and Entrepreneurship Outlook*, OECD, Paris.

Packham, G., Brooksbank, D., Miller, C. and Thomas, B. (2005) Climbing the Mountain: Management Practice Adoption in Growth Oriented Firms in Wales, *Small Business and Enterprise Development*, 12, 482-497.

Packham, G. (2002) Competitive Advantage and Growth: The Challenge For Small Firms, *International Journal of Management and Decision-Making*, 3, 165-179.

Parasuraman, A. (2000) Technology Readiness Index (TRI): a multiple-item scale to measure readiness to embrace new technologies, *Journal of Service Research*, 2, 397-329.

Thomas, B. and Simmons, G. (eds.) (2010) E-Commerce Adoption and Small Business in the Global Marketplace: Tools for Optimization, Business Science Reference, Hershey: IGI Global.

Zahra, S. and George, G. (2002) Absorptive capacity: A review, reconceptualization and extension, *Academy of Management Review*, 27(2), 185–203.

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Dr. Brychan Thomas, Dr. Christopher Miller and Lyndon Murphy

Cardiff and Newport

December 2010

1. Introduction

Brychan Thomas, Christopher Miller and Lyndon Murphy

“Innovation is the central issue in economic prosperity”

MICHAEL PORTER (1947-)

This chapter at a glance

- Innovation and Small Business
- Small Business Innovation Networks
- Organisation of the Book

Innovation and Small Business

Small businesses are making an important contribution to the development of technological innovation within industries at regional and national levels. In fact, the European Commission (EC, 1993, 1994, 2007) has reported that this sector probably holds the key to the future renewal and growth of Europe. According to the EC small businesses are enterprises employing fewer than fifty people, with an annual turnover/balance sheet total not exceeding ten million euro (EC, 2005). Innovation can be defined as either the ‘application of a new method or device’ (Collins, 1997) or the ‘successful exploitation’ of a new idea (Thomas and Rhisiart, 2000). According to Baregheh et al. (2009) innovation is ‘the multi-stage process whereby organisations transform ideas into new/improved products, services or processes, in order to advance, compete and differentiate themselves successfully in their marketplace’.

Whereas the advantages of small businesses in innovation are largely associated with flexibility, dynamism and responsiveness (Rothwell, 1994), the disadvantages are often related to a lack of financial and technological resources. This can lead to problems in their capability to absorb and diffuse technology within industrial sectors. This is a major problem in the development of the small business sector in many UK regions, especially as external inputs are of greater importance for the small firm than for the large firm during the innovation process (Allen et al., 1983). With the different levels of regional industrial development within Europe there will also be variations in the importance of innovation support to the small business (Saxenian, 1991). This inequality can make access to knowledge, technology and human resources more difficult, and will affect not only the development of small businesses within regions, but also the efficiency and effectiveness of the regional innovation system. Regional policy needs to respond to these variations, and develop innovation support networks that are sensitive to the needs of small business.

Uyarra (2005) has investigated theoretical issues and empirical evidence of regional innovation strategies with regard to knowledge, diversity and regional innovation policies. The development of concepts concerning regional innovation has led to the new regionalist literature (Lovering, 1999) and to models of territorial innovation (Moulaert and Sekia, 1999). Such concepts include regional innovation systems, the triple helix, innovative milieu, technological districts and learning regions (Uyarra, 2005). Here there are concerns on the use of concepts including regional innovation systems to study declining economies, rural areas and peripheral regions (Doloreux, 2002; Asheim and Isaksen, 2002). It is concluded that it is rare to identify the requisite aspects for a regional system of innovation (Evangelista et al, 2002). In terms of increasing globalisation it appears sensible for small businesses to use support for their own innovation goals (Cooke, 2001) whether or not the support comes from outside or within a region (Uyarra, 2005).

Small Business Innovation Networks

It has been shown that networking is a time-consuming and demanding activity with opportunity costs for small businesses with limited resources (Rothwell, 1994). Accordingly, there is a need to enable small businesses to overcome innovation-related disadvantages associated with networking. Since this has become a key feature of industrial innovation this increases the small businesses innovatory capabilities. Negative and positive aspects of networks need to be noted since, for example, ICT systems carry dangers as well as opportunities for small businesses, especially where industry-wide operating standards lock them into large networks.



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In innovation support networks technology equates with knowledge. Within university-industry link systems a multiplicity of technology transfer mechanisms are apparent, which appear to be well integrated (Cheese, 1993). Chambers of commerce who deliver innovative support to small businesses complement the higher education system. Small businesses need to co-operate through network groups to share learning and training resources and good practice. It is clear that chambers of commerce can provide support by acting as the prime entry point into the local innovation support network, by offering basic consultancy and using knowledge of the network to direct businesses, as necessary, to the agent, such as an independent research centre or a higher education institution (Cheese, 1993). A non-trivial source of the exchange of information on problems of common interest are personal contacts within an informal network (Desforges, 1985). A problem that is particularly acute for small businesses is co-operation since they tend not to be well integrated into academic/government/company networks.

A network of co-operation partners will operate to form a 'focal point' of business innovation (Martinussen, 1992). The hub of the process needs good organisation and a network of co-operation partners involving business innovation centres, technology transfer companies, science parks, and venture capital companies. These will be responsible for developing technology from a business idea to establishment of a new firm.

Organisation of the Book

This volume contains chapters concerning the innovation process and small business and considers invention, innovation and small business, research and development and the small firm, technology diffusion, clusters and knowledge flows, higher education spin-offs, global start-ups and business development and innovation performance indicators.

Chapter 2: Invention, Innovation and Small Business

This opening chapter introduces the distinction between invention and innovation and the interrelationships between invention, innovation and small business. The chapter investigates inventive activity in the modern technological setting of the 21st Century and reports on the barriers, motivations and drivers to inventors becoming entrepreneurs in exploiting their ideas and taking them to market.

Chapter 3: Research and Development and the Small Firm

The chapter investigates R&D in terms of spillovers and technology absorption, the measurement of R&D activity and these activities in small businesses. In relation to these aspects the chapter considers R&D activities in businesses according to demand, organisation, innovation, imitation and diffusion, complementary assets, networking and government influence on business R&D.

Chapter 4: Technology Diffusion

This chapter considers technology diffusion, technology transfer networks, a model of technology diffusion, "best practice" and implications for policy. Technology diffusion in the form of new or improved technology, the transmission of knowledge or technical expertise is investigated. This involves spillovers through formal and informal networks enabling learning by interacting and an absorptive capacity to assimilate new technology developed elsewhere. Implications for policy relevant to technology and entrepreneurship arising from the model are also investigated and conclusions are drawn.

Chapter 5: Clusters and Knowledge Flows

Clusters and knowledge flows are explored together with mobility within clusters followed by the example of the Inkjet Printing Cluster in the Cambridge area. Labour mobility and knowledge spillovers in clusters are interrelated phenomena with knowledge embodied in entrepreneurs and specialised workers can spill over from one enterprise to another through labour mobility and direct revelation (Guarino and Tedeschi, 2006). It is found that knowledge diffused by the mobility of employees contributes to a cluster performing better through the generation of spinouts and the accumulation of knowledge (Dahl, 2002).

Chapter 6: Higher Education Spin-offs

Academic entrepreneurs, academic spin-offs and the economic importance of academic spin-offs are explored in this chapter. A number of factors will influence the ability to establish and develop spin-offs. Some of these arise from the priorities and views of university researchers and characteristics of academic culture. Others are from the wider business environment and the ability of the academic-industry infrastructure to promote and support the development of spin-offs. Supply-side factors will include the business background, skills, relevant experience and access to finance, of the founders/co-founders of spin-offs. Whereas, the demand-side factors will include unemployment in the region, demand for the services provided by the spin-offs, the local industry structure (whether conducive to the formation of spin-offs), and the level of economic activity in the local economy.

Chapter 7: Global Start-ups and business development

This chapter examines the characteristics of global start-ups and relates case studies of these small businesses. By describing, understanding and interpreting the reasons behind the emergence of global start-ups it is possible to gain insight into their needs for business support. Six global start-up case studies are described, which were investigated, and these reveal different characteristics and aspects for business development. Perhaps the main limitation is that most of the companies are in the early stage of business development, but it is envisaged that this work will be developed into a longitudinal study which will show interesting evolutionary dynamics in future years.

Chapter 8: Innovation Performance Indicators

Innovation performance indicators and small firms are discussed together with an examination of innovation performance, a framework for measuring innovation performance and regional innovation performance. The extant concepts and research the chapter builds on is the recent work into innovation performance indicators, at national and regional levels. A framework for selecting and placing indicators in three performance areas is explored according to i) basic research and the production of new knowledge; ii) links between public and private research and iii) levels of industrial innovation (OECD, 2001). Through categorisation and weighting, indicators are determined to measure innovation performance.

Recommended Reading

Thomas, B. (2000) *Triple Entrepreneurial Connection: Colleges, Government and Industry*, London: Janus Publishing Company.

Thomas, B. and Simmons, G. (eds.) (2010) *E-Commerce Adoption and Small Business in the Global Marketplace: Tools for Optimization*, Business Science Reference, Hershey: IGI Global.

References

Allen, T., Hyman, D. and Pinckney, D. (1983) Transferring Technology to the Small Manufacturing Firm: A Study of Technology Transfer in Three Countries, *Research Policy*, 12(2), 199-211.

Asheim, B.T., Isaksen, A. (2002) Regional Innovation Systems: The Integration Of Local ‘Sticky’ And Global ‘Ubiquitous’ Knowledge, *Journal of Technology Transfer*, 27, 77-86.

Baregheh, A., Rowley, J. and Sambrook, S. (2009) Towards a multidisciplinary definition of innovation, *Management Decision*, 47(8), pp. 1323-1339.



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- Cheese, J. (1993) Sourcing technology - industry and higher education in Germany and the UK, *Industry and Higher Education*, March, 30-38.
- Collins (1997) *Collins Concise Dictionary*, Glasgow, Harper Collins.
- Cooke, P. (2001) *Strategies for Regional Innovation Systems: Learning Transfer and Applications*, UNIDO World Industrial Development Report (WIDR).
- Dahl, M.S. (2002) Embedded Knowledge Flows through Labour Mobility in Regional Clusters in Denmark, Paper presented at the *DRIUD Summer Conference on "Industrial Dynamics of the New and Old Economy – who is embracing whom?"*, Copenhagen/Elsinore 6-8 June.
- Desforges, C.D. (1985) USA/UK Experience in Technology Transfer: a comparative analysis, *CDP Conference on Commercial and Industrial Collaboration*, Sheffield, 27.
- Doloreux, D. (2002) What we should know about regional systems of innovation, *Technology and Society*, 24, 243-263.
- European Commission (EC) (1993) Growth, competitiveness, employment: the challenges and ways forward into the 21st Century, *Bulletin of the European Communities*, Supplement 6/93.
- European Commission (EC) (1994) *Growth, competitiveness, employment: the challenges and ways forward into the 21st Century*, White Paper, Brussels, EC.
- European Commission (EC) (2005) *The new SME definition - User guide and model declaration*, Enterprise and Industry Publications, Brussels: European Commission.
- European Commission (EC) (2007) *Fourth European Community Innovation Survey: Strengths and Weaknesses of European Countries*, Brussels: European Commission.
- Evangelista, R., Iammarino, S., Mastrostefano, V. and Silvani, A. (2002) 'Looking for regional systems of innovation: evidence from the Italian innovation survey', *Regional Studies*, 36(2), pp.173–186.
- Guarino, A. and Tedeschi, P. (2006) *Endogenous Knowledge Spillovers and Labour Mobility in Industrial Clusters*, Department of Economics and ELSE, University College, London.
- Lovering, J. (1999) Theory led by Policy: The Inadequacies of the "New Regionalism" (Illustrated from the Case of Wales), *International Journal for Urban and Regional Research*, 23(2), 379-395.
- Martinussen, J. (1992) Business Creation and Technology Transfer, *OECD Seminar on Strategies for Promoting Technology Transfer*, Grenoble, April, 11.
- Moulaert, F. and Sekia, F. (2003) Territorial innovation models: a critical survey, *Regional Studies*, 37, 289-302.

Organisation for Economic Co-operation and Development (OECD), 2001; *The New Economy: Beyond the Hype – The OECD Growth Project*.

Rothwell, R. (1994) The changing nature of the innovation process: implications for SMEs, in Oakey, R (ed.), *New Technology-Based Firms in the 1990s*, London, Paul Chapman, 11-21.

Saxenian, A. (1991) The Origins and Dynamics of Production Networks in Silicon Valley, *Research Policy*, 20, 423-437.

Thomas, M. and Rhisiart, M. (2000) Innovative Wales, Bryan, J. and Jones, C. (eds.) *Wales in the 21st Century: An Economic Future*, London, Macmillan Business, 115-122.

Uyarra, E. (2005) *Knowledge, Diversity and Regional Innovation Policies: Theoretical Issues and Empirical Evidence of Regional Innovation Strategies*, PREST Discussion Paper Series, Institute of Innovation Research, University of Manchester, Manchester, 1-18.

2. Invention, Innovation and Small Business

Brychan Thomas, Lynne Gornall, Christopher Miller and Gary Packham

“Where a new invention promises to be useful, it ought to be tried”

THOMAS JEFFERSON (1762-1826)

This chapter at a glance

- Introduction
- Distinction between invention and innovation
- The Interrelationships between invention, innovation and small business
- Conclusions

Introduction

Much has been written about invention and inventive activity – and today increasingly, about the concept of ‘entrepreneurship’. Published work typically describes inventive activity on a historical-developmental basis or as a collection of case studies, presenting qualitative findings in relation to the inventive developments taking place. Indeed, the relationship between invention, innovation and entrepreneurship has involved much discussion. Innovation is defined by Kanter (1983) as involving ‘creative use as well as original invention’ and simply it is defined by Mellor (2005) as ‘creativity plus application’ or ‘invention plus application’. According to Porter (1990) ‘invention and entrepreneurship are at the heart of national advantage’ and Burns (2007) reports that ‘invention is the extreme and riskiest form of innovation’. In particular, Bolton and Thompson (2000) highlight creativity in the invention and innovation process and Burns (2007) posits that ‘invention can be successfully exploited in the entrepreneurial environment’.

The inter-relationship between invention, innovation and entrepreneurship is both of theoretical and practical significance. It may involve inventors and entrepreneurs in all aspects of the process of product, process or service development but also it can involve them separately. The latter case is exemplified historically by Adam Smith (1776) who observed that ‘all the improvements in machinery, however, have by no means been the inventions of those who had occasion to use the machines’. He also considered the way in which the division of labour promoted specialised inventions. This is articulated by Marx (1858) who notes ‘invention then becomes a branch of business, and the application of science to immediate production aims at determining the inventions at the same time as it solicits them’. Freeman and Soete (1997, p.15) develop this theme of invention as ‘an essential condition of economic progress and a critical element in the competitive struggle of enterprises and of nation-states’. And that it ‘is of importance not only for increasing the wealth of nations in the narrow sense of increased prosperity, but also in the more fundamental sense of enabling men (and women) to do things which have never been done before at all. It enables the whole quality of life to be changed for better or for worse. It can mean not merely more of the same goods but a pattern of goods and services which has not previously existed, except in the imagination’.

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