INNOVATION IN SMALL CONSTRUCTION FIRMS: IS IT JUST A FRAME OF MIND?

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Findings will be provided on an eighteen-month research project involving in-depth case study and action research fieldwork with seven small construction companies to understand the role and significance of innovation for them.

A key finding of the work has been the organizational and market pressures for senior managers to focus principally on operational, short-term innovation, to the detriment of more long-term, strategic innovation. The potentially adverse implications of this 'innovation myopia' are discussed, and the need for senior managers in small construction firms to think more strategically and holistically is argued.

Keywords: innovation, owners, small construction firms

INTRODUCTION

The construction industry delivers its product to its client base by way of a stream of generally single and unique projects. These projects typically draw together a significant number of diverse small and large construction firms into varying collaborations (for example, see Betts and Wood-Harper, 1994). The ambition to bring about the kind of step change improvements in construction industry performance called for by the 'Egan' report (amongst others) must, by necessity, appropriately envision and engage large *and* small construction firms. Further, the scale of small firm activity in the UK construction industry is considerable, with, in 1999, ninety-nine percent of UK construction firms having one to fifty-nine staff (DETR, 2000: Table 3.1), delivering some fifty-two percent of the industry's workload in monetary terms (DETR, 2000: Table 3.3.) Therefore, any overall performance improvement of the industry through innovation is significantly influenced by the innovation performance of small construction firms.

The aspiration to enhance construction performance through innovation has been traditionally checked by the industry assumption that the intrinsic characteristics of construction and the construction industry - such as industry sector fragmentation, 'boom-and-bust' market cycles, use of relatively low technology and antagonistic procurement policies - inhibits innovation (for example, see Gann, 2000; CERF, 1998). Although it is acknowledged that construction firms have always demonstrated an ability to innovate (for example, see Slaughter, 1998), construction practitioners are now very much getting to grips with the need for, and management of, innovation as an *explicit* endeavour. Practitioners are in the process of asking fundamental questions such as: what is the motivation to innovate? what is appropriate

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innovation, how can individual firm and supply chain innovation be integrated? and how can innovation be successfully implemented? (CIC/DOE, 1996).

The innovation research field, in the construction firm context, is thus still very much in its embryonic stage. Innovation theory and practice are being drawn from established bodies of innovation knowledge predominately based on other industries (for example, see Barrett and Sexton, 1999), but they have not been sufficiently envisioned, embedded and evaluated in a construction context to form a robust body of construction innovation knowledge and practice in its own right. We agree with the observation that "there still remains a great deal to be investigated and learned about organizational innovations within a construction environment. This is more so within the management domain of innovation where there is still a meagre amount of empirical studies that have given attention to the innovations in construction enterprises." (Egbu *et al.*, 1998: 605). Similarly, it is argued, "[construction] project-based, service-enhanced forms of enterprise are inadequately addressed in the innovation literature" (Gann and Salter, 2000: 955). These observations are extended further by commenting that to our knowledge the construction innovation literature often emphasizes construction firms of large size, and that innovation in small firms has been neglected. We neglect small construction firms at our peril, as considerable evidence from the general innovation literature indicates that there is a significance difference in the innovation capability and output of small firms compared to large firms with it being argued, for example, that small firms are organic in nature making them more agile and responsive, while large firms tend to be more mechanistic (for example, see Nooteboom, 1994; Rothwell and Dodgson, 1994). This difference must be understood, and underpin policy and corporate guidance. Drawing upon similar concerns in the design of technology transfer mechanisms for small and medium sized construction firms (SMEs, it has been stressed that there is a "need to appreciate that construction SMEs and large construction companies *are* different animals, that live in different business market habitats, that must behave in different ways in order to adapt and succeed, and which need different sources and types of knowledge and technology to remain nourished and healthy" (Sexton, *et al.*, 1999: 21).

This gap in our understanding identifies an urgent need for research into innovation in small construction firms. It is this need that provided the motivation for the eighteen-month EPSRC IMI 'Innovation in Small Construction Firms' (ISCF) project. The focus of this paper is to investigate the role of the owner(s) of small construction firms in innovation activity. Full results of the ISCF project, however, are located at http:www.scpm.salford.ac.uk/pbarrett.

KEY ISSUES FROM THE LITERATURE

Organizational capabilities for innovation are defined as "… the comprehensive set of characteristics of an organization that facilitate and support innovation strategies" (Burgelman *et al.*, 1996: 8). In the general innovation literature, a plethora of capabilities (such as culture, organizational structures, processes, and leadership) have been offered as being necessary for successful innovation activity (for example, see Tushman and Moore, 1988). For our purposes we shall categorize capabilities into two distinct, but complementary bundles: cognitive (or thought) capabilities, and the broader group of organizational (or action) capabilities. Cognitive capabilities focus on the ability of individuals to innovate or be receptive to innovation; indeed, the foundation of innovation is ideas, and it is people who "… develop, carry, react to, and modify ideas" (Van de Ven, 1986: 592). Prerequisites to this flow of ideas is that there must be an initial cognitive trigger or felt need to innovate and the necessary power to progress these ideas. Taking the cognitive trigger first, there are two ideas from the literature are potentially useful. First, individuals need to possess both the ability to organize and manage steady state activities for efficiency and reliability whilst still retaining a capability to identify key situations where innovation is demanded in order to ensure effectiveness and responsiveness. In short, individuals need to be adept at "switching cognitive gears", as illustrated in Figure 1 (Louis and Sutton, 1991).

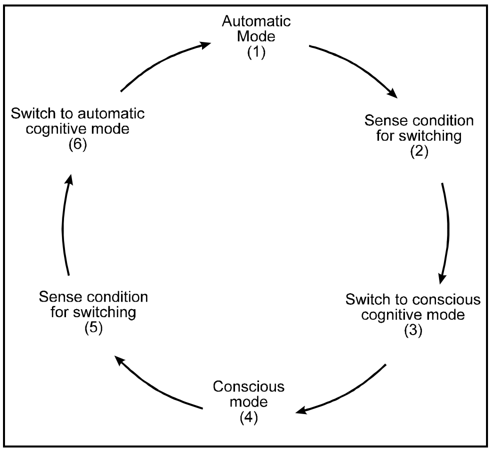

Figure 1: Switching cognitive gears

In this diagram "automatic mode" equates to steady-state activities and "conscious mode" to active problem-solving and innovation. It is stressed that the real problem is knowing *when* to switch from one to the other. This challenge is the focus for the second complementary idea from the literature: that one of the central problems in the management of innovation is the management of attention (Van de Ven, 1986). It was noted that management of attention is difficult because individuals gradually adapt to the environment such that their awareness of need deteriorates and their action thresholds reach a level where only crisis can stimulate action. The challenge for organizations is getting people to pay attention to the creation of new ideas instead of the protection of existing practices. This argument complemented by an appreciation that there must be an ‘openness to innovation’ which is determined by whether staff are willing to consider the adoption of or are resistant to an innovation (Zaltman *et al.* 1973).

Second, the issue of ‘openness’ feeds into the assertion in the literature that the creation of ideas is not sufficient for innovation; amongst over issues, the idea must have adequate political and change management support. The development of a specific innovation in companies requires an innovation champion who envisions and motivates others to either positively buy into the idea, or at least allow it safe passage (for example, see Howell and Higgins, 1990). In addition, such innovation champions often need the benefit of a sponsor; a senior manager who symbolically nurtures and protects the innovation from political forces within the organization who are hostile to the innovation (for example, see Maidique, 1980). The securing of a sponsor is argued to be significantly influenced by the ability of senior management to recognized the potential of a proposed innovation. This ability is argued to be a function of its managerial logic or view of the world, which in turn, depends on management experiences, organizational logic and industry logic (for example, see Finkelstein and Hambrick, 1990; Spender, 1989). Within small companies, this management logic is very much driven by the owner and/or senior management of the company. Storey (1986) asserts that one of the principal reasons why ‘a small or medium sized firm is not a large firm of small size’ is that their ownership and management are intertwined in such a way that the characteristics of this type of company are closely related to those of its owner(s). Evidence has been presented, for example, that many owners of small companies have a logic that is geared towards independence and autonomy rather than profits or growth (for example, see Bolton, 1971; Gray, 1998). It is thus argued that the personality of these people has a significant influence on the innovative performance of small companies (Miller and Toulouse, 1986), through the undertaking of tasks such as technological assessment, building and maintenance of external links, internal communication of strategic objectives and human resource development (Rothwell, 1991; Dodgson and Rothwell, 1991).

In summary, the literature stresses the pivotal role of the owner(s) of small construction firms in identifying and sifting innovation opportunities/needs, and implementing chosen innovation initiatives. The ISCF project provided insights in the nature and scale of the owner(s) influence on innovation activity in small construction firms. Before presenting these results, the research methodology employed in the ISCF project will be briefly detailed in the next section.

RESEARCH METHODOLOGY

This paper is based on results from an eighteen-month project looking at innovation in small construction firms (ISCF). The overall research process used in the ISCF project is given in Figure 2 (see http:www.scpm.salford.ac.uk/pbarrett for fuller discussion).

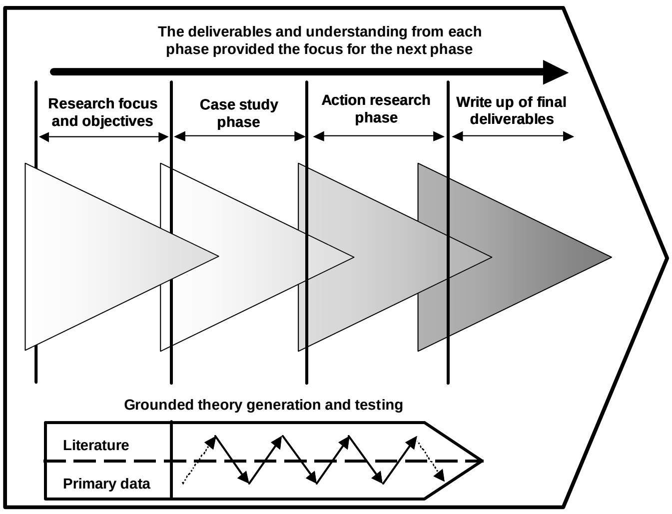

Figure 2: ISCF Research methodology

The seven collaborating small firms consisted of four consultants and three contractors. Firm size varied from eleven to twenty-six staff, and the turnovers (in 1999) ranged from £0.44m to £3.2m.

KEY ISCF PROJECT RESULTS

The ISCF findings defined *appropriate innovation* as:

> *the effective generation and implementation of a new idea, which enhances overall organizational performance*

This definition contains the following assumptions:

Idea – ideas are taken to mean the starting point for innovation. Ideas can be administrative and technical in nature.

New - not all ideas are recognized as innovations and it is accepted that newness is a key distinguishing feature. The idea only has to be new to a given firm, rather than new to the 'world'. Further, the newness aspect differentiates innovation from change. All innovation implies change, but not all change involves innovation.

Effective generation and implementation – innovation requires not only the generation of an idea (or transfer of a 'new' idea from outside the company), but also its successful implementation. The implementation aspect differentiates innovation from invention.

Overall organizational performance – innovation must improve organizational performance, either individually, or collectively through the supply chain. Innovations that improve some isolated aspect at the expense of overall performance are undesirable.

The key implication of the ISCF definition of innovation is that not all innovation *per se* is beneficial, which is the message often communicated by relevant stakeholders; rather, *appropriate* innovation is beneficial.

Small construction firms need both the organizational capability and an appropriate response to the interaction environment to bring about such appropriate innovation. The ISCF findings produced a model of the organizational factors critical to successful innovation (see Figure 3) which proved to be useful in both understanding and managing innovation activity i.e. it is both an analytical and prescriptive model. The variables which make up the model are defined as follows:

Business strategy is concerned with the overall purpose and longer term direction of the firm and its financial viability.

Market positioning is the chosen (or emergent) orientation towards desired target markets for the purpose of achieving sustainable profitability.

Technology is the machines, tools and work routines used to transform material and information inputs (for example, labour, raw materials, components, capital) into outputs (for example, products and services).

People are viewed as possessing knowledge, skills and motivation to perform a variety of tasks required to do the work of the firm.

Organization of work involves the creation and co-ordination of project teams and commercial networks both within the firm and across its business partners.

Interaction environment is that part of the business environment which firms can interact with and influence.

Given environment is that part of the business environment which firms are influenced by, but which they cannot influence themselves.

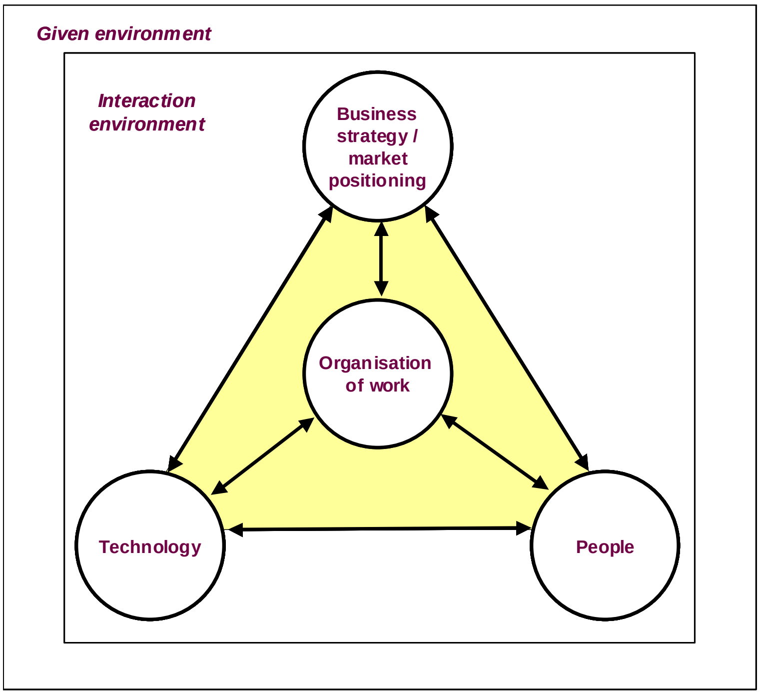

Figure 3: Organizational factors of innovation model

The model proposes that business strategy / market positioning, organization of work, technology, and people are the key organizational variables in understanding and improving innovation in small construction firms. The model emphasizes and embraces both the holistic and systemic dimensions of innovation. The creation, management and exploitation of innovation involves consideration of not only the *content* of a chosen innovation, but also the management of the *process* of innovation and the *context* in which it occurs. The model considers two aspects of context: the inner and outer contexts of the firm. The inner context refers to the business strategy / market positioning, organization of work, technology and people. The outer context refers to the given and interaction business environments. The process of innovation refers to the actions, reactions and interactions of, and between, the various organizational variables in the outer and inner contexts.

The key variable in better understanding the role of owner(s) in innovation activity in small construction firms is the ‘business strategy’ variable. The ISCF project findings indicate that small construction firms have business strategies which are 'soft focus' in nature. The term 'soft focus' denotes a business strategy which maps out a broad strategic aspiration, but that aspiration is not fleshed out in too great a detail in terms of what the firm wants to achieve, how it wants to achieve it, and when it wants to achieve it by. The 'soft focus' provides both a cue and a vehicle for strategic decision-making and action; rather than a rigid goal and model. Contractor B, for example, articulates its business strategy in the following way:

> *"[we] want to grow turnover, and also not to be in a position where so and so who knew us from x, y or z drops an enquiry through the door and we take that, or we've got one bid going in and we've got to make sure it's a good one; we want to be in a position to pursue say this avenue or that avenue."*

Business strategy is depicted by other firms in a more fluid, moment-by-moment fashion:

> *"Every so often, perhaps quarterly, the Associates and us, perhaps just go out for a pizza somewhere. We then say, 'Right, where are we going? What do we need to do? Any thoughts?'"* (Consultant B)

However, the nature and volatility of their workload tended to create reactive responses. This position is captured by Consultant B, who argue that despite the strategic rhetoric espoused in 'pizza' meetings, the reality is that:

> *"our strategy is very much driven from the outside by clients. If they want something done quicker or in particular formats, we have to adapt. They're still driving the way the industry moves, as much as we try to guide things in a certain direction. I don't think we change the behaviour of the client from a strategic point of view Technically we might say that we've got this form of contract, or we recommend this contractor, but I think from the point of view of the client wanting a new building or upgrading an existing building, I don't think we have an awful lot of influence. That decision's usually been made by the time it gets to us. ... we tend to be more reactive than proactive. It is difficult for a practice our size to be proactive."*

The tension between the aspiration of long term business planning and the volatility of workload is stressed by contractors also, with Contractor A stating that they do not look beyond the length of its longest contract at any given time (at most twelve months) because:

> *"... in our industry you can't, because you don't know what is going to happen. You get long established companies ... going out of business."*

The apparently contradictory, 'reactive' nature of strategic thinking resonates with the observation by Bracker and Pearson (1986) that small firms tend to focus on adaptation issues, while larger firms concentrate on integration issues. This reactive, adaptation orientation is considered to have a positive aspect by the small firms when compared to large construction firms:

> *"Responses within an organization like ours tend to be much quicker than those in larger firms. It isn't a long-winded process, where policies are formalized, and written down, and information is disseminated by memos and letters and emails. People just meet on corners, saying, 'We're going to do this tomorrow.' If someone has an idea, they walk into another partners of the office and say, 'What about this', and they say 'Yes, go away and do it. Ring him up, get on with it.' In a small firm we can pick something up and run with it very quickly."* (Consultant C)

This perception endorses the literature which argues that small firms are often more agile and responsive than larger firms (for example, see Nooteboom, 1994; Rothwell and Dodgson, 1994).

In addition, the ISCF project findings show that this reactive stance is exacerbated by the lack of managerial time and expertise which tends to create tactical responses to day-to-day opportunities and obstacles. Contractor C comments, for example, that although it is able to ‘nail issues’ quickly, they exhibit weakness in addressing longer-term issues as resources are committed to work-in-progress; and their:

> *“managers, like many in construction firms, have neither the experience nor training to manage long-term investments.”*

Closely linked with the effect of managerial perception of business strategy is the substantial role that the owners have in influencing the business strategy of their firms. The owner of Contractor A, for example, comments on the power of his position in the observation that:

> *“They probably know that we are going to do it ... when you have 19,999 shares out of 20,000 you don’t have resistance. That is the reason you have all the shares ...It’s just like anything else, it’s mine.”*

This finding is consistent with the literature which argues that the managerial logic or ‘view of the world’ exhibited by the principals of small firms have a considerable impact on envisioning and guiding strategy (for example, see Storey, 1986; Dodgson and Rothwell, 1991).

The financial viability constraints affecting the capacity and capability of small construction firms is epitomized by Consultant B who stresses that:

> *“small firms have a tight budget, so they don’t have the people around to tackle a specific problem ... the cost of innovation is the short-term human involvement, and then having committed the capital to physically spend, you need some human time to make it work. The three go together. The big one though is the cash one.”*

Together, the instrumental role of managerial time and expertise, and financial resources in this orientation is consistent with Welsh and White (1981) who noted that the scarcity of resources, in addition to the knowledge, experience, perceptions and amount of time available to the principals united to produce a strategy formulation process which was distinctly different from that of larger companies.

In summary, the ISCF project findings on 'business strategy' have two key implications for innovation in small construction firms. First, small construction firms are more exposed to the whims and movements of their business environments than large firms and, in necessary response, their business strategies tend to be more 'soft focus' and reactive in nature. Second, the dominant role of the owner(s) of small firms allows quick decision-making and innovation activity to take place in response to rapidly shifting market conditions and client demands; in effect, to create an agile firm. The very political strength that stimulates agility can, however, bring about an adversely myopic view of the 'best way' for the firm to operate.

CONCLUSION

The owner(s) of small construction firms have the necessary power to ensure quick decision-making and innovation activity to take place in response to rapidly shifting market and project conditions and client demands; in effect, creating an agile firm. These triggers for innovation are predominantly filtered and prioritized by the owner(s) of the firm. The dominant role of the owner, however, can bring about ‘innovation myopia’ and constrain innovation activity if the owner does not have the necessary *vision* and *systemic thinking* when diagnosing and progressing innovation activity. Innovation in one part of the business often has significant implications for other parts of the business which need to be considered and brought together in an integrated way.

The organizational model of innovation assists owner(s) in identifying the factors critical to successful innovation: ‘business strategy / market positioning’, ‘organization of work’, ‘technology’ and ‘people.’ The model provides a framework or checklist to help owner(s) identify what action has to be taken to progress an innovation in a systemic, integrated way; in other words, to give the owner(s) the appropriate ‘frame of mind’ to successfully innovate.

REFERENCES

Barrett, P. and Sexton, M.G., (1999)The Transmission of ‘Out-of-industry’ Knowledge into Construction Industry Wisdom. *Linking Construction Research and Innovation in Other Sectors*, Construction Research and Innovation Strategy Panel, London, 24th June.

Barrett, P. and Sexton, M.G., (1998*) Integrating to Innovate: Report for the Construction Industry Council.* DETR / Construction Industry Council: London.

Betts, M. and Wood-Harper, T., (1994) Reengineering Construction: A New Management Research Agenda. *Construction Management and Economics*, **12**: 551-556.

Bolton, J., (1971) *Small Firms – Report of the Committee of Inquiry on Small Firms,* HMSO: London.

Bracker, J.S. and Pearson, J.N., (1986) Planning and Financial Performance of Small Mature Firms. *Strategic Management Journal*, **7**: 503 – 522.

Burgelman, R., Maidique, M. and Wheelwright, S., (1996*) Strategic Management of Technology and Innovation,* Irwin: Homewood.

CERF, (2000) Guidelines for Moving Innovations into Practice. *Working Draft Guidelines for the CERF International Symposium and Innovative Technology*

Construction Industry Council and Department of Environment, (1996) Conference entitled *'A New Way of Working: The Future of Construction'*, London: 15th - 16th January.

Department of the Environment, Transport and the Regions, (2000*) Construction Statistics Annual: 2000 Edition*, DETR: London.

Dodgson, M. and Rothwell, R., (1991) Technology Strategies in Small Firms. *Journal of General Management*, **17** (1), 45 – 55.

Egbu, C.O., Henry, J., Kaye, G.R., Quintas, P., Schumacher, T.R. and Young, B.A., (1998) Managing Organizational Innovations in Construction. *Proceedings of the Association of Researchers in Construction Management Fourteenth Annual Conference*, University of Reading: September 9th – 11th.

Finkelstein, S. and Hambrick, D.C., (1990) Top-management Tenure and Organizational Outcomes: The Moderating Role of Management Discretion. *Administrative Science Quarterly*, **35**: 484 - 503.

Gann, D.M., (2000) *Building Innovation: Complex Constructs in a Changing World*, Thomas Telford: London, UK.

Gann, D.M. and Salter, A.J., (2000) Innovation in Project-based, Service-enhanced Firms: The Construction of Complex Products and Systems. *Research Policy*, **29**(7/8), 955-972.

Gray, C., (1998) *Enterprise and Culture*, Routledge: London.

Howell. J.M. and Higgins, C.A., (1990) Champions of Technological Innovation. *Administrative Science Quarterly*, **35**: 317-341.

Louis, M.R. and Sutton, R.I., (1991) Switching Cognitive Gears: From Habits of Mind to Active Thinking. *Human Relations*, **44**: 55-76

Maidique (1980) Entrepreneurs, Champions, and Technological Innovation. *Sloan Management Review*, (Winter), 59-76.

Miller, D. and Toulouse, J.M., (1986) Chief Executive Personality and Corporate Strategy and Structure in Small Firms. *Management Science*, **32**(11), 1389 – 1409.

Nooteboom, B., (1994) Innovation and Diffusion in Small Firms: theory and Evidence. *Small Business Economics*, **6**, 327-347.

Rothwell, R., (1991) External Networking and Innovation in Small and Medium Size Manufacturing Firms in Europe. *Technovation*, **11**(2), 93 – 112.

Rothwell, R. and Dodgson, M., (1994) Innovation and Firm Size. In M. Dodgson and R. Rothwell, (Eds.), *The Handbook of Industrial Innovation*, Edward Elgar: Aldershot Hants.

Rothwell, R. and Dodgson, M., (1993) SMEs: Their Role in Industrial and Economic Change. *International Journal of Technology Management*, Special issue: 8-22.

Sexton, M.G., Barrett, P. and Aouad, G., (1999) *Diffusion Mechanisms for Construction Research and Innovation into Small to Medium Sized Construction Firms*, CRISP – 99/7: London.

Slaughter, S.E., (1998) Models of Construction Innovation. *Journal of Construction Engineering and Management*, **124**(3), 226 – 231.

Spender, J.C., (1989) *Industry Recipes: An Inquiry into the Nature and Sources of Management Judgement*, Basil Blackwood: Cambridge, MA.

Stanworth, J. and Gray, C., (Eds.) *Bolton 20 Years On*, Paul Chapman: London.

Storey, D.J., (1986) The Economics of Small Businesses: Some implications for Regional Economic Development. In A. Amin and R. Goddard (eds.), *Technological Change, Industrial Restructuring and Regional Development,* London.

Tushman, M.L. and Anderson, P., (1986) Technological Discontinuities and Organizational Environments. *Administrative Science Quarterly*, **31**: 439 - 465.

Van de Ven, A., (1986) Central Problems in the Management of Innovation. *Management Science*, **32**: 590-607.

Welsh, J.A. and White, J.F., (1981) A Small Business is Not a Little Big Business. *Harvard Business Review*, (July/August), 18-32.

Zaltman, J., Duncan, R. and Holbek, J., (1973) *Innovations and Organizations*, Wiley: New York.