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Fast tracking innovation in manufacturing SMEs

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Abstract

Many SMEs have difficulties achieving successful innovation, despite having significant investment in research and development. This paper explores the innovation process within the context of strategy, organizational culture and leadership styles in an effort to fast-track effective innovation in SMEs. The domain of the study is the electronics and engineering sectors.

The analysis confirms the close association between strategy, organizational culture, leadership and innovation. It also depicts the attributes of each concept associated with innovation. The analysis also confirms that high performing firms place a much higher emphasis on strategy attributes and have stronger and more defined leadership and culture styles compared with low performing firms. The paper provides systematic steps to enable managers to effectively manage and deploy innovation. It is unique in that it fills the 'how to …' gap for SMEs.

Keywords: Innovation; Strategy; Culture; Leadership; SMEs

1. Introduction

The business environment is becoming increasingly dynamic, complex and unpredictable environment (Coopers and Lybrand, 1997), where technology, globalisation, knowledge and changing competitive approaches impact on overall performance (Hitt et al., 2001; Scott, 2000). Stopford (2001) suggests that this change is the reason why many firms are seeking new ways of conducting business to create wealth. Arguably, change need not be detrimental—it can also bring opportunities that firms should seek to exploit (Shane and Venkatraman, 2000).

Barnett and Hansen (1996) suggest that it is the rate of innovation a firm has, compared with its rivals, that matters. Arguably, it is also the effectiveness of that innovation that is crucial to its success. Nevertheless, there is little doubt that innovation is needed to combat the shortening of product life cycles, and to take advantage of new opportunities (Barkema et al., 2002; Pisano and Wheelwright, 1995).

However, achieving effective innovation is a complex and formidable task. Many SMEs have some difficulties converting research and development into effective innovation. Many of these difficulties are organization specific. For example, Christensen (1997) suggests that 'there is something about the way that decisions get made in successful organizations that sows the seeds of eventual failure'. Ahuja and Katila (2001) look at this contention from a more positive viewpoint and state that 'a long tradition of research in technology suggest that new innovative outputs are often the result of combining existing elements of knowledge into new syntheses'. This suggests that organizational behaviour is an important driver of innovation. Accordingly, to enable firms to innovate effectively, the authors contend that it is now appropriate to consider the impact of the main drivers of effective innovation: strategy, leadership and culture.

2. Aims of the research

The ability of SMEs to meet growing consumer expectations is largely based on their capability to innovate and deliver new products at competitive prices. Innovation is a key driver of sustainable competitive advantage and one of the key challenges for SMEs. The literature suggests that ignoring innovative and creative changes can only lead to failure in the medium to long term. Barkema et al. (2002) state that:

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'globalisation is reshaping the competitive landscape. It is sparking new technologies, markets, industries and criteria for competitive success and survival. It is speeding up industry life cycles by accelerating the pace and rhythm at which firms must develop new technologies and produce and roll out new products and services on a global scale to stay competitive'.

The failure of many SMEs to successfully convert research and development into innovation indicates that there are many hurdles to be overcome in the innovation process. For example, Kim and Mauborgne (2000) suggest that such hurdles 'make or break the commercial viability of even the most powerful innovative ideas'. What can SME managers do about these hurdles, and what determines the level and effectiveness of the innovation strategies adopted?

Despite the obvious importance of SMEs (SGS, 2002), there is a paucity of research and consequently a lack of understanding on SME needs and requirements. To date, most SME research focuses on factors that contribute to their survival such as financing, rather than a greater understanding of the growth process and the achievement of sustainable competitive advantage (Storey, 1994). In this paper, we adopt an organizational stance and contend that there are three main dimensions of the organizational environment that enable innovation: strategic management, culture and leadership. An understanding of these dimensions is critical in order to explain the deployment of innovation strategies. Most of the studies to date have focused on examining the bilateral relationship between two of these variables in a single study rather than examining the relationship between the four variables simultaneously. The integrated approach has a number of advantages. First, it is possible to test the model presented in Fig. 1 more vigorously by eliminating the contingency influences inherently present in different bilateral studies. Second, the bilateral studies can at the very best provide a partial view of the relationship between these variables and any broader conclusion is necessarily based on conjecture. Thus, one of the aims of the research presented in this paper is to test the veracity of the model presented in Fig. 1.

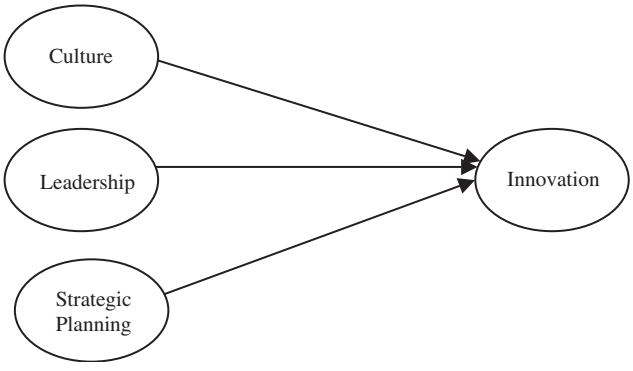

Fig. 1. A framework approach—drivers of innovation.

This study focuses on SMEs—an area that is under researched to-date.

3. A framework approach

The resource-based view of strategy suggests that strategic management emphasises the configuration and reconfiguration of resources in order to ensure a 'fit' between the external and internal environments (Teece et al., 1997). Arguably, such configuration leads to the more effective deployment of the innovation process by focusing on the organizational leadership and culture. Frost (2001) states that 'the locus of technological innovation resides not only within the boundaries of the innovating organization, but also outside it'. Accordingly, strategy was also included to provide a greater external orientation. Existing research on innovation has focused on the cost and risks involved (Drazin and Schoonhoven, 1996). This study provides an additional focus by examining the factors that drive the deployment of innovation. We adopted a framework approach based on three major influences: the firm's strategic plan, its ability to lead the process and its ability to nurture the innovation process. The following sections provide a brief outline of the organizational factors driving innovation.

4. Strategy

SMEs are increasingly turning to strategy in an effort to attain competitive advantage (Larsen et al., 1998). A number of research studies indicate that small firms using strategy performed better than non-strategy firms (Kargar and Parnell, 1996; Naffziger and Mueller, 1999). Others found that 'strategic' small firms were likely to have significant capability to grow, expand, innovate and introduce new products to the market place (Joyce et al., 1996), and achieve greater profitability (Roper, 1997). Strategy is also considered to be one of the most effective ways for firms, regardless of size or sector, to cope with the changes in the business environment (Hart and Banbury, 1994).

However, the literature indicates that many SMEs are 'naïve about planning and the development of strategy' (Deakins and Freel, 1998). While there are arguably many reasons for this, it is suggested that SMEs tend to have intuitively derived strategies that reside mainly in the mind of the Managing Director or Chief Executive (Miller and Toulouse, 1986).

Researchers have adopted a number of independent characteristics to delineate strategic processes (Ramanujam et al., 1986; Ramanujam and Venkatraman, 1987; Veliyath and Shortell, 1993; Kargar and Parnell, 1996). Each of the characteristics is supported by the literature. Following those researchers, we adopted the following characteristics to describe the strategic process: external orientation, internal orientation, departmental co-operation, the use of

analytical techniques, resources for strategy, staff creativity and strategy as control mechanism.

5. Leadership

Leadership is a topical issue at most gatherings of Managing Directors. Yet it remains an elusive concept as managers constantly seek to access the latest thinking in a bid to achieve greater value and competitive advantage (Moxley, 2000). Dess and Lumpkin (2003) define leadership as 'the process of transforming organizations from what they are to what the leader would have them become'. Accordingly, leadership implies a significant degree of innovation. Increasing innovation, global competition and variable customer needs as well as more effective and efficient resource utilisation imply that 'new kinds of management abilities' are needed (Arvonen and Pettersson, 2002).

The impact of leadership on organizational effectiveness is well documented in the literature. For example, Miller and Shamsie (2001) referred to the growing body of literature identifying the significant impact that leader's characteristics can have on both strategic direction and overall organizational performance. In particular, there 'is little disagreement that the most powerful executive position is that of CEO' Daily et al. (2002; p. 391). This is particularly true in the case of small firms where the CEO tends to 'occupy a position of unique influence, serving as the locus of control and decision-making'. Arguably the role of the Chief Executive in the smaller firm is more significant as he/she is the controlling influence with regard to decisions and strategy.

A number of studies found a relationship between leadership and performance (Bass, 1990; Wilderom and v. d. Berg, 1997; Lim, 1997). The latter two studies found that a mixture of transformational and human resources orientation types yield enhanced performance. Wilderom and v. d. Berg (1997) in an empirical study of small firms derived, tested and validated four main leadership styles: transformational, transaction, human resources and laissez faire styles. Accordingly, these constructs were used in this study.

6. Organizational culture

Culture is not a new phenomenon in SMEs and is well established within the literature base. Most managers will be aware of the enterprise culture that has become well established in the UK over the past two decades (Curran and Blackburn, 2000). Similarly, there is a growing emphasis on culture at the organizational level as a means of developing sustainable competitive advantage, on the basis that 'much of … what matters in organizational life takes place at the cultural level' and that 'cultural phenomena are pervasive throughout organizational life' (Louis, 1981).

Culture is often seen as the conduit through which management can influence this process (Harris and Ogbonna, 1999). In addition, culture is considered as a major obstacle in the implementation of new ideas, processes and systems (Morgan, 1989). Lounsbury and Glynn (2001) define culture as an interpretative framework through which individuals make sense of their own behaviour, as well as collectivists in their society.

Yet, empirical research on the impact of culture on innovation is thin on the ground (Ashkanasy et al., 2000). Indeed, Cooke and Szumal (2000) suggest that the determination of new initiatives by leaders based on control rather than empowerment results in a 'cultural bypass' and has an adverse impact on the motivation and loyalty of employees.

The available literature focuses on larger firms and suggests that corporate strategy is influenced by organizational culture (Barney, 1986). In fact, the literature goes so far as to say that strategy and culture are inseparable (Andrews, 1994), and that firms can retain and enhance their competitiveness by incorporating a sharing culture into the overall strategic direction of the firm (Morgan, 1997). However, the literature stresses that the use of culture in a strategic and structured manner in SMEs is limited (Chaston et al., 1999).

Recent studies contend that the characteristics and limitations of some forms of quantitative research preclude the exploration of certain aspects of organizational culture such as language and symbols (Harris and Ogbonna, 1999). Accordingly, this study focuses on culture styles only. Culture was operationalised based on dimensions tested and validated by Wilderom and v. d. Berg (1997) on small firms. The culture styles used in this study are external orientation, internal orientation, empowerment, inter-group orientation and human resources.

7. Innovation

Rogers (1995; p. 11) defines innovation as 'any idea practice or object that is perceived to be new by an individual or other unit of adoption'. Innovation involves the adoption of new products and/or processes to increase competitiveness and overall profitability. It involves new ways of identifying the needs of new and existing clients. Innovation is one of the principal challenges to the management of SMEs.

Hitt et al. (2001; p. 484) state that innovation is critical to enable SMEs to compete in domestic and global markets. The importance of innovation for SMEs and start-up firms is encapsulated by Lee et al. (2001) when they state that:

> 'head-to-head competition with established players is bound to result in failure due to resource shortcomings, scale diseconomies, and questionable reputation'.
>
> They state that innovation is the key to competition as 'competitors cannot easily mimic innnovativeness…

since it depends on quality and quantity of R&D personnel and the complex social relationships'.

Innovation is increasingly seen as a contributory factor to higher performance in a growing number of industries (Zahra et al., 1999) and in particular, strengthening the firm's competitive advantage (Mone et al., 1998). Kanter (1999) states that 'Winning in business today demands innovation. Companies that innovate reap all the benefits of a first mover'. Yet the literature indicates that many firms still believe that their existing ways and processes are sufficient for the next decade: 'a pattern emphasised…is the degree to which powerful competitors not only resist innovative threats, but actually resist all efforts to understand them, preferring to further entrench their positions in the older products (Utterback, 1994)'.

SMEs are renowned for their creativity and new product development. This applies in particular to SMEs that have the ability to innovate effectively and develop new products more rapidly than larger firms (Vossen, 1998; Storey, 1994). Indeed, Harrison and Watson (1998) contend that there is little doubt that SMEs are capable of effective innovation. However, many SMEs still fail to see the opportunities and advantages that are open to them, such as the flexibility of customising products to the requirements of the consumer, an advantage adopted by larger firms. Their failure to take such opportunities is paraphrased in Peters (1997; p. 91) as 'you miss 100% of the shots you do not take'. Clearly, the capability to innovate quickly is a key factor in the sustainable competitive advantage of any firm.

The importance of innovation as a driver of sustainable competitive advantage is well documented (Shoham and Fieganbaum, 2002). Existing studies on innovation relate to creativity (Amabile et al., 1996), resource availability (Dougherty and Hardy, 1996), managerial control and strategic focus (mergers, acquisitions, divestitures, downsizing, and cost reduction (Hitt et al., 1996). Previous research shows that innovation impacts on performance (Roberts, 1999), and firm survival (Banbury and Mitchell, 1995).

However, despite the numerous articles and theoretical discussions, there is no conclusive theoretical perspective on innovation (Drazin and Schoonhoven, 1996). In a review of previous research on innovation, Shoham and Fieganbaum (2002) suggest the need for additional theoretical integration to link organizational context with industry-level dynamics—an issue addressed by this study.

8. Methodology

To identify potential respondents for participation in the study, sample criteria were established. While no one directory provides an entirely suitable sampling frame, a random sample was available from a reputable commercial firm. As there are nearly 15,000 electronic/engineering small firms in the UK (DTI, 1996), a simple random sampling method was used.

Data were gathered by means of a self-reporting survey questionnaire, consisting of questions to ascertain the emphasis given to strategy, culture and leadership and the degree of perception of satisfaction with the results of the strategy process. Selecting a self-reporting respondent is a well-established approach in management research (Avolio et al., 1991). The questions in relation to strategy were largely based on a survey instrument devised and tested by Kargar and Parnell (1996). All questions used a five-point Likert type scale, with a response of one indicating that an item that received 'no emphasis' and five indicating that an item received 'strong emphasis'. The questions in relation to culture and leadership were largely based on a survey instrument devised and tested by Wilderom and v. d. Berg (1997).

The literature states that innovation performance can be measured according to the inputs (budgets allocated to R&D) or outputs (number of patents issued; Ahuja and Katila, 2001; Henderson and Cockburn, 1996). However, the exploratory interviews and discussions with Managing Directors of six organizations and employer federations suggested that, in general, it was not possible to obtain wide-ranging hard measures of innovation in SMEs. Therefore, we adopted the notion of measurement against purpose (Steiner, 1979). In practice, we assessed the degree of success in innovation arising from individual factors such as strategy, culture and leadership. A similar approach to assessing the level of satisfaction arising from specific factors and actions was adopted by other researchers (Luo and Park, 2001). Respondents were also asked to indicate, on a five-point scale ranging from 'highly dissatisfied' to 'highly satisfied', the extent to which they were satisfied with their firm's success in innovation. The constructs specifically referred to: manufacturing learning, the degree of technological change in products and processes, the product life cycle, investment in R&D, the capability to make rapid design changes and/or introduce new products. All these attributes loaded onto one factor during the data reduction stage as outlined in Table 1.

Table 1
Factor analysis—innovation measures

Kaiser–Meyer–Olkin measure of sampling adequacy = 0.66718
Bartlett test of sphericity = 258.8739, significance = 0.0000
Varimax converged in three iterations

Attributes	Factor 1
To what extent did your firm focus on:	
Product life cycle	0.66576
Investment in R&D	0.65255
Capability to make rapid design changes	0.63880
Technological change in processes	0.62755
Technological change in products	0.76645
Manufacturing learning	0.68964
Introduction of new products	0.67293

The variables designed to test the emphasis placed on the factors considered in the development of strategic plans and the resources devoted to the process, were largely based on the survey instrument devised and tested by Kargar (1996)[1]. The merits of including these factors and their comprehensiveness were initially tested with the help of the literature as discussed previously. They were further tested in detailed qualitative interviews held with six Managing Directors of small and medium-sized firms that met the sample frame specification. The dimensions were also tested at the pilot phase and modified where necessary. In summary, the external validity of the instrument was secured by:

(a) using where possible elements of relevant instruments tested in previous field work by other researchers;
(b) identifying significant support in the literature for the relevance of the concepts used and their attributes;
(c) using initial qualitative interviews with the managing directors of SMEs to test comprehensiveness and relevance of the instrument;
(d) piloting the questionnaire to test for clarity of questions, relevance, and completeness.

The internal validity was established by testing the questionnaire constructs for their ability to yield a significant factor structure. The instrument could be said to have a high degree of reliability when there is a significant association between responses to each of the attributes. In effect, it is 'an indicator of how well the different items measure the same issue' Litwin (1995; p. 21). Construct reliability was determined using Cronbach's Alpha and factor analysis. The alpha co-efficient 'represents the most widely used and most general form of internal consistency estimate' (Murphy and Davidshofer, 1994; p. 83). Nunnally (1978) states that a Cronbachs Alpha value of 0.7 is adequate for internal consistency. All the constructs had an alpha value in excess of 0.7. Factor analysis was used to reveal underlying common themes and also as a means of data reduction. Kline (1994; p. 6) suggests that 'factor loadings are high if they are greater than 0.6… and moderately high if they are above 0.3'. In this study, we adopted the more stringent criteria and retained factors with loadings of 0.6 and above. Correlation analysis was used to indicate the relationship between organizational culture, leadership, strategy and innovation.

We used managerial perceptions as the basis of the study, as they shape to a significant degree the strategic behaviour of the firm. This is consistent with Chattopadhyay et al. (1999), and Spanos and Lioukas (2001). Gioia and Chittipeddi (1991; p. 434) states

> 'the C.E.O. is portrayed as someone who has primary responsibility for setting strategic directions and plans for the organization, as well as responsibility for guiding actions that will realise those plans'.

In a review of the literature, Westphal and Frederickson (2001) found that top management has a significant impact on strategic direction and change. We chose to use Chief Executives as respondents in this study as they are seen as having a wide breadth of knowledge of all the organizations functions, activities and operating environment (Frost et al., 2002; Hillman and Keim, 2001). The literature suggests a strong relationship between high innovators and superior performance (Roberts, 1999; Subramaniam and Venkatraman, 1999). Accordingly, firms were classified into two groups: high and low performing firms. A comparison of the degree of emphasis given to the drivers of innovation by both groups was carried out.

9. Response

Factors such as change in address, size and sector incompatibility reduced the effective size of the sample to 702 SMEs. One hundred and ninety four valid responses were received—a response rate of 27%. This represents a highly satisfactory response (Hart, 1987). The degree of non-response was measured to eliminate any source of bias within the sample. All SMEs were contacted by telephone to ascertain the reasons for non-response. The most frequent reasons were:

- lack of time and resources to complete the survey
- company policy not to participate in surveys
- a reluctance to divulge information
- unable to contact the managing director or his/her deputy
- refusal to participate with no particular reason given

Taken together with the number of valid responses this suggests that response bias is not a serious problem and does not invalidate the results. The demographic of non-responding firms were compared with that of responding firms. No discernible differences were detected. This points to the absence of any serious response bias.

10. Data analysis

An overview of the strategic plans deployed by SMEs over the previous three years is depicted in Table 2.

Table 1 indicates that the most frequent strategy adopted relates to new product development. This is consistent with the views of Hamel (2000) who states that innovation is the most important component of a firm's strategy. Over one-fifth of firms introduced new products, which implies that the organizations in this sample have a reasonable degree of success in innovation and product development. The following sections will identify

[1] The authors acknowledge the kind assistance of Prof. Kargar in forwarding a copy of the constructs used and for permission to use the constructs as the basis of this study.

Table 2
Types of strategies deployed by manufacturing SMEs

Strategies deployed	Percentage of firms
Introduced a new product	20.8
Expanded operations	13.9
Discontinued a product range	1.0
Established networks/alliances	4.1
Increased market share in existing markets by increased promotion	7.2
Introduced new products in old market	9.8
Introduced new products in new market	7.7
Offered on an industry wide basis unique products or services	10.8
Diversification	5.7
Serving a particular larger group/firm, a segment of product line, or a geographic market more effectively or efficiently	19.0, $n=194$

the attributes of culture, leadership and strategy that impact on the effectiveness of innovation.

11. Culture and innovation

Correlation analysis was used to establish the relationship between the culture styles and the degree of emphasis placed on innovation. This was achieved by computing the aggregate score for each of the five culture styles. These scores were then used to generate a new set of variables by determining the lower and upper range of scores. We then placed each of the culture styles for each firm into the lower, two intermediate and upper quartiles of the scores. Descriptive statistics were used to examine the relationship between the relative strength of each culture style and the degree of emphasis placed on innovation (Table 3). Examining the relationship between two extremes of each culture styles that is to say, upper and lower quartile categories and the characteristic of the strategy process accomplished this task. Comparing the two extreme point of continuum is commonly used by management researchers in this type of situation Lee et al. (2001).

The analysis of Table 3 indicates that without exception and regardless of the culture style, organizations with styles classified to the upper quartile achieved higher levels of innovation compared with firms classified to the lower quartile. This suggests that the strength of the culture style positively influences the innovation process. Correlation analysis indicated that firms in the upper quartile of the empowerment culture style were significant at the 0.01 level (two-tailed). No other significant correlations were detected. These findings, depicted in Table 4 are consistent with the outcome of the previous research (Harris and Ogbonna, 1999).

12. Leadership and innovation

In a similar manner to Section 11, correlation analysis was used to establish the relationship between the leadership styles and the degree of emphasis placed on innovation. Descriptive statistics were used to examine the relationship between the relative strength of each leadership style and the degree of emphasis placed on innovation (Table 5).

The analysis shows those firms in the upper quartiles of both transformational and human resources leadership styles have greater success in achieving innovation compared with firms in the lower quartiles. This finding

Table 3
Percentage of firms indicating fulfilled/entirely fulfilled innovation objectives according to their emphasis on culture styles

	Culture styles									
	Empowerment		External orientation		Internal orientation		Intergroup		Human resource	
	Quartile		Quartile		Quartile		Quartile		Quartile	
	Strong	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
Innovation	72.9	54.3	58.8	57.5	73.3	50.0	76.7	55.6	65.3	50.1

Table 4
Factor correlation matrix—culture styles and innovation

	Empowerment	External orientation	Internal orientation	Departmental co-operation	Human resource	Innovation
Empowerment	1.00					
External orientation	0.553[a]	1.00				
Internal orientation	0.486[a]	0.715[b]	1.00			
Departmental co-operation	0.587[b]	0.655[b]	0.493[b]	1.00		
Human resource	0.577[b]	0.651[b]	0.589[b]	0.641[b]	1.00	
Innovation	0.601[b]	0.201	0.086	0.082	0.546[b]	1.00

[a] Correlation significant at the 0.05 level (two-tailed).
[b] Correlation significant at the 0.01 level (two-tailed).

Table 5
Percentage of firms indicating fulfilled/entirely fulfilled innovation objectives according to their emphasis on leadership styles

Leadership style	Transformational		Transactional		Human resource		Laissez faire	
Quartile	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
Innovation	63.7	61.5	47.7	37.4	71.4	65.6	13.3	7.9

Table 6
Factor correlation matrix—leadership and innovation

	Transformational	Transactional	Human resource	Laissez faire	Innovation
Transformational	1.00				
Transactional	0.223	1.00			
Human resource	0.569[a]	0.124	1.00		
Laissez faire	0.031	0.073	0.128	1.00	
Innovation	0.462[a]	0.194	0.385[a]	0.038	1.00

[a] Correlation significant at the 0.01 level (two-tailed).

was not unexpected, as both styles are normally associated with a longer-term outlook. This indicates that firms intending to change or revise their existing strategies and eliminate barriers to implementation should emphasise a mixture of both transformational and human resource leadership styles.

Correlation analysis indicated a positive correlation at the 0.01 level between transformational (upper quartile) and human resources (upper quartile). No correlation was detected between transactional or laissez faire leadership styles and innovation (see Table 6).

13. Strategy and innovation

In a similar manner to both culture and leadership in the previous sections, we used correlation analysis to establish the relationship between the characteristics of strategy and the degree of emphasis placed on innovation. Descriptive statistics were used to examine the relationship between the relative strength of each strategy characteristic and the degree of emphasis placed on innovation (Table 7).

The analysis of Table 7 indicates that without exception and regardless of the strategy characteristic emphasised, organizations with strategic styles classified to the upper quartile achieved higher levels of innovation compared with firms classified to the lower quartile. This suggests that the strength of the strategy culture style positively influences the innovation process. Correlation analysis indicated a positive correlation, significant at the 0.01 level (two-tailed) between staff creativity and innovation, and a significant correlation at the 0.05 level (two-tailed) between external orientation (lower quartile) see Table 8.

14. Testing the innovation framework

The previous sections outline that empowerment culture, transformational and human resources leadership, and the staff creativity characteristic of strategy are associated with successful innovation to a significant extent. The next stage is to ascertain the impact of these factors on performance. As a basis for testing the framework, we used the work of Roberts (1999), and Subramaniam and Venkatraman (1999), that found effective innovators achieve superior performance. Accordingly, firms were classified into two groupings: high and low performing firms. Firms with a perceived increased market share were classified as 'high performing' firms and firms with a perceived decreasing market share as 'low performing' firms. In addition, this classification was cross-checked with the achievement of the firm's initial goals and objectives as well as the financial results expected. The majority of firms classified as 'high performing' achieved goals and financial results whereas less than half of all firms classified as 'low performing' achieved their goals and financial results. A summary analysis is depicted in Table 9.

Table 7
Percentage of firms indicating fulfilled/entirely fulfilled innovation objectives according to their emphasis on strategy characteristics

	Strategy									
	External orientation		Internal orientation		Staff creativity		Strategy—a control mechanism		Departmental co-operation	
	Quartile		Quartile		Quartile		Quartile		Quartile	
	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
Innovation	64.9	44.3	51.8	32.5	74.2	49.0	32.7	25.6	43.3	36.1

Table 8
Factor correlation matrix—strategy characteristics and innovation

	External orientation	Internal orientation	Departmental co-operation	Analytical tools	Resources	Creativity	Control	Innovation
External orientation	1.00							
Internal orientation	0.537[a]	1.00						
Departmental co-operation	0.304[a]	0.271	1.00					
Analytools	0.351[a]	0.305[b]	0.010	1.00				
Resources	0.341[a]	0.491[a]	0.159	0.403[a]	1.00			
Creativity	0.651[a]	0.434[a]	0.234	0.250	0.042	1.00		
Control	0.565[a]	0.386[a]	0.373[a]	0.265	0.542[a]	0.511[a]	1.00	
Innovation	0.334[b]	0.064	0.096	0.211	0.207	0.525[a]	0.242	1.00

[a] Correlation significant at the 0.01 level (two-tailed).
[b] Correlation significant at the 0.05 level (two-tailed).

The degree of emphasis by both high and low performing is depicted in Table 10.

Table 10 indicates that the emphasis by high performing firms on the attributes of all three factors is greater than that given by low performing firms to the same attributes. The mean scores are higher for all attributes in the high performing firms. A wilcoxon test shows that the majority of attributes in all the culture styles are statistically significant ($p<0.01$* or $p<0.05$**).

All of the attributes of the characteristic staff creativity are statistically significant. The emphasis on the attributes of the characteristic staff creativity is consistent with the findings of Smallbone et al. (1993) which stress their importance for the growth and success of SMEs.

15. Practical implications of the findings

In line with the contention of Kelemen and Bansal (2002), and Hodgkinson (2001), this section will relate the findings to contemporary management practice. This analysis provides a practical step by step guide (see Fig. 2) for managers to consider in the deployment of innovative initiatives. Our framework identifies the organizational attributes that are specifically associated with innovation. While each factor is associated with innovation, managers are advised to consider the associated attributes simultaneously, rather than in isolation. This will enable managers to avoid emphasis on attributes of leadership, culture and strategy that are not directly related to the achievement of innovation.

16. Concluding remarks

The growing importance of SMEs, coupled with the increasing plethora of efficiency related initiatives provide the ideal opportunity to derive and test a framework for enhanced innovation in SMEs. In this study we empirically tested the relationship of strategy, culture and leadership, on innovation. This study found that transformational and human resources leadership, empowerment culture and staff creativity strategy characteristic are associated with innovation. The analysis indicated that strong leadership and culture styles irrespective of the style itself, as well as strong strategy characteristics resulted in greater emphasis placed on innovation.

The framework model was tested to ascertain the greater degree of emphasis given by high performing firms to the attributes of culture, leadership and strategy associated with innovation compared with low performance firms. The results indicate that high performance firms place a greater emphasis on all these attributes compared with low performance firms. The differences in emphasis are statistically significant in respect of the majority of the attributes. It is logical to deduce that SME success based on innovation may be associated with the degree of emphasis on the important attributes identified.

Table 9
Degrees of success in the implementation of innovation by high performing and low performing firms as defined by their market share

Firm type	Number	Achieved[a]		
		Initial goals/objectives (%)	Financial results expected (%)	Deployment of firms resources allocate (%)
High performing	108	75.0	50.1	63.9
Low performing	35	48.5	34.3	45.7
All firms[b]	194	67.0	53.0	56.0

[a] Firms indicating that their goals were either fulfilled or entirely fulfilled.
[b] Includes firms whose share of the market remained static.

Table 10
The emphasis on the attributes of culture, leadership and strategy associated with innovation in high and low performing firms

	High performing mean ($N=108$)	Low performing mean ($N=35$)
Empowerment culture		
Room for non-managerial employees to make decisions	3.46	3.05[a]
Assignment of interesting tasks	3.52	3.09[a]
Employees exert influence on important work decisions	3.13	2.77[a]
The opportunity for employees to bring forward ideas	3.68	3.22[a]
Freedom for employees to depart from the rules	2.40	2.38
Efforts for exceptional performance of the firm	3.49	3.09[a]
Implementation of change	3.55	3.19[a]
Transformational leadership		
Instil perfect trust	3.88	3.32[a]
Gives feeling that management can overcome obstacles	3.45	3.06[a]
Shows an extraordinary ability in everything they do	3.17	2.72[a]
Makes a powerful impression	3.61	3.13[a]
Encourage new ideas from employees	3.62	3.52
Introduces new projects and challenges	3.81	3.39[a]
Stimulates employees to support their opinions	3.65	3.16[a]
Human resource leadership		
Has an ear for matters that are important to employees	3.90	3.33[a]
Gives advice to employees when they need it	3.87	3.42[a]
Creates a feeling of working together on major projects	3.80	3.32[a]
Shows employees how to look at problems from new angles	3.32	3.23
Staff creativity strategy		
Ability to cope with surprises/crises/threats	3.57	3.15[a]
Flexibility to adapt to unanticipated changes	3.78	3.27[a]
Ability to identify new opportunities	4.14	3.77[a]
Role in identifying key problem areas	3.69	3.52[b]
Capacity to generate new ideas	3.87	3.38[a]
Capacity to generate and evaluate alternatives	3.58	3.36[b]
Anticipating and avoiding barriers to strategy implementation	3.61	3.16[a]

[a] Significance $p<0.01$.
[b] Significance $p<0.05$.

Finally, the results were used to derive a framework relating leadership style, culture types, characteristics of strategy and innovation together. The analysis suggests that managers would be well advised to give detailed consideration to their leadership and culture to ensure that they are aligned with their overall strategic plan. The results outlined provide a practical guide towards achieving this aim. However, it must be stated that the sample was restricted to two different sector types: mature products and stable technology, products with short life cycles and changing technology, respectively. Clearly the analysis applies primarily to these sectors. In addition, the study did not attempt to examine the differences at the more detailed sub-sectoral level. In other words, it assumed that the engineering and electronics sectors were internally homogeneous. This assumption should be tested in future studies. In addition, any future research should consider a more in-depth approach. It would have been beneficial to augment the quantitative data with qualitative in depth case studies or an ethnographic approach. Further testing should be carried

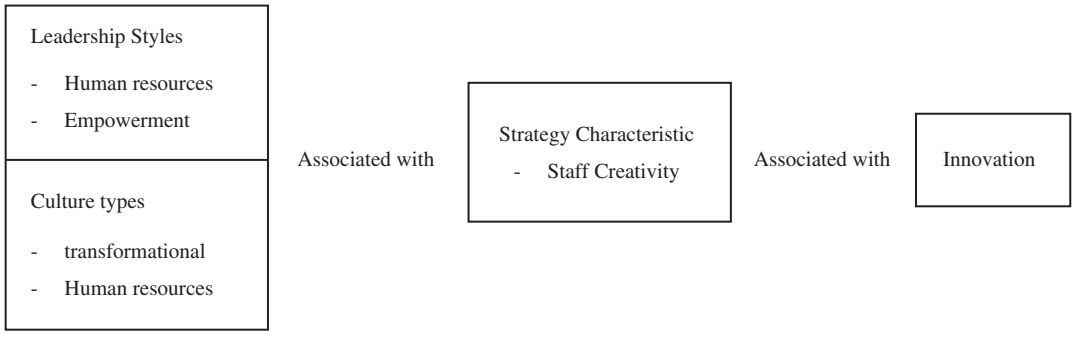

Fig. 2. Fast tracking innovation—a step-by-step guide.

out to confirm the finding's relevance to practice and in particular it's effective operationalisation. This might entail the development of a diagnostic framework to assist SMEs to identify the aspects necessary for the effective deployment of innovation using a checklist principle. Such a checklist would be of immense value to SMEs managers as a self-monitoring instrument.

References

Ahuja, G., Katila, R., 2001. Technological acquisitions and the innovation performance of acquiring firms: a longitudinal study. Strategic Management Journal 22, 197–220.

Amabile, T.M., Conti, R., Coon, H., Lazenby, J., Herron, M., 1996. Assessing the work environment for creativity. Academy of Management Journal 39, 1154–1184.

Andrews, K.R., 1994. The concept of corporate strategy, in: Dewit, B., Meyer, B. (Eds.), Strategy: Process, Content and Context. West, NY.

Arvonen, J., Pettersson, P., 2002. Leadership behaviours as predictors of cost and change effectiveness. Scandinavian Journal of Management 18, 101–112.

Ashkanasy, N.M., Broadfoot, L.E., Falkus, S., 2000. Questionnaire measures of organizational culture, in: Ashkanasy, N.M., Wilderom, C.P.M., Peterson, M.F. (Eds.), Handbook of Organizational Culture and Climate. Sage Publications, Thousand Oaks, CA, pp. 131–146.

Avolio, B., Yammarino, F.J., Bass, B.M., 1991. Identifying common methods variance with data collected from a single source: an unresolved sticky issue. Journal of Management 17, 571–587.

Banbury, C., Mitchell, W., 1995. The effect of introducing important incremental innovations on market share and business survival. Strategic Management Journal 16 (Special Issue), 161–182.

Barkema, H.G., Baum, J.A.C., Mannix, E.A., 2002. Management challenges in a new time. Academy of Management Journal 45 (5), 916–930.

Barnett, W., Hansen, M.T., 1996. The Red Queen in organizational evolution. Strategic Management Journal 17, 139–157.

Barney, J.B., 1986. Strategic factor markets: expectations, luck and business strategy. Management Science 32 (10), 1231–1241.

Bass, B.M., 1990. From transactional to transformational leadership: learning to share the vision. Organizational Dynamics, Winter 18 (3), 19–31.

Chaston, I., Badger, B., Sadler-Smith, E., 1999. Small firm organizational learning: comparing the perceptions of need and style among UK support service advisors and small firm managers. Journal of European Industrial Training 23 (1), 36–43.

Chattopadhyay, P., Glick, W., Miller, C.C., Huber, G., 1999. Determinants of executive beliefs: comparing functional conditioning and social influences. Strategic Management Journal 20 (8), 763–789.

Christensen, M.C., 1997. The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail. Harvard Business School Press.

Cooke, R.A., Szumal, J.L., 2000. Using the organizational culture inventory to understand the operating cultures of organizations, in: Ashkanasy, N.M., Wilderom, C.P.M., Peterson, M.F. (Eds.), Handbook of Organizational Culture and Climate. Sage Publications, Thousand Oaks, CA, pp. 147–162.

Coopers, Lybrand, 1997. How to Innovate with Trust and Passion. Coopers and Lybrand, London.

Curran, J., Blackburn, R.A., 2000. Panacea or white elephant? A critical examination of the proposed new small business service and response to the DTI consultancy paper. Regional Studies 34 (2), 181–206.

Daily, C.M., McDougall, Covin, J.G., Dalton, D.R., 2002. Governance and strategic leadership in entrepreneurial firms. Journal of Management 28 (3), 387–412.

Deakins, D., Freel, M., 1998. Entrepreneurial learning and the growth process in SMEs. The Learning Organization 5 (3), 144–155.

Dess, G.G., Lumpkin, G.T., 2003. Strategic Management: Creating Competitive Advantages. McGraw-Hill, NY.

Dougherty, D., Hardy, C., 1996. Sustained product innovation in large, mature organizations: overcoming innovation-to organization problems. Academy of Management Journal 39, 1120–1153.

Drazin, R., Schoomhoven, C.B., 1996. Community, population and organization effects on innovation: a multilevel perspective. Academy of Management Journal 39, 1064–1083.

DTI, 1996. Small Firms in Britain Report. Department of Trade and Industry, London.

Frost, T.S., 2001. The geographic sources of foreign subsidiaries' innovations. Strategic Management Journal 22, 101–123.

Frost, T.S., Birkinshaw, J.M., Ensign, P.C., 2002. Centers of excellence in multinational corporations. Strategic Management Journal 23 (11), 997–1018.

Gioia, D.A., Chittipeddi, K., 1991. Sensemaking and sense giving in strategic change initiation. Strategic Management Journal 12 (6), 433–448.

Hamel, G., 2000. Leading the Revolution. Harvard Business School Press, Boston, MA.

Harris, L.C., Ogbonna, E., 1999. Developing a market oriented culture: a critical evaluation. Journal of Management Studies 36 (2), 177–200.

Harrison, N.J., Watson, T., 1998. The Focus For Innovation in Small and Medium Service Enterprises, Conference proceedings of Western Decision Sciences Institute, 27th Annual Meeting, Reno NV, April 7–11.

Hart, S., 1987. The use of the mail survey in incremental; market research. Journal of Marketing Management 3, 25–38.

Hart, S., Banbury, C., 1994. How strategy-making processes can make a difference. Strategic Management Journal 15 (4), 251–269.

Henderson, B., Cockburn, I., 1996. Scale, scope, and spillovers: the determinants of research productivity in drug discovery. RAND Journal of Economics 27 (1), 32–59.

Hillman, A.J., Keim, G.D., 2001. Shareholders, stakeholders and social issue. Strategic Management Journal 22 (2), 125–139.

Hitt, M., Hoskisson, E., Johnson, R., Richard, A., Moesel, D.D., 1996. The market for corporate control and firm innovation. Academy of Management Journal 39, 1084–1119.

Hitt, M.A., Ireland, R.D., Camp, M.S., Sexton, D.L., 2001. Guest editors' introduction to the special issue—strategic entrepreneurship: Entrepreneurial Strategies for wealth creation. Strategic Management Journal 22, 479–491.

Hodgkinson, G.P., 2001. Facing the future: the nature and purpose of management research re-assessed. British Journal of Management 12, S1–S80.

Joyce, P., Seaman, C., Woods, A., 1996. in: Blackburn, R., Jennings, P. (Eds.), Small Firms: Contributions to Economic Regeneration. The Institute for Small Business Affairs, London.

Kanter, R.M., 1999. From spare change to real change: the social sector as beta site for business innovation. Harvard Business Review 77 (3), 122–132.

Kargar, J., 1996. Strategy system characteristics and planning effectiveness in small mature firms. The Mid-Atlantic Journal of Business 32 (1), 19–34.

Kargar, J., Parnell, J.A., 1996. Strategy emphasis and planning satisfaction in small firms: an empirical investigation. Journal of Business Strategies 13 (1), 42–64.

Kelemen, M., Bansal, P., 2002. The conventions of management research and their relevance to management practice. British Journal of Management 13 (2), 97–108.

Kim, W.C., Mauborgne, R., 2000. Knowing a winning business idea when you see one. Harvard Business ReviewSeptember–October2000;, 129–137.

Kline, P., 1994. An Easy Guide to Factor Analysis. Routledge, London.

Larsen, P., Tonge, R., Ito, M., 1998. The strategy process in growing companies. Journal of General Management 24 (1), 53–67.

Lee, C., Lee, K., Pennings, J.M., 2001. Internal capabilities, external networks, and performance: a study on technology-based ventures. Strategic Management Journal 22, 615–640.

Lim, B., 1997. Transformational leadership in the UK management culture. Leadership and Organizational Development Journal 18 (6-7), 283–290.

Litwin, M., 1995. How to Measure Survey Reliability and Validity. Sage Publications, Thousand Oaks, CA.

Louis, M.R., 1981. A cultural perspective on organization: the need for and consequence of viewing organization as culture-bearing milieux. Human Systems Management, 2.

Lounsbury, M., Glynn, M.A., 2001. Cultural Entrepreneurship: stories, legitimacy and the acquisition of resources. Strategic Management Journal 22 (6–7), 545–564.

Luo, Y., Park, S.H., 2001. Strategic alignment and performance of marketing-seeking MNCs in China. Strategic Management Journal 22 (2), 141–155.

Miller, D., Shamsie, J., 2001. Learning across the CEO life cycle. Strategic Management Journal 22 (8), 725–745.

Miller, D., Toulouse, J.M., 1986. Strategy, structure, chief executive officer personality and performance in small firms. American Journal of Small Business 10, 47–62.

Mone, M.A., McKinley, W., Bargar, V.L., 1998. Organizational decline and innovation: a contingency framework. Academy of Management Review 23, 115–132.

Morgan, G., 1989. Creative Organization Theory: A Resource Handbook. Sage Publications, London.

Morgan, G., 1997. Images of Organization. Sage Publications, London.

Moxley, R.S., 2000. Breathing New Vitality and Energy into Individuals and Organizations. Jossey-Bass, San Francisco.

Murphy, K.R., Davidshofer, C.O., 1994. Psychological Testing, third ed. Prentice-Hall, NJ.

Naffziger, D.W., Mueller, C.B., 1999. Strategy in small businesses: process and content realities, in the Proceedings of the 14th Annual USASBE Conference, San Diego, CA.

Nunnally, J., 1978. Psychometric Theory. McGraw-Hill, New York.

Peters, T., 1997. The Circle of Innovation. Hodder and Stoughton, London.

Pisano, G.P., Wheelwright, S.C., 1995. The new logic of high tech R&D. Harvard Business Review 73 (5), 93–105.

Ramanujam, V., Venkatraman, N., 1987. Planning and performance: a new look at an old question. Business Horizons 30 (May–June), 19–25.

Ramanujam, V., Venkatraman, N., Camillus, J., 1986. Multi-objective assessment of effectiveness of strategy: a discriminant analysis approach. Academy of Management Journal 29 (2), 347–372.

Roberts, P.W., 1999. Product innovation, product-market competition and persistent profitability in the US pharmaceutical industry. Strategic Management Journal 20, 655–670.

Rogers, E., 1995. Diffusion of Innovations. Free Press, New York.

Roper, S., 1997. Strategic initiatives and small business performance: an exploratory analysis of Irish companies. Entrepreneurship and Regional Development 9, 353–364.

Scott, M.C., 2000. Re inspiring the Corporation. Wiley, Chichester.

SGS Consulting, 2002. SMEs: A National Survey, March 2002. SGS Consulting (5251/0302).

Shane, S., Venkatraman, S., 2000. The promise of entrepreneurship as a field of research. Academy of Management Review 25, 217–226.

Shoham, A., Fieganbaum, A., 2002. Competitive determinants of organizational risk-taking attitude: the role of strategic reference points. Management Decision 40 (2), 127–141.

Smallbone, D., North, D., Leigh, R., 1993. The growth and survival of mature manufacturing SMEs in the 1980s: an urban and rural comparison, in: Curran, J., Storey, D.J. (Eds.), Small Firms in Urban and Rural Locations. Routledge, London.

Spanos, Y.E., Lioukas, S., 2001. An examination unto the causal logic of rent generation: contrasting porter's competitive strategy framework and the resource-based perspective. Strategic Management Journal 22 (10), 907–934.

Steiner, G.A., 1979. Strategy: What Every Manager Must Know. Free Press, New York.

Stopford, J., 2001. Should strategy makers become dream weavers?. Harvard Business Review 79 (1), 165–169.

Storey, D., 1994. Understanding the Small Business Sector. Routledge, London.

Subramaniam, M., Venkatraman, N., 1999. The influence of leveraging tacit overseas knowledge for global new product development capability, in: Hitt, M.A., Clifford, P.G., Nixon, R.D., Coyne, K.P. (Eds.), Dynamic Strategy Resources. Blackwell, Oxford.

Teece, D.J., Pisano, G., Shuen, A., 1997. Dynamic capabilities and strategic management. Strategic Management Journal 18, 509–533.

Utterback, J.M., 1994. Mastering the Dynamics of Innovation: How Companies can Seize Opportunities in the Face of Technological Change. Harvard Business School Press, Boston.

Veliyath, R., Shortell, S.M., 1993. Strategic orientation, strategy systems, characteristics and performance. Journal of Management Studies 30, 359–381.

Vossen, R.W., 1998. Relative strengths and weaknesses of small firms in innovation. International Small Business Journal 16 (3), 88–95.

Westphal, J.D., Frederickson, J.W., 2001. Who directs strategic change? Director experience, the selection of new CEOs, and change in corporate strategy. Strategic Management Journal 22 (12), 1113–1138.

Wilderom, C., van den Berg, P., 1997. A Test of the Leadership–Culture–Performance Model within a Large Dutch Financial Organization, Working Paper 103952 Tilburg University.

Zahra, S.A., Nielsen, A.P., Bognar, W.C., 1999. Corporate entrepreneurship, knowledge and competence development. Entrepreneurship: Theory and Practice 23 (3), 169–189.

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