THE PROCESSES OF INNOVATION AMONG RURAL MANUFACTURING SMEs: EXTERNALITIES AND BEYOND

By

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This study explored the processes of innovation among innovative rural manufacturing SMEs by using the narratives of the owner/manager of case study firms and other actors involved in the innovation process. This was consistent with the ontology of critical realism that was selected which entailed the use of case study method as a tool for data collection. This study makes a number of incremental rather than radical contributions to innovation theory and our understanding of innovation among rural Manufacturing SMEs. The results of this study shows the importance of opinions of owner/managers in the measurement of innovation considering that the majority were either unaware of the need to register their innovation and the lack of support organizations in rural areas who can advice SMEs on the need for patents and the registration process. Regarding the characteristics of innovation in rural areas, the results showed that rural innovative SMEs are likely to be relatively strong in innovations where effects of scale are not yet important but where they can make use of their flexibility and proximity to market demand.

The results of this study showed that SMEs received ideas for their innovations from various sources located both within and outside the case study area. The firms then used different approaches to develop their innovations including internalised design and externalised manufacturing, externalised design and internalised manufacturing, and internalised both design and manufacturing. Lastly, rurality did not appear to constrain the processes of innovation since SMEs had developed strategies that enabled them to adapt and adjust to their rural environment in order to remain innovative.
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DECLARATION

I declare that this thesis is my own unaided work. It is being submitted for the degree of Doctor of Philosophy at the University of Luton. It has not been submitted before for any degree or examination in any other University.

MOSES OGUTA OCHIENG

27th July 2006

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<tr>
<td>SMEs</td>
<td>Small and Medium Enterprises</td>
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<tr>
<td>OECD</td>
<td>Organisation of Economic Co-operation and Development</td>
</tr>
<tr>
<td>DETR</td>
<td>Department for Environment Transport and Regions</td>
</tr>
<tr>
<td>DEFRA</td>
<td>Department for Environment Farming and Rural Affairs</td>
</tr>
<tr>
<td>MSMEs</td>
<td>Manufacturing Small and Medium Enterprises</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
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<td>EU</td>
<td>European Union</td>
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<tr>
<td>SMART</td>
<td>Small firm Merit Award for Research and Technology</td>
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<tr>
<td>SPUR</td>
<td>Support for Product Under Research</td>
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<tr>
<td>UK</td>
<td>United Kingdom</td>
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<tr>
<td>ICTs</td>
<td>Information and Communication Technologies</td>
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<td>n-Ach</td>
<td>Need for Achievement</td>
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<tr>
<td>LOC</td>
<td>Locus of Control</td>
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<tr>
<td>RIS</td>
<td>Regional Innovation System</td>
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<td>IS</td>
<td>Innovation System</td>
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CHAPTER 1

INTRODUCTION TO THE STUDY

1.0 Introduction

The prevailing thinking among academics and practitioners on the study of the incidence of innovation in small and medium enterprises has stressed the comparative advantages of 'resource munificence' core regions, where fertile conditions are created by easy access to factors of production, information networks and markets (Vaessen and Keeble, 1994; OECD, 2000). These theories, including agglomeration economies and industrial districts, seek to explain how proximity to other firms, services and institutions enhances the availability, quality and transmission of knowledge between and among economic actors (Harrison et al., 1996). In contrast, rural areas with small markets, limited numbers of businesses and networking opportunities, deficient in factors of production and agglomeration have been seen as hostile environments for innovation in the SME sector (O'Farrel and Hitchens, 1989).

Despite evidence of the occurrence of innovative manufacturing SMEs in the rural areas (Keeble, 1997; Smallbone et al., 1997), there has been limited attention from researchers in the study of innovative manufacturing rural SMEs. Vaessen (1993) has pointed out that orthodox theory is inadequate to explain their existence. This study argues that there has been diminishing role of space in advance economies such as the UK due to the improvements in physical, information and communication infrastructure and that innovative manufacturing rural SMEs are able to access innovation inputs from dynamic agglomerations and therefore remain innovative. Hence, approaches that only emphasise supply factors of limited areas are unlikely to
provide much insight into the processes of information acquisition (Fuelhart and Glasmeirer, 2003) and innovation among rural SMEs. For rural SMEs, linkages with regional, national, and international sources of innovation inputs, and response to the needs of spatially located customer's can provide essential inputs during the development of innovative products and processes. Further, this study argues that the personality and characteristics of owner/managers of innovative rural manufacturing firms enables them to actively develop strategies to overcome constraints arising from their local external environment by adapting and adjusting and therefore being able to innovate despite the perceived locational disadvantages (Smallbone et al., 1999; Vaessen and Keeble, 1995). This places emphasis on the link between innovation and entrepreneurship in enriching our understanding. Hence, this study will focus on the experiences of manufacturing SMEs in rural areas by conducting in-depth case studies that will enable us fill this gap in the literature.

1.1 Research aims

The aim of this research is to enrich our understanding of the processes of technological innovation among independent manufacturing SMEs in rural areas. Within this context, considerable emphasis will be placed on the inter-relationship between innovative SMEs and their environment.

1.2 Research Questions

The following are the research questions that this study will address and which have been derived from the gap in the innovation literature that has focused more on the experiences of innovative SMEs based in areas of high agglomeration.
1. **What are the characteristics of innovation in rural areas?** The characteristics of innovation in SMEs, for example Pavitt (1984), have largely from the experiences of firms that are located in core regions. This study will seek to understand the nature and characteristic of innovation among SMEs based in rural areas.

2. **How do rural SMEs innovate?** Vaessen and Keeble (1995) have argued that while firms in rural and peripheral areas may encounter greater environmental constraints than their counterparts in core regions, these constraints are likely to stimulate entrepreneurial behaviour and result in SMEs having to internalise most innovative activities. Hence this study will seek to understand how rural SMEs innovate.

3. **Where and how do innovative rural SMEs derive their innovation inputs?** Lagendijk (1999) has argued that the role of space, proximity, and local embeddedness has been presented in the innovation literature (Porter, 1990; Malmberg et al., 1996) as necessary conditions for innovative activities. However, Curran and Blackburn (1994) observed that spatial dimension may be of less relevance in accessing information and networks than has been assumed in the agglomeration related literature.

4. **How does the attribute of the owner/manager of innovative rural SMEs influence the innovation process?** Benneworth (2004), for example, has explained the role played by entrepreneurs in core regions with reference to innovation and raised the question of whether entrepreneurship can promote innovation in less successful regions.
1.3 Theoretical underpinning

From the 1950's to the early 1970s innovation was conceived as somewhat a linear process, beginning with basic science and ending in sales- or vice versa (Deakins and Freel, 2003). Deakins and Freel observed that this conception viewed innovation as being either 'science-pushed', in which the emergence of new opportunities based upon new technologies drives the process, or 'demand-pull' innovation (reflecting more stationary technology, an increase in the importance of marketing to firm growth and a 'needs'-driven innovation agenda). However, Rothwell (1984) notes that systematic evidence from the mid-1970s suggested that 'technology-push' or 'need pull' models of innovation were extreme and atypical examples of a more general process of interaction between technological capabilities on the one hand, and market needs on the other. Deakins and Freel (2003) argue that it is this idea of interaction that underpins the current view of innovation as being a process of complex links and feedback mechanisms, notably represented by Kline and Rosenberg (1986) 'chain-linked' model\(^1\) and by Rothwell and Zegveld (1985) 'coupling model'. However, these earlier models were later found to have a number of weaknesses- chiefly, the implicit assumption that innovation remains a linear, though occasionally iterative, process enacted by organisations, or more usually firms, as discrete entities. Hence, while the functional units within the organisation intermittently interact with each other or with an external agency, the principle innovation tasks are undertaken with relative autonomy.

\(^1\) The model proposes that there are more than one major path of activity in the innovation process starting from the first path, the central chain of innovation, that begins with a design and continuing through development and production to marketing. During this process, multiple sources of knowledge are used. The second path is a series of feedback links that connect and co-ordinate R&D with production and marketing in which feedback links are seen as a part of the co-operation between product specification, product development and marketing.
In, contemporary and prevailing thinking has begun to view innovation as a systemic phenomenon. Emerging largely from the chain-linked model of Kline and Rosenberg (1986) and broadened and deepened by the national system of innovation (Abrunhosa, 2003), the systems approaches to innovation are driven by the idea that innovation by firms cannot be understood purely in terms of independent decision-making at the level of the firm but that it is an interactive, cumulative and co-operative phenomenon in which interactive learning and collective entrepreneurship are fundamental. Learning in turn is largely a social process, particular in the context of transfer or accumulation of tacit knowledge, and is likely to involve considerably more than two actors. Hence, an innovation system is likely to be socially embedded in such a manner that innovativeness of individual firms will be influenced by socially specific factors.

The reasoning behind the role of space in innovation generally runs from proximity, as in agglomeration economies, to innovation. Proximity emphasises traded and untraded interdependencies, highlighting the importance of face-to-face contact, as well as the sociological-institutional dimensions such as routines of communication, trust and the transfer of tacit information, which may be embedded within particular regions (Lagendijk, 1999). One dimension of the role of space in innovation discussed in the milieu literature emphasises the importance of routines and conventions guiding behaviour in regards to shared production and innovation, the quality of networking, the level of trust, the provision of vital information from within and outside the milieu.
In what Lagendijk (1999) call 'an imperative' claim about the role of space, proximity and local embeddedness are presented as necessary conditions for innovative economic activities. For example, Porter (1990) asserts that even non-local actors, such as subsidiaries of multinational firms, are not able to transcend the conditions of proximity and thus the need to behave like local firms especially in regards to innovative activities. Similarly, Malmberg et al. (1996) argued that milieu-based regional assets, regional social capital, are not only hard to diffuse but may also attract additional resources in the form of entrepreneurs, skilled labour and finance and that even foreign firms can only exploit such assets by becoming a local innovator. Through the processes of agglomeration and synergy, such assets can facilitate economic specialisation in innovative activities that is spatially rooted through the interaction between firms and local organisations.

However, Lagendijk (1999) has argued that while it may be accepted that industrial development occasionally show high inclinations to spatial clustering, it seems that in reality such opportunities are rare and very difficult to detect. Lagendijk maintains that not many regions can expect to become the nucleus of global industrial chain like the Silicon Valley. For most firms, spatial behaviour of firms is not guided by strong economic or social imperatives but often is an arbitrary, or at least incidental, nature. Available evidence also suggests that for small traditional firms, the spatial dimension may be of less relevance in creating access to information and networks than assumed in agglomeration-oriented literature (Curran and Blackburn, 1994). In relation to rural areas, the starting point for regional action may not be the re-emergence of agglomeration forces but rather the acceptance that in many cases firms may be
largely indifferent to the spatial outcomes of their actions while they enjoy some freedom in locational choices.

Chapter 2 of this study will review leading conceptual frameworks in the literature that have adopted the systems approach to the understanding of innovation. In general, geographical distance, accessibility, agglomeration and the presence of externalities provide a powerful influence on knowledge flows, learning and innovation and that this interaction has a regional dimension. Moreover, close cooperation with suppliers, subcontractors, customers and support institutions as well as with other firms in the region may enhance the process of interactive learning and create an innovative milieu favourable to innovation (Lundvall, 1992).

One such conception, the Regional Innovation System (RIS), is based on the concept that the overall innovation performance of an economy to a large extent depends on how firms manage to utilise the experience and knowledge of other firms, research organisations, government sector agencies etc. in the innovation processes, and not just on the capability of the individual firm (Lundvall, 1992). Another conceptual framework is Agglomeration Economies which is said to occur when the unit cost of production of a business enterprise or establishment are lower, or when there is heightened prospect of technological learning in relatively dense clusters of firms or specialised resources than would be the case if the business were located elsewhere (Feldman, 1993). Similarly, Industrial districts are localisation economies resulting from close linkages among flexible and specialised SMEs in the same industry contributing to the production of the same product group (Bagnasco, 1977). Another leading conceptual framework associated with the industrial district concept is that of
clusters which are groupings of closely linked businesses that develop multiple on-going co-operation and interdependent relationships in order to acquire some common gain (Porter, 1990). The milieu concept seeks an interpretation for the advantages of regional proximity by the underlying complex network of mainly informal social relationships on a limited geographical area, which enhances the local innovative capability through synergy, collective learning process and acts as an uncertainty-reducing mechanism in the innovation process (Maillat, 1998). Spin-offs and spillovers (Jaffe et al., 1993; Anseline et al., 1997) emphasises proximity to R&D facilities of large firms and university research as being important in the SME innovation process. Similarly, Industrial economists in the United States (Acs and Audretsch, 1993) have observed that the inherent flexibility of SMEs can explain their ability in exploit spillovers from university laboratories and R&D spin-offs of large enterprises. Traded and untraded interdependency (Storper, 1995) refer to localised input-output relations that constitute webs of user-producer relations essential to information exchange. The network theory (Powell, 1990; Maillat, 1998) emphasises the importance of interdependencies between industrial activities as being essential to the smooth working of the territorial innovation process.

In addition, Fuellhart and Glasmeier (2003) have argued that theoretical and empirical research on innovation among SMEs has largely concentrated on supply factors, focusing on regional competitive advantages based on the conditions of a location as a benefit to firms because of the perceived ‘rich’ supply of information and knowledge (Enright, 1998). Hence, Steyaert and Katz (2004) observed that studies of entrepreneurship has to a large extent being connected to cities both in how cities themselves develop entrepreneurship images and discourses but also how cities are
sites for economic and industrial growth, centres of innovation and creativity, habitats for creative professionals and for minorities. However, Steyaert and Katz (2004) have noted the emergence of entrepreneurship in broader set of spaces. From the literature, Benneworth (2004) explains that, the role played by entrepreneurs in core regions has been established with reference to the ‘new high technology’ innovative sectors. This raises the question of whether entrepreneurship can raise productivity in other, less successful regions. If the way factors cohere is important, this raises the question of how entrepreneurship in peripheral/rural areas can promote innovation (Benneworth, 2004). Moreover, the firm itself and in particular the role of the owner/manager or entrepreneur has been largely abstracted from research in favour of the competitiveness of production systems and regions. Chapter 3 will review the literature regarding the role of the entrepreneur in the innovation process.

1.4 Definitions and measurements

There are three key definitional and measurement questions that need to be tackled at the onset of this research: firstly, how are rural areas to be defined; what constitutes a small and medium enterprise for the purpose of this study; and what is technological innovation. Secondly, how is technological innovation measured?

1.4.1 What is a rural area?

The term rurality gained usage in the UK when it was linked with locality in the early 1980’s (Pratt, 1999). Pratt argues that whilst the locality gained some credibility and international attention, after much debate, the term rurality continues to attract dispute. Hence, there is considerable debate among researchers as well as policy-makers regarding the definition of rural areas. Traditionally, rural areas have been
associated with 'land based' industries, which include the exploitation of natural resources, through mining, forestry and agriculture. However, there is no unambiguous definition of rurality, nor is there a generally accepted approach to measurement. Most researchers and policymakers choose approaches that are best suited to their own application, taking into account pragmatic issues of availability, quality, consistency, and ease of collection of data (Martin and Ringman, 2000). The rest of this section will review the major approaches used in defining rurality.

### Table 1 Measures used to describe urban and rural areas

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<tr>
<td>Settlements size</td>
<td>An urban area, town, or village is defined on the basis of the maximum and/or minimum population thresholds.</td>
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<tr>
<td>Population density</td>
<td>Number of people in the spatial unit divided by area of unit. May be weighted by population, or re-expressed as sparcity.</td>
</tr>
<tr>
<td>Nearest neighbour</td>
<td>Algorithm to find mean and standard deviation of distances between postcodes in a given area.</td>
</tr>
<tr>
<td>Accessibility</td>
<td>Ease with which a defined population can access a facility. Generalised inaccessibility may be described as 'peripherality'.</td>
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The neo-classical approach to rurality defined rural areas as those areas given over to particular resource based economic activities such as agriculture and forestry, and areas of natural open space such as moor lands and mountainous areas. This approach is essentially a micro-economic approach concerned mainly with the effectiveness of
agriculture as an activity (Heady, 1952). It therefore underestimates the social and territorial context of agriculture and in so doing ignores the rural environment.

Another type of definition has characterised rural areas in terms of a number of socio-spatial aspects such as population densities and distance from major cities, leading to the construction of 'an index of rurality' for England and Wales based on census variables (Cloke, 1977; Cloke and Edwards, 1986). This approach, which relied on the rural-urban dichotomy, dominated much of the European rural studies in the 1960's and 70's. In this approach, opposition to the city defines the country, so that the rural becomes a formal category with no individual existence of its own. Changes in the countryside are therefore perceived as being the particular expression of the process of capitalist accumulation, which has its epicentre in the cities.

More recently, rural areas have been defined more in terms of social representation of reality, emphasising more on the way people strive after a rural ideal and try to achieve this in their everyday lives (Hoggart et al., 1995). This approach is becoming more important as the traditional production functions of rural areas (i.e. agriculture and forestry) decline in importance and various consumption functions (e.g. recreation and leisure) become more significant, particularly in certain countries (Ilbery, 1998; Smallbone et al., 1997). The debate about what constitutes rurality is therefore symptomatic of the changes, which are occurring to the economy and social composition of these localities. Although this approach places greater emphasis on rurality than the preceding approaches, it's handling of 'rural' is limited to a geographical and descriptive treatment and there is no conceptual definition that distinguishes clearly between 'rural' and 'agricultural'. Under this approach, 'rural' is
mainly associated with a discussion of income levels and the living standards of rural areas. In this way, 'rural' is spatially distinct not by reason of its specific attributes but on account of the different economic and social characteristics which derive from the different types of agricultural activity taking place in each rural space.

From the above definitions, the 'rural' remains merely an empirical reference point, thinly-populated space which mainly derives its economic and social structure from agriculture and traditional industries such as mining. Hence, in order to understand the rural world it is necessary to adopt an interdisciplinary methodological approach taking into consideration the recent structural changes in rural areas.

With the decline in the economic and social significance of agriculture in recent decades, the traditional economic role of the rural world has been called into question. At the same time, some rural areas in close proximity to cities have increasingly come to be part of the process of urban growth. This essentially means that an attempt to go back into the traditional concepts and analytical categories of rurality will not reflect current realities. To understand the new reality, we have to take into consideration the influence of Information and Communication Technologies (ICTs), the marked improvement in rural infrastructure, accessibility of rural areas and the spread of information.

This brings into question the traditional dichotomy between town and country that regard the rural and urban as interdependent and complementary. Furthermore, there appears to be a continuum, which exists between the town and the country with resultant effect of the ‘consumption’ by countryside dwellers of cultural and
economic 'products' and 'customs' of the town. The 'urbanisation of the countryside' expresses itself in the division of the rural world into 'core' rural areas; 'remote' or marginal rural areas; 'low density' rural areas; and 'peripheral' rural areas (OECD, 1993; Goffette-Nagot, 2000). These taxonomies reflect a diverse range of views of the asymmetries which are to be found in inter-spatial relations, the traditional rural-urban dichotomy being replaced by a view in which the city and its surrounding 'core rural areas' are seen as having a high degree of complementarity, while 'remote rural areas' are seen as areas with weak relational density whose loss of complementarity with urban areas may place them at a competitive disadvantage.

From the current rural studies, it can be summarised that there are four features which these approaches have in common: they are not tied to a view of the rural as being equivalent to agriculture; they attempt to overcome the rural-urban dichotomy; they stress the diversity of types of rural space and rural development trajectories; and they seek to establish a theoretical and conceptual frame of reference which makes it possible to adopt a territorially integrated approach.

The Countryside Agency (2000) has, for example, proposed that although it classifies rural districts according to areas with similar characteristics; population density and the DETR list of districts included in the 1995 Rural White Paper, in future it will use settlement structure, population density, land use and land cover to improve on the definition of what a rural area is. However, DEFRA (2004) has developed a new rural definition consisting of two parts:

1. Settlement morphology comprising all places under 10,000 population including small ('rural') towns, villages and scattered dwellings; and
The wider geographic context in which individual settlements are located i.e. whether the wider area is defined as being ‘sparsely’ populated or not.

In addition, under the new definition, settlements and contexts are identified on a grid consisting of one-hectare cells, which is the foundation of the definition. Hence, sparsity refers to the broader setting in which settlements are located and is measured as the average density of households across areas of radius 10,000m, 20,000m and 30,000m. These distances have been chosen to broadly represent the costs of overcoming distance in the delivery of different types of rural service. An area is therefore considered ‘sparse’ if it meets a minimum density criterion on all three-distance measures and is then classified accordingly as ‘major urban’, ‘large urban’, ‘other urban’, ‘significant rural’, ‘rural-50’, and ‘rural 80’. According to this classification:

(i) **Major Urban** are districts with either 100,000 people or have 50 percent of their population in urban areas with a population of more than 750,000.

(ii) **Large Urban** are districts with either 50,000 people or have 50 percent of their population in one of 17 urban areas with a population between 250,000 and 750,000.

(iii) **Other Urban** are districts with fewer than 37,000 people or have less than 26 percent of their population in rural settlements and larger market towns.

(iv) **Significant Rural** are districts with more than 37,000 people or have more than 26 percent of their population in rural settlements and larger market towns.
(v) **Rural-50** are districts with at least 50 percent but less than 80 percent of their population in rural settlements and larger market towns.

(vi) **Rural-80** are districts with at least 80 percent of their population in rural settlements and larger market towns.

This study will adopt the DEFRA definition of rural districts (rural-50 and rural-80) but improve it using the classification used by North and Smallbone (2000). Hence, a rural area will be defined as one having a population of under 10,000 including small ('rural') towns, villages and scattered dwellings and at least 50% of their population in rural settlements and larger market towns.

### 1.4.2 What is a Small and Medium enterprise (SME)?

The lack of officially established or otherwise definition of what a small and medium enterprise is has created problems for small business research (Curran and Blackburn, 2001). Researchers and policy-makers often use definitions based on numbers employed in the enterprise because of their simplicity and their quantitative nature. Further, quantitative definitions are seen as 'objective' and amenable to statistical manipulation. Employment data is convenient because it is collected in national statistics and therefore already in existence for the researchers to use, and is also relatively easy to collect directly from firms.

Curran and Blackburn (2001) cautions that employment measures are likely to be very sector dependent as a 'small' oil refinery for example, which may employ several hundred people (and be capitalised at several million pounds), cannot be compared with a small independent 'back-street' garage that employs three people besides the
owner (and has a capitalisation of perhaps £150,000). Further, the apparent simplicity of numbers employed as a measure of business size is becoming more and more problematic in practice with full-time employment becoming less common in the UK and part-timers, casual and temporary workers and the self-employed becoming more widely used by employers. This makes definitions based on numbers employed difficult, as part-time, casual and temporary labour is not evenly spread across the size distribution of businesses. Where this measure is to be used, acceptable conventions on the use of employment measures such as treating a part-time employee as the equivalent of half a full-time employees may be required (Curran and Blackburn, 2001).

An alternative definition is one based on turnover. However this has more problems than employment-based definitions as turnover has sectoral characteristics. For example, a ‘small’ independently owned retail outlet selling newspapers, confectionery and cigarettes might have an annual turnover of well under £100,000 but a ‘small’ precision instrument manufacturer, selling throughout the UK and abroad might easily have an annual turnover of £2 million. Furthermore, finding out a firm’s turnover is not a simple process because many small business owners use differing financial management conventions and practices, which may not produce comparable data (Jarvis et al., 1997). Owner-managers themselves may not even have precise data on their annual turnover and not be able to provide accurate information to researchers. Further, many small business owners are sometimes reluctant to supply turnover data to outsiders.
There are, however, qualitative definitional approaches including one offered by the Bolton Committee (1971): “First, in economic terms, a small firm is one that has a relatively small share of its market. Secondly, an essential characteristic of a small firm is that the owners or part owners manage it in a personalised way, and not through the medium of a formalised management structure. Thirdly, it is also independent in the sense that it does not form part of a larger enterprise and that the owner-managers should be free from outside control in taking their principal decisions” p.g.1. However, the Bolton Committee was quick to acknowledge that the weakness of its qualitative definition was its difficulty to operationalise as there is a lack of comprehensive data on the business population in terms of ownership, management, organisational structure and market share.

The multiplicity of definition criteria used in the Bolton Report (1971) for small and medium enterprises (SMEs) has been replaced in most circumstances by the European Union (EU) definition. The EU defines small and medium enterprises as those enterprises employing less than 249 employees. However, combining employment criteria used by the UK department of Trade and Industry (DTI) and the annual turnover and balance sheet applied in the UK Companies Act of different firms provides use with a richer framework (Table 2 below).

<table>
<thead>
<tr>
<th></th>
<th>Employees</th>
<th>Turnover</th>
<th>Balance sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro firm</td>
<td>1-9</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Small firm</td>
<td>10-49</td>
<td>Max £2.8 million</td>
<td>Max £1.4 million</td>
</tr>
<tr>
<td>Medium firm</td>
<td>50-249</td>
<td>Max £11.2 million</td>
<td>Max £5.6 million</td>
</tr>
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</table>
This study will define ‘independently owned manufacturing small and medium enterprises’ (SMEs) as those employing between 1-249 employees. However, to improve our definition, some qualitative measures will be incorporated including that the enterprise be independently owned and not be a branch plant of another enterprise. This approach is not without its disadvantages as lumping together all businesses with less than 249 employees as ‘small and medium enterprises’ implies that besides having below this number of employees, they also share enough characteristics to be treated as members of the same category for research purposes. However, despite the above limitations and the criticisms that it might generate, there are circumstances where a simple definition of small and medium enterprise has clear utility.

1.4.3 Invention, creativity and innovation

Innovation and invention

Biemans (1992) has argued that innovation is not a universally agreed term as each writer presents a 'new' definition, emphasising the elements he or she deems relevant. In a neo-Schumpetarian tradition, Roberts (1988) made a distinction between invention and innovation whereby he categorised invention as the generation of an idea while innovation incorporates both invention and exploitation. Hence invention can be defined as the conception of an idea while innovation is the use of an idea or invention into an economic activity. Twiss (1992) set out a criterion that for ‘invention’ to become ‘innovation’ it must succeed in the market place (Twiss, 1992).
Innovation and creativity

Brazeal and Herbert (1999) have defined creativity as the process through which invention occurs and is the enabling process by which something new comes into existence. However, Woodman et al. (1993) considered creativity to be a subset of innovation, which is in turn a subset of change. The creative process is therefore the starting point or origin of innovation. Brazeal and Herbert (1999) argues that creativity is a variable in its extent of creativeness, measured by how radical a departure the creation is from its antecedents or predecessors. Hence, at some point, one might argue that a creativity and innovation comes close to intersecting.

It is often difficult to distinguish between innovation and creativity because successful innovation often offers something new that meets a customer needs or wants and arises from a new technology or a new application of an existing technology. Further, the quality of the innovation results from the originality or the creative minds of one or a few individuals. Creativity is not confined to R&D but also results from the creative minds of one or a few individuals in the firm (Twiss, 1992). Within large firms, new product development ideas typically come from top management and marketing departments while process development ideas come from production departments (Twiss, 1992. Pg.16). Externally the three main sources of creativity are competitors, suppliers and customers. The path by which external information is transferred into an organisation is often indirect and involves relatively few people known as 'technological gatekeepers'. This situation is different in SMEs where the technological gatekeepers are mainly the entrepreneur or owner/manager.
Many definitions of creativity stress the part played by imagination in generating new concepts or unusual solutions to problems. However, the definition of creativity can be widened to include the analytical techniques based upon systemic search methods. Hence, facts, relationships or parameters, both technical and non-technical are arranged in new combination. Further, Brazeal and Herbert (1999) argue that creativity is a function of situational attributes, including the skill, knowledge, intensity, and availability of other resources of the creative person(s).

Innovation

North and Smallbone (2000) have argued that innovation is an elusive concept, which is difficult to define. A key distinction can be made between those who define innovation as the introduction of something that is new to the firm and the industry, and those who define it as the introduction of something that is new to the firm but not new to the industry. Woodman et al. (1993) have explained that innovation can generally be defined as the commercially successful implementation of a creative idea. Rodgers (1995) has added that an innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption. Thus, newness of an innovation need not just involve new knowledge but may be expressed in terms of knowledge, persuasion, or a decision to adopt. West and Farr (1990) explained that whereas creativity is only the conception of an idea, innovation is the conception of a new idea, transformed into an invention, and exploited as much as possible.

Another definition of innovation has been provided by Elam (1993) as 'the combining of materials in a novel fashion to produce other things, or the same things by a different method' (P.g 102). The term innovation often refers to one of the three
processes (Urabe, 1988): the process of developing a new item, the process of adopting a new item, and the new item itself.

The term's 'innovation' and 'technology' are often used as synonyms. A technology often refers to a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome. A technology usually has two components, a hardware component consisting of the tools that embodies the technology as a material or physical object and a software aspect consisting of the information base for the tool (Rodgers, 1995).

The Frascati Manual (1992) goes further to define technological innovation as comprising new products and processes and significant technological changes of products and processes. The OECD also includes in its definition “...new products and processes and significant technological changes in products and processes” (OECD, 1994, p.4). Similarly, the European Union defines innovation as the “commercially successful exploitation of new technologies, ideas or methods through the introduction of new products or processes, or through the improvement of existing ones” (EC DGXIII, 1996, p.54). “Technological” innovation is emphasised in this research because “the technological component is normally present, if not the determining factor, in the creation, manufacture...of products and services” (EU, 1995). In this study, innovation will be referred to as a new item itself while the process of developing the new item will be referred to as 'product or process development'.

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Davenport (1993) has defined a process as a structured, measured set of activities designed to produce a specified output for a particular customer or market. Process innovation, therefore, combines the adoption of a process view of the business with the application of innovation to key processes. Davenport argues that what is new and distinctive about this combination is its enormous potential for helping any organisation achieve major reduction in process cost or time, or major improvements in quality, flexibility, service levels, or other business objectives. Further, process innovation can be distinguished from process improvement, which seeks a lower level of change. Hence, while process innovation means performing work activity in a radically new way, process improvement involves performing the same business process with slightly increased efficiency or effectiveness. In this study, although the actual benefit derived from operational betterment initiatives falls along a continuum, where process innovation entails only incremental benefit, it will be classified as an improvement.

Considering the distinction between product and process innovation, Hall (1994) has argued that process innovation occurs when a given product is produced in a new way and product innovation takes place when the product is altered or a new product is introduced. Further, some product innovations are also process innovations. This study will define process innovation as the production of a given product in a new way and product innovation as involving the alteration of current products of the firm or rival firms, or introduction of a new product. However, it should be remembered that innovation is a continuum and what is product innovation can in fact be process innovation. The OECD (1994) maintains that the word “innovation” can have different meanings in different contexts and the one chosen will depend on the
particular objectives of measurement or analysis. Shioriya and Perlwan (1994) recommends that the best approach is to acknowledge that although the distinction between product and process innovations is a useful tool for analysis it should, however, be recognised that their definition and measurement have fuzzy boundaries and practical difficulties. If it is acknowledged that various definitions of product and process innovation exist, it would be good practice for those who employ these terms to explain clearly which meaning they attach to them (Shioriya and Perlwan, 1994).

There are two types of innovation that have been identified in the literature. Brazeal and Herbert (1999) have suggested that incremental innovations consist of relatively small modifications of, or refinements to, pre-existing processes and are typically considered to be discrete events scattered over time. Each incremental change may be considered to be less 'creative' and less of an innovation than a simple modification or improvement. Brazeal and Herbert argue that it is possible that the cumulative effect of a series of incremental improvements can yield an end result that may meet the hallmarks of an innovation. Normally such a substantial cumulative effect is not observed as it can occur over a length of time and may not differ markedly with the industry. However, radical innovations are 'discontinuous' and represent dramatic departures from current ideals in design, application or process. Hence radical innovations are quantum leaps in theory and application rather than linear, progressive changes embodied in incremental innovation (Brazeal and Herbert, 1999).

1.5 Measurement of innovation

The fundamental question that faces a researcher of technological innovation is whether it is possible to measure it? Shodjai (1995) suggested that it is important that
if we are to better understand innovation and encourage it, then we need to be able to measure it to begin with. It has, however, proved more usually problematic to measure innovation. There is considerable diversity amongst researchers on the measures of innovative activities. Kalantaridis and Pheby (1999) identified four distinct methods used to measure innovative activities. The first method includes the use of patents as a proxy of innovative activity—this excludes alterations and modification to products and processes (Jaffe, 1989) and ‘innovation awards’ which includes the Queen’s Award of Exports and Technology, and the Small Firm Merit Awards for Research and Technology (Simmie, 1996). The second measure focuses on an industry-specific monitor of all innovations reported in trade journals, research periodicals, conferences and exhibitions (Acs et al., 1994). The third measure revolves around the use of industry-specific benchmarks set out from the onset by the researcher (Smallbone et al., 1997). The fourth measure consists of the survey work of owner/managers involving self-reporting (Keeble, 1997).

1.5.1 Use of patents as a proxy

This measure is based on the linear model of innovation in which innovation is seen as a sequential process leading to the final production of products or process with resultant effect of obtaining patents. This measure excludes alterations and modification to products and processes (Kalantaridis and Pheby, 1999). Kalantaridis has argued that this measure potentially underestimates SME involvement in innovative activities, as they are often unable to afford the resources required in the process of patenting. Furthermore, most SMEs are unaware of the need to patent their innovation as well as the negative perception that the process is bureaucratic.
1.5.2 Innovation Awards

This measure is similar to that of the use of patenting and is more commonly used in the UK. It revolves around the use of 'innovation awards' such as the Queen's Award for Exports and Technology and the Small Firm Merit Awards for Research and Technology (SMART). Although this measure has been used by researchers such as Simmie (1996), it not only has the same weaknesses as the 'patents measure' but is also biased due to the varying degree of awareness of these awards among SMEs in different localities, which is in turn influenced by the degree of dynamism of the local business support network (Kalantaridis, 1999). From a rural perspective, it is therefore considered that this approach will not yield the desired result and is hence not appropriate for this study.

1.5.3 Industry-specific monitor of all innovations

This consists of an industry-specific monitor of all innovations reported in trade journals, research periodicals, conferences and exhibitions. Kalantaridis and Pheby (1999) have argued that although this approach is resource intensive it is reliable especially for research with a national orientation. However, its application at the regional and sub-regional level raises a number of practical questions such as availability of regional and sub-regional level data, the number of SMEs who attend conferences and exhibitions and whether their work are reported in trade journals and research periodicals. This approach although better than the first two suffers from some of their limitations and therefore has the potential of understating the number of innovative SMEs in rural areas.

1.5.4 Industry-specific benchmarks
Smallbone and North (1999) have suggested that this approach involves conducting a systematic assessment of the extent to which a particular firm's products or processes could be considered innovative, based on 'benchmark data'. Thus data is gathered from sectoral information sources which includes interviewing representatives of sectoral organisations, supplemented in the more scientific and technological sectors by the receipt of a SMART award (Small Firms Merit Award for Research and Technology) or SPUR award (Support for Products Under Research). On the basis of this sectoral information, each firm is then assigned to one of three categories: (1) possessing 'highly innovative' products or processes, (2) possessing 'fairly innovative' products or processes, or (3) possessing no innovative products or services. Although the main attraction of this approach is that it introduces 'objective' yardsticks against which a company's product and process technology can be compared, the issue of objectivity of the yardstick raises concerns about its measure of innovative activity.

1.5.5 Survey of owner/managers

The use of opinions of owners/managers through interviewing to classify innovations has been used in some studies (Keeble, 1997). This approach tends to focus on the innovation rather than the innovator. However, Shioriya and Perlwlan (1994) have argued that the use of this approach relies on the perspective of the owner/manager and therefore contains a high degree of subjectivity. From the perspective of the owner/manager, new or improved products that can be sold on the market and changes in their production techniques are product and process innovation respectively.
This study will use the opinions of owner/managers combined with innovation awards as proxies for the degree of innovation. This is because the influence and importance of the owner-manager is especially strong in small firms and also has an effect on the diffusion of innovations inside the enterprises. Although it is based on self-reporting and therefore has the potential of being exposed to subjective value judgements of the owner/manager, it is a valuable measure of innovation in rural areas with limited information. This approach will also help overcome the problem of other measures such as the use of R&D expenditures as small firms with limited resources are bound to exploit externalities than have R&D conducted within the company. Furthermore, self-reporting can also help in the identification of the processes and obstacles to innovation. To strengthen this approach, an index of innovative firms will be used. The main measure of the level of innovation for product and process will be the extent to which the innovation is new to the industry or firm and whether or not the firm has received an innovation award or gained national recognition for its innovation. If the innovation is new to the industry and has received an innovation award or gained national recognition, then it will be referred to as ‘highly innovative’. If the innovation is new to the industry or firm but has not received an innovation award or gained national recognition then it will be referred to as ‘fairly innovative’. If the innovation is not new to the industry or firm but is of an incremental nature then it will be referred to as ‘innovative’. If the innovation is not new to the industry or firm nor is it of an incremental nature, then it will be referred to as ‘not innovative’.

1.6 The role of SMEs in innovation

The recent literature on the key factors influencing the success of regional and local economies has emphasised the innovativeness within small firms (Asheim, 1996;
One of the reasons for focusing on SMEs is that they are seen as having a higher propensity to innovate than larger firms because they are thought to be more flexible, dynamic and responsive to shifts in demand and changes in economic conditions. Rothwell and Zegveld (1982) have argued that the role played by small firms in relation to innovation depends on a number of factors that include the attitude of government and society to technological change and the opportunities that exist within technology-related industrial sectors for the formation and growth of SMEs. Rothwell and Zegveld explains that in terms of sectoral performance, it is argued that the contribution of SMEs to innovation is greatest in sectors such as mechanical engineering and scientific instruments where the capital requirements are relatively low. However, Deakins and Freel (2003) have argued that in contrast to earlier convictions, it has gradually become clear that there is no firm size unequivocally optimal for innovation and that both large and small firms have significant and often complementary roles to perform in the process of technological development and innovation.

Pavitt (1984) explored the sectoral influences on the level and composition of firms' innovative activity and found that, for example, in traditional manufacturing such as textiles, technical change comes predominantly from the suppliers of equipment and that these firms conducted mostly process innovation using the product innovation of other firms. Large-scale production intensive firms such as motor vehicles, tend to produce their own process innovations, and few product innovations. However, smaller scale mechanical and instrument engineering firms tend to concentrate on product innovations for use in other sectors, such as large-scale production intensive
firms. Science based firms, such as chemicals and electronics, were found to produce a mixture of process and product innovations.

The view that large firms are the main source of innovative activity can be traced back to Schumpeter (1942) and Galbraith (1956) who advocated that innovative capability increases with firm size. Acs and Audretsch (1993) explained that there are four factors favouring the innovative advantage of large firms that have been identified in the literature. Firstly, innovative activity is viewed as requiring a high fixed cost and thus can be carried on only by a firm that has the requisite resources, thus large firms (Galbraith, 1956). Secondly, only firms that are large enough to attain at least temporary market monopoly power will choose innovation as a means of maximisation (Schumpeter, 1950). Thirdly, R&D is seen as a risky investment hence small firms engaging in R&D make themselves vulnerable by investing a large proportion of their resources in a single project unlike their large counterparts who can reduce the risk accompanying innovation through diversification into simultaneous research projects (Acs and Audretsch, 1991). Fourthly, economies of scale in promotion and distribution facilitate the penetration of new products, thus enabling larger firms to enjoy a greater profit potential from innovation (Cohen and Klepper, 1992). However, recent trends suggest that large firms have been at a disadvantage regarding their innovativeness due to two factors: Firstly, product cycles are getting shorter and shorter because innovations are more rapidly copied by competitors, pushing down margins and transforming today’s consumer sensation into tomorrow’s commonplace commodity (Economist, 2004). Hence, firms have to innovate continuously and incrementally these days to lift products out of the slough of commoditisation. This has resulted in, the USA for example, small companies
dominating the introduction of new inventions and radical innovations (US Small Business Administration, Office of Advocacy, 1994). During the 1990's, for example, Cisco Systems kept itself at the cutting edge of its fact-moving high-tech business by buying a long string of creative start-ups financed originally by Venture Capital. More recently, large pharmaceutical firms have continued to get their hands on new science by buying small innovative firms, particularly in biotech (Economist, 2004).

Secondly, fragmentation of markets has meant that once uniform mass markets are breaking up into countless niches in which everything has to be customised for a small group of consumers. Hence, looking for 'Schumpeterian' path-breaking innovations in such a world becomes a daunting task. These recent trends highlight the innovation advantage of small firms. There are those who argue that SMEs tend to have an innovative advantage, at least in certain industries (Rothwell and Zegveld, 1985). Firstly, it is argued that the main factor stems from the difference in management structures between large and small firms. Scherer (1980) argues that the bureaucratic organisation of large firms is not conducive to undertaking risky R&D and that SMEs are more at an advantage due to the flat nature of their management structures. Secondly, the SME environment free from bureaucracy is in itself conducive to innovation. Hence, researchers from large organisations whose efforts have been thwarted by managerial constraints have often found the SME environment as being conducive to their work (Rothwell and Dodgson, 1994). Feldman (1993) adds that small firms are likely to be relatively strong in innovations where effects of scale are not (yet) important and where they can make use of their flexibility and proximity to market demand, such as new products or product-market combinations,
modifications to existing products for niche markets, and small-scale application. Lastly, while Schumpeter suggested that barriers to entry favour innovation, they may also weaken incentives for innovation. (Dijk et al., 1997; Dasgupta and Stiglitz, 1980). Further, Mansfield et al. (1997) argue that entry barriers hamper the entry of new firms, which are among the most important contributors to innovation.

The advantages of small firms discussed above have been criticised by Vossen (1996) who argued that while the fewer hierarchical layers in smaller firms may on the one hand reduce bureaucracy, increase flexibility and result in less filtering of proposals, it also limits career opportunities for their employees. Vossen explained that less filtering of proposals could result in very original ventures, or a fatal lack of opposition to misapprehensions. Acs and Audretsch (1991), however, argue that smaller firms account for a disproportionately large share of innovations relative to their size, and that R&D productivity tends to decline with firm size.

From the above discussion, it can be concluded that most of the features are firm specific rather than directly related to size. Vossen (1996) argued that there is great diversity especially among small firms. Rothwell (1985) summarises by stating that the relative strengths of large business can be said to be predominantly material (economies of scale and scope, financial and technological resources), whereas those of small firms are mostly behavioural (entrepreneurial dynamism, flexibility, efficiency, proximity to the market, motivation).

Researchers have recognised that the role of small firms in relation to technological innovation can take many forms, ranging from the entrepreneur’s complete
indifference towards technological advances at one extreme, to small firms which are at the leading edge of technological advances at the other (North and Smallbone, 1997). North and Smallbone points out that it is likely that in the majority of small firms the pace of technical change is slow and originates from outside the firm itself and that in firms where technological change is more important, many firms will be 'imitators' than 'innovation leaders'. Pavitt et al. (1989) and Tether et al. (1997) observes that viewed across all sectors and types of innovation there is no optimal firm size from the point of view of innovation and that dynamic complementarities exist between large and small enterprises. It can also be argued that whilst it is questionable whether SMEs are more or less likely to introduce fundamentally new innovations than large firms (Storey and Sykes, 1996), Storey (1994) argues that they do have a greater ability to make more incremental innovations as a result of the niche role, which they often perform.

At the same time, it is important to recognise the heterogeneity that exist within the SME sector that has implications for the contribution of different types of SMEs with respect to innovation. On the one side, there are many conservatively managed, traditional, SMEs operating in niches that are relatively untouched by technological change and where innovation is not an issue for managers. On the other side there exist highly innovative new technology based firms whose knowledge base makes them potential world leaders in a specific field. Along the continuum is to be found SMEs who are mainly involved in incremental and 'imitation' innovations.

One of the factors that can help to explain the heterogeneity existing among SMEs with respect to innovation is the sectoral context. This has led some authors to
classify the various roles that SMEs play in relation to innovative activities. For example, Rizzoni (1991) has developed a six-fold classification based on the role of small manufacturing firms with respect to technological innovation. These range from 'static' small firms in the sense of being largely uninvolved with innovation and 'traditional' small firms which play a more active role in the diffusion of innovation, to 'new technology' based small firms which play an important role in the introduction of significant new technologies. Similarly, Hassink (1997) has developed a typology to distinguish between: firstly, technology-driven SMEs which need to keep abreast of leading edge technologies; secondly, technology-following SMEs where technology though important does not have to be the most advanced available; and thirdly, technology-indifferent SMEs, which are essentially craft firms, and which rarely invest in new technological equipment.

1.7 Rural innovative SMEs

Storper (1995) and Cooke and Morgan (1998) have observed that there has been increasing interest in the role of regions as environments that facilitate the processes of innovation. Hence, SMEs in resource munificent regions characterised by a concentration of industrial, governmental, technological support, as well as other firms have been viewed to be at an advantage in regards to innovation. However, SMEs located in rural areas characterised by lower density and dispersed distribution of businesses, relative lack of opportunities for local trading and subcontracting linkages (Smallbone et al., 1993), the absence of higher educational and research institutions, and the relative lack of business support organisations have been viewed to as likely to be less innovative. However, Vaessen and Keeble (1995) have argued that a more hostile business environment may encourage firms to be more innovative.
in order to overcome the constrains they face. It is within this context that this section will review the characteristics of innovative rural SMEs.

The continued decline of employment in agriculture and other traditional rural industries has meant that policy makers have had to identify and encourage new sources of employment as a priority in rural development (Smallbone and North 1999). Smallbone and North argue that it is increasingly thought that the bulk of new jobs in rural areas are going to come form new and existing small firms including some lighter manufacturing industries. This has mainly been based on the recent trend of faster employment growth of rural SMEs compared to their urban counterparts (North and Smallbone, 1995; 1996).

However, the rural environment presents a number of challenges for SMEs including limited scale and scope of local market opportunities, which results in firms to be particularly active in developing non-local markets (Smallbone and North, 1999). Smallbone and North explains that even if rural firms are successful in developing innovative products, effective marketing is important for them if the innovation is to be fully exploited. Another challenge of the rural external environment is the rural labour market, which is characterised by low wages and loyalty. Smallbone and North (1999) argue that this characteristic can reduce the incentive for firms to invest in labour saving process innovations, particularly in more craft-based sectors. However, Vaessen and Keeble (1995) argued that SMEs in rural areas may paradoxically have more reward for their R&D since the limited regional sales opportunities can force innovating or growth oriented firms to break out of their home regions and expand their sales linkages across the country and overseas earlier and
more intensively than their counterparts in core-regions (Meyer-Krahmer, 1985; Oakey et al., 1993). This can lead rural firms being more 'outward-oriented' than their urban counterparts (O'Farrell and Hitchens, 1988; 1989) with considerable learning advantages in the process of overcoming their locational disadvantages. Indeed Cooke and Wells (1990) have argued that as innovative rural firms faced by limited local markets develop wider geographical action and information spaces in order to grow, they can attain greater economies of scale for each innovation than may be possible for firms located in core region.

Another characteristic of the rural environment is the lack of a local industrial and service milieu resulting in fewer opportunities for firms to subcontract out locally. Moreover, there is only a small number of potential collaborating firms locally as well as sparsely distributed research and development facilities, educational institutions, and business support providers (North and Smallbone, 2000; Smallbone and North, 1999) which can constrain innovation. This has resulted in some rural SMEs in the more technology-based sectors to face technical and skills constrains when trying to develop either new products or services or when investing in new technology.

The relative absence of local competition in many product markets might mean that there is less incentive for some firms to innovate than in other areas where local competition is intense (North and Smallbone, 2000). This is because intensive rivalry can spur a company to innovate and to upgrade its activities in order to find a distinct competitive edge (Porter, 1990). However, rural areas can provide a more favourable competitive environment for SMEs because less intense competition and rivalry can provide them with a 'greenhouse protection' (Vaessen and Keeble, 1995) in which
they can develop their innovation. Moreover, this can lead to rural firms being more successful in exploiting specific niche markets and hence realising monopoly profits (Keeble, 1994).

1.8 The structure of the Thesis

The thesis is divided into seven chapters. Chapter One provides the introduction to this study and discusses the aims of the study, research questions, theoretical underpinnings, definitions of rurality, small and medium firms, innovation among SMEs and large firms, and innovation in rural areas. Chapter two is a review of the literature that discusses the systemic approach to the understanding of innovation including the regional innovation system and other related conceptual frameworks such as agglomeration economies, industrial districts, clusters, and milieu. From the review of the literature, emerging issues such as sticky or impacted information, untraded interdependencies, spin-offs and spillovers, and networks are discussed. The chapter concludes by arguing that rural innovation system comprises various elements identified in the literature in varied intensity and impact to the innovation process.

Chapter three reviews the literature on entrepreneurship that provides a framework for the understanding of the innovation behaviour of owner/managers of SMEs. The chapter argues that there has been a missing dimension in the evolution of innovation studies with the role of the entrepreneur or individual innovator having been consigned to the periphery. The chapter defines the term ‘entrepreneur’ and the relevant literature regarding the attributes of the entrepreneur that are likely to lead a person to embark on an entrepreneurial career. The chapter then examines how the functions of the entrepreneur can enable us to closely relate the personal attributes to
the processes of innovation and how rural institutional arrangements affect the quantity of the entrepreneur's effort, namely technological innovation. The chapter concludes by developing a conceptual framework that links chapters two, three, and four.

Chapter four provides a detailed description and analysis of the geography, social, and economic characteristics of the study area.

Chapter five describes in detail the methodological approaches for the two phases of the study. The first phase, the pilot study, used a multimethod approach involving desktop research, informant interviews, telephone interviews, and a case studies. Letters of introduction detailing the aims of the study were sent to fifteen key informants with a follow-up telephone call in order to set up the appointment dates for an interview between the period of July and September 2000. Thus, an open-ended discussion, without any pre-set structure, was used. The results of the key informant interviews was then used to inform the study in the context of understanding of the study area (Chapter five) and also by illuminating the findings of the face-to-face in-depth case studies in the second phase of the empirical study.

The study then undertook the selection of the sample of firms in the study area that were eligible. This involved developing a database of innovative SMEs in Cumbria using the Business Link Directory. From this, a database of two hundred and fifty SMEs was compiled. A short telephone interview was conducted with all the firms in the population, using a structured questionnaire to determine firm characteristics and the incidence of product or process innovation. From the telephone interviews, sixty-
four (64) firms were independent and innovative while seventy-eight (78) firms were independent but not innovative. Of the remaining one hundred and eight firms, thirty-six (36) were not independent and the rest could not be included in the database. Using a combination of stratified and purposive sampling methods five firms were selected for the pilot study according to the sectors found in the sample frame and the willingness of the owner/managers to participate in the pilot study within the time frame suggested. The results of the pilot phase was then used to design case studies with six innovative SMEs and twenty-one face-to-face and telephone interviews with those who provided support to the firms during the innovation process.

Chapter six uses the narratives of firm owner/managers, employees, suppliers, private research and development companies, universities, customers, and public support organisations to understand how rural SMEs innovate. The systemic and behavioural influences are also examined. Finally, chapter seven presents the conclusions of the main findings and discusses the contributions of the study to our understanding of innovation among rural SMEs. It also draws together the role of SMEs in the innovation process, the systemic and behavioural dimensions to innovation and how rural institutional arrangement influence innovation output. In conclusion, the chapter discusses the implications of the study to theory, its limitations and areas for further research.
CHAPTER 2
THEORETICAL CONTEXT: THE SYSTEMIC APPROACH TO INNOVATION

2.0 The structure of the chapter
This chapter will review the systemic frameworks in the literature, which have been associated with the processes of innovation in SMEs. The chapter is organised in the following way: Section I, will discuss the systemic approach to innovation, the Regional Innovation System (RIS), and its relevance to innovation amongst SMEs in rural areas. Section II will discuss other leading conceptual frameworks that have adopted this systemic approach, thus underlining the importance of agglomeration, and innovation as a socially embedded process i.e. as an institutionally and culturally contextualised, interactive learning process. Section III will conclude by discussing the ensuing issues of scholarly interest. The chapter will then conclude by drawing conclusions and implications for innovative SMEs in rural areas.

2.1 Introduction
The prevailing thinking in the innovation literature views technological innovation as been a process that is based on relationships of proximity, the forms, modes and combinations of which may be quite varied. In regards to innovation and learning, the following approaches to proximity have been identified. Firstly, geographic proximity indicates the positioning of actors within a predetermined spatial framework. This type of proximity is different from physical proximity, which is a social construction, built as much by the installation and development of transportation and communication infrastructure as by architectural aspects and
technical imperatives (Kirat and Lung, 1999). Secondly, technological or industrial proximity (Torre, 1993) may be construed as either vertical interdependencies (linked to the complementarities existing in the R&D-production relationships) or horizontal interdependencies (linked to the similarities existing in production). The third approach to proximity is that of the organisational and institutional proximity. Institutions consist of formal and informal rules that ultimately constitute the 'rules of the game' in society. Organisations, the group of actors involved in practising a finalised activity, represent the players. Thus, organisational proximity connects the set of actors participating in a finalised activity within the scope of a particular entity. This type of proximity relies upon a certain consistency in the configuration of relationships between actors, and is structured around a common cognitive framework.

Thus, organisational proximity is deployed inside organisations (firms and establishments) and between organisations, on a need be basis, connected by a relationship of either economic or financial dependence/interdependence (within a network). Institutional proximity for its part indicates the assembly of actors as parties to a common space and is heavily tied to the interactions occurring between actors, who can base the emergence of a territory on a collective learning process. Moreover, this collective learning process might imply a certain geographic proximity among agents. As such much of the innovation literature emphasises that proximity is indeed a prerequisite to forming sustainable relationships, a vector in the exchange of non-codified knowledge, which cannot be transported spatially by technical means.
It is also important to analyse a territorially defined innovation system because it enables an updating of the techniques wherein various forms of proximity are combined or interconnected. It is important to emphasise the importance of the institutional context within the overall functioning of these systems. Hence, geographic proximity can be considered to be a necessary, but not sufficient, precondition for the existence of a territorially defined innovation system. A proximity that is merely geographic in nature can provide the basis for the presence of an agglomeration of firms, yet not necessarily the presence of an innovation system. Hence, geographic and technological proximity are essential prerequisites for the existence of such a system. This study will seek to understand how proximity influences the processes of technological innovation in rural areas. Section 1 will review the systemic approach to technological innovation - the regional innovation system.

2.2 Section I- The Regional Innovation System: A systemic approach to innovation

The understanding of the innovation process has changed considerably in recent years. According to the traditional linear innovation model, individual firms and their R&D activities are the main driving forces for innovation. Under this model, the innovation process follows a strict sequence from research to development, production and to the market. More recently, the Schumpetarian and the linear product cycle model have been found inadequate as innovation is neither an exclusive internal activity of firms in order to achieve monopolistic advantages (Schumpeter, 1934) nor does it follow a mechanistic sequence from research to production and to the market, in which research is the main driving force, as the linear model theory
argue. Increasingly, innovation is regarded as an evolutionary, non-linear and interactive process between the firm and its environment (Malecki, 1997). This approach recognises that technology does not exist alone but functions as an integrated part of a socio-economic milieu. Hence, Wiig and Wood (1995) argues that the context within which firms conduct innovation may be highly important and maybe understood by analysing the inter-relationships between social, economic and technological systems. It is in this context that the concept of 'Innovation System' (IS) has been introduced.

Storper (1995) has described an IS as consisting of a production structure and an institutional infrastructure, and the interaction between these structures (see figure 1 below). Lundvall (1992) argues that this is a social system in the sense that interactive learning is a social activity and also a dynamic system where the elements either reinforce each other in promoting processes of learning and innovation or conversely, combine into constellations blocking such processes. This approach views particular research environments, systems of education, finance and regulation as shaping the innovation process of specific countries to a high degree (Porter, 1990; Nelson, 1993). In this case, innovation is carried out interactively between firms and knowledge suppliers and is supported by policy institutions, technology transfer agencies and education (Gregersen and Johnson, 1997; Kaufmanns and Todtling, 2000). Initially, this concept was applied to the national context where innovation systems were found to differ significantly between countries depending on their economic structure, knowledge base and institutional specificities (Nelson, 1993).

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2 A system is generally defined to be a 'set of objects together with the relationships between the objects and their attributes' (Hall and Fagan, 1956,p.18).
More recently, there has been a growing interest in innovation systems at the regional level (Braczyk et al., 1995).

Figure 1 Main factors affecting learning and innovation in a national system of innovation

Various arguments have been advanced to support the reasons why RIS’s are territorially based such as that qualified labour force, educational and research institutions (Todtling, 1992; Simmie, 1997); industrial clusters- which often go beyond exchange of goods and services and include untraded interdependencies, are
often localised giving rise to networks between firms at the regional level (Enright, 1998; Storper, 1995); interactions between knowledge providers and firms such as university-industry links, knowledge spillovers and spin-offs are often localised since they work through the mobility of persons on local labour markets and through face to face contacts between actors (Castells and Hall, 1994; Todtling and Kaufmann, 1999); a common technical culture in the local production system developed through collective learning leading to an innovative milieu (Camagni, 1991; Maillat, 1995; Asheim, 1996). Under certain conditions this may lead to high-tech development in specific regions (Castells and Hall, 1994).

The quality of labour force, not just R&D personnel, are relevant and therefore training organisations are important in an IS. This is because access to skilled labour is important, especially in the early stages of the product life cycle, which are characterised by R&D activities. This is because there will be limited progress in R&D unless it has highly skilled engineers and scientists. However, product and process innovation are not limited to R&D activities only but also in the units of production through 'learning-by-doing' (Arrow, 1962) hence emphasising the importance of education. Further, although large firms generally have an advantage in that they can decide to locate wherever there are skilled labour, SMEs with a stronger territorial base often have to rely on the labour that the home region can offer (Karlsson and Olsson, 1998). Moreover despite the fact that SMEs have difficulties in attracting skilled labour\(^3\), it is the management of labour inside the firms that produces innovations. Oakey et al. (1993) have argued that although SMEs generally

\(^3\) That small firms will be constrained in their ability to recruit, train and retain highly qualified and competent staff is mainly due lack of internal labour markets, levels of required remuneration, relatively high training costs (both time and finance), and the potential for 'poaching' (Westhead and Storey, 1996)
suffer the difficulties in attracting scientists and engineers and often have to rely on external sources, some form of internal R&D capacity is essential. This is because limited human resources can influence a firm's propensity and ability to be aware of, and respond to opportunities and threats presented by the external environment (North et al., 2001). One of the attractions of rural/peripheral for innovative firms may be an access to loyal workers in rural/peripheral regions where the prospects of unionisation and other forms of worker resistance appears minimal. Supporting this view, Schoenberger (1989) has argued that as a general principle, the more specialised and skilled the demand for labour, the more constrained are the potential location choices for the firm with production likely to remain in regions with a well articulated industrial structure, despite high wages and even high levels of unionisation. Thus, the lowest skilled activities are the most susceptible to decentralisation to rural areas. However, a general lack of labour mobility within rural areas can constrain skills availability.

Regarding the application of the RIS thesis, empirical work within geographic economics has shown highly qualified links between the locational context of firms and innovation. For example, the findings of a study by Fuellhart and Glasmeier (2003) suggests that 'while locational factors can certainly enhance the information environments within which business organisations find themselves in some instances, location alone cannot be assumed to be the most important factor-or even relevant-in some instances' (pg. 245). Similarly, regarding the importance of information exchange among SMEs, customers and vendors within a local context, Glasmeier and Fuellhart (1996) argued that these tend to be primarily routine in nature related to day-to-day activities. In addition, although customer relationships has been viewed to be
important in both pre-development and post-delivery process of innovative products, Prajogo et al. (2004) explain that the underlying philosophy of customer relationship could be detrimental to product innovation if implemented in a reactive manner leading managers to see the market only through their current customers eyes and therefore ignoring potential needs which could be served through new products or processes.

Further the importance of new employees in the innovation process among SMEs suggests that in smaller organisations, decision-making is not spread out across the organisational structure hence it is unlikely that a large number of new employees would be hired explicitly for the purpose of acquiring decision-making information (Fuellhart and Glasmeier, 2003). This suggests that the importance of new-employees in the innovation process could have a sectoral dimension and hence the need for caution in its applicability 'across the board' among SMEs. Moreover, a study by O'Gorman and Kautonen (2004) found that the investments in generating new graduates only supply 'raw recruits' and that it is industry-specific knowledge and experience that is most valued by firms. Further, it is the ‘on the job’ training and experience that employees accumulate which converts basic generic knowledge into advantage creating firm-level knowledge. For rural SMEs, this emphasises the need for policy aimed at improving human resources within existing firms. Similarly, the study by Fuellhart and Glasmeier (2003) also found that information from competitors is seen as less credible and less relevant than non-competitor firms. This is because businesses that are in competition with one another, except in special circumstances are unlikely to willingly share important information with one another. Moreover, SMEs also tended to have low levels of information acquisition from firms
in industries other than their own suggesting that regardless of whether or not they are proximate, other sectors are, overall, relatively unimportant as information providers. Interestingly, information from institutional sources including universities and state programmes were found to be important when an organisation is faced with more non-routine, strategic-level problems, that cannot be solved with more familiar, internal or localised sources. However, a study by Julien et al. (2004) supported the notion that SMEs (except those in high technology sector) tend not to use the services of public and quasi-public agencies including universities, colleges, research centres and standardization agencies. Fuellhart and Glasmeier (2003) argue that it is important to realise that information from universities and state programmes are not likely to be tacit and therefore can be accessed by anyone who knows where to look and who has the resources to obtain it. Similarly, sector-based information sources including trade publications, trade shows and association’s seminars, databases, and consultants are usually provided in codified generic forms, often relating to general industry, economic and technological trends Fuellhart and Glasmeier (2003). The above empirical results support the central thesis of this study that location is probably not the most critical factor in accessing these types of materials and contacts.

Hence, the concept of RIS has been criticised as being less convincing than National Innovation System (NIS), as a region may be an ambiguous concept (Gregersen and Johnson, 1997). Gregersen and Johnson (1997) have argued that there are regions within countries and regions crossing national borders and also regions with and without elected governments. Moreover, a region may be a small part of 'a little country' or it may encompass a whole continent. Although there are regions with
excellent territories of IS's, some are much less productive as environments for innovation processes (Kalantaridis and Pheby, 1999).

Within any country, the range of institutions, which contribute to innovation and the linkages among them, comprise the national innovation system (Lundvall, 1992; Nelson, 1993). The innovation process takes place within this system and the behaviour of its components and the nature of the links among them constitute an important aspect of understanding why specific features of the innovation process vary from one country to another. It is also important to note that elements of the NIS will have international connections (Hall, 1994). Gregersen and Johnson (1997) suggest that the theoretical case for territorially based systems of innovation builds on interactive learning that depends on relations between proximity\footnote{Proximity does not just refer to geographical distance as distances may sometimes be more meaningfully measured in time rather than in kilometers (Gregersen and Johnson, 1997). Other kinds of proximity such as economic space, organizational space and cultural space have also been identified (Lundvall, 1992). If one or more of these distances become too great, interactive learning will be hampered and hence innovation.} and diversity. They argue that behind the process of innovation is to be found the durable and selective relationships that are quite different from arms-length, anonymous market transactions.

There are several reasons that have been advanced to support the concept of NIS. Gregersen and Johnson (1997) argue that firstly, institutions and institutional change affect innovations and that without institutional adaptation and evolution, the process of technical change would be more and more restricted. The role of the state in the regulation of these institutional changes are necessary for the process of technical innovation and can take the form of protection of intellectual property rights, standards, capital and labour market regulations and laws of contract. Secondly,
because innovation often leads to structural change, which may generate conflicts, the state plays an important role in forming institutions, which reduce conflicts that may restrict continual growth. Thirdly, although classical fields of infrastructure such as transport and energy may be decreasing in importance as state monopolies, areas such as education, the supply of information, technical standards and basic research, which are important in the knowledge infrastructure, requires increased state activities. Fourthly, because the innovation driven economic growth results in continual transformation, the necessity for a mobile labour force ready to move form one occupation to another is only possible through a supportive system of education and training providing both general purpose and learning skills and diversified specialisation. Fifthly, the performance of IS depends on effective communication and interaction between people with different skills and knowledge and thus on the state as an environment for such communication and interaction. Hence what is more important is the way in which public policies and private initiatives are combined with accumulated competencies to allow an efficient innovation and imitation process to take place (Musyck, 2003).

Although important aspects of the technological system in a country are often regional, nations matter for the evolution and maintenance of many institutions that affect interactive learning and innovation. Similarly, although it is relevant to include policy initiatives by the state aimed at stimulating innovation in the description of a NIS, other types of indirect policies such as education policies, employment policies and those in regards to communication infrastructure may influence innovation even more.
In conclusion, it is important to note that a NIS is the organisation of all the interactions between various actors involved in technological change—i.e. firms, research and educational institutions, financial institutions, local authorities—at the sub-national level (Andreosso-O’Callaghan, 2000). Innovation is therefore seen as an integral part of the system in that they can be shaped or greatly influenced by its various elements. Thus, knowledge infrastructures, production structures, institutional set-ups, consumer demand structures, and government policies are not independent explanatory factors for innovation performance (Gregersen and Johnson, 1997). Rather, they are interdependent and evolve in interaction with each other (see Although the NIS tends to evolve more than designed, the various elements discussed above have sufficiently clear national distinctiveness and are stable over time. This allows for analysis to be made within the innovation systems approach and thus contributing to innovation studies.

Section II of the literature review will discuss other leading conceptual frameworks that have been identified in the literature and which can be viewed to occur within the NIS, and the various forms that they take. The section will analyse the interaction between the various elements discussed above, and illustrated in figure 1, within the regional context and specifically rural areas of the UK with a view of establishing to what extent they provide an explanation for the occurrence of innovative SMEs in those areas.

2.3 Section II - Other conceptual approaches adopting the systemic approach

In much of the literature on innovative regimes during the last ten to fifteen years, commentators have generally agreed that success was underpinned by a combination
of functional and territorial integration. The territorial dimension of the socio-cultural structures represented the basic input promoting flexibility and dynamism. An important factor contributing to the generalisation of the experiences of innovative regimes is the new understanding of innovation as being a social process (Lundvall, 1992). Therefore, a more sociological view to innovation is needed in which interactive learning is looked upon as a fundamental aspect of the innovation process that cannot be understood independent of its institutional and cultural contexts. Within this context, agglomeration is viewed as the most efficient basis for interactive learning and an interactive regional innovation system. O’Gorman and Kautonen (2004) have suggested that there are three models of agglomeration that have been discussed in the literature, namely the technopolis\(^5\) model, (regional) cluster model, and the innovation milieu (including the RIS already discussed, industrial districts, and innovation milieu) model. The sections that follow will discuss these various concepts and how they influence the processes of innovation, and their relevance for our understanding of the occurrence of rural innovative MSMEs.

### 2.3.1 Agglomeration economies

Geographic concentration of resources, known as agglomeration economies emphasises proximity\(^6\) of complementary activities as promoting information transfer, which lowers the cost and reduces the risks associated with innovation (Feldman, 1993). Thus disintegration of production raises transaction costs as it results in

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\(^5\) A technopolis refers to a geographic agglomeration of high-technology activities whose objectives are to successfully commercialize technology to create wealth and high-value jobs (Gibson and Stiles, 2000).

\(^6\) Proximity is defined in terms of minimization of geographic distance, as afforded by spatial concentration of infrastructure, institutions, organizations and persons. However, it has also been defined in terms of economic and cultural relatedness resulting from having something in common.
increased exchange relation’s external to the firm, which are less predictable and more complex. The theory postulates that agglomeration is an outcome of the pursuit of transaction cost minimisation where such economies outweigh other geographically dependent production cost differentials (Storper, 1995. Pg.198). Storper also argues that agglomeration economies provide firms with the advantages of interdependence- risk minimisation etc- that reduces the costs or difficulties of intensified transactions.

Harrison et al. (1996) have distinguished between static and dynamic agglomeration economies. They argue that static agglomeration economies occur when the unit costs of production of a business enterprise are lower in the context of relatively dense clusters of other firms or specialised resources, such as skilled labour and infrastructure, than would be the case if the business were located elsewhere. Such economies lead to the emergence of industrial clusters, industrial districts, and innovative milieu (localisation economies). Dynamic agglomeration economies on the other hand refer to the heightened prospect for technological learning to occur in relatively dense urban places, districts or clusters compared to less dense locations. Dynamic agglomeration leads to the emergence of manufacturing belts or metropolitan regions (urbanisation economies). Porter and Solvell (1998) explain that in both cases, agglomeration economies have their root in processes whereby links between firms, institutions, and infrastructures within a geographic area give rise to economies of scale and scope. In this study, agglomeration economies will refer to both static and dynamic agglomeration economies with particular emphasis on technological learning.
There are several factors that have been found to influence technological innovation in agglomeration economies. The uncertainties associated with innovation can be reduced by a firm participating in information exchanges that can enable it exploit new developments in an industry in a timely manner (Nelson, 1990). This means that to the extent that location promotes timely information exchange, innovation will be enhanced thus providing an incentive for firms to locate together. The nature of information has also been found to influence agglomeration economies. When information is 'sticky or impacted', long distance transmission is limited hence creating an incentive for firms using complex and dynamic technologies to locate near knowledge sources such as universities. The importance of universities has also been highlighted. This is because most important and timely information comes from personal communications which provide information far in advance of printed sources and also because the stylistic limitations of formal papers often limit their substantive usefulness. Specifically, formal papers do not convey what the experimenter thinks the work means (Grefsheim et al., 1991). Hence, innovation occurs when new scientific and technical knowledge is developed (O'Gorman and Kautonen, 2004) and therefore an important determinant of the potential of a region to establish new industries is a capability to produce and commercialise new knowledge in relevant scientific and technological fields and/or a capability to quickly absorb and exploit knowledge created elsewhere. However, in the new-networked global economy, rural areas deficient in knowledge creating and scientific institutions can be innovative by tapping into knowledge created elsewhere by developing 'extra-local' networks. Further, O’Gorman and Kautonen (2004) have criticized the prevailing public policy approach where investments in generating new scientific knowledge has focused on

7 The role of universities in technological innovation has been discussed in detail in section 3.3.1.
the supply of such knowledge from universities and related institutions, and then subsequently on ways to commercialise such new knowledge. Their study suggests that R&D activity at the level of the individual firm can generate new scientific knowledge that has market potential, suggesting that interventions must also focus on the innovative activity of individual firms.

Feldman (1993) has also highlighted Business services as being important in agglomeration economies since they provide information about consumer demand and help shepherd new product innovation through a maze of regulations and product specifications. The specialised services of patent attorneys, market research and feasibility studies, and commercial testing laboratories are beyond the means of all except the large firms to internalise. Feldman argues that because these services exist solely to supply information, they tend to locate near their clients.

Carlson and Jacobsson (1991) also found proximity to customers and suppliers to favour agglomeration economies, since the development of technologically complex products requires close collaboration between suppliers and customers. This is because constant specification and design changes make it too costly to get involved with distant customers and suppliers. Moreover, O'Gorman and Kautonen (2004) found that the presence of an initial local customer base, which is willing to pioneer new products, could have a crucial impact on the emergence of a new industry. This is because innovative firms need to have both a local market, with advanced users capable of absorbing technological innovations, as well as firms integrated into the global market for the successful development of a new industry.
Shefer and Frenkel (1998) have argued that although agglomeration economies suggest proximity as being important, the pressures to locational convergence are not constant over all industries. Location pressures will be intense in cases where inter-industrial linkages tend to be small in scale, unstable and unpredictable, resulting in high unit costs, where speed and face-to-face interaction are critical and where the production system is dependent on transaction-intensive forms of inter-industrial forms of co-operation. A converse tendency to deterritorialise may prevail where the opposite kinds of characteristics, especially those engaged in extra-regional trading, are dominant. A study conducted by Shefer and Frenkel (1998) in the northern region of Israel found that the effect of agglomeration economies on the probability of innovation was positive in the electronics industry (high-tech) and quite insignificant in the plastic and metal industries.

While agglomeration economies provide valid reasons why innovative firms tend to locate in resource-munificent areas with dense population of other firms, it fails to allow for active entrepreneurial efforts to overcome resources deficiencies. Vaessen (1993) argues that while firms in rural and peripheral areas may encounter greater environmental constraints than their counterparts in core regions, these constraints may in fact stimulate greater pro-active entrepreneurial behaviour. Furthermore, the lack of institutional support may result in organisational autonomy in relation to the local environment, which may result in SMEs having to internalise most innovative activities (Vaessen and Keeble, 1995). Hence, entrepreneurial experience gained in an incubator organisation outside the region may play a valuable role in this case. Decentralisation can also be brought about where industry becomes disconnected from the national market, for consumer and producer goods as well as the changes in
the process of production (Jensen-Butler, 1992). Jensen-Butler argues that this can result in the development of ‘enclave economies’ where inputs for production are imported and the product is exported resulting in the diminishing importance of urban areas as locational factors. This implies that rural areas can be suitable locations for such enclave developments.

The impact of the new-networked world economy (web economy), conceived as a complex web of transactions, on agglomeration is also yet to be appreciated. The inter-networked enterprises creating clusters on a global scale, with transactions supported by digital communication networks, termed “virtual districts” are assuming global importance (Romano et al, 1999). Hence, firms in the web economy can improve their collective learning process even if there is no spatial proximity among them. Romano further argues that enterprises located in spatial context with low agglomeration economies, such as rural firms, may partially offset the localisation disadvantages by gaining dynamic agglomeration economies from the new global virtual learning environment. Franke (1999) argues that the virtual web approach emphasises unlimited space and time in information and knowledge exchange between co-operating companies based on flexible information technology systems than geographical proximity.

Davelar and Nijkamp (1997) have explained that in the web economy, firms may gain dynamic agglomeration economies from the global learning environment. In this regard, digital networks can partially support the transferability of agglomeration economies across regional boundaries thereby reducing its dependence on locational constraints (Romano et al, 1999). It can also help in our understanding of apparent
innovative activities among rural manufacturing small and medium firms despite such environments being low in agglomeration. However, the tacit nature of critical knowledge necessary in the innovation process can reduce the impact of the web economy significantly.

Further, factors that favour proximity such as availability of timely information, importance of universities and research institutions and the provision of business services have been found to be particularly important for product innovation than process innovation (Shefer and Frenkel (1998). Although localisation economies, a cost reduction strategy, may help in our understanding of why rural SMEs can be found in particular locations and not others it cannot help in our understanding of the innovation process. To summarise, the theoretical underpinnings of agglomeration economies discussed above may not provide us with an understanding of the processes of technological innovation in rural SMEs but that static agglomeration could provide some explanations. The following sections will discuss the industrial district and clusters concepts respectively.

2.3.2 Industrial Districts

The industrial district\(^8\) concept originated with Marshall (1919) who observed the efficiency of an industrial organisation characterised by a network of firms. Marshall termed such a network an industrial district and concluded that its propelling factor was derived from geographical, historical and politico-psychological characteristics of the region. To enable such ‘districts’ to maintain their vitality external economy of agglomeration of a sufficient level is important. Marshall further enriched his

\(^8\) An industrial district can be defined as a concentration of SMEs involved in interdependent production processes, often in the same industry or industry segment, which are located in close
analysis by underlying the importance of shared location to include: direct face-to-face interaction between firms, exchange of information, and circulation of new ideas and diffusion of innovation. Marshall’s model also interconnected the economic, social and cultural resources of a territory by emphasising that the efficiency of a localised system of enterprises is for the most part an outcome of its socio-territorial context.

Thus contemporary researchers re-invented the industrial district concept, beginning with studies in the Third Italy (Bagnasco, 1977), which argued that the prevailing form of industrial organisation there was reminiscent of the Marshallian industrial district. Later, Becattini (1990) concluded that the Marshallian-type external economies of agglomeration found in industrial districts of the Third Italy are strongly anchored in the territory and should display a resolute irreversibility built on the historical and social structures of the district.

Braczyk et al. (1995) has interpreted industrial districts as localisation economies resulting from close linkages between flexible and specialised SMEs in the same industry contributing to the production of the same product group. Pyke (1992) has provided a more comprehensive definition of ‘...an industrial system that is composed of (generally) independent small firms, organised on a local or regional basis, belonging to the same industrial sector with the individual firms tending to specialise in a particular production phase, organised together, and with local institutions, through relationships of both competition and co-operation’ p.2.

proximity and are embedded in local institutional structures that support a dynamic mix of competition and co-operation (Becattini, 1992).
In explaining how industrial districts come into existence, Maillat (1995) explains that favourable socio-economic conditions in the form of homogeneous cultural attitudes and aspirations are important ingredients. Maillat further explains that family and community structures, the kinship and neighbourhood relationships become closely textured and give shape to the economy. Thus, the social characteristics, untraded interdependencies, give rise to systematic and stable relationships between enterprises beyond normal buyer-supplier interactions. This mode of ‘collective industrialisation’ is built on a pattern of networks with a strong social identity. The emergence of industrial districts is not without strong cultural and historical roots as those of the Third Italy are related to the last industrialisation of the country (Maillat, 1995).

In the industrial district, there is an implied linkage between the economic and the non-economic. Curran and Blackburn (1994) argue that the non-economic linkages have placed emphasis on the key role played by the social and political infrastructure of the district which include long established, close-knit communities cemented together by strongly developed, stable common value systems. They suggest that these non-economic linkages promote economic co-operation and trust by embedding economic relations in a wider web of spatial relations. In a study on the Italian regions, Putman (1993) presents a convincing case that variation in prosperity between regional economies was highly and positively associated with variation in the degree to which strong social capital⁹ were present or absent.

⁹ Unlike the economic view of human action that perceives individuals as resources that can be developed and that can shape environmental factors, social capital takes a sociological view of human action and perceives individuals as actors who are shaped by societal factors (Dakhli and De Clercq, 2004). Dakhli and De Clercq (2004) explains that the central proposition of social capital is that networks of relationships constitute, or lead to, resources that can be used for the good of the individual or collective. At the individual level, social capital has been defined as the resources embedded in one’s relationship with others, emphasizing the actual or potential benefits that one accrues from his/her network of formal and informal ties with others (Burt, 1992). At the organizational level, social
Technological dynamism in industrial districts is depended on the firm’s ability to maintain a particular balance of co-operation and competition. There are two principal aspects of co-operation among local producers in industrial districts. Firstly is the provision of collective goods or services, training or education and research and development which can be provided by a variety of institutional arrangements such as local business associations, trade unions or regional governments (Lawson and Lorenz, 1999). Lorenz (1992) explains that co-operation can also be in the form of adherence to certain norms of reciprocity such as sharing of technical information, subcontracting out to one’s less successful competitors, refraining from wage competition and labour poaching. Describing the Minneapolis medical equipment cluster, Lawson and Lorenz (1999) demonstrates that the concentration of expertise in the medical device area can be understood as resulting from a rich history of co-operative product development between local engineering

capital has been defined as the value to an organization in terms of the relationships formed by its members for the purpose of engaging in collective action (Freel, 2000).

In Contrast, human capital refers to individuals’ knowledge and abilities that allow for changes in action and economic growth (Coleman, 1988) and can be developed through formal training and education aimed at updating and renewing one’s capabilities in order to do well in society. Hence, firm-specific human capital refers to skills and knowledge that are valuable only within a specific firm hence having a limited impact on the level of innovative activity within a region or the wider society. Industry-specific human capital refers to knowledge derived from experience specific to an industry and can play an important role in the generation of innovative activity within an industry if it is characterized by high quality knowledge exchange among the main players within that industry (Bianchi, 2001). The presence of industry-related capital could play an important role in creating innovations when new product or process ideas result from the combination of intimate communication among network partners on the one hand and tacit know-how present in existing technology on the other hand (Dakhali and De Clercq, 2004). However, individual-specific human capital refers to knowledge that is applicable to a broad range of firms and industries and includes much of the personality and characteristics of the entrepreneur such as general managerial and entrepreneurial experience, the level of academic education and vocational training, and the individuals’ age (Pennings et al., 1998). Hence, Dakhali and De Clercq (2004) argue that those who are better educated, have more extensive work experience, and invest more time, energy, and resources in honing their skills are better able to secure higher benefits for themselves, and at the same time are better able to contribute to the overall well-being of the society.

10 Co-operation in this case can be regarded as a mode of co-ordination between firms whose activities are complementary (they intervene at different stages in the process of production) but are not similar (they do not have the same competencies)
firms and medical researchers working in the University of Minnesota Medical School, the Mayo Clinic and the Twin Cities Hospital with a significant commitment to research in these organisations dating back to the 1930s and 1940s. Herrigel (1993) found that SMEs in Baden-Wurttemberg valued cooperation and trust, as mechanisms that facilitate the transfer of information needed for production. For example, small specialist firms in mechanical engineering resort to cooperation to acquire the special technological expertise of suppliers. Pyke (1994) has underlined the importance of close inter-firm cooperation in explaining the success of Emilia-Romagna. Emphasising on the importance of cooperation, You and Wilkinson (1994) maintain that a high degree of cooperation may be an important ingredient of industrial success. Supporting the same view, Lazonick (1993) argues that domestic cooperation rather than competition is important in the innovation process, as global competitive advantage requires continuous innovation, which can only be sustained through domestic cooperation. However, the emphasis on co-operation does not explain the learning capacity of firms, discussed extensively under the milieu concept, or how they generate new knowledge, which is essential for innovation.

For industrial districts to survive, economic and non-economic actors must be integrated into regional, national and global networks acting as external growth stimuli through the utilisation of external sources of knowledge. Pihkala et al. (1999) observe that an important underlying characteristic of industrial districts is that they are 'naturally' born and not artificially 'induced'. Keeble et al. (1992) have argued that in the UK, the uneven integration into, and impact of globalisation of economic activities and the social effects of two severe recessions have not provided fertile ground for the emergence of industrial districts. Keeble et al. also observed that
massive urban redevelopment, population shift from inner cities to the suburbs and smaller towns and from urban to rural areas have all contributed to undermining existing community and social relations which are essential non-economic pre-conditions for industrial districts.

Studies of industrial districts of the past, such as the Ruhr, have highlighted some of their limitations. Grabher (1993) points out that the initial strength of the industrial district such as highly industrial atmosphere, highly developed and specialised infrastructure, the close inter-firm linkages can turn into an obstacle to innovation. This is because the close intra-regional relations embedded in long standing 'personal connections' can result in serious shortcomings in so called boundary-spanning functions which are important to in environmental scanning relevant for the firm.

Personal ties of long standing can also result in common language regarding technical matters, contracting rules, and knowledge on which the parties can draw in communicating with one another resulting in 'group-think' with negative consequences to the innovative activities of the firms (Grabher, 1993). Grabher also argues that personal cohesiveness and well-established relations can be another trap. Intensive relations can limit the perception of innovation opportunities leaving no room for those relations that transcend a firm's own narrowly circumscribed group and bring together information from different sources- the 'weakness of strong-ties'. Lechner and Dowling (2003) have argued that whereas strong ties add to depth, weak ties result in diversity. Hence successful firms first develop strong ties to get the maximum out of the relations and then add weak ties to gain diversity. Moreover, given relational constraints, they have to cut subsequently redundant strong ties and
use its time and energy to transform weak ties into strong ties in order to get again the maximum out of the relation. This leads to a continuous process in which weak-tie networking becomes more important over time (Lechner and Dowling, 2003). This argument suggests that innovative rural MSMEs with limited local networking opportunities can be at a disadvantage in ‘renewing’ their strong ties and in the process being unable to access new information which is necessary for innovation.

Similarly, Simmie (1997) argues that local allegiance, co-operation, trust relations, social and institutional solidarity are hard to find and have become increasingly rare in developed economies and are difficult to nurture in places where they do not already exist. Simmie further argues that analysis of industrial districts tend to ignore the significance and effects of the global economy as far as different areas are concerned as attention is focused often on the internal socio-political and institutional characteristics and therefore treating such areas as industrial islands as much as districts.

The concept of industrial districts has emphasised geographic proximity and concentration of economic resources and institutions as being important in the firm’s ability to be innovative. This implies that firms located in rural areas with sparse resources and less concentration of institutions are unlikely to generate the level of dynamism required by industrial districts. Further, the characteristics of firms in an industrial district being ‘SMEs in the same industrial sector contributing to the production of the same product group’ is unlikely to be found in rural areas except in clusters. However, one of the important ingredients that enable the evolution of industrial districts is homogeneous cultural attitudes and aspirations. Rural areas
often with a strong sense of communalism can be viewed as having the necessary potential where such cultural attitudes and aspirations can be found in abundance. Hence, the occurrence of innovative SMEs in rural areas could be an indication of earlier stages of the industrial district phenomenon.

From the foregoing discussion, it can be concluded that although aspects of industrial district concept such as the key role played by available infrastructure, long established and close-knit communities providing stable common value systems can provide important ingredients for the occurrence of innovative SMEs in rural areas, the clustering concept may shed more light into this phenomenon. It is also more common to find clusters of firms in the same or closely related industries in close proximity than the occurrence of industrial districts. The following section will discuss the clustering concept and its importance in the innovation process.

2.3.3 Clusters

Nadvi and Schmitz (1994) have defined clusters as comprising a group of firms in the same industry or closely related industries that are in close geographic proximity to one another that co-operate, due to common technologies or similar problems. However, Artherton (1999) defined clusters as "a grouping of closely linked businesses that develop multiple ongoing co-operative and inter-dependent relationships in order to acquire some common gain". Pg. 46. Schmitz (1995) explains that through collaboration, these businesses develop relationships in order to acquire wider economies of scale and scope.
The definitions of clusters can be expanded to include firms that are not just closely linked geographically but also those linked through the use of information technology networks. Through the use of such technologies, clusters of firms with similar requirements can be brought together across different geographical boundaries. Hence firms in rural areas can be linked with other firms and economic actors within the territorial location and across space in order to access dynamic agglomeration economies. The extent that this is possible is, however, dependent on the nature of information to be exchanged, as tacit information is more difficult to codify and transmit through telecommunication networks. Feldman (1993) argues that innovation is expected to exhibit strong geographic clustering because the process of bringing new products to market relies on specific scientific and technical knowledge, which are path-dependent.

The development of thinking about clusters, like industrial districts, has been influenced by Marshallian conclusion that co-operation between geographically close small businesses can generate additional benefit, for both the businesses and the economy as a whole. This can result in the development of a positive ‘industrial atmosphere’ in which specialised businesses share complementary capacity and knowledge.

Clusters are characterised by multiple actors such as firms and institutions that are relatively autonomous, in terms of decision-making and strategy formulation, whose interaction contains an element of both co-operation and rivalry (Porter and Solvell,

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11 Actors include firms and institutions found in a local milieu.
Clusters are also characterised by specific tangibles such as firms and infrastructure, intangibles such as knowledge and know-how, and institutions such as authorities and legal framework. Such elements make up a complex web of relations that tie the various economic actors together. The interaction between economic, socio-cultural, political and institutional actors in a given location can trigger learning and enhance the ability of actors to modify their behaviour and find new solutions in response to competitive changes. Capello (1999) argues that the concept of collective learning is at the basis of the cluster concept as common knowledge, which goes beyond the boundaries of the firm gives rise to a process of cumulative local know-how.

Lawson and Lorenz (1999) have argued that amongst regional clusters learning depends on tacit knowledge, which can be shared amongst organisations embodied in routines and procedures. Further, in order for new knowledge to be generated within the cluster, diverse knowledge has to be combined. This means that innovation depends on searching for new knowledge in close proximity to each firm’s existing knowledge base. Common codes of communication and interaction are particularly valuable when knowledge is tacit. This can result in the build-up of trust, which will inevitably improve the fluidity of knowledge and ease of communication through common language and cultural similarities in a cluster.

12 Anderson et al. (2004) suggested that there are seven elements that can be found within a cluster: geographic concentration- firms locate in geographic proximity due to hard factors such as external economies of scale as well as soft factors such as social capital and learning; specialization- centered around a core activity to which all actors are related; multiple actors- public support institutions, academic, private finance, and institutions for collaboration; competition and co-operation; critical mass; the cluster life cycle; innovation- firms in a cluster are involved in processes of technological, commercial and/or organizational change.
Regional clusters have been characterised as having their origin in some specific local factor conditions, local demand or related industry (Enright, 1998). Enright argues that the forces that have fostered the subsequent growth of regional clusters are not necessarily the same as those that gave the location its initial advantage. Subsequent growth is mainly due to the creation of industry-specific knowledge, development of supplier and buyer networks, and local competitive pressures that force firms to innovate. Enright further argues that the frequent interaction and rapid information flows found in most regional clusters tend to enhance the innovative performance of such clusters and that the informal and oral information provides key communication about market needs and technological possibilities that lead to innovation. Thus, it is in this type of interaction that a geographically concentrated industry configuration has a substantial advantage over a dispersed configuration.

In their recent study of the Aberdeen oil complex, Mackinnon et al (2004) found that most firms had developed a range of contacts that included customers, suppliers, firms in similar areas of business and public agencies in addition to the 'strong ties' of friends and family. Hence, they argue that in this sense, the Aberdeen cluster is often described as a 'village' where a shared experience of oil related development has generated close relationships between key actors. In addition, Mackinnon et al (2004) explains that as a location, Aberdeen offers distinct advantages to oil-related firms by providing access to crucial forms of industry-specific information and expertise. In this sense, the 'local milieu matters' and 'being there' offers firms recognition and credibility within the international oil industry.
There are several important roles of clusters, which include creation of industry-specific skills. Over time, knowledge cumulates as skills are handed down from person to person forming explicit knowledge. Another important role of clusters is that it provides a stimulus for public and private investments including commercial research and specialised training by local industry associations and universities, which enable firms to leverage their own investments in innovative activities. Regional clusters that dominate local economies also provide a focus for the innovative effort of local communities (Enright, 1998).

However, there are some limitations with regards to the relevance of clusters to the practice of business development with potential barriers to the transfer of insight from theory to practice and from one case and context to others. Clusters can be regarded as being exceptions, in the sense of exceptional configurations, embedded within specific contexts. Various authors have argued that lessons learnt from studying a particular cluster can be applied with limited success to other clusters, given the importance of historical roots, social embeddedness, and a supportive local institutional framework (Garofoli, 1992; Asheim, 1992; Amin, 1992). Curran and Blackburn (1994) argue that “whatever the utility of the thesis in discussing areas in Italy, or elsewhere outside the UK, the examination of the thesis applicability to contemporary Britain showed that it was hopelessly over-stretched to the point of distortion” pg. 23.

Artherton (1999) argued that the above limitations can be addressed on the basis of one’s ability to differentiate between the context within which the cluster operates and the generic dynamics and principles of business-to-business co-operation. Atherton
explains that in theory, an ability to distinguish the context from the clustering activity offers a clear framework for identifying business practice. The second argument against the above critique is that of one’s ability to re-contextualise or localise the business clustering practices from a particular context thus offering opportunities for developing a structured approach to clusters development (Artherton, 1999).

It is important to emphasise that clustering occurs due to the ability of firms to take advantage of a local concentration of resources (Porter, 1990). This is because proximity even in rural context provides critical strategic inputs to the firms in such locales. Smith (1994) argues that firms in clusters compete not by producing the same product cheaper, but by producing new products with new performance characteristics and new technical capabilities. The clustering concept can therefore help us in understanding ‘deviant’ cases of firms, which locate away from core regions in rural areas (Vaessen and Keeble, 1995). Firms within a cluster may be as result of spin-offs from an existing firm or spillovers from research activities of universities or a new start-up. Further, Rosenfeld (1996) argues that clusters can develop in rural areas if one uses ‘a looser definition of clusters’ pg. 19. Malecki and Poehling (1999) have described a rural cluster as likely to be smaller and/or dispersed across a larger region than traditional clusters with links predominantly outside the region. The next section will discuss the milieu concept, which emphasise the importance of territorial aspects of innovation.

2.3.4 Milieu

The concept of milieu, evolved from studies by Aydalot (1984) who was seeking to understand a phenomenon of transformation of spatial hierarchies on French territory.
It is based on the role played by the territorial context in the processes of learning and innovation (Maillat, 1995). Christopoulos (1999) has defined the 'milieu' as the socio-economic environment of a region, produced by the interactions of firms, socio-political institutions and labour resulting in a set of relationships that bring unity to a production system (consisting of firms, research, training institutions, local authorities), and an industrial culture. Such an 'environment' is believed to generate a localised dynamic process of collective learning that act as an uncertainty-reducing mechanism in the innovative process thus generating 'codified' attitudes and behaviours forming the basis of organisation and regulation of the milieu (Camagni, 1995; Maillat, 1998).

Within a milieu, the process of learning from and with one another is brought about by the activity of participating actors, the mobility of labour, the interconnections between suppliers, and face-to-face contacts that are determined by geographical proximity. Lundvall (1992) explains that learning is predominantly an interactive process, and therefore a socially embedded process, which cannot be understood without taking into consideration its institutional and cultural context. Similarly, Camagni (1991) argues that 'technological innovation...is increasingly a product of social innovation, a process happening at the intra-regional level in the form of collective learning processes...'. p. 8. The concept of collective learning is at the basis of the milieu concept as it implies the capacity of a particular region to generate or facilitate innovative behaviour by the firms found within it (Camagni, 1995). This is because the presence of common knowledge, which goes beyond the boundaries of the individual firm but remains within the milieu, gives rise to a process of cumulative know-how (Capello, 1999). Dimou (1994) in a study of Roanne district in France
found that because weaving has been performed for almost two centuries, knowledge has been transmitted from generation to generation, which has allowed for the spreading of technical know-how and craftsmanship. Camagni (1995) argue that learning is not simply the acquisition of information, and in fact the availability of information is not a central issue. Instead, Camagni maintains that it is the process by which information becomes knowledge that is the main focus.

Firms within the milieu seek to cope with the problem of uncertainty by developing a 'transcoding function' that translates external information into a language that each firm can understand (Lawson and Lorenz, 1999). Lawson and Lorenz argue that crucial to this process is the emergence of a common language and culture, untraded interdependencies, that act as preconditions for such transcoding to take place. Such common language and culture emerge due to the labour mobility between firms, spin-off activities as well as through imitation, emulation, and reverse engineering. The factors that facilitate the emergence of common language and culture do not necessarily enable knowledge to be transferred directly but can be seen as part of the social context in which learning occurs and new knowledge generated. Lawson and Lorenz (1999) argue that common language provides a clear understanding and mutual consensus over the rules and provides a basis for the progressive build-up of trust, which is arguably indispensable for innovative collaboration. Regional collective learning can therefore be understood as the emergence of basic common knowledge and procedures across a set of geographically proximate firms, which facilitates co-operation and solutions to common problems (Keeble et al., 1999).
Keeble et al. (1999) has pointed out that the most important, but mostly elusive and difficult to measure aspect of regional collective learning is the need for preconditions for learning. In their study, Keeble et al. found two key sources of regional codes of behaviour, namely the University of Cambridge and a small group of large local R&D consultancies. Hence, the University of Cambridge was found to be characterised by "general positive attitudes towards research collaboration, sharing and the development of new knowledge which appear to have spilled over into and helped shape, to a considerable degree, the wider culture of the local research based business community, via university spin-offs, researcher recruitment and direct research collaboration" (Keeble et al, 1999. Pg.323). Keeble et al. argue that such attitudes and rules provide a local cultural context which is particularly conducive to the development of innovative and cross-fertilisation research within and between local firms. The key mechanisms or processes of collective learning are: the degree of local movement and spin-off of embodied technological and managerial expertise in the form of entrepreneurs; the frequency and importance of inter-firm networking and interaction; and the importance of flows of research and professional staff between local firms (Keeble et al., 1999). Lundvall and Johnson (1994) argue that firms of the learning economy are to a large extent 'learning organisations'. Therefore, a learning organisation is one that promotes the learning of all its members and has the capacity to continuously transform itself by rapidly adapting to changing environments by adopting and developing innovations (Weinstein, 1992).

The central assumption underpinning the milieu concept is that the innovative firm is not a predetermined entity but is generated by the former, with innovative behaviour dependent upon variables that are better related to the local or regional level and that
there are specific territorial dynamics capable of setting up territorial development of innovation (Maillat, 1995). Maillat et al. (1994) further argue that differences in regional innovation process are attributed to the specificity of the milieu, which 'metabolise' technologies, markets and resources in different ways, thereby opening up new and original opportunities for a region. Apart from generating original opportunities, the milieu needs external from outside the system in terms of new opportunities to maintain its vitality. While the capabilities of an individual employee can be transferred to other geographical regions, regional capability rooted in particular patterns of inter-firm networking and in inter-personal connection cannot and is only built over time (Foss, 1996).

A milieu is thus characterised by a coherence that enables it to differentiate itself from the others and to benefit from advantages that it has been able to create. However, it can only remain dynamic if it is in tune with the external environment. To achieve this, the firms within a milieu must be constantly capable of interpreting what is happening in their technological and market environments so as to ensure the vitality of the milieu. Keeble et al. (1999) in their analysis of firms located within the 'Cambridge milieu' found that 48% of firms had collaborative research activity with other firms in the UK and 37% with foreign firms, compared with only 14% locally. Similarly, Varaldo and Ferrucci (1996) observed in the case of Italian industrial districts that to develop, firms have had to evolve networks beyond their community for external sources of learning, knowledge and innovation. Thus, national and global research networks are seen as important as they enable local firms to access the latest technological knowledge from around the globe thus avoiding a technological 'lock-in'. Although local firms must be involved in the process and local entrepreneurship
should be dynamic, external activities must be attracted into the region in order to address local deficiencies. A milieu can, therefore, be seen as an active territorial organisation capable of creating specific and differentiated resources and of actuating development and innovation process (Maillat, 1998). Maillat (1995) points out that although it has been accepted that industrial dynamic has an effect on determining the development of regional systems, so does territorial organisation of productive activities, which contribute just as significantly to increasing their capabilities especially in technical-technological order has rarely been recognised.

The effect of globalisation on the territorial production systems has also been said to make them compete with each other and subject them to the need to innovate and acquire comparative advantages. This makes a territory attractive, not because of its locational factors but its production system’s ability to create specific resources and to generate innovation process. The OECD (1993) argues that: “In order to meet the needs of the markets, the companies (and especially the small ones) in a given industry must find in their immediate environment advantages in the form of strategic inputs such as information on markets and technologies, commercial prospection, management advice, technology transfers, training of labour, financing of innovation and risk, etc...in this sense and to the extent that a critical mass of resources has been mobilised, the innovative milieu can contribute to reducing both the uncertainties and cost of transactions, thus becoming a place of innovation incubation and information amplification, acting as a supplier of strategic resources and externalities and as a bridge to the outside world”. Pg13. The milieu concept posits that the starting point of development is the territory (Capello, 1999). Innovation is therefore seen as a creation of a milieu and a fruit of the inventiveness of the milieu and is a response to
the needs of local development. Aydalot (1984) argues that however advanced the innovation, it will be successful only if it is built on the elements of continuity of experience gained within the milieu.

The milieu theory, however, raises several questions. One of the questions has been on whether the milieu represents a general model of regional development or a peculiar model suited to highly unique circumstances (Bergman et al, 1991). The milieu theory has been criticised that it has neither been unequivocally defined nor a comprehensive economic rationale by which milieu fosters innovation. Although the milieu is suggestive of something intangible, ‘in the air’, which permits innovativeness to proceed in some place and not others, Storper (1995) points out that it has a circularity: “innovation occurs because of a milieu, and a milieu is what exists in regions where there is innovation” p.203. Storper argues that the milieu concept does not reveal what it is about regions in innovation that is essential to contemporary capitalist development. Camagni (1995) also points out that the milieu may become a constraint rather than an element of strength in local systems when they face environmental discontinuities on a vast scale. The proponents of the milieu concept, however, argue that economic progress is fundamentally about creation of knowledge and resources and that the process cannot be derived from the calculations of the rational actor on the margin. Rather, Storper (1995) argues that how economic actors reason and interact is in large part a product of their context, and this context is likely to have territorial boundaries and specificities and thus the process of economic creativity by such actors should depend on their milieu.
The above discussion of the milieu also raises some fundamental questions about the frequency of occurrence of such regions and its applicability to rural areas. Recent studies by Longhi (1999) in Sophia-Antipolis, in France, can help in our understanding of the milieu concept within a rural context. Although the area had the general advantages such as attractive climate and infrastructure, it appeared to be institutionally and economically exogenous to the local milieu. Unlike the Cambridge milieu, for example, with a strong culture of collective learning with a strong science base and social networking, Longhi (1999) explains that Sophia-Antipolis was without a strong science base and characterised until recently by weakness of local interactions. Thus in contrast to Cambridge, Sophia-Antipolis thrived predominantly on attraction of external resources by international firms located in it making major investments, which enabled them to operate without local linkages (although this has changed in the 1990s with the emergence of more regional linkages). Longhi asserts that this model is exactly the reverse of the established model because large firms arrived first followed by services and SMEs, and finally the university.

Longhi (1999) suggests that the development of Sophia-Antipolis has mainly been characterised by the location of large national and international firms who have implanted their own resources, including human resources. The mass effect created by the process of accumulation of activities obviously resulted in internal dynamics and positive feedback generating agglomeration economies and creating an innovative milieu. Longhi (1999) observes that the growth of Sophia-Antipolis can be described as a ‘satellite platform’, which is a system directed from the outside, rich in external connections but deprived of internal linkages. This process of development is generally hostile to the processes of collective learning, a key to the milieu concept.
This observation is particularly powerful in our understanding of the processes by which a milieu comes into being. Rather than be seen as 'a given' place, a milieu is created by the dynamic interaction of various internal and external factors to give it a distinctive identity, thus a milieu.

Similarly, Malecki (1991) points out that it is generally assumed that innovative areas are often located within or adjacent to core regions. An extensive empirical study by Davelaar and Nijkamp (1997) shows that the link between a favourable production milieu and a firm's innovativeness is generally weak and that remote areas are in fact well equipped with firms with innovation potential. Similarly, Kalantaridis and Pheby (1999) found that Bedfordshire despite having a favourable 'milieu' failed to translate this into innovative activity in the locality.

From the foregoing, it can be concluded that the concept of the milieu brings not only specific successful geographical areas and regions but also rural areas with no previous industrial history to the limelight. The territorial specificities thus enable the emergence of new dynamic productive regions with demonstrable adaptive capacity to the new conditions of production and trade (Bernadette, 2000). Hence rural areas are potential such areas. The central thrust of the milieu concept is the collective learning process, which fosters innovation. The process of collective learning discussed in this section has emphasised the elements of trust and cooperation as being important. The 'closeness and sense of belonging' found in rural communities provides fertile grounds for the emergence of trust and cooperation and to an extent collective learning. It can be concluded that the milieu concept can help in our
understanding of the processes of innovation in rural SMEs. Section 3.2 will discuss concepts that emphasise learning as being important in the innovation process.

### 2.4 Section III - Emerging Issues

The review of the systemic approaches to technological innovation has pointed at the importance of key conceptual issues of scholarly enquiry. These include the issue of the nature of information that is transferable between different actors within an innovation system and how innovative SMEs are founded or where they derive their innovative ideas. This raises the issue of sticky or impacted information as well as spin-offs and spillover. Further, the systemic approaches have emphasised the importance of core-areas as lowering the cost of transactions hence traded interdependencies. However, the interdependent actions of actors within the social context of the innovation system are seen as important in fostering learning and therefore emphasising untraded interdependencies and networks.

#### 2.4.1 Sticky or impacted information

There has been a tendency in economic theory to view information as costless to transfer. The issue of information is of particular importance to firms located in rural areas, which are generally viewed as distant from the supportive environments that assist firms in their search for information, and communication flows with other firms and institutions (Malecki and Poehling, 1999). Indeed, it has not always been clear that technical information used by innovators in the course of their problem solving work might be costly to transfer from place to place either physically or 'virtually' at a single locus (Hippel, 1998). Hippel argues that the need to transfer information from its point of origin to a specific problem-solving site will not affect the location
of problem-solving activity when that information can be shifted at no or little cost. Although information technology has speeded up the codification of knowledge enabling large chunks of knowledge to be transmitted over computer and communication networks, there are some types of knowledge that are more difficult to codify and exchange in a market (Frybourg, 1997). Hippel (1998) argues that when knowledge is costly to acquire, transfer and use—i.e. “sticky”—the location of the problem-solving activity can be affected significantly. Hippel suggests that several reasons have been given as to why knowledge can be sticky including the nature of information itself, the amount of knowledge to be transferred, and the characteristics of the seekers and providers of the knowledge.

Knowledge can be sticky due to the nature of the knowledge that is to be transferred. It is worth acknowledging that some knowledge is available in explicit forms while others are “tacit”. Hippel (1998) argues that tacit knowledge is like an art, which cannot be specified in detail and, therefore, cannot be transmitted by prescription since no prescription for it exists and that such information is often relatively costly and difficult to acquire, learn to use, and diffuse. Subjective insights, intuitions and hunches fall into this category of knowledge. Tacit knowledge is also often deeply rooted in an individual’s action and experience, as well as in the ideals, values or emotions they embrace (Nonaka and Takeuchi, 1998). Nonaka and Takeuchi points out further that tacit knowledge can be segmented into technical and cognitive dimensions. Hence, technical dimension includes the kind of informal and hard to pin down skills or crafts captured in the term ‘know-how’ which is obtained through experience and is difficult to articulate the underlying technical and scientific principles. However, cognitive or perceptive knowledge are often so ingrained that
they are taken for granted and yet they profoundly shape how one perceives the world around them. Because tacit knowledge cannot be divorced from its individual, social and territorial context, it can only be purchased, if at all, via the labour market as embodied knowledge and not in the form of patents (Hudson, 1999).

In contrast, explicit or generic knowledge tends to be available to a wide variety of uses and users. Explicit knowledge can be expressed in words and numbers, and easily communicated in the form of hard data, scientific formulae or codified procedures (Nonaka and Takeuchi, 1998). Such knowledge tends to be "the stock in trade of professionals" in a field, and there tends to grow a systematic way of describing and communicating such knowledge, so that when new generic knowledge is created anywhere, it is relatively costless to communicate (Nelson, 1990).

Hippel (1998) explains that the amount of information to be transferred can result in stickiness of information. This is because the cost of transferring information sufficient to solve a given innovation-related problem will vary according to the amount of information required by the problem-solver. Further, information can also be sticky because organisations must have or acquire related information and skills to be able to use the new information that may be transferred to them.

Characteristics of the information seekers and providers also affect the stickiness of knowledge. This is because innovations often require specialised personnel or upgrading of skills of current personnel, which can significantly affect the cost of transferring a given unit of information between organisations. The decisions of
knowledge possessors as to the pricing of access to proprietary information also
directly affect the stickiness of that information (Hippel, 1998).

Hippel (1998) argues that the effect of sticky information is that when information
costs are significantly high, there will be a tendency to carry out innovation-related
problem solving at the location of the sticky information to minimise transfer costs,
other factors being equal. When the cost of locating problem solving to the location
of the sticky information is considered to be high, efforts will sometimes be made to
invest in "un-sticking" some of the information through 'expert systems' to convert
information from tacit to the more explicit and easily transferable form.

Although modern information and communication technologies (ICTs) provides more
flexibility and opportunities for firms to be established in areas other than those with
dense population of firms, the nature of information to be transferred can affect the
effectiveness of ICTs. However, the use of knowledge conversion systems such as
video conferencing and e-mail can enhance the learning mechanism related to the
conversion of tacit to explicit knowledge. Moreover, the use of devices such as the
telephone, world-wide-web based audio-conferencing, chat systems, computer
conferences, can also enable individuals to exchange and combine information.
Hence, Breschi and Malerba (1996) concluded that a fundamental implication of the
argument is that the nature of knowledge can strongly affect the way technological
opportunities and knowledge externalities are transmitted among distant firms.
2.4.2 Untraded Interdependencies

Orthodox economic theory has emphasised the input-output relations as being a cost minimisation strategy by firms engaged in an innovative network (refer agglomeration concept). Consequently, disintegration of production from core-areas raises the transaction costs of traded-interdependencies (input-output relations) and therefore justifying agglomeration as being an outcome of the minimisation of these transaction costs (Storper, 1995). Evolutionary economics, however, holds that technological change is an inextricable part of an economic system, which is not principally the result of allocational adjustments but of interdependent actions in which the forces that allow the parameters of cost minimisation are central (Dosi et al., 1990).

Harrison (1994) explains that according to the industrial district concept, a wave of economic growth in a number of regions in east and north-central Italy and Silicon Valley in North America is said to be led by highly spatially concentrated networks of mostly small and medium-sized enterprises characterised by substantial local interfirm linkages. Harrison argues that the embedding of these clusters of producers within local social, cultural and political institutions are often seen to be place-specific thus reinforcing the willingness or inclination of SMEs to subordinate their competitive tendencies to the need for cooperation and collaboration. This has increasingly led attention to be focused on industrial agglomeration being turned from economic to social and cultural reasons such as social consensus and collective learning (Hassink, 1997).

The untraded interdependency concept stresses the importance of the social context of industrial development (Amin and Thrift, 1994; Grabher, 1993). In particular, Lorenz
(1992) and Dakhali and De Clercq (2004) have stressed on the importance of trust\textsuperscript{13}, while Morgan (1995) stresses the interactive process of innovation and its contextual setting as shaped by a variety of institutional routines and social conventions. Morgan goes on to develop the concept of the learning region as enabling firms to upgrade their competitiveness rather than relocate away from the region. Untraded interdependencies can therefore be summarised as referring to the role that labour markets, regional conventions, norms and values, public or semi-public institutions attach to the process of economic and organisational learning and co-ordination. Storper (1995) argues that where these are localised, which is often the case in technological dynamism, then the region can be said to be a key element in the ‘supply architecture’ for learning and innovation.

Learning\textsuperscript{14} is one of the aspects of the untraded-interdependency concept. Expounding on the evolutionary economic theory, Storper (1995) argues that technologies are the products of interdependent choices, which means uncertainty, since it is difficult to determine the course of action of others upon whom our choices are dependent. Storper argues that this is an external economy, which benefits those who follow suit in both cost and feasibility terms. There are reasons why producers tend to follow certain pathways, beyond the external economies characterised by significant technological spillovers (Storper, 1995). Romer (1990) argues that often knowing how to do one thing is consequent upon knowing how to, or key to, do another. Hence, an economy is seen as consisting of ‘spaces’ or fields of endeavour.

\textsuperscript{13} Trust can be defined as the judgment one makes on the basis of one’s past interactions with others that they will seek to act in ways that favor one’s interests, rather than harm them, in circumstances that remain to be defined (Lorenz, 1999).

\textsuperscript{14} Learning is the process by which knowledge and skill is assimilated and diffused on among firms in a milieu as a result of interaction between the various economic actors.
in part having to do with the density of non-traded technological connections between them (e.g. common types of knowledge or knowledge of how to work similar types of materials or inputs).

Underlying the innovation process is, by definition, a learning process (Lazonick and O'Sullivan (1995). The new understanding of the institutional context of a learning economy emphasises the socio-cultural structures as a necessary prerequisite for regions striving to be innovative in a post-Fordist global economy, where the socio-economic structures represent the contemporary basis for the development of a 'learning economy' (Amin and Thrift, 1994; Grabher, 1993). Because learning is often an interactive process (please refer to milieu concept for a detailed discussion on learning) industries located in core areas tend to display a higher level of formal R&D than their counter-parts in rural areas. Hence, it can be expected that learning tends to occur more in core areas than in rural areas. However, the strong socio-cultural structures in rural areas can enable firms to compensate by relying on other forms of innovative activity (Asheim and Isaksen, 1997).

Asheim and Isaksen argue that locally controlled independent SMEs often build their competitive advantage on localised learning processes. In addition to the informal, practical and tacit knowledge of 'learning by doing' such learning processes depend on the important category of localised, codified knowledge. Asheim and Isaksen (1997) argue that localised codified knowledge can provide the basis for 'learning by interacting' which represents a more advanced form of learning than 'learning by doing' and 'learning by using', which are not primarily based on tacit knowledge.
Because knowledge in the form of embodied technical progress cannot be exported independent of social institutions, such institutions can be used to generate innovation and economic development (Lazonick and O'Sullivan, 1995). We can therefore conclude that the territorial dimension of innovation is important in the sense that innovation process is in part based on resources that are place-specific, i.e. resources tied to particular places which cannot be copied or reproduced elsewhere (Asheim and Isaksen, 1997; Todtling, 1994).

More recently, research exploring the link between territorial dimension and learning have questioned the connection between location and information acquisition arguing that this can only be understood by looking at diverse industries, regions and locations and that the results must be interpreted in the context of demand as well as supply (Fuellhart and Glasmeier, 2003; Malecki and Veldhoen, 1993). Hence, to assume that SMEs in a region rich with governmental programmes and universities actually use sources for information when empirical evidence clearly shows that some SMEs do not generally use these institutions, is to make a somewhat tenuous leap (Harrison, 1994). It will therefore be interesting to examine the learning processes in rural areas under this study with a view to establishing to what extent it explains the occurrence of innovative manufacturing SMEs.

Another aspect of untraded interdependency is that of conventions and routines. Production systems often involve uncertainties of several kinds, including between producers in the input-output chain, because markets have fluctuations of some sort (Storper, 1995). Storper explains that the main way that such uncertainty is resolved
is through conventions, which are often taken for granted. Rules and routines between partners in different kinds of relations defined by uncertainty may not only result in collective action but also impede it through the problem of sclerosis' or lock-in. Conventions and routines form the concept of business institution, which consist of a habitual pattern of behaviour embodying knowledge that is often tacit (Langlois and Robertson, 1995). Morgan (1997) argues that conventions and routines may help regulate economic life, for example by reducing uncertainty. Lorenz (1991), however, argues that much still needs to be known about the different kinds of conventions, which construct efficient and dynamic production, and those that favour technological or institutional lock-in. In a study of Baden-Wurttemberg, Herrigel (1993) found that the institutionalisation of cooperation, trust and power resulted in a repertoire of traditional values and symbols local to the area. Further, Herrigel explains that the traditions of Protestantism in the region have infused the language actors use to understand their behaviour resulting in actors stressing the importance of openness in their organisation. Herrigel cautions that this is in no way conclusive as the prevalence of similar Protestant belief in Scotland, for example, has not increased the incidence of industrial cooperation in that region. Similarly, a study by Dakhli and De Clercq (2004) found that the relationship between norms of civic behaviour and innovation to be weak and even negative for one of the innovation measures that they used. They argue that one possible explanation could be that adherence to norms that reflect general tendency of 'being a good citizen' is generally contradictory to the general willingness to deviate from existing rules and procedures that has often been shown to be necessary for innovative activities.
Brusco (1992) argues that the combination of closely interdependent small firms and a positive supportive physical and organisational infrastructure found in the Italian districts misses something. Beccatini (1990) identifies this 'something' as an attitude of trust born either out of 'historical and cultural vestiges' or of the experience of repeated contracting with one another. Harrison (1994) therefore argues that the relationship between the daily economic relations and the deeper context of social and political institutions, norms and tacit rules is a consequence or manifestation of trust. Thus, Lorenz (1989) in his studies of the evolution of subcontracting relationships among the mechanical engineering firms around the French town of Lyons reports that an emotive vocabulary emerged continually, emphasising partnership, loyalty, morality and especially mutual trust. Contrasting the institutional frameworks for trust between Britain and Germany, Bachmann (1999) points at the deregulation policy over the past fifteen years as having weakened the British socio-economic system. This has resulted in the inability of British trade associations to provide general guidelines of behaviour amongst their members in order to produce system trust. Early research in the United States of America also suggested that industry and trade meetings as been of questionable value as a source of useful external information. For example, Aguilar (1967) argued that 'exchange of information that takes place at such forums are often referred to as 'swapping lies'. However, Bachmann (1999) state that in contrast, the German trade associations where membership is almost compulsory can be regarded as an efficient tool of self-organised monitoring of the behaviour of individual firms hence producing system trust. Through work groups, members of trade associations frequently exchange economic and technical knowledge, essential for technological innovation, and also act as a conducive atmosphere for generating and monitoring the rules and standards
of business behaviour (Bachmann, 1999). Similarly, a study by Fuellhart and Glasmeier (2003) found that industry and trade meetings are of significant importance to many firms who regard information gathered from such meetings as being both credible and relevant.

Harrison (1994) argues that the source of trust is experience-as trust is built over a period of time, through continual contracting and re-contracting, through informal deal-making, through one firm or group's offering assistance to another in moments of stress, and through mutual reinforcement in responding to contingency. This raises the question of proximity as trust can best be built through learning, which if it requires repeated interaction, is likely to be facilitated by personal contact, and that contact, it is assumed, is in turn enhanced by geographical proximity (Sabel, 1992). Bernardy (1999) in his study of Grenoble region of France found that 'personal address books' played an important role in obtaining quick answers to problems and reactions to new ideas. Bernardy argues that such informal, local social networks and untraded interdependencies can play an important role in obtaining friendly advice. Similarly, Sabel (1992) writing on the Italian, German and French regions emphasise the role of trust in the wage determination process. Sabel observed that the local adjustment to the minimum wage are negotiated largely through informal deals subject to a common understanding that the flexible deployment of labour and machinery, believed to be the key to the regions or districts competitiveness, will not be compromised. Asheim (1996) argues that "the presence of trust can stimulate the introduction of new technology into industrial districts in addition to reducing transaction costs..." p.g.38.
The untraded interdependency concept highlighted above has emphasised the importance of socio-cultural factors in the innovation process. Thus, trust, conventions and routines have been discussed as being important in the localised learning process. Because technically embodied knowledge cannot be exported independent of its social context, firms must find in their immediate environment such institutions to provide them with innovative inputs. The importance of trust in network development has been discussed in section 3.3.2. Untraded interdependency theory has the potential of helping in our understanding of the occurrence of innovative SMEs in rural areas by looking at the socio-cultural factors that promotes their activities.

2.4.3 Spin-offs and Spillovers

That small and medium enterprise are the engine of technological innovation in certain industries despite an obvious lack of formal research and development raises the important question of where they obtain the innovation producing inputs. Jaffe et al. (1993) reports an important finding that investment in R&D made by private corporations and universities “spills over” for economic exploitation by third party firms. Perhankangas and Kauranen (1996) has defined a ‘spin-off as an independent firm fulfilling two criteria: (a) the start-up of a new business by an agent previously belonging to another local firm, (b) the derivation of the business idea leading to the formation of a new firm from previous employment of the founder. Acs and Audretsch (1993) explained that spin-offs are the result of an employee from an established company, often a scientist or engineer working in a research laboratory, having an idea for an innovation. Due to lower valuation of the new product by the
employer and a subsequent decision not to pursue its development, the employee may decide to start his/her own firm. Since the knowledge was generated in the established firm, the new firm is considered to be a 'spin-off' from the existing firm. Keeble et al. (1999) in their analysis of firms located within the Cambridge region found that 88% of firms studied were originally set up as entirely new independent start-ups or spin-offs from an existing firm or institution while 81% of these were set up by founders who were previously working within the Cambridge region, and most frequently for a local firm (56%).

Start-up of new firms is especially important in our understanding of innovative firms in rural areas. Smallbone et al. (1997) have emphasised that the increasing population growth of remote rural areas has been largely due to the inflow of economically active households from elsewhere in the UK with the resultant effect of expansion of labour supply and an increase in the pool of potential entrepreneurs. This, they argue, is providing a stimulus of new business formation with innovative potential.

Spin-offs mainly occur within a milieu, which provide preconditions for these phenomena to occur (Capello, 1999; Longhi, 1999). Capello further explained that trust and a common sense of belonging to the same cultural society and knowledge of the market provided by stable interactions with supplier's known in the previous job are important conditions. Further, a receptive local demand of particular products developed in the previous job, and the presence of external economies is also important preconditions of a milieu. Within rural areas, preferences for physical and environmental conditions have been found to be a contributing factor in attracting skilled labour and would-be entrepreneurs to the 'peace and quiet' of the countryside.
(Tarling et al, 1993). Tarling et al. have pointed out that the relatively strong performance of manufacturing industry in rural areas has been driven by the higher rate of new firm formation with the majority of the founders being immigrants. Within this context, rural areas can be said to provide a milieu, which is conducive to new firm formation from entrepreneurs with ideas from their previous work experience.

The importance of universities as a source of innovation-generating knowledge that is available to private enterprise for commercial exploitation cannot be overemphasised. A number of studies have found persuasive evidence that knowledge created in university laboratories do contribute to the generation of commercial innovations by private enterprises (Acs et al (1994). For example, the importance of Stanford University in the origin of the Silicon Valley has been documented (Castells and Hall, 1994). Several factors have been offered to explain how university spillovers occur. These include encouragement of research excellence coupled with research funding; encouragement of research in areas where business start-up costs are low; encouragement of individual flair; permissive attitude to intellectual property rights; and development of products with rapidly rising demand. Lawson and Lorenz (1999) found in their study that the multidisciplinary competence required in 'high-technology' innovation resulted from the University of Minnesota's commitment to medical related engineering. Storper (1995) however argues that this logic works only when innovation is strongly formal science-based and is by no means a universal logic. For example, the Siberia branch of the Russian Academy of Sciences in Akademgorodok failed to transform the area into a Technopoles due to political and administrative constraints (Castells and Hall, 1994).
Feldman (1993) adds that universities are important in the innovation process as they emphasise the free exchange and flow of information and that their existence in an area creates a sort of 'intellectual commons'. Similarly, Lawson and Lorenz (1999) in their studies found that there was a certain spirit of knowledge openness, as the universities sought no effort to obtain royalties on the inventions of its employees. Lawson and Lorenz observed that this culture has changed significantly in the 1990s resulting in more restrictions on knowledge flows by some firms in the clusters. This has partly been attributed to the governments urging universities to promote a new commercial mission with a resultant effect that a new culture based on greater restriction of knowledge flows with potential negative impact on innovation. Universities can also assume a more entrepreneurial role by supporting the process of spin-off of their research into a network of industrial firms and business ventures (Castell and Hall, 1994). This is particularly exemplified by Stanford University, which supported spin-offs in its industrial park resulting in the growth of Silicon Valley into a technopole. Similarly, location survey of Boston's Highway 128 high-technology companies show that the "critical factors for maintaining their location here is direct access to one of the largest concentrations of academic, scientific, and engineering talent in the world" (Castells and Hall, 1994; pg. 31. It is also possible for universities to encourage and allow their faculty members to set up businesses by themselves, either by leaving the university to start a company or work part-time.

Unlike the notion that knowledge is a public good easily transferred via publications, gaining commercial control over new technology requires access to individuals who can turn information into knowledge (Nelson, 1989). Grefsheim et al. (1991) have
highlighted the importance of face-to-face interaction. Sternberg (1999) in his study concluded that personal contacts with colleagues from previous jobs are essentially more frequent whenever the employer was a research institution and not a private firm. Personal contacts between colleagues at other research institutions were also found to frequently lead to co-operation than in cases where the previous job was in a firm. Keeble et al. (1999), however, found in their study of the Cambridge region that 75% of the firms retained links with the parent or incubating company involving a wide range of interactions. These ranged from continuing personal contacts, swapping ideas and helpful comments to more formal sub-contracting, share holding or joint venturing arrangements.

The importance of universities and research institutions in knowledge spillover is however not universal. In a study of Austria, Todtling (1990) found that often there was an 'ivory tower mentality' amongst the universities with little interest to cooperate with SMEs. However, a study of three universities located in Styria indicated that they pursued a vigorous cooperation strategy with firms with specific institutes for external contacts established at the University of Karl-Franzens and at the Technical University.

University spillovers are not only beneficial to areas with high agglomeration but can also be important to firms located in rural areas through the use of various networks. Through cooperation in networks, firms located in rural areas can benefit from university spillovers through the establishment of a cooperation agreement with universities located outside their region. Recent advances in information and communication technologies has made it feasible for firms to participate in national
and global innovative environments and therefore opening up opportunities for firms in rural areas. This is particularly possible where the nature of information is not sticky and can be transmitted between distant firms. Firms located in rural areas can also benefit from university spillovers through technological cooperation agreements and strategic alliances with firms located near those universities. However, firms in rural areas located far from universities have been found to utilise sectoral research institutes more than universities (Asheim and Isaksen, 1997). Therefore, Asheim and Isaksen (1997) concluded that firms in urban centres make most use of basic research institutes while firms in the least central areas make use of the applied R&D sector.

2.4.4 Networks

There are several definitions of networks that have been identified in the literature. Mitchell (1969), for example, defines a network as a specific form of relation linking a defined set of persons, objects, or events. Mitchell states that the set of persons, objects or events of which the network is comprised can be called actors or nodes. Further, there are those who define a network as ‘intermediate’ or ‘hybrid’ form of organisation of economic activities with respect to markets and firms (Williamson, 1991). However, there are those who contrast this view and maintain that a network is a ‘third-type’ of organisational arrangement, with its own characteristics and properties, which is qualitatively different from those of markets and firms (Powell, 1990).

More recently, Penrose (1995) has defined the term ‘network’ or ‘business network’ to technically refer to formal contractual arrangements or alliances among a limited number of firms bound together in an interrelated managerial framework sometimes
referred to as 'quasi firms' or 'virtual corporations'. Powell (1990) however defines networks to entail indefinite, sequential transactions within the context of a general pattern of interaction where sanctions are typically normative rather than legal and the preferred option is often one of creating indebtedness and reliance over the long term. This study is primarily interested in networks as modes of organising economic activities through inter firm coordination and co-operation.

There are different views that have been advanced in the literature explaining why firms participate in networks. Economic approaches including industrial economics have identified various classes of production costs stemming from technological regimes such as economies of scale, scope, specialisation and experience. This approach maintains that economies of specialisation and experience are important in explaining why, even in the presence of significant interdependence, a network of separate firms may be superior to an integrated enterprise (Eccles, 1981).

Building on the industrial economics perspective, the organisational economics approach has included alternative transaction governance costs to that of production costs in explaining the relative success of networks. Thus the nature of the forms of regulation of economic activities are explained as optimal hybrid forms which strikes a balance between the properties of markets and those of hierarchies (Williamson, 1985; Powell, 1987). The organisational economics approach involves two perspectives, the transaction cost and uncertainty reduction, which have been

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15 The inter-firm cooperation that will be discussed in this section are those that involve the transfer of tacit know-how or 'invincible' assets compared to the transfer of tangible or codified know-how. These kinds of assets are more easily employed through relational rather than transactional exchange (Helper and Levine, 1992; Zajac and Olsen, 1993).
16 Economies of scale has been attributed with playing a role in the formation of resource pooling coalitions aimed at the provision of common services such as in joint production agreements (Turati,
hypothesised to be sources of increasing coordination costs under a market arrangement (Williamson, 1981). The Transaction-cost perspective recognises that there are a variety of distinguishable transactions on the one hand and a variety of alternative governance structures on the other and that the objective is to match governance structures to the attributes of transactions in a discriminating way (Williamson, 1981). Hence, a transaction is said to occur when a good or service is transferred across a technologically separable interface.

According to this perspective, exchanges that are non-repetitive and do not require specific investments are likely to take place in the market. This is because in the market, each firm is specialised in the production of a limited part of the final product or service and the relationships among firms are regulated by price (Williamson, 1981). However, transactions, which recur frequently and require specific investments that cannot be easily transferred, are more likely to take place within hierarchies. Hence a firm will integrate a transaction when the external cost of a certain good plus the transaction costs is higher than the internal cost of production. This implies that firms that do not follow this rule are expected to be less efficient than their competitors and will eventually be driven out of business. In this regard markets and hierarchies are seen as two alternative ways of organising economic activity.

Advancing the argument that inter-firm networks are a 'hybrid' form of governance, Williamson (1981) suggests that this enables the firm to minimise transaction costs in 1990). Teece (1980) suggests that economies of scope can be the basis for the formation of agreements for the joint utilization of equipment or know-how, such as licensing agreements.
an intermediate situation of assets specificity. Hence, when assets specificity\textsuperscript{17} increases, a condition of bilateral dependency is built up. Under this circumstance, there is a trade off between transaction costs induced by the level of dependency created by asset specificity and the bureaucratic cost implicit in hierarchies. For low levels of asset specificity, the market is the best governance structure, as actors can effectively adapt to disturbances without incurring additional bureaucratic costs. For high levels of asset specificity, transaction costs overcome bureaucratic costs and hierarchy becomes the most effective form of governance. Hence, for the intermediate levels of asset specificity, the hybrid form of governance appears to be the most effective as the sum of transaction and bureaucratic costs implicit in this form of governance is lower than both pure transaction costs sustained in the market and pure bureaucratic costs sustained in hierarchies.

The main thrust of the transaction-cost economics is that entrepreneurs realise the economic convenience of internalising certain transactions, but they find it hard to do so because of certain environmental obstacles such as legislation and rapid technological change. Thus, the market form of governance becomes inadequate for coping with a situation, which requires idiosyncratic investments and long-term contracting. However, hierarchy does not emerge as the obvious solution to this problem. Entrepreneurs therefore realise that it would be more economical to internalise certain transactions, but also that the rigidity and bureaucracy of a large organisation can be harmful. Therefore, they are forced to look for innovative ways of reducing transaction costs without incurring the higher management costs\textsuperscript{18} implicit in the hierarchy alternative (Demsetz, 1993). Entrepreneurs, therefore, see networks

\textsuperscript{17} Asset specificity refers to the level of investment in assets.

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as an alternative to growth through direct investments. Dickson and Hadjimanolis (1998) argue that since small firms typically lack some of the essential resources for innovation, such as specialist skills and research equipment, they have to acquire them from external sources such as other firms and technical institutions through networking. Hence, the transaction cost economics can be useful in enabling our understanding of how innovative SMEs in resource munificent regions derive their innovative inputs.

Powell (1990) explained that strong competitive pressures within an industry reduces the number of levels of hierarchy within firms and pushes companies to redefine the boundaries of their organisations. Firms will therefore search for new co-operative methods for producing components that require high skills and innovative efforts and externalise the production of highly standardised components. Brusco (1990) found that firms in the Italian industrial districts co-operated with other firms at different stages of the production process while competing fiercely with firms performing the same functions. Despite the strong arguments for the transaction cost thesis, its universal applicability has been questioned. Aoki (1988), for example, found that the development of inter-firm networks among Japanese companies was connected to their great propensity to cooperate, which in turn can be ascribed to their great ethnic homogeneity and long experience with the sharing of water rights.

In contrast to the economic approaches, evolutionary approaches stress the role of technology-related costs and learning problems in the formation of inter-firm networks. Nelson (1993) argues that the approach adds the possibility of inter-firm

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18 Management costs are those costs associated with strong power of workers and unions inside factories and unfavorable labour legislation.
organisational cooperation and co-ordination to that of the 'visible hand' of one integrated firm, especially in the process of technological innovation.

A distinctive factor that is characteristic of networks is trust, which is considered important within networking for its role in reducing the need for formal contracts and thus transaction costs (Pihkala et al., 1999). Although networking helps to enhance the level of understanding within a business environment which could mean sharing the same concepts of success or survival, an increase in trust may not be very dependent on increases in generalised morality amongst the actors but may be developed on the basis of personal relationships within narrow and specific social and economic networks (Moore, 1999). Moore further argues that the prospects for creating market order may be relatively bright even in societies apparently characterised by low levels of trust and generalised morality. He however cautions that it is dangerous to conflate 'trust' over a wide variety of social domains and assume that one is talking of equivalent phenomena in all contexts.

Humphrey and Schmitz (1998) have distinguished between the minimal trust for making markets effective and extended trust that is required for deeper kinds of inter-firm co-operation to work. They define minimal trust as a situation where agents expect that explicit agreements or contractual obligations will be honoured while extended trust characterises a much deeper degree of transactional interdependency between agents, where there are so many potential unspecified contingencies that any attempt to rely primarily on contracts and specified agreements would fail. They argue that it is the extended trust, which is essential for innovation especially in the transfer of tacit knowledge between firms.
Networking may involve interactions between firms who do not know each other and are not located together. In such instances, the network broker becomes essential in network building and reinforcing its trustworthiness. The role of the network brokers is to spread the network concepts, promote co-operation, organise groups of firms, and connect them to the product designers, marketing specialists, training providers, and industry services programmes that they need in order to compete successfully (Franke, 1999). The network broker is also involved in conflict-resolution, disciplinary action, monitoring and improving the performance of the network, searching for new members with complimentary or missing resources and also replacing members whose performance falls below the network standards. The importance of a network broker in rural/peripheral areas has been highlighted in a study conducted by Isaksen (1996) in Norway who found that the New Technology Programme for Northern Norway acted as public support structure providing firms with links external firms and R&D institutions.

The second distinctive feature of networks is power, which can be viewed as a mechanism of co-ordinating social interactions efficiently thus enabling stable relationships between co-operating social actors to emerge (Bachmann, 1999). Bachmann argues that power can be an alternative to trust, as it is more robust and less in danger of being ‘disappointed’. In the use of power as a means of co-ordinating social relationships, the powerful actor selects the possibility of behaviour, which he/she suggests to the subordinate actor as an undesirable and connects it with a threat of sanctions. Bachmann (1999) suggests that power is normally used in
situations where the institutional order of a given business system is patchy or cannot be deemed reliable.

Thus, in social systems, which are based on low level of institutional regulation, power is more often chosen as the dominant mechanism to co-ordinate expectations and to control interactions between actors. Comparative empirical studies of British and German socio-economic systems concludes that in the British socio-economic system, co-operative mechanism and trust are much more difficult to generate than in German business environment, hence businessmen in Britain are more inclined to control the dynamics of their relationships by power instead of trust (Stewart et al., 1994; Lane, 1995; Lane and Bachmann, 1997). Lane (1995) explains that these differences between the two countries are deeply rooted in ancient traditions, which concern the role of the state and the relationship between state and civil society. Another dimension of power in networks is collective power (Herrigel 1993). In a study conducted in Baden-Wurttemberg, Herrigel observed that the main holders of power within the industrial district were the firms themselves and the various economic actors with none of the organisations dominating. Rather, power is negotiated and control is diffused. Thus to maintain power within the system, all organisations continuously seek to come up with ideas and strategies to improve the system and by implication their position in it.

Although networks offer unique opportunities for firms to relate with other firms, Grimmie (2000) cautions that there can be a considerable underestimation of the significance of face-to-face communication, which has richness unattainable in any other mode of communication. Grimmie argues that once face-to-face contact has
been established, the contact can be maintained by means of technology, but face-to-face contact retains primacy of importance as a means of communication. In the context of rural/peripheral areas, some locational disadvantages can be ameliorated by recent developments in information and communication technologies (ICT). Storgaard (1998) argues that contrary to popular belief that high-tech is closely related to urban areas, highly advanced users of ICTs are also found in rural locations. Simmie (2002), however, argues that research to date suggests the need for a more cautious conceptualisation of the changing geography of economic activity. Simmie further suggests that to ameliorate potential lack of dynamism of rural areas in innovation diffusion, in-migration of professionally skilled ‘outsiders’ having established contacts with core regions should be encouraged. Further, Koschatzky (1999) argues that rural firms are more oriented towards intra-regional interactions. Ilbery et al. (1995) concludes that ICTs may offer particular advantages to rural firms to increase their area of operation by replacing physical communication networks with digital networks. Participation in networks can also generate certain disadvantages. These include the increased dependency for weaker partners (and the resulting dominance of the stronger), higher coordination costs, increased management time, and the potential loss of secrecy over innovative development (Biemens, 1992).

There are six economic and technological variables that have been identified from the literature that influences the firm’s propensity towards forming network ties, which can be important for this study. These include asset specificity, product development and design, product differentiation, market uncertainty, demand growth, and industry structure. The creation of assets specific to a particular transaction invites
opportunism by both parties whereby the firm investing in the assets has incurred a sunk cost and can be held at ransom by a customer exploiting this commitment by seeking lower prices and the customer, having no easy alternative source of supply, can be held to ransom by the supplier demanding higher prices (Perry, 1998). Transaction cost economics argues that a network can be seen as a solution to risks of opportunism associated with asset specificity if the network includes at least a quasi-vertical integration, in which there is buyer ownership of specialised tools used by the supplier; credible commitments, in which promises to avoid opportunism are supported by reciprocal trading (a supplier promises to place orders with the company it sells to); or negotiation of an effective dispute procedure.

The second variable is that of product development and design as contracting relations vary according to the inputs provided by the supplier. Asanuma (1989) has distinguished three types of relationships on the basis of the supplier's ability to modify or originate technology for the customer. This includes design-supplied (manufacture according to specifications set by the customer); design-approved (manufacture according to specifications approved by the customer); catalogue-goods (manufacture of standard items). Hence, from a customer's perspective, design-approved relations differ from the other cases because of the extent of information and uncertainty over performance, the risk of propriety knowledge being lost, and the extent of supplier bargaining power. Thus, although there is a need for customisation and supplier inputs into the development and design process as inducements to obligatory relations, choices remain in the precise organisational response. From the suppliers' perspective, the willingness to help their customer with improvement ideas
will be influenced by the perceived likelihood of gaining further work in return for their assistance as well as the design input asked for.

Product differentiation is another variable that influence networking. Perry (1998) argues that businesses with competitive strategies that emphasise product differentiation and diversification through shortening of the product cycle are more likely to be associated with obligatory relations than businesses with other marketing priorities. This is because products that undergo frequent design changes (such as those in consumer goods) require more customer-supplier co-ordination over design and development than do products of stable design, which demands and acts to induce obligatory relations.

The fourth variable is that of market uncertainty. From the buyer’s perspective, market instability might be an incentive to form obligatory ties, which can offer flexibility in production scheduling, hence minimising the risk of excess purchases of products whose demand is difficult to predict. However, the transaction cost expectations have tended to overlook the incentive to favour arm’s-length ties in unstable markets so that buyers can avoid any responsibility for protecting their suppliers from market unevenness. Further, technology characteristics can partly influence how far buyers seek to avoid any obligation for protecting suppliers as the ability to change production scheduling at short notice without obligatory ties varies between industries. From the supplier’s perspective, market instability might encourage support for obligatory ties to customers who are prepared to assist their operation by smoothing demand unevenness. However, conditions of market instability might be associated with high levels of opportunistic behaviour by buyers.
who seek to exploit the uncertainty to the disadvantage of suppliers. Where this occurs, suppliers may be reluctant to make specific investments to support an individual customer and prefer to retain arm's-length ties.

Another important variable is the demand growth conditions, which can contribute to general business confidence and the sense of shared goals and reduce the risk to buyers in making commitments about ongoing work. Furthermore, suppliers will have greater confidence in customer promises. Under this condition, buyers will be constrained in their choice of alternative suppliers and will be under pressure to accommodate supplier expectations and retain their cooperation. Lastly, industry structure is an important variable because the greater availability of potential trading partners might increase the opportunity for choice and change in business relationships, which favour arm's-length contracting. The implication of the above variable is that even within a society where historic experiences and institutional structures favour obligatory ties such as industrial districts or clusters, economic and technological considerations interact with these influences to create differences in networking formation (Perry, 1998).

There are several types of networks that can be important for understanding how SMEs obtain information, namely personal, business, and information networks (Julien et al., 2004). Personal networks, which are specific to an individual entrepreneur, are generally composed of one or two friends, key staff members and one or two colleagues from school or university, about eight or nine people in northern countries (Julien, 1995). However, business networks are composed of sources with which the firm currently does business, including suppliers, equipment
providers, distributors, transporters etc (Julien et al., 2004). Some business network members may eventually join the personal network if contacts are frequent enough. Information networks can be divided into personal and impersonal or formal and informal sources. Julien et al. (2004) have argued that SME managers generally turn most frequently to informal sources from their personal networks, including clients, staff members, salespeople, and suppliers (Brush, 1992). On the other hand, formal sources provide raw information that must be sorted and interpreted and includes specialised publications, brochures and catalogues, business magazines, government publications and other reports (Julien et al., 2004).

Further, Granovetter (1982) identified two main types of networks, namely strong tie networks and weak tie networks. Julien et al. (2004) explains that strong tie networks tend to be composed of the same type of people and the information they can provide is often redundant or repetitive and therefore not a significant channel for new ideas, but serve instead, to confirm the opinions of their members and in the case of entrepreneurs, to consolidate their business decisions, and to reduce uncertainty (McGee and Sawyer, 2003). Julien et al. (2004) argue that in SMEs, strong tie networks can be subdivided into personal networks that serve basically to criticize, to complete or to support managerial decisions if needed and to link with other information sources, and business networks that promotes business. A study by McGee and Sawyer (2003) found that owner/managers of newer SMEs relied more heavily on personal sources of information to addressed increased levels of perceived uncertainty in the immediate environment than those in older firm who used impersonal sources of information much more frequently. In contrast, weak tie networks are composed of people who are not used to working together. Business
people use weak tie\textsuperscript{19} networks much less frequently, and their signals are therefore weaker, requiring more effort to be understood, interpreted, complemented and used appropriately. Hence, although weak tie networks can facilitate the circulation of new ideas, and hence innovation because of the diversity of its members (Fine and Kleinman, 1979), it is faster and easier to ask someone for a piece of information than to spend the time necessary to research impersonal sources for the same piece of information (McGee and Sawyer, 2003).

However, availability of information is not sufficient, of itself, for innovation since if meaning is to be understood the information as to be decoded, collected and converted into knowledge, know-how and decisions. To this extent, weak tie networks may not be ideal channels for transferring complex knowledge because there are fewer interactions through which information can be assimilated (Hansen, 1999). To exploit the benefits of weak tie networks, there is a need for SMEs to have a certain organisational capacity that comes with the presence of gatekeepers and boundary spanners, to absorb the information, give it meaning and covert it into knowledge or varying levels (intensities) of innovation (Julien et al., 2004). Julien et al. (2004) argue that the reason why not all enterprises innovate is due to the difficulty that some of them find in absorbing new information from outside their own boundaries, especially the weak signals. Hence, they use the term ‘absorptive capacity’ to mean the acquisition of new, possibly tacit information, its conversion into new opportunities and its ultimate use. Cohen and Levinthal (1990) have pointed out that an organisation has a greater capacity to assess the value of information in a given field, assimilate that information, reduce its uncertainty, give it meaning and apply it,

\textsuperscript{19} Weak tie networks are made up of more distant acquaintances or people with whom contacts are less frequent, those with whom there are few interactions over time, a lower emotional intensity, a lower
if it already possesses rich knowledge in the same field. This emphasises the importance of understanding the educational, technical, and experience of the owner/manager and employees of innovative rural SMEs and how these influence the processes of innovation.

There are other types of networks that are similar to the ones described above but largely derived from studies of networks among large firms, which can be important for this study. These include community-based networks, organisational networks, and subcontracting and supplier networks. Community-based network has perhaps encouraged most interest in the possibility of enhancing competitiveness through interfirm cooperation (Perry, 1999). The Italian industrial district has been of particular interest suggesting an alternative model of industrial organisation that combines innovation, craft skills, independence, and a strong attachment to place. The distinguishing characteristics of industrial districts include interfirm dependency, disaggregation of the value chain into independent, specialised activities shared values and norms. More recently

Organisational networks are held together through relations of ownership, investment or shared membership. The degree of integration and co-operation within these networks varies encompassing a potentially wide set of business relationships, which may even be extended to the parentsubsidiary relation (Sayer and Walker, 1992). While the relationship between firms under a common ownership may provide a limited division of responsibility, business practice differs in the preference to divide ownership across separate operating units. Thus, where management is seen to level of confidence and little reciprocity (Julien et al., 2004).
require specific industrial expertise, the propensity for activities outside the core business to be allocated to separate units tends to increase. Regulatory conditions also affect the propensity to set up satellite firms. Joint ventures and strategic alliances involve two or more firms in the control of a third-party venture, a form of network that may be formed with a comparatively narrow and short-term focus but from which further co-operation among the partners might be encouraged. Business groups comprise looser forms of owner-investor network formed through overlapping lines of financial and managerial participation round which personal and operational ties are sustained (Strachan, 1976). Further, franchising may also be added as an example of an organisational network and is of particular interest because it provides a way of overcoming distance and territorial limits on interaction.

Common membership of a third-party association, established independently of any one company, with powers to aid, guide and cajole participating businesses, provides another form of network (Sayer and Walker, 1992). The distinctiveness of this network is the willingness of participants to accept some degree of collective discipline or resource sharing from an external entity that is outside the individual firm's control. Examples of such a network includes industry-linked trade associations which lobby on behalf of their membership, inform and generally encourage a collective interest in their industry's development; specific-purpose associations which are formed for a marketing, research or other project; and multisectoral associations such as small business associations and chambers of commerce. Although industrial associations are widespread, their character and significance vary considerably between countries. However, many associations may work as special interest groups that lobby for preferential policies and protection of
the status quo, and therefore hamper risky, innovative activities (Dakhli and De Clercq, 2004). Moreover, strong tightly-knit groups may hamper economic development by inhibiting an individual’s personal advancement and posing strong personal obligations on them (Portes and Landholt, 1996).

Buyer-supplier networks are formed through relational contracting or ongoing relations of exchange, interaction and mutual development between two or more firms (Sayer and Walker, 1992). These connections are something more than the links created through ‘normal’ transactions because they involve some degree of commitment to mutual development and a willingness to accept some degree of involvement by one firm in the operation of another. The significance of relational contracting is seen in its comparison with arm’s-length, competitive contracting which has a focus simply on satisfying immediate supply requirements. In contrast, relational contracting is concerned with securing long-term advantage through information sharing and co-operation. This advantage can be realised through co-engineering of new products, which involves supplier participation in new product or process design, or in securing price reduction agreements over the lifespan of a production contract. Buyer-supplier relationships have been changing by the increased management of interfirm linkages through formalised agreements, just-in-time delivery schedules, supplier partnerships and technology development agreement. Regarding the relevance of buyer-supplier relations in the innovation process, a study by Lechner and Dowling (2003) found that supply networks are not considered as being part of the most important networks. Hence a relation becomes important if it adds value other than through the exchange function of goods and services.
From the foregoing, it is apparent from the literature that the role of the entrepreneur is critical in building external relations and that his or her personal network is an important resource for the firm (Ostgaard and Birley, 1994; Johannisson, 1995). Hence, in entrepreneurial firms and more particularly in SMEs, personal and organisational networks often seem to converge. Moreover, Lechner and Dowling (2003) have argued that since knowledge and innovation related networks require the highest investment in terms of time and money, they are characterised by frequent contact and relations. Hence initially, firms build networks to overcome the liability of newness and smallness while relying on their initial technology base.

The network concept discussed above assumes that information is easily transferable between economic agents. However, even with the recent advances in communication technology certain information is not easily transferable among economic agents. The transaction cost thesis has also alluded to the externalisation of certain transaction costs in cases of ‘deepened’ asset specificity. This may be true in areas of high agglomeration such as industrial districts or clusters but may offer little explanation for firms in rural/peripheral areas to participate in inter-firm networks.

Further, the uncertainty reduction thesis has inferred that a firm’s participation in inter-firm network is due to unpredictability of technological and demands conditions. However, unlike the transaction cost thesis where dense asset specificity discourages vertical integration, this is in fact the case and vice versa. It can therefore be concluded that rural/peripheral firms are less likely to be involved in inter-firm networks as uncertainty reduction strategy.
However, the concept of the network broker can be especially useful in understanding the development of inter-firm network in rural/peripheral areas. Particularly, the network broker can be important in facilitating linking of firms as well as bringing harmony to the system. Moreover, the element of power in networks can also be important as a single firm or institution such as the local chamber of commerce can play a pivotal role in network development thereby linking firms within the network to regional, national and international networks.

2.5 Section IV- Implications for rural innovative MSMEs

The literature reviewed in this section tends to suggest that an innovative environment is one such as an industrial district, which creates an incentive for firms to locate near sources of knowledge, information and access to technology. Hence, it has been suggested that rural areas with sparse population of firms tend to be outward looking for their innovative inputs. In conclusion, rural innovation system can be summarised as comprising various elements as identified in the literature in varied intensity and impact to the innovation process of SMEs (figure 2 overleaf).

Although the literature has tended to suggest that elements of an innovation system interact, an evaluation of the elements above in the context of rural SMEs suggests that this could be an idealistic approach. This study therefore proposes that the elements of an innovation system exist in varying degrees of intensity and impact on the innovation process of rural SMEs differently. Further, because of the 'unawareness' of the existence of some externalities by some SMEs, it can be inferred
that the interaction between the elements do vary and that some elements may in fact not interact with each other despite their presence in a rural innovation system.

**Figure 2 (Density of elements of an innovation system and their influence on innovation in rural areas)**

Section 2.3 discussed other leading conceptual approaches that have adopted the systemic approach and their relevance to innovation in rural areas. It is therefore important to understand whether these frameworks (agglomeration economies, industrial districts, clusters and milieu) are different or the same concepts. Table 3 below represents factors that have been identified in the literature as being important under each conceptual framework and their influence on the concept.
Table 3

Factors associated with agglomeration economies, industrial districts, clusters and milieu concepts and the hypothesised direction of association with innovation

<table>
<thead>
<tr>
<th>Independent Factors</th>
<th>Agglomeration Economies</th>
<th>Industrial District</th>
<th>Clusters</th>
<th>Milieu</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Geographic concentration of firms and specialised resources</td>
<td>+ (Feldman, 1998)</td>
<td>+ (Harrison, 1996; Lorenz, 1999)</td>
<td>+ (Harrison, Enright, 1994)</td>
<td>+ (Harrison, 1996; Christopoulos, 1999)</td>
</tr>
<tr>
<td>2. Transaction cost minimisation</td>
<td>+ (Storper, 1995)</td>
<td></td>
<td>+ (Atherton, 1999)</td>
<td></td>
</tr>
<tr>
<td>11. Local, regional and international Inter-firm networks</td>
<td></td>
<td></td>
<td>+ (Enright 1998)</td>
<td>+ (Keeble et al., 1999)</td>
</tr>
<tr>
<td>12. Territorial context</td>
<td></td>
<td></td>
<td>(Marshall, 1919; Enright 1998)</td>
<td></td>
</tr>
<tr>
<td>13. Trust and Co-operation</td>
<td></td>
<td></td>
<td>(Becattini, 1987; Maillat 1995)</td>
<td>+ (Lundvall, Maillat, 1992; Maillat, 1995; Capello, 1999)</td>
</tr>
<tr>
<td>14. Labour mobility</td>
<td>-ve (Keeble et al., 1992)</td>
<td>-ve (Keeble et al., 1992)</td>
<td>+ve (Keeble et al., 1992)</td>
<td>+ (Keeble et al., 1999)</td>
</tr>
</tbody>
</table>

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From table 3 above, it can be inferred that the factors that have been identified in the literature as being important in the formation or existence of the four concepts have many similarities. Although the literature review has not explicitly indicated the reasons why firms locate in such environments, it can be inferred from the transaction cost theory that it is for transaction cost minimisation. This study therefore suggests that the four leading conceptual frameworks, in principle, are similar albeit different terminologies depending on the backgrounds of the “inventors” of the concepts.

Furthermore, although the clustering concept has been empirically found to be relevant to the study of innovative SMEs in rural areas, agglomeration economies, industrial districts and milieu concepts may also be found in varied scales. This is because the clustering concept has been found in rural town centres with ‘some agglomeration economies’ and within a ‘supportive milieu’. This conclusion, therefore, suggests that the understanding of innovative activities of SMEs in rural areas would require a synthesis of the aforementioned concepts.

Section 2.4 has discussed emerging issues of scholarly enquiry, which included the nature of information, untraded interdependency concept, as well as spin-offs and spillovers. Although tacit knowledge has been found to be ‘sticky’ or location sensitive thereby making rural areas with low agglomeration to be at a disadvantage in terms of sources of innovative inputs, such locales have been found to have strong social-cultural structures that are important in localised learning processes.

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20 The term ‘supportive milieu’ has been used to widen the definition of the milieu so as to include “soft” factors such as trust and ‘sense of belonging’.
The social-cultural structures found in rural areas can be a key towards helping us understand innovation processes because it explains how tacit knowledge is transferred thus enabling rural SMEs obtain their innovation inputs. However, due to low agglomeration economies in rural areas, firms have to participate in intra-regional and national networks for their innovative outputs. An important factor that has been discussed in the literature review, which can have significant impact on learning in rural areas, is entrepreneurship. Hence, in-migration of founders with prior experience in an incubator organisation is an important source of innovative input especially in regards to learning in rural SMEs.

Although the process of spin-offs and Spillovers have been associated with areas of high agglomeration economies and an appropriate milieu, rural areas have been found to benefit from these processes. Within this context, entrepreneurship can be important in helping our understanding of innovation amongst rural SMEs as migration of professional workers from urban to rural areas can promote the spin-off process away from the proximity of the ‘incubator institution’. This brings into focus the importance of the behaviour of the owner/manager or innovator in the innovation process.
CHAPTER 3

ENTREPRENEURSHIP: A BEHAVIORAL APPROACH TO THE STUDY OF INNOVATION

3.0 The structure of the chapter

The preceding chapter, the systemic approach to innovation, explored the importance of the external environment in stimulating innovative activities and identified implications for SMEs in rural areas. However, exploratory power of the systemic approach regarding the actual process of innovation within SMEs in the rural context is limited due to the emphasis placed on the interface between the firm and its environment. This study suggests that there has been a missing dimension in the evolution of innovation studies with the role of the entrepreneur or individual innovator having been consigned to the periphery. Therefore, there is a need to understand the personality and functions of the entrepreneur and their influence on the innovation activities of the firm. However, this study will not attempt a comprehensive review of all the nuances that has been identified in the literature as been associated with entrepreneurship. Rather, a purposeful review will be undertaken that seeks to understand some of the more influential aspects that can be relevant for this study. Understanding innovation in this manner is not only appropriate and timely but also distinctive as it attempts to demonstrate the important role played by the entrepreneur in enabling SMEs to derive innovation inputs from the external environment but also how this is then 'organised' within the firm to realise innovative outputs.
This chapter is organised in the following way. Section 3.1 defines the term entrepreneur and its relevance to the study of innovation. Section 3.2 and 3.3 then reviews the relevant literature on the personality and functions of the entrepreneur respectively. The chapter will then conclude by proposing a new conceptual framework that incorporates the systemic and behavioural approach.

3.1 Definition

Although the term 'entrepreneur' has been used for more than two centuries, different writers in the field of entrepreneurship continue to extend, reinterpret, and revise the definition (Bygrave, 1989a). Writers from diverse disciplinary backgrounds such as anthropology, economics, history, political science, psychology, and sociology have contributed to the existing body of research (Bull and Willard, 1995). Many of the definitions offered can be considered to be complementary rather than competitive because each seeks to focus attention on some different feature of the same phenomenon.

The entrepreneur was first identified in the early 18th Century by Richard Cantillon who coined the term the ‘entrepreneur’ as one who buys factors services at certain prices with a view to selling their product at uncertain prices in the future. However, Jean-Baptiste Say (1767-1832) regarded the entrepreneur as a rare phenomenon who is able to co-ordinate and combines the factors of production. Thus the essential characteristic of the condition in which the entrepreneur operates is the variety of inputs and markets, which confront the entrepreneur and which by definition, must be successfully combined. These are not restricted to the final product’s market or the case of transactions that involve buying and selling-on for anticipated profit but also
by other factor markets such as those for raw materials, labour, finance, land, and plant and equipment (Binks and Vale, 1990). Binks and Vale observes that these early contributions to entrepreneurship theory indicated that the activities of entrepreneurs were intrinsically bound up with those of the market process.

In a departure from the forces of demand and supply which pushes the market towards equilibrium, the Austrian and neo-Austrian school of thought conceptualised the role of the entrepreneur as being the conveyor of the market process in a condition of perpetual disequilibrium (Carl Menger, 1840-1921). Menger placed the production process within a hierarchical structure where finished products constituted low-level goods, and primary inputs which were further removed from final production, were higher-order goods. Within this context, the entrepreneur was portrayed as being one of the highest orders since s/he determined the allocation of inputs of lower orders and the pattern of outputs that resulted. Menger emphasises the entrepreneur's need for information and an ability to analyse that successfully in order to allocate resources correctly, which by implication meant that the entrepreneur is also a risk-bearer. This characteristic along with those of leadership and alertness was later emphasised by Friedrich Von Wieser (1851-1926) and taken up by Kirzner (1973) who emphasised that it is the alertness and superior perception of entrepreneurs, which cause factors of production to be reallocated towards an equilibrium condition.

Although the neo-classical school does not explicitly deny the existence of the entrepreneur, it is almost irrelevant to consider entrepreneurs in the context of neo-classical analysis, since their operations refer to the adjustment processes, which are assumed to be instantaneous for the purposes of analysis. Despite the neo-classical
omission, the notion of adjustment and its speed are clearly crucial in attempting to explain the economic contribution of entrepreneurs. Among the various characterisations of the entrepreneur to be found in economics literature, the entrepreneur is defined in what may be termed 'dynamic variants'\(^{21}\) as decision-maker, innovator, co-ordinator of economic resources, an arbiter, and an allocator of economic resources (Batstone and Pheby, 1996).

The economic definitions have mainly concentrated on the functions of the entrepreneur within the market system. Thus, Leibenstein (1968) defined the entrepreneur as one who marshals all resources necessary to produce and market a product that answers a market deficiency. However, Barretto (1989) aptly described the entrepreneur as "shorthand for uncertainty, imperfect information, and the unknown. He operates in the shadowy world of intuition, ignorance, and disequilibrium. As a functional agent, he is completely outside the scope of modern orthodox economic analysis because entrepreneurial issues are irrelevant and, more important, inadmissible, in the deterministic, tightly interlocking theoretical environment that is modern microeconomic theory. The entrepreneur cannot be introduced into the modern theory of the firm because he directly clashes with consistency- this is a battle that the entrepreneur has not won". P.137.

Perhaps the most influential conceptualisation is provided by Schumpeter (1942) who defines the entrepreneur as the individual who carries out new combinations which

\(^{21}\) There are three essential structural elements of dynamic economic analysis (Bausor, 1986): Firstly, time must be construed as backwardly irrevocable and uncertain into the future, historical time. Thus, each decision and each economic opportunity cannot simply be reversed or repeated. Secondly, once we accept historical time into our analysis, we cannot reasonably assume knowledge about future actual outcomes thus limiting our epistemic claims to the imagination of individuals as to anticipated outcomes. Thirdly, given that actions take place largely on the expectations of individuals rather than
includes the introduction of a new good or a new quality of a good, the introduction of a new method of production, the opening of a new market, the conquest of a new source of supply of raw materials or components, or the reorganisation of any industry. Schumpeter (1942) further argued that everyone is an entrepreneur when s/he actually carries out new combinations and loses that character as soon as s/he has built up his business and settles down to running it as other people run their businesses. Schumpeter therefore made a distinction between the entrepreneur and the owner/manager of a business. Thus, the function of the entrepreneur is to reform or revolutionise the pattern of production by exploiting an intervention or an untried technological possibility for producing a new commodity or producing an old one in a new way.

Although Say (1767-1832) regarded the entrepreneur as a rare phenomenon, this study will adopt his definition as one ‘who is able to co-ordinate and combine the factors of production’. By defining the entrepreneur in such a dynamic way provides us with an opportunity to analyse his/her personality and functions in a broader manner than would be offered by the static definitions, for example as innovator.

There are two areas that can enable us learn more about the 'coordinating and combining' entrepreneur. Firstly, one can discover the attributes of the individual that are likely to lead a person to embark on an entrepreneurial career, which mainly involves psychological and sociological perspectives. The discovery of the attributes of the entrepreneur is certainly promising and is dealt with in this chapter in section 3.2.

actual knowledge, there is no logically inherent reason why we should automatically assume either the constant existence of equilibrium or a tendency towards it.
The second task would be to examine how the functions of the entrepreneur can enable us to closely relate the personal attributes, discussed in section 3.2, to the processes of innovation and how rural institutional arrangements affect the quantity of the entrepreneur's effort, technological innovation. Subsequently, section 3.3 will examine how rural institutional arrangements affect a specific aspect of the entrepreneur's effort, namely technological innovation.

3.2 The entrepreneur's personality

In the entrepreneurship literature, it is possible to differentiate between two schools of thought in regards to the entrepreneur's personality: one based on the trait approach and the other on sociological approaches. The trait approach seeks to understand why certain individuals start firms hence ignoring the context, within which the individual actions are based, and focuses on the innate characteristics of the individual. However, the sociological approach argues that the personality of the entrepreneur is formed by the interplay between the individual and the environment (Rotter, 1966).

The first part of this sub-section will examine the trait approaches, which includes innate abilities of individual entrepreneurs including need for achievement, social marginality, locus of control, uncertainty-bearer, risk-taking propensity, tolerance of ambiguity, and deviance. The second part will examine the sociological characteristics of the entrepreneur including those that are developed throughout one's lifetime. These include the importance of family background, education qualification, and technical and work experience.

22 Personality, by definition, refers to relatively broad, stable differences among people and the interplay between these differences and specific situational variables (Phares, 1976).
3.2.1 Trait approaches

Need for achievement: One of the early psychological studies of entrepreneurship is that of McClelland (1961) whose objective was to identify and analyse the psychological factors that produce entrepreneurial personalities. In particular, he focused on the motivational variables affecting the supply of entrepreneurs, namely the psychological drives underlying the individual’s ‘need for achievement’. Individuals with a high n Ach are depicted as preferring to be responsible for solving problems and for setting goals to be reached by their own efforts as well as having a desire to receive feedback on their accomplishment. Thus, entrepreneurs are hypothesised to have a high n Ach because they seem to possess the same characteristics.

McClelland (1961) ascribes the inculcation of the achievement motive to child-rearing practices, which stress standards of excellence, maternal warmth, self-reliance training, and low father dominance. Hence the achievement motive is formed during middle childhood and is produced by “reasonably high standards of excellence imposed at a time when the son can attain them, a willingness to let him attain them without interference, and real emotional pleasure in his achievements short of overprotection and indulgence” (McClelland, 1961 p.356). The special entrepreneurial qualities cited by McClelland that is attributed to people with a high n-Ach includes a desire for responsibility, and a desire for a concrete measure of task performance. A high n-Ach can be described as a desire to excel, to achieve a goal in relation to a set of standards.
According to McClelland's (1961) theory, individual's who have a strong need to achieve are among those who want to solve problems themselves, set targets, and strive for these targets through their own efforts. The theory suggests that individuals with a strong need to achieve often find their way to entrepreneurship and succeed better than others as entrepreneurs.

An interesting variant to McClelland's theory concerning the factors determining the child-parent relationship is the socialisation of children resulting from the type of status mobility system that prevails in society (LeVine, 1966). Levine argues that where higher status is attained through outstanding performance in one's occupational role, parents will try to foster in their children initiative, industriousness, and foresight through self-reliance and achievement training. In contrast, in hierarchical societies upward mobility is attained through loyalty, obedience, and sycophancy and thus parents subject their children to obedience training, instructions in use of flattery, and the suppression of tendencies that might antagonise superiors.

In seeking to explain how those with entrepreneurial traits are directed into business pursuits, McClelland begins with the simplest proposition that boys with high need for achievement will tend to be attracted to business occupations because they perceive the occupations as calling for characteristics which they posses. However, at an aggregate level, there was no evidence that achievement motivated individuals are especially attracted to entrepreneurial occupations.

Further, a closer inspection of McClelland's explanations reveals that the indices that are correlated are not economic growth and n-Ach. McClelland's use of achievement
imagery in primary school textbooks as his primary explanatory variable has been
criticised by Kilby (1971) as raising serious question as to the validity of all his
empirical tests. Admittedly, McClelland recognised that comparison of reader n-Ach
levels with levels obtained from individuals raised some interesting questions as to
just what the readers are measuring and therefore throwing some doubt on whether
they are measuring anything of importance.

Social marginality: Another trait approach to entrepreneurship with some similarity
to McClelland's is that of Hagen (1962) who examined the causal interplay between
society, personality and economic change. Hagen's theoretical explanation for the
supply of entrepreneurs highlights the importance of two sets of variables: withdrawal
of status respect (or group subordination) and relative social blockage. Status
withdrawal is said to occur when members of a previously accepted social group
perceive that their value system is no longer recognised by other social groups whose
respect they seek (Hamilton and Harper, 1994). Thus, such a loss of social
recognition is the initial disturbance, which sets in motion a sequence of changes over
many decades in child-rearing practices and personality formation, gradually giving
rise to technological innovation.

According to Hagen, the supply of entrepreneurs is disproportionately more by
subordinated groups who are alienated from society and assert themselves through
enterprise. This is because the possession of, and belief in, different value systems
from that of the mainstream society will contribute to the development of
unconventional patterns of behaviour, including entrepreneurship. Thus, men in these
groups feel discriminated against and because of relative social blockage, they
compensate in the best way open to them by succeeding in business. This means that
the existence of relative social blockage is crucial in determining the channel into
which their creative and entrepreneurial energies flow.

Thus, the existence of individuals who have gone through this process may be one of
the contributing factors to the emergence of creative, innovating entrepreneurial
activity (De Vries and Mantred, 1977). The changes in personality can be explained
by the fact that the old patterns of behaviour of the social group or family are not
respected and acceptable any longer, therefore necessitating that the entrepreneur
develops innovative models so as to integrate the individual with society. Hagen
(1962) has suggested that the four events that can produce this process of status
withdrawal includes displacement by force (i.e. by political upheavals; denigration of
value symbols (i.e. religion); inconsistency of status symbols with changes of the
distribution of economic power; and non-acceptance of expected status of immigrant
groups.

Locus of control: Locus of control (LOC) theory emerged from the social
learning theory, which is a theory of how choices are made by individuals from the
variety of potential behaviours available to them (Phares, 1976). A special and
important example of such a generalised expectancy is the degree to which people
believe in internal or external control of reinforcement whether they believe that what
happens to them is dependent upon their own behaviour and is thus controllable by
their actions or is contingent upon luck, powerful others, etc. For example, personal
lack of control coupled with malignant and inexplicable influence from others has
been offered as an explanation for 'voodoo' deaths (Richter, 1957). Further, in Nazi
concentration camps the prisoners' sense of personal helplessness and lack of control not only seemed to produce apathy and withdrawal, it often culminated in death, a death produced by something beyond sheer physical deprivation and cruelty (Bettelheim, 1960).

The significance of the belief in fate, chance, or luck has been discussed by various social scientists over a long period of time. Vebley (1899), for example, argued that a belief in luck or chance represented a barbarian approach to life and was generally characteristic of an inefficient society. This implied that a belief in chance or luck as a solution to one's problems was characterised by loss of productivity and bears some similarity with the hypothesis that a belief in external control of reinforcements is related to a general passivity (Rotter, 1966). Similarly, Merton and Kendall (1946) explained that the belief in luck more or less as a defence behaviour enabling people to preserve their self-esteem in the face of failure, which can also act to curtail sustained endeavour.

Rotter (1966) defined external and internal LOC thus: "when a reinforcement is perceived by the subject as following some action of his own but not being entirely contingent upon his action, then, in our culture, it is typically perceived as the result of luck, chance, fate, as under the control of powerful others, or as unpredictable because of the great complexity of the forces surrounding him... we have labelled this a belief in external control. If the person perceives that the event is contingent upon his own behaviour or his own relatively permanent characteristics, we have termed this a belief in internal control." p.g 1. According to LOC theory individuals believe
that the outcomes of events in their lives are either within or beyond their personal control. Thus, people with internal LOC believe that the environment can be controlled by their own actions and that they are responsible for their own destiny. In contrast, a person with external LOC interprets events as the result of outside factors that they cannot influence and therefore luck, chance, fate, or "powerful others".

Empirical psychological studies conducted by Gilad (1982) indicated that an individual's LOC is a major factor determining his or her level of entrepreneurial alertness. In particular, internal LOC gives rise to heightened alertness, which is necessary for incidental learning (i.e. the recognition of profitable opportunities once they are encountered) with spontaneous learning ultimately resulting into entrepreneurial behaviour. Furthermore, Gilad's studies hypothesised that the internality of economic agents is dependent on, among other things, the institutional-constitutional framework, and the degree of decentralisation in the economy and the character of the regulatory constraints. Thus, a society based on decentralised control is more likely to produce citizens who believe in internal LOC and who are entrepreneurial (Gilad, 1982). Further, a low generalised expectancy for personal control can contribute to reduced acquisition of information because the belief in an external locus of control is accompanied by a low expectancy that one's own efforts will have an impact hence information acquisition is not seen as a productive enterprise (Seeman, 1963). Thus, Seeman hypothesised that individuals high in powerlessness (external orientation) will possess inferior knowledge in control-relevant areas of their experience. This suggests that internals are more knowledgeable, at least in terms of personally relevant information, than are externals.

23 Reinforcement is anything that has an effect on the occurrence, direction, or kind of behavior. Further, the value of reinforcement for a person may be defined as "the degree of preference for any

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Such knowledge is essential if individuals are to seek to exert an effect on their surroundings (Phares, 1976).

The factors that influence internal-external locus of control include parental nurturing. In a study conducted by Chance (1965), permissive and flexible maternal attitudes and expectations for early independence seemed to be associated with internality. Similarly, studies conducted by Shore (1967) and Davis and Phares (1969) found that internals reported that their parents showed less rejection, less hostile control, less withdrawal of relations, and more positive involvement.

Another antecedent factor that has been associated with locus of control beliefs is consistency of experience. Thus, when children are not able to anticipate parental discipline due to inconsistency within the behaviour of one parent, inconsistencies between the parents, and/or inability to fathom any consistency that may in fact exist, a foundation is laid for a belief that reinforcement is unpredictable and therefore is not subject to personal control (Phares, 1976). Davis (1969) argued that “lack of consistency in this regard would increase the likelihood that s/he will continually seek aid in an attempt to understand his environment, which would, in tum, lead to a belief that s/he is not the effective agent in controlling reinforcement. In contrast, a clearly structured system of family relationships in which regulations are consistently reinforced to occur if the possibilities of their occurring were all equal” (Rotter, 1954, p.107).

24 However, a methodological caution is that self-reporting data and data based on actual observation should be viewed carefully by investigators. This is because self-reported data is likely to be influenced by a variety of factors such as social desirability, defensiveness, and defective or self-serving facets of memory, upon which most of the retrospective self-reporting data depend (Katkovsky, et.al, 1967).

25 Phares (1976) has cautioned that much of the work on family determinants of locus of control has tended to rely heavily on questionnaires which often call for retrospective reports which extremely sensitive to distortion and that what is normally dealt with is perceptions of parent behavior rather than the behavior itself.
presented and enforced would allow the child to rely on his own judgements and interpretations of events and consequences”. (P.24).

Lastly, social antecedents has mainly analysed the relationship between locus of control and social class and ethnicity. Most evidence indicates that blacks are more external than whites and that lower social status is associated with external beliefs (Phares, 1976). Thus, those social and ethnic groups that have relatively little access to significant power, social mobility, opportunity, or material advantages will manifest relatively higher external scores (Battle and Rotter, 1963).

**Deviance:** In the study of the entrepreneur, “we are usually introduced to a person with an unhappy family background, an individual who feels displaced and seems a misfit in his particular environment. We are faced with a loner, isolated and rather remote from even his closest relatives. This type of person gives the impression of a ‘reject’, a marginal man...” (De Vries and Manfred, 1977). De Vries and Manfred goes on to argue that this type of person also utilises innovative rebelliousness as an adaptive mode with occasional lapses toward delinquency, which are ways of demonstrating his ability to break away, to show independence of mind. However, the entrepreneur also demonstrates a remarkable resilience in the face of setbacks, with the ability to start all over again when disappointments and hardships come his way.

The deviant characteristics of the entrepreneur follow a childhood that is portrayed very disturbing, with images of endured hardships (De Vries and Manfred, 1977). De Vries observes that 'desertion, death, neglect and poverty are themes which continue
to be brought up in conversations with entrepreneurs' P.50. Further, a remote or absent father makes for a poor role model for the child, creating a lack of familiarity and unpredictability, thus making the process of growing up not a very happy or harmonious one. This may leave the child and later the adult troubled by a burdensome psychological inheritance centred on problems of self-esteem, insecurity and lack of confidence. As a result, repressed aggressive wishes towards persons in control are not strange to these individuals and the resulting sense of impotence and helplessness contributes to these feelings or rage, insecurity and low self-esteem (De Vries and Manfred, 1977).

De Vries argues that before society at large recognises his capabilities, the potential entrepreneur enters a period of disorientation, without apparent goals, but also during which he is testing his abilities and ascertaining his strengths. Thus, the future entrepreneur drifts from job to job, while encountering difficulties in the acceptance of his ideas, in conceptualising and structuring possible 'new combinations'. Hence the entrepreneur is perceived by other people as 'deviant' or a person out of place, frequently provocative and irritating because of his seemingly irrational, non-conformistic actions and provocative ideas. De Vries (1977) further points out that the non-conformist rebelliousness becomes the entrepreneur's mode of behaviour, his way of exerting power and control over an environment perceived as dangerous and uncontrollable. However, the entrepreneur's actions do not derive from inner strength and self-assurance established through a secure and consistent family upbringing but rather from the confusing and disturbing family interactions that forces him to react to situations out of inner insecurity.
These very characteristics of the entrepreneur can lead to serious dysfunctional
developments in the future of the firm and also limit its innovative capacity. De Vries
(1977) observes that most entrepreneurial organisations consist of an organisational
structure and work environment completely dependent and dominated by the
entrepreneur and run in an autocratic manner, whereby all the decision-making
processes revolve around the entrepreneur. Furthermore, the entrepreneur often
refuses to delegate, is impulsive, lacks any interest in conscious, analytical forms of
planning, and engages regularly in bold, proactive moves, which although important
for the initial success of the enterprise, can be carry a high risk component. The
entrepreneur's impulsiveness, lack of deliberation and judgement, and the reliance on
'hunches' makes for a rather limited time horizon.

Further, the organisation is often poorly defined or poorly used control and
information system (no information sharing), an absence of standard procedures and
rules, and a lack of formalisation. This situation, although it may breed innovation,
contributes to a high incidence of role conflict and role ambiguity leading to low job
satisfaction, low self-confidence, a high degree of job-related tension, a high sense of
futility and low confidence in the organisation. Withdrawal or avoidance behaviour
and a reduction in communication among employees also become symptomatic
resulting in information hoarding (De Vries, 1977).

The entrepreneurial personality picture painted by Kets de Vries of an adult troubled
by a burdensome psychological inheritance centred around problems of self esteem,
insecurity and lack of confidence and a suppressed aggressive tendencies towards
persons in authority can hardly be regarded as been essential for an entrepreneurial
career and indeed for our purpose. This is mainly because the 'hostile, aggressive and impulsive' personality can constrain would be entrepreneur's ability to network and hence access inputs which maybe critical for innovation. Further, these personality characteristics may, in the long run, jeopardise the success and even the viability of the business (Chell, 1986). Further, a study by Gibb and Ritchie (1981) suggested that "the stereotyped notion of the prospective entrepreneur being a behavioural deviant employee proved of very limited applicability...there were few who could be regarded as opportunistic and loosely committed rapid 'job changers' unable to follow given job and career lines...in overall terms, the research does not support the view of these being people substantially disillusioned with their current work environment" pp. 195-6.

Furthermore, Robbins (1979) explains that the main theoretical problem with the deviant approach is that it tends only to describe accurately the extremes of a given population and leaves the vast majority untouched. Thus, the Kets de Vries model may only be applicable to those entrepreneurs with particular backgrounds and life experiences and may not apply to entrepreneurs in general (Chell, 1986). Thus, the description may not be able to differentiate a particular type of entrepreneur from individuals from other walks of life with similar deprived backgrounds.

**Conclusion:** The personality trait approaches discussed above which could be of importance for this study are those that makes an individual have an apparent disposition to act and includes high need for achievement and internal locus of control. This study suggests that these two personality traits may provide one with the necessary impetus to pursue an entrepreneurial career.
Hampson (1982) has suggested that personality traits do not reside within individuals but between actors in varying social contexts and is also multifaceted. Hampson argued that all attempts to explain personality were inferences based on the observation of behaviour and that trait is therefore a descriptive category used by an observer in the social context to describe behaviour of other people. Thus, the understanding of personality depends on multiple perspectives of an individual's behaviour. Hence, trait categories will have 'fuzzy boundaries' in that some behaviours will be typical of certain traits and some behaviours may also be interpreted differently by different individuals in the social context and investigations of behaviour will therefore need to involve more than one perspective.

Although the results of studies conducted into the area of personality traits have been mixed, need for achievement and internal locus of control theories is promising. For example, internal locus of control theory could enable us understand the reasons why rural innovative SME owner/managers are alert to innovative opportunities, which is necessary for incidental learning, resulting into entrepreneurial behaviour. It could also enable us to understand why rural innovative SMEs are able to overcome the 'perceived environmental disadvantages. Supporting this view, Hornaday and Aboud (1971) who suggested that the characteristics of achievement and independence, among others, differentiated the successful entrepreneur from a control group. Similarly, Pandey and Tewary (1979) provided evidence that people with high 'internal scores' are more likely to be successful entrepreneurs. More recent studies by Cromie and Johnes (1983) have found entrepreneurs to display greater
achievement motivation and self-confidence than other groups in society and possess internal rather than external locus of control over life events.

Deakins and Freel (1998) have however argued that the psychological approaches to personality traits of individual entrepreneurs is essentially static since it assumes that there is only a potential set of individuals that have inherent characteristics associated with successful entrepreneurs. Further, most researchers do not allow for an experiential learning role that may influence entrepreneurship. Deakins and Freel further argues that these approaches do not capture the essentially dynamic process of entrepreneurship since entrepreneurs alter their behaviour through experiential learning from early days to later stage of their development. Hence, section 3.2.2 will review the literature that looks at how sociological factors could influence entrepreneurial behaviour with possible implication on innovation processes.

**3.2.2 Sociological approaches**

**Introduction:**

The trait approaches discussed above assume an in-born characteristic, which differentiates the entrepreneur from other groups or individuals and largely ignores environmental influences. Gibb and Ritchie (1981) argues that this approach “in sum assumes that ‘entrepreneurs are born and not made’” pp.182. Thus, Gibb and Ritchie (1981) proposed an alternative model, the social development model, which suggests that entrepreneurship can be wholly understood in terms of the types of situations encountered and the social groups to which individuals relate. The model assumes that individual’s change throughout life and it is the individual’s transactions with specific social contexts and reference groups that shape the person. Hence, people are
assumed to change throughout their life course and it depends at what point in the life cycle one makes the decision to pursue and entrepreneurial career.

Family background

The importance of one's family background on the decision to become an entrepreneur has been found to be positive (Goldthorpe, 1987; Watkins and Watkins, 1984,1986). Blackburn and Curran (1993) have argued that parental occupation is one of the critical factors influencing entry into business. Similarly, Goldthorpe et al (1987) found that there is a high propensity for the 'off-spring' of parents who run a business to do so themselves. These studies suggest that people with parents in self-employment or small business ownership face a different process of socialisation from those with parents in employment. Watkins and Watkins (1984) argue that this is because parents in self-employment play an important role as 'role models'. Similarly, Rosa (1993) argued that people with successfully self-employed parents have advantages of access to financial resources and skills, which are directly relevant to starting their own business.

Mabel (1961) observed that many entrepreneurs come from families where the father has been self-employed in one form or another because the vicissitudes of self-employment, its ups and downs, its turmoil and other psychosocial uncertainties have a profound effect on the family situation and will influence career orientation at a later stage. However, in spite of the hardships so often experienced by the father, the son frequently follows his footsteps because familiarity with the fact that obstacles have to be overcome in some way has an assuring quality (De Vries, 1981). De Vries further argues that early exposure to risk may increase one's tolerance to it.
Technical and educational qualification

Farr and Ford have suggested that educational and technical ability is important in the innovation process because it can enhance the individual's beliefs concerning the possession of those skills and knowledge that permit successful task performance. Gist (1986) has suggested that direct training experience may be more effective than learning by doing in altering the beliefs of an individual. However, the training content should be meaningful to the trainee so that the links between what is learned in the training program and how it can be applied on-the-job situation are clear (Goldstein, 1986).

A distinction should be made between learning situations and the performance of previously learned tasks or skills (Bandura, 1986). This is because although a high level of efficacy is beneficial to the execution of well-learned tasks, it may not always be beneficial in a learning situation leading to a dysfunctionality of well-learned task as learning situation brings some level of uncertainty requiring more effort to be expended in learning. Furthermore, the variety of potential solutions during the innovation process can be addressed through the application of an individual's background knowledge and skills that enable the innovator to decide which alternative to choose (Cambell, 1960). Barron and Harrington (1981) argue that this requires factual knowledge and at least moderate intelligence. Further, the ability to recognise the best of the alternatives is likely to be related to personal characteristics such as general intelligence and critical skills, as well as specific knowledge of the field in which the problem occurs.
Work Experience

Personal work experience in relation to technological innovation is important as it can enable the innovator reduce the uncertainty that may accompany a novel situation or action (West and Farr, 1990). This is because previous work experiences that are related to specific change or innovation are likely to increase the individual's belief about the implementation of that change. West and Farr argue that although favourable or successful experiences are likely to result in more positive beliefs, unsuccessful experiences may also be important if the individual believes that he or she has learnt from the failure how to be successful in the future.

Hill et al. (1987) found that previous experience with computers was positively related to more general beliefs about the use of other innovative products and services and that generalisation from experience with one form of innovation may occur and lead to more positive efficacy beliefs about innovation or change in general. Bandura (1992) adds that by observing others being successful or unsuccessful in the performance of a task can enhance or undermine an individual's beliefs about performing that or related tasks.

The importance of work experience and technical skills is best illustrated by a framework proposed by Staw (1990), an adaptation of Amabile's componential framework of creative problem solving, which basically reviewed many of the personality and environmental determinants of individual creativity and placed them into a sequence of problem solving steps (figure 3 overleaf). The framework proposes that domain-relevant skills primarily affect the generation of alternatives and the selection of preferred solutions during problem solving activities. Hence, variables
such as cognitive skills, technical training and background are seen as contributors to the reservoir of knowledge from which one can draw alternative solutions and that without substantial task knowledge, the choice of potential solutions would be largely arbitrary, resembling blind trial and error. It should, however, be pointed out that rather than categorising technical and educational qualities as personality characteristics of a few special individuals or as an immutable cognitive process, these qualities are in essence influenced by both personal and environmental factors.

Fig. 3. An evolutionary model of individual creativity

<table>
<thead>
<tr>
<th>Variation</th>
<th>Selective Retention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation or discovery of problem</td>
<td>Generation of alternative solutions</td>
</tr>
<tr>
<td>Selection of preferred solutions</td>
<td>Outcomes</td>
</tr>
<tr>
<td>Response to failure</td>
<td></td>
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</tbody>
</table>

Task Motivation

Domain-relevant Skills

Creativity-relevant skills


Taking this analysis further in regards to technological innovation among manufacturing rural SMEs, Kanter (1988) provided a conceptual scheme that is parallel to the problem solving sequence framework of Amabile. The scheme suggests that like individual creativity, it is possible to view organisational innovation as an evolutionary process comprising variation and selective retention processes. However, although organisational innovation is in no doubt more than the sum of its individual parts, it arguably begins with the input of individuals (Staw, 1990). Thus,
skills and experiences of the individuals, their breadth and scope, will affect the innovation process.

The personal characteristics of the owner/manager, such as their background in terms of education and previous experience is important to the understanding not only of the way that SMEs innovate but also on their learning capacity both internally and externally through interaction with other individuals and organisations. It should be noted that the characteristics highlighted above do not necessarily make for entrepreneurship but rather we can postulate that given these special background factors, individuals possessing them might have a greater disposition for entrepreneurship. Furthermore, the above descriptions should not be viewed as causal relationship but only as part of a more complex phenomenon, which contributes to the emergence of entrepreneurship. It is also important to note that although the systemic view to innovation discussed in Chapter 2 has tended to emphasise the importance of external innovation inputs, Prajogo et al. (2004) have argued that SMEs wishing to become innovative product and process developers need to focus on their internal innovative capabilities as the first point of leverage. Hence, the characteristics of the entrepreneur highlighted above can be important for SMEs, especially start-ups, in rural areas often characterised by sparcity in sources of external innovation inputs to have internal innovation capabilities.

3.3 The entrepreneur’s functions

Introduction

The economic literature has suggested that the entrepreneur performs three key roles: those of risk-taking, co-ordinator, and innovator (DeVries and Manfred, 1977).
Although these roles are not distinctive compared to business executives, the examination of the functions of the entrepreneur can enable us to more closely relate the personal attributes discussed in section 3.2 above to the situations, which the entrepreneur may encounter during the innovation process. This section will also discuss how rural institutional arrangements can affect the functions of the entrepreneur.

An important assumption that can enhance our conceptualisation is that during the innovation process, both internal and external environments of the business create situations, which the entrepreneur has to deal with or ignore. This implies that the entrepreneur will have to bring his/her own set of personal attributes to bear on each situation.

The main theoretical approach for examining innovation in this way was provided by Weber (1949) who considered it fundamental that the subject matter of economics is human action. Weber argued that in their economic action, individual agents act with self-consciousness because they are endowed with the capacity and the will to take a deliberate attitude towards the world and to lend it significance in a 'subjective sense'. These essentially human foundations for socio-economic science led Weber to pursue the objective of making intelligible and thereby understanding the causes of events and phenomena generated by the social actions of individual subjective agents. Furthermore, as agents in social and economic processes, human beings are also contained within and constrained by the structured situational complex comprising their many and varied social connections with others. This means that in problematic situations, human agents seek to do their best in selecting and applying the most
appropriate means to the realisation of their preferred ends and goals. However, rational action is highly subjective and depends on expectations, plans, situational adaptations, deliberations, opinions, orientations, and other human contingencies.

The entrepreneurial functions are mainly found in the economic literature where the entrepreneur has been defined as co-ordinator of economic resources, uncertainty-bearer and risk-taker, decision-maker, innovator, and an arbiter. It is our conceptualisation that the role of the entrepreneur as co-ordinator of economic resources encapsulates the aforementioned functions that are necessary to undertake innovative activities and can enable us to understand how current rural institutional arrangements and other externalities could affect the quantity of the entrepreneur's effort, namely technological innovation.

3.3.1 The entrepreneur as co-ordinator

Jean Baptiste Say (1821) argued that there are three agents of production that are indispensably necessary for the creation of a product—human industry, the capital or value which serves for that purpose, the land and other natural agents which contribute to it. Under this conceptualisation, capital is taken to include physical capital (tools and implements) and money capital, natural agents include powers offered spontaneously by nature such as soil and air, wherein mankind bears no part but which is important in the creation of a new product. Although Say recognised capital and natural agents as indispensable, he envisaged that the real key to production was labour-human industry.
Say analysed human industry from two perspectives. Firstly, he categorised human industry by its actual application in the economy. This implies that the manufacturing industry, for example, consists in giving to the product of another industry a greater value by the new forms, which we give to it through the changes it is made to undergo, and by buying a product in one place where it is of less value and conveying it to another place where it is of greater value.

Secondly, division of human industry focuses on the functional roles labour plays in the productive process, which can broadly be understood as analysing theory, application and execution. Thus, the steps towards the attainment of any specific product are the study of the laws and course of nature regarding the application of this knowledge into a useful purpose, and then the execution of the manual labour. This means that all products are produced by the combined efforts of these three functions of human industry. Say identifies the actors who carry out each of the above functions as: the philosopher or man of science who studies the laws and conduct of nature of which another avails himself to create useful products; the person who uses the knowledge of the philosopher or man of science to create useful products can be an agriculturalist, manufacturer, or trader; while the operative workman or labourer supplies the execution, under the direction of the former two. Under this categorisation, the final product can be agricultural, manufactured, or commercial thus making the entrepreneur an agriculturalist, manufacturer, or trader respectively emphasising the important role of the entrepreneur in the production process.

The important role of the entrepreneur in the production process is highlighted by the fact that out of the three major agencies of production (human industry, capital, and
natural agents), Say focused on the human industry as the key input. Barreto (1989) argued that although a further functional division separated this factor of production into scientist, entrepreneur, and workman, Say’s emphasis placed the entrepreneur as the most important. Hence, although theory and execution are necessary, it is the entrepreneur who drives the productive process by applying theory and directing execution. Say considered information as essentially a free good by arguing that the knowledge of the man of science, indispensable as it is to the development of industry, circulates with great ease and rapidity from one nation to another. This means that a nation in which science is but little cultivated may nevertheless carry its industry to a very great length by taking advantage of the information derivable from abroad. Moreover, although someone must command the necessary resources and organise the productive process in agriculture, manufacturing or commercial industry, it is the entrepreneur who fills the functions of coordination, supervision, and decision-making.

Similarly, Kaldor (1934) recognised the role of the entrepreneur as co-ordinator describing it as that part of the managerial function that determines what sort of contracts should be entered into. It can be argued that the coordinating function can limit innovation since even if this responsibility falls to a board of directors or management team, in all strategic decisions each member of the board or management team will have to keep all alternatives in his or her mind, which is limited. In regards to innovation, if the entrepreneur has coordinating activities which lead to new product lines and supervisory responsibilities of overseeing the production processes of these products, one would expect that the number of products the entrepreneur can enter into is limited by the number of products which the entrepreneur can supervise.
However, Barnard Hawley (1907) maintained that co-ordination is not the key element in the enterpriser's function because the enterpriser is only a co-ordinator in the sense that he directs co-ordination for his own benefit. Because he is the principal and they (land, labour, and capital) are the agents, co-ordinations are only the means by which he attains his end, which is to subject him to the benefits of ownership with its attendant responsibilities. This makes the enterpriser to posses a key function in the productive process by deciding what to do with the means of production at his disposal. Thus his power is derived from his ownership rights of the means of production. This means that any product created is therefore the property of the enterpriser and by virtue of his ownership rights he can dispose and direct the means under his control or the final product as he sees fit.

The importance of this conceptualisation for our understanding of innovation process within rural areas can best be understood by analysing the essential attributes of the entrepreneur that enables him/her to perform this function. In regards to SMEs, this conceptualisation provides us with a unique understanding of the innovation process by suggesting that it is the entrepreneur who drives the productive process by applying theory and directing execution. Thus the essential attributes of the entrepreneur within a rural context would be need for achievement, internal locus of control, work experience and educational and technical experience.

Need for achievement will enable the entrepreneur to take responsibility for solving technical problems that might arise during the innovation process. This is because, although the knowledge of the man of science may circulate with great ease from one
location to another, it is often difficult to solve technical problems across space. A high need for achievement is essential for rural entrepreneurs as it would enable them want to solve problems themselves rather than rely on support organisations and to set targets. This is important because rural entrepreneurs often have to work in 'isolation' and therefore need to have self-initiative in order to accomplish innovative tasks. However, the ability of the entrepreneur to perform the co-ordinating function will be dependent on their educational and technical qualifications as well as work experience. Hence, rural areas with low educational and technical training institutions are likely to constrain innovation by inhibiting the development of essential skills of would-be entrepreneur that are necessary for the performance of the co-ordination function.

Furthermore, the hierarchical social structures in rural areas is likely to constrain status mobility and hence limit the inculcation of children's self-initiative, industriousness, and foresight, through achievement training by parents. Hence the hierarchical status mobility structure is likely to constrain the co-ordinating function of the entrepreneur by limiting the need for achievement training thus constraining innovation process.

Due to the sparcity of support infrastructure in rural areas, internal locus of control is important since the entrepreneur has to have a belief that the outcomes of the innovation process can be controlled by their own action and that they are responsible for the final output. Hence, a high degree of 'independence' found among rural farming communities is likely to produce citizens with internal locus of control, which is important in the co-ordination function of the entrepreneur. Moreover, rural
'cultural' institutional arrangements can influence the processes of innovation by improving the co-ordinating function of the entrepreneur.

Because of low firm formation in rural areas, there is likely to be a lack of employment opportunities that can provide would-be entrepreneur's with an environment for developing the co-ordinating skills through 'learning-by-doing'. This is likely to constrain the innovation process by limiting the incidences of 'learning-by-doing' which can be important in cases where the entrepreneur lack educational and technical skills.

3.3.2 Uncertainty and risk bearing

Uncertainty is present when an individual cannot provide a complete set of the feasible outcomes from some particular action, decision or experiment or when having been able to specify that set his or her knowledge does not permit the selection of one of the competing outcomes as certain to occur (Ford, 1994). In discussing the entrepreneur as uncertainty-bearer, Barreto (1989) argues that there is no one theory that is representative of the different roles the entrepreneur may play in an environment characterised by uncertainty.

Richard Cantillon focused on the entrepreneur's role in a free market system whereby the entrepreneur conducts all of the exchanges in the market, buying from producers and selling to consumers. By performing this function he leads the market toward equilibrium but in a fashion that is more than mere arbitrageur. This is because the entrepreneur in conducting his transactions buys at a certain price and sells at an uncertain one, hence a speculator. This makes the entrepreneur's role as speculator
the key to the market system because of his willingness to bear risk. Thus if profits are made there is entry whereas losses lead to exit. Therefore, without the entrepreneurial element no exchanges would take place. Cantillon further uses a risk theory of profit as a means of identifying entrepreneurship by arguing that any agent, labourer, landlord, or capitalist who receives an uncertain income is an entrepreneur. Furthermore, a farmer who pays a fixed sum for the productive factors such as land, labour and raw materials in return for an uncertain profit is an entrepreneur as the price of the farmer's produce depends on those unforeseen circumstances and consequently conducts the enterprise of his farm with uncertainty. Cantillon extended his definition to cover some unlikely 'entrepreneurs' by including anyone earning an uncertain income whether they set up with a capital to conduct their enterprise or are undertakers of their own labour without capital. Hence anyone who receives a fixed income cannot be, by definition, an entrepreneur but 'hired people'.

Fredrick Barnard Hawley (1907) accepted the orthodox production theory (land, labour, and capital as the three great agencies of production), but argued that a particularly crucial element, enterprise, was missing and classified the three orthodox factors as 'means of production' and enterprise as the 'cause or purpose of production'. This implies that enterprise is not a productive factor or means but rather a motivational factor (Barreto, 1989). Because the enterpriser is the one who commences the productive process, enterprise is the source of all economic activity as well as all individualistic and social activities. However, the adoption of the entrepreneurial role carries with it a cost associated with the assumption of responsibility because in an uncertain environment, the enterpriser motivates production and becomes the responsible owner of the product. Hawley argues that by
his ownership, the enterpriser assumes the responsibility of the use and employment of the means of production and the sale of the product.

Frank Knight focused on the responsible decision-making function of the entrepreneur in an uncertain environment by arguing that the crucial 'heroic' assumption of orthodox production theory lies in the assumption of practical omniscience on the part of every member of the competitive system. This assumption of perfect knowledge or perfect information reduces the productive process to a mechanical model where land, labour and capital combine to make a product. In such an ideal state, pure profit is non-existent. Knight then introduces the crucial element of uncertainty\textsuperscript{26} by arguing that if the chances of an event occurring are known, they can be accounted for and the system will function exactly as before with managers routinely calculating expected values and receiving fixed returns. However, uncertainty alters the workings of the system. Although there is no basis on which to proceed, someone must take the responsibility of decision-making in such an environment. This brings in the role of the entrepreneur who takes over one of the functions of the price system by determining what products are produced, forecast consumer wants and direct production towards those perceived wants. The presence of uncertainty implies a role for responsible decision-making.

The most fundamental element of Knight's entrepreneurship theory is based on the realisation that someone must decide what to do and be responsible for that decision. However, the entrepreneur never really knows in advance if his plans and

\textsuperscript{26} Knight distinguished between risk and uncertainty by defining risk as a random event with a known distribution, while uncertainty is randomness in which the distribution of probabilities is completely unknown.
expectations are correct. Thus the entrepreneur bears uncertainty by taking the chances and simultaneously shielding those who are unwilling to gamble from the effect of an uncertain environment.

However, Hayek (1937) asserted that the fundamental problem is not the uncertainty involved in coordination but that due to the imminence of the future and incompleteness of information that are more serious. This is because the various expectations on which different individuals base their decisions at a particular moment either will or will not be mutually compatible resulting in at least some people getting disappointed. Hayek argues that under such circumstances, it is important to make very definite assumptions about the attitude of persons towards the future. However, to fulfil the conditions of complete foresight it would be necessary that the periods for which people foresee are the same for all individuals and that the changes that will happen in the more distant future be disclosed periodically and simultaneously to all people. Hayek maintains that such assumptions are not realistic even for the limited periods. Hence, in order to deal with uncertainty some individuals will have better foresight than others and therefore distinguishing the entrepreneur from the non-entrepreneurs.

We can therefore conclude that without the entrepreneur, production cannot take place in uncertain environments such as rural areas. The entrepreneur counters uncertainty thus allowing production and distribution to occur by shielding the economy from uncertainty. This argument can be extended to the study of technological innovation

27 In the concept of equilibrium implies that everybody foresees the future correctly and that this foresight included not only the changes in the objective data, but also the behavior of all the other people with whom he expects to perform economic transactions (Hayek, 1937).
among rural manufacturing SMEs, which essentially entails the production of goods in uncertain environment. Given the scarcity of externalities in rural areas, it is the innovative entrepreneur who decides what to innovate and be responsible for that decision. Further, the innovative entrepreneur must counter the uncertain environment by allowing the production and distribution of new products.

In regards to risk taking, this function can be traced back to Mill (1848) who included as entrepreneurial function direction, control, superintendence, and risk bearing. Mill believed that the inclusion of risk taking distinguished the term 'entrepreneur' from the term 'manager'. However, Schumpeter (1954) stressed that the role of innovation was of major importance in defining the entrepreneur as both entrepreneurs and managers are viewed to be subject to the risk of failure.

Liles (1975) suggested that in becoming an entrepreneur, an individual risks financial well-being, career opportunities, future well-being, and family relations. Moreover, Liles argues, because the entrepreneur is likely to have devoted himself to the venture at a personal level, the failure of the venture becomes the failure of the individual and therefore can have major emotional consequences. Thus, the decision whether or not to become an entrepreneur, with its associated risks, depends to a great extent upon the potential entrepreneur's perception of the risk involved.

Atkinson (1957), an expectancy theorist, developed a model that was derived from the relationship that McClelland found between need for achievement and preference for moderate probabilities of success. Atkinson suggested that performance level should be greatest when there is greatest uncertainty about the outcome. However, persons
in whom the achievement motive is stronger should prefer intermediate risk, and
those in whom the motive to avoid failure is stronger should avoid intermediate risk,
preferring instead either very easy and safe undertakings or extremely difficult and
speculative ones. This preference is based on the theory that an individual with a
stronger motivation to avoid failure will tend either to succeed with the safe tasks or
will be easily able to explain failure of a very speculative task without assuming
personal blame, which he finds particularly painful (Brockhaus, 1980).

The three levels of risk preferences—low, intermediate or moderate, and high—could
affect an individual’s decision to start a business venture (Brockhaus, 1980). A
research conducted by Meyer et al. (1961) found that managers selected to represent
the entrepreneurial role did show greater preference for intermediate risks on a risk
preference questionnaire than did specialists of comparable age, education and job
level. A contrasting study conducted by Brockhaus (1980) concluded, “The failure of
risk propensity to distinguish entrepreneurs from managers appears to be a major
deviation from the widely reported theory that entrepreneurs are the more moderate
risk takers. Thus, the level of risk taking propensity does not distinguish new
entrepreneurs either from managers or from the general population.

Therefore, although earlier studies concerned with the entrepreneur’s risk-taking
propensity may have correctly found the majority of entrepreneurs to have a tendency
toward moderate levels of risk, they may have failed to recognise that this same
characteristics is also true of the population in general. However, the risk-taking
propensity of established entrepreneurs may be different from that of new
entrepreneurs because the process of being an entrepreneur may increase the desire
for moderate levels of risk, thus causing a larger percentage of established entrepreneurs to appear to be moderate risk takers. Further, Brockhaus (1980) argues that those entrepreneurs who have a propensity for low or high levels of risk tend to cease to be entrepreneurs at a greater rate than do those who have a propensity for moderate levels of risk.

The application of uncertainty and risk bearing function of the entrepreneur to the innovation process in rural areas is important. This is because the existence of imperfect knowledge and information in rural areas due to sparcity or lack of knowledge creation and exchange institution creates uncertainty during the innovation process necessitating that the entrepreneur bears the risk of the uncertain outcome of the innovative product/process by making the decision about its development. However, the ability of entrepreneur to bear the risk associated with uncertainty of the innovation is dependent on the personal and sociological attributes as well as societal attitudes towards risk.

Hence, once the entrepreneur has made a decision about the development of the innovative product/process, a high need for achievement will be important in enabling him/her to achieve the desired goal in the midst of uncertainty. The desire to excel will enable the entrepreneur overcome the uncertainty surrounding innovation and hence develop the product/process.

Further, relevant work experience especially of a technical or managerial nature can enable the entrepreneur develop the innovative product/process under uncertainty especially if the product/process is related to those of the former employer. Work
experience is also important in skills development, which is essential for risk-uncertainty bearing. Management and technical experience can enable the entrepreneur learn various processes and methods of bearing risk and uncertainty associated with the development of an innovative product/process through learning by doing. Hence, lack of employment opportunities in rural areas especially in large firms can constrain the development of important practical skills, which can be crucial for risk and uncertainty bearing.

Furthermore, the risk associated with starting a business in order to develop an innovative product/process often means that entrepreneur will be committed financial at a personal level. Thus the decision will depend upon the entrepreneur's perception of the risk involved and the general societal attitude towards risk. A pre-disposition against risk will discourage the would-be entrepreneur from engaging in risky situations such as innovation. Hence, rural areas with a general attitude against risk is likely to constrain innovation by discouraging would-be entrepreneurs from engaging in risk ventures.

3.3.3 The entrepreneur as judgemental decision-maker

The standard neoclassical, or macroeconomic, theory of decision-making is essentially static as it argues that the decision maker, under conditions of certainty, has complete information about all the possible outcomes and can assign weights to them. It further assumes that these weights are readily available if the probability calculus is used. Thus under the expectation principle, with its reliance on the probability calculus, when the entrepreneur is considering, for example, the prospective investment return from the purchase of a particular piece of machinery, he
would have in mind a possible profit for each of the years of the anticipated working life of the machine. These would be suitably discounted with each profit being assigned a probability of occurrence and the expected value of the sum of the discounted profit-stream evaluated. If the outcome is greater than or equal to the current purchase price of the machine, it is bought.

According to the above view, the probabilities can be envisaged as being assigned directly or through the medium of the states of nature, which are considered to be the generators of economic conditions that will produce the imagined outcomes. Further, it is assumed that the entrepreneur knows all the possible states of nature to the extent that for each choice of action, prospect, strategy, investment, the entrepreneur knows the outcomes, the states of nature and their probabilities. This, then enables the entrepreneur to select the strategy that maximises the difference between the expected value of the discounted profit-stream and the purchase cost or selects the strategy which maximises the expected value of utility emanating from the probability distributions which attach to the profit-streams of the competing machines, taking into account the utility which would result from a 'do nothing' solution (Ford, 1994).

However, this position has been criticised by Shackle (1966) who argued that probability calculus in whatever guise it is presented has no part to play in the analysis of decision-making under uncertainty because the presence of uncertainty implies lack of knowledge whilst the application of probability suggests the existence of knowledge. Further because probability is a distributional variable, it assumes that any individual who is confronted by the need to take a decision, is given, or can compile for him or herself, an exhaustive list of all the possible consequences of any
particular action. Hence, to rely on the notion of probability requires that the decision can be regarded as one whereby the individual is involved in an infinitely repeatable experiment, a fete that is rarely possible during the innovation process. This makes the theory deterministic and static, thereby dealing with situations of actual certain knowledge hence an inability to form a satisfactory basis for a theory of entrepreneurship, which is considered to be dynamic (Batstone and Pheby, 1996). Thus, Batstone and Pheby (1996) argue that it is difficult to imagine how any of the features commonly associated with entrepreneurship such as risk taking and innovation could be adequately fused into such a theoretical schema as the orthodox theory of choice.

Shackle (1966) argued that if there is one essential function of a firm, it is to take decisions of a planning nature whereby the task of the planner is to invent, not discover. Shackle (1966) alludes to the Schumpetarian type of decision-making, creative destruction, by emphasising that in the decision-making process, the businessman is not merely the helpless victim of uncertainty but is actively promoting it in order to discover and apply new knowledge that is destructive of old knowledge. The necessity of making decisions occurs in any work as no cobbler's apprentice can repair a shoe without making some resolutions and without deciding independently some questions, however small. Schumpeter (1934) argues that although 'the what' and 'the how' are taught him, this does not relieve him of the necessity of certain independence. Hence, the decision-maker acts not on the basis of the prevailing conditions of things, but much more according to certain symptoms of which he has learned to take heed, especially those arising from the demand of his customers.
Casson (1995) has defined judgemental decisions as those decisions for which no obviously correct procedure exists and therefore cannot be made “simply by plugging available numbers into a scientific formula and acting on the basis of the number that comes out. This defines judgement by what it is not, namely the routine application of a standard rule” pg. 80. Judgement is therefore important in improving the quality of decisions that must be taken urgently in novel and complex situations. An emphasis on ‘scarce resources’ confines the discussion to decisions of an economic nature.

Knight (1921) argued that because situations without precedent create uncertainty, the decision-maker must employ subjective probabilities rather than objective frequencies. Hence, a confident individual who recognises that his own beliefs differ from the common view may perceive an opportunity for speculation (Casson, 1995). Thus, if he is more optimistic than others then he can explore an opportunity that others do not recognise. The pessimistic view of the others discourages them from competing with the entrepreneur and therefore acting as a barrier to entry. However, if their beliefs turn out to be right then it is his overconfidence that leads him into losses instead.

Knight’s ideas can be extended to include many issues that cannot be decided by objective methods given the available information. Casson (1995) suggested that decisions of this kind call for judgement which can be defined as a service that enhances the quality of decisions in novel, complex and ambiguous situations which require an urgent decision such as in technological innovation. Casson (1995) argues that in principle, judgemental decision-making could be a once-for-all rather than a
continuing process. Thus, spontaneous changes in data with which a person is accustomed to can create new situations of which adaptation require time. Further, before the individual can adapt to the new situation a great many positive or negative discrepancies between cost and receipt occur in the economic system (Schumpeter, 1934). Schumpeter argues that adaptation always offers difficulties, as the mere knowledge of the changed state of affairs is not attained in most cases with the desired promptness. Furthermore, to draw conclusions from one's knowledge is again a big step, which meets many obstacles as a result of unpreparedness and the lack of means. Therefore, perfect adaptation relative to the formerly existing products is impossible especially in the case of durable producer goods.

Casson (1995) argues that the Schumpeterian innovation can be considered to be a classical example of judgemental decision as the synthesis of incomplete data on product demand, factor supply and technological possibilities calls for a high level of judgement whereas a lower level of judgement is involved in arbitrage. It is important to note that successful judgement does not necessarily imply accepting every proposal because innovation and arbitrage are not always the right decisions to make. Hence, focusing on judgement places emphasise on the responsibility for the decisions rather than the outcome of the decisions as being important.

Schumpeter (1934) explains that in the decision making process, the individual does not always pay attention to all the facts given expression to in his value system, but only to certain indices at hand. Hence, the decision-maker acts in the ordinary daily round according to general custom and experience, and in every use of a given good

\footnote{Value system is a person's whole economy expressed in the form of 'all the relations of his life, his outlook, his method of production, his wants, all his economic combinations' (Schumpeter, 1934).}
he starts from its value, which is given to him by experience. Thus, in every
economic period the tendency exists to turn again into the former well-worn tracks
and even when this constancy is interrupted, some continuity always remains. This is
because even if the external conditions change, it is never a question of doing
something completely new, but only of adapting what was previously done to the new
conditions (Schumpeter, 1934). Schumpeter argues that the value system once
established and the combinations once given are always the starting point for every
new economic period (path-dependent). This stability is indispensable for the
economic conduct of individuals because in practice they could not, in by far the
majority of cases, do the mental labour necessary to create this experience anew
(Schumpeter, 1934). The salient fact is that these rules of behaviour have stood the
test of experience and that individuals are of the opinion that on the whole they cannot
do better than go on acting according to them.

However, good judgement is partly a product of life experience and that a wide range
of employment experience, based on a career 'spiral' through varied jobs of increasing
difficulty as well as migration, is useful in giving the entrepreneur practice in
synthesising information from diverse sources (Casson, 1982). Similarly, personality
is important as a high degree of confidence helps the entrepreneur to cope with the
stress of decision making while perseverance and ascetic lifestyle may be useful in
surviving setbacks. Furthermore, education can improve entrepreneurship by
providing technical instruction that is important in making judgemental decisions.

This emphasises the importance of both the entrepreneurial trait (internal locus of
control) and sociological personality (work experience and educational and technical
achievement) in improving the quality of decision-making. Hence the importance of employment opportunities as well as technical and educational institutions can be important in increasing the level of entrepreneurial activities in a locality. We can conclude that due to low levels of employment as well as technical and educational institutions in rural areas, entrepreneurial decision-making is likely to be constrained leading to a lowering of innovation activities.

Further, influence of externalities on the behaviour of the decision-maker will be dependent on the number of decision-makers within the firm. In a one-man firm, where the external support environment is thin, the quality of decision-making will be influenced to a great extent by the personality of the decision maker and his/her educational and technical background. This is particularly interesting since it could imply that due to the thinness of a supportive environment, the formation of the entrepreneur’s personality as well as their educational and technical training are acquired from ‘outside’ the rural environment and then brought through a process of ‘in-migration’. In order to cope with the rural environment, the decision-maker may resort to ‘adaptation’ and ‘trial and error’ strategies as well as seeking support from ‘personal networks’ within the national support environment. This requires that the decision-maker have a strong internal locus of control that can enable him/her acquire the relevant information, hence increasing their knowledge about the decision-making activity.

However, where the firm has more than one decision maker, it will adopt a strategy similar to the aforementioned in addition to ‘co-creation’ of the environment, depending on internal resources. The forgoing argument suggests that educational
and technical background of the decision makers will influence the quality of decision-making more than their personality. Further, the presence of more than one decision-maker is indicative of a 'larger' and more resourced firm that is able to improve its decision-making processes by attracting good quality labour unlike in a 'one-man' firm.

3.3.4 The entrepreneur as arbitrageur

The arbitrage theory of entrepreneurship can be attributed to Kirzner (1973) and is rooted in the Austrian economics, which views orthodox economic theory as being inadequate, because of its obsession with equilibrium. The theory proposes that because the world is in a state of disequilibrium, opportunities are constantly being recognised and acted upon. Hence, in any given period, the economic man is more concerned with acquiring information and revising his plans. Entrepreneurs therefore reassess previous decisions in the light of new information, i.e. they learn. However, Kirzner (1973) emphasises that it is not the acquisition of information per se that is important but rather that of being alert to opportunities. In any given period, the economic man is more concerned with acquiring information and revising his plans than with determining his optimum market, therefore human action is the key to understanding the market process. Therefore, in a continually changing environment, the entrepreneur moves the economy towards equilibrium through speculation and arbitrage (Casson, 1995).

Kirzner placed the power of human action on entrepreneurs whom by constantly being alert for new opportunities drive the market process. Although Ludwig Von Mises argued that everyone possessed the capacity for human action, Kirzner has
limited those who are alert to opportunities to a select group called entrepreneurs. Disequilibrium is therefore characterised by ignorance, which is directly responsible for profitable opportunities. Under this circumstance, opportunities are not realised because of mistaken perceptions about the environment. Entrepreneurs have the power to reassess previous decisions based on new information therefore having the ability to learn.

In regards to the functional role of the entrepreneur the ‘pure’ entrepreneur, which by definition is arbitrageur, observes the opportunity to sell something at a price higher than that at which he can buy it (Kirzner, 1973). This means that the entrepreneur is not a factor of production, since he requires no special ability to carry out his function other than the capacity for perceiving opportunity. Hence the entrepreneur fulfils no coordinating or management role in the productive process. It is therefore unnecessary to have any special abilities to organise factors and choose optimum rates of inputs and outputs. “All he needs is to discover where buyers have been paying too much and where sellers have been receiving too little and to bridge the gap by offering to buy for a little more and to sell for a little less. To discover these unexploited opportunities requires alertness. Calculation will not help, and economising and optimising will not of themselves yield this knowledge”. P.g 41.

The crucial question that arises from the foregoing argument is why certain people perceive opportunities and others do not? It is not the acquisition of information per se that is important but being alert. Under this conceptualisation, the hired expert may possess more knowledge about a particular field than the employer, yet it is the employer who is the entrepreneur (Kirzner, 1973). This is because somehow the
employer was able to perceive a profitable opportunity and hire the resources to realise the gain. However, it is not possible to explain or understand the processes by which the entrepreneur get their flashes of superior foresight nor how some men discover what is around the corner before others do.

However, Rizzello (1999) has argued that every form of exchange takes place between individuals who are always asymmetrically informed, even when they have gathered the same information. This is because although individuals gather information from the external world, in the decision-making process they use the knowledge, which they build upon the acquired data, which represent the exogenous and quantitative component. After being perceived by an individual, they are interpreted through subjective mechanisms that vary from one individual to another, with the final knowledge that the individual utilises in the choice being specific and personal in terms of quality. This is because each individual builds it up and it is therefore endogenous and different from anyone else's. Rizzello (1999) argues that when an individual who has acquired some information and conveys it to the external world by means of communication signals, it will represent new data for another person, who will build his own knowledge upon it endogenously, which in turn represent new data for another person, and so on. This implies that the acquisition of quantitative data is only the beginning of the process through which individual knowledge is formed. However, in order to obtain useful information one has to give these data a qualitative meaning by means of an internal process. Consequently, different individuals never perceive a given phenomenon in exactly the same way but the process of interpretation is essentially based upon the experiences of an individual (Hayek, 1952).
In addition, the entrepreneur has to possess complete foresight of the relevant changes that are likely to be involved. However, this requires an assumption that all of the prices be fixed simultaneously in advance on some single market, where not only present but also all future commodities that will become available during the relevant period are traded (Hayek, 1945). Further, it would be necessary that the periods for which people foresee are the same for all individuals, and that the changes that will happen in the more distant future be disclosed periodically and simultaneously to all people. The multiple periods over which plans have to be made and realised entails an element of uncertainty since all periods, except the present, for which plans must be made are in the future. Furthermore, Hayek argues that to the set of actual commodities one must add contingent commodities, which may exist in several possible states of nature. This suggests that various actions of an individual have to stand in equilibrium relationships to each other and these must necessarily take place successively in time. It can be argued that the so-called ‘data’ from which an individual sets out to act are all facts given to the person in question, the things that are known or believed by him to exist are not strictly speaking objective facts (Hayek, 1945).

Hayek explains that the plans of different individuals must in a special sense be compatible if it is to be even conceivable that they should be able to carry all of them out since some of the data on which any one person will base his plans will be the expectation that other people will act in a particular way. It is therefore essential for the compatibility of the different plans that the plans of the one contain exactly those actions, which form the data for the plans of the other. The constant revision of plans
arising from changes in external data results in some level of experience been gained by the individual which then creates knowledge. Different people will therefore gain different experiences resulting into specialisation in knowledge necessitating a pooling of the specialised bits of knowledge. Hayek (1945) adds that ‘the problem which we pretend to solve is how the spontaneous interaction of a number of people, each possessing only bits of knowledge, brings about a state of affairs in which prices correspond to costs, etc., and which could be brought about by deliberate direction only by somebody who possessed the combined knowledge of all those individuals’. P.g. 50. These fragments of knowledge are not ‘scientific knowledge’, which are in the preserve of the experts, but rather the ‘knowledge of the particular circumstances of time and place’. Hence, each person has unique information of which beneficial use might be made, but of which use can be made only if the decisions depending on it are left to him or are made with his active cooperation. This knowledge fragment is usable but only in a ‘fixed coefficient’ technology with the individual concerned and cannot be alienated from him without his active co-operation as only the individual can translate it into an alienable/exchangeable commodity or service. However, the ‘man on the spot’ cannot decide solely on the basis of his limited but intimate knowledge of the facts of his immediate surroundings as there is still a need for him to obtain further information that can enable him fit his decisions into the whole pattern of changes of the large economic system. Hayek proposes that in a system in which the knowledge of the relevant facts is dispersed among many people, prices can act to coordinate the separate actions of different people in the same way as subjective values help the individual to coordinate the parts of his plan. Hence, the price
system\textsuperscript{29} provides the intermediate links required to close the circle of complete information.

Further, it is the knowledge of the basic fact of how the different commodities can be obtained and used that explains why the subjective data to different persons correspond to the objective facts. In addition, it is not only prices, current and future that are in the individual’s ‘information set’ but also some knowledge or belief about the ‘opportunity set’- production and supply possibilities. Hayek asserts that although a person need not know everything, once he has formulated his plans he needs to be aware of those things that in the course of carrying out his plans he should have known or else they will lead to a revision of plans. This ‘local’ knowledge requirement implies that any equilibrium is relative to this local knowledge and the position attained by the individual in such equilibrium may be only locally but not globally optimal. Hence, Rural environments, often characterised as hostile can limit the ability of the entrepreneur to engage in arbitrage. This is because entrepreneurs usually reassess their decisions based on new information, hence having the ability to learn.

Although the literature points out that it is not necessary to have any special abilities to organise factors and choose optimum rates of inputs and outputs as all one needs is to be alert to such profitable opportunities, the importance of access to information is important for this process. Hence, the availability of information and communication infrastructure in an area as well as access to markets to gain the knowledge about

\textsuperscript{29}“The price system is a mechanism for communicating information...a kind of machinery for registering change, or a system of telecommunications which enables individual producers to watch merely the movement of a few pointers, as an engineer might watch the hands of a few dials in order to
profitable opportunities is key to our understanding. This is because the entrepreneur cannot make decisions only on the basis of his limited but intimate knowledge of the facts of his immediate surroundings. S/he still need to obtain further information that can enable him fit his decisions into the whole pattern of changes of the large economic system. This highlights the important role that entrepreneurial support organisations can play in providing information about customer demand, amongst others. Hence, rural environments, lacking appropriate policy support can constrain the ability of entrepreneurs to engage in arbitrage.

Furthermore, the role played by knowledge gained through work and technical and educational experience are important in enabling the arbiter to interpret the data, which s/he can then utilise in selecting a specific and personal opportunities for arbitrage. This emphasises the role of employment opportunities as well as educational institutions in enabling entrepreneurs realise their ventures. This is because different individuals can never perceive a given phenomenon in exactly the same way but the process of interpretation is essentially based upon the experiences of an individual. Hence, rural environments, lacking appropriate policy support can constrain the ability of entrepreneurs to acquire timely information that is essential for arbitrage.

3.3.5 The entrepreneur as innovator

In contrast to the Austrian economic theory, Schumpeter (1934) accepted the general equilibrium as resulting from a static market system but added that static theory would not lead to further insights. However, the market system has an inherent

adjust their activities to changes of which they may never know more than is reflected in the price movement” (Hayek, 1945, p.g. 86-7).
tendency toward change because the dynamic attributes of capitalism were its most useful characteristics. Thus, the crucial role of generating change in a market system belonged to the entrepreneur (Schumpeter, 1934).

In his theory of economic development, Schumpeter defined development as endogenous change, which excludes wars, acts of God, and mere growth. Thus development is spontaneous and discontinuous change in the channels of flow involving the disturbance of the equilibrium, which forever alters and displaces the Equilibrium State that previously existed. Within this context, development is characterised by a variety of internal changes including the introduction of a new good, one with which consumers are not yet familiar or a new quality of a good; the introduction of a new method of production, which has not yet been tested by experience in the branch of manufacturing concerned but not necessarily founded upon a scientifically new discovery or a new way of handling a commodity commercially; the opening of a new market into which the particular branch of manufacture of the country in question has not previously entered; the conquest of a new source of supply of raw materials or half-manufactured goods irrespective of whether this source already exists or whether it has first to be created; and the carrying out of the new organisation of any industry, like the creation of a monopoly position or the breaking up of a monopoly position.

The key to understanding Schumpeter's theory of economic development is 'new combination' which entails innovation. This is because it is the new good, new method of production, new market, new source, or new organisation that defines economic development. The new combination does not refer to incremental change
but radical, discontinuous breaks from the past that occurs regardless of institutional set-up. It should be emphasised that to produce other things, or the same things by a different method, means to combine these materials and forces differently. Under the free market system, it is the entrepreneur\textsuperscript{30} who carries out new combination and is therefore the key figure and champion of any economic development (Schumpeter, 1934). However, it is not essential that the same people who control the productive or commercial process, which is to be displaced by the new, should carry out the new combinations. On the contrary, they are as a rule, embodied, as it were in new firms, which generally do not arise out of the old ones but start producing beside them.

The carrying out of new combinations implies command over means of production, which is provided by the banker (or capitalist) who provides credit. It should be emphasised that although direction and supervision are necessary, it is the direction and supervision of new combinations that characterises the entrepreneurial function which does not include mere management and decision making based on established grounds as they do not bring out what can be considered as the salient point and the only one that specifically distinguishes entrepreneurial from other activities. In the circular flow decisions are made in a routine manner and it is the very special function of the entrepreneur that exude leadership in his path-breaking role. This means that the entrepreneurial function refers to a special kind of supervising, coordinating function as it refers to supervision and coordination over new, untried methods.

\textsuperscript{30} The Schumpetarian entrepreneur is an innovator who carries out new combinations: introducing a new technology or product, discovering a new export market, exploiting a new source of raw material supply, or creating a new type of institution. The entrepreneur is not an inventor- he does not generate technology himself- but merely identifies its commercial potential.
Schumpeter argues that the success of everything depends upon intuition and of grasping the essential fact while discarding the unessential. Further, because there is an inherent resistance to change, a new and another kind of effort of will is required in order to “wrest, amidst the work and care of the daily round, scope and time for conceiving and working out the new combination and to bring oneself to look upon it as a real possibility and not merely as a day-dream” p.g. 86. Furthermore, the social environment surrounding the prospective entrepreneur creates a severe obstacle because any deviating conduct by a member of a social group is often condemned. This means that the entrepreneur must overcome the difficulty of finding the necessary cooperation.

From the above discussion of the Schumpeterian entrepreneur, we can derive that firstly the entrepreneur is not a risk-bearer as risk always falls on the owner of the means of production and hence never on the entrepreneur. Secondly, the entrepreneur is not anyone who supervises, coordinates or manages things but one who does these things in a novel manner. Thirdly, although invention must precede innovation, it is the actual implementation of new combinations that characterises the entrepreneur’s role. This theory refines Say’s notion of direction and coordination by insisting on the ‘carrying out of new combinations’ as the ultimate case of economic development.

A fundamental question that arises from the above discussion is exactly how does the entrepreneur carry out new combination? It is important to understand that if in the past, facing a problem, an individual has experimented effective schemes of action, he will use them again every time he associates these already selected schemes to new perceived phenomena (Rizzello, 1999). ‘Long experience’ enables the entrepreneur to
know the extent and intensity of the demand to be reckoned with to which he adheres as well as he can and only gradually altering it under the pressure of circumstances. Although the data may change, whereof everyone will act accordingly as soon as it is noticed, but everyone will cling as tightly as possible to habitual economic methods and only submit to the pressure of circumstances as it becomes necessary (Schumpeter 1934).

Many times, a problematic situation is not coped with by gathering a new procedure but through the imitation of procedures that have been successfully experimented by others (Rizzello, 1999). However, where a person faces a new situation where there is no routine, as in technological innovation, he tends to resort to the procedures he has already successfully experimented in similar situations, adjusting them to the present purposes. Furthermore, the individual represents his own environment to himself by reducing it to concepts. Whenever he follows a non-innovative routine, he modifies neither that representation nor the existing bonds. However, when he performs an innovative action, change occurs by drawing from other environments or through a genuine process of discovery. We can hypothesis that this process of adjustment is dependent on in born dispositions that are continuously remodelled and fitted to experience. Thus, the role of pre-dispositional factors such as need for achievement and internal locus of control can provide an explanatory framework for understanding the level and rate at which an individual can adjust in reaction to perceived innovative opportunity.

In regards to organisations, this process is generated within their hierarchical structure based on the division of knowledge and competence, and on control (Rizzello, 1999).
This can improve the process of co-ordination of the decisions, which is again carried out through the application of already experimented routines or by means of processes of inductive learning aimed at the generation of new routines. Further, within organisations every situation is faced by means of creative problem solving, through the distribution of the problems to be coped with, and then through the application of routines. However, organisations act within an institutionalised context, which is characterised by its own dynamics and by a feedback relationship with the other organisations and with the individuals. The continuous interaction between institutions and organisations- in an environment characterised by scarcity and therefore by competition- represents the key to institutional change. In a context of uncertainty, organisations are spurred by competition to invest in knowledge and skills in an attempt to cope efficiently with the problems arising from the environment.

From the above discussion it is essential to understand the characteristics of the person who carries out new combination- the entrepreneur. Schumpeter (1934) explains that the entrepreneur of earlier times was not only as a rule the capitalist but also, as he still is today in the case of small firms, his own technical expert in so far as a professional specialist was not called in for special cases. Likewise, he was often his own buying and selling agent, the head of his office, his own personnel manager, sometimes his own legal adviser in current affairs. Therefore, the essential function

31 Institutions are made of formal rules, such as constitutions, laws, regulations; of informal rules such as conventions and behavioral rules, and all those processes carried out to enforce both formal and informal rules (Rizzello, 1999)

32 Organizations are the players including political aggregations such as parliament, parties and counties; economic aggregations such as firms, the unions, co-operatives, family businesses; social aggregations such as churches, sports associations, the different clubs, etc; cultural aggregations such as schools and colleges (North, 1992).
of the entrepreneur must always appear mixed up with other kinds of activity, which as a rule must be much more conspicuous than the essential one.

In regards to innovation among rural SMEs, because new combination refers to radical and discontinuous change, the current institutional set-up can limit innovation outputs. Although Schumpeter has argued that the institutional set-up is not important and that command over means of production is provided by the banker (or capitalist) in the form of credit, the thinness of financial institutions and other innovation support organisations is likely to act as a bottleneck to innovation.

Moreover, because in the Schumpeterian conception, the success of innovation depends upon intuition and grasping the essential fact while discarding the unessential the personal attributes of the entrepreneur is important in this regard. This requires the entrepreneur to have high need for achievement as well as a strong internal locus of control. The aforementioned attributes together with educational and technical abilities can enable the entrepreneur overcome the obstacles created as a result of a 'hostile' rural environment by finding the necessary co-operation within and outside the immediate environment.

Furthermore, experience gained in an incubator organisation can enable the entrepreneur to know the extent and intensity of the demand to be reckoned with associated with the innovative product or process. Work experience is also important because a new situation without routine, such as technological innovation, often require that the entrepreneur resort to the procedures he has already successfully experimented in similar situations, adjusting them to the present purposes. This is
because the entrepreneur is, especially in the case of small firms, his own technical expert, his own buying and selling agent, the head of his office, his own personnel manager, and sometimes his own legal adviser in current affairs. But where his knowledge is not sufficient, he may draw from other environments through engaging in networking opportunities or through a genuine process of discovery involving trial and error. Although the continuous interaction between innovative firms and support institutions is expected to signal their needs, in an environment characterised by scarcity, the support institutions may react too slowly to the needs of the SMEs thereby forcing them to seek for 'external' assistance. However, the firm's ability to access external assistance will be constrained by the scarcity of the externalities including transport and communication infrastructure.

3.4 Conclusions: Synthesising the Systematic and Entrepreneurial Approaches

Although the common emphasis found in most of the entrepreneurship literature is the role of particular individuals to innovation, the literature review in this chapter suggests that most innovations are collective achievements of the efforts of many actors working often in parallel and independent locations. This calls for a 'macro perspective' on individual entrepreneurs in order to gain a collective appreciation of the entrepreneurship process (Van De Van, 1995). The environment undoubtedly influences entrepreneurship and can either support or constrain it (Bull et al., 1995).

Supporting this conclusion is the ecological approach to entrepreneurship, which suggests that the intra-population processes (such as prior foundings and organisational density) influence the environments into which new firms are 'born'.
Furthermore, inter-firm and organisational networks affect the distribution of resources available to entrepreneurs in the environment and that institutional factors can shape the macro-context within which these population processes occur (Aldrich, 1990). Hence, the rural context will undoubtedly influence the entrepreneurial effort and therefore the innovative ability of SMEs.

Similarly, previous studies have suggested that new technologies are rarely developed by a single firm without an enabling institutional environment (Usher, 1954; Jewkes et al., 1958; Nelson, 1982; Chandler, 1990). Rosenberg and Birdzell (1986) argue that many complementary innovations in technical and organisational arrangements are usually required before a particular technology is suitable for commercial application. Studies conducted by Freeman (1986) and Dosi (1982) have shown that the commercial success or failure of a technological innovation is to a great measure a reflection of institutional innovations, which embody the social, economic, and political infrastructure that any community needs to sustain its members. This interorganisational 'community' includes not only an industry but also other public-private sector actors who perform critical functions to develop and commercialise a new technology (Van De Van, 1995). The emergence of this social system represents the creation of a new environmental niche which are socially constructed through the opportunistic and collective efforts of interdependent actors in common pursuit of a technological innovation.

The social system therefore provides an opportunity for individual firms and entrepreneurs to appropriate basic knowledge from the public domain and transform it into proprietary knowledge through applied research and development work in areas
related to a technological innovation (Van De Van, 1995). Van De Van (1993) suggested that most entrepreneurial innovations are collective achievements of many people in both the public and private sectors that develop an infrastructure that supports entrepreneurship. Mowery and Rosenberg (1979) have emphasised the importance of basic scientific or technological research, financing mechanisms, and a pool of competent human resources as being important in the development of technology and industry and that although private entrepreneurial firms do engage in the development of these resources public organisations play an important role in their creation and provision. Furthermore, while environmental niches are created and constructed through the opportunistic and collective efforts of independent actors in common pursuit of a technological innovation, entrepreneurs tend to utilise an infrastructure that is substantially developed by others and are less likely to create new combinations without such a supportive environment (Bull et al., 1995).

For an individual entrepreneur, start-up finance provides an initial stock of assets that provides the entrepreneurial venture a period in which to develop and commercialise its innovation by reducing the risk of terminating the innovation during its introductory period (Finchman and Levinthal, 1988). Innovation uncertainty also decreases over time as system function that defines key technical and institutional parameters for the innovation emerge.

Van De Van (1995) has suggested that although there are many technologies and industries in which entrepreneurs act independently and compete with each other with new products and services to gain monopoly profits, this practice may result in unsuccessful results when the innovation involves a new technology for a new
industry. This suggests that simultaneous cooperation and competition in the development and commercialisation of innovation can result in the creation of an industrial infrastructure that enables them to maximise total returns from their common transactions and their respective shares in the surplus. Multiple ties among firms emerge over time and become the infrastructure upon which subsequent relations are based.

From the economic analysis of what constitutes entrepreneurship and the factors that influences entrepreneurial activity, an area that can be relevant to our understanding of the relationship between entrepreneurship and innovation in rural areas includes the conception of a new allocation of resources, which is essentially what innovation and entrepreneurship entails- requires imagination and knowledge available to the entrepreneur and the freedom and latitude to investigate the commercial implications of the idea (Binks and Vale, 1990). This implies that for the idea to be developed through untried allocation of economic resources requires a supportive and flexible institutional structure that can allow resources to be diverted from their existing uses. Binks and Vale (1990) have argued that impediments to the flow and acquisition of knowledge or conditions that inhibit imaginative combinations will restrict entrepreneurship. This suggests that rural areas without appropriate adequate institutional support can act as an impediment to entrepreneurial ideas and therefore innovation.

However, Binks and Vale (1990) have argued that an economic condition such as rurality, which may be deficient in entrepreneurial activity, cannot be taken to imply that there is necessarily a shortage of entrepreneurs. This is because the stock of
potential entrepreneurs may be high but their activity could be suppressed by the lack of appropriate ‘entrepreneurial infrastructure’.\textsuperscript{33} Hence, the characteristics of the context in which entrepreneurs operate that affect either the magnitude of uncertainty or profit will have some bearings upon the quantity of entrepreneurial activity and determine which potential entrepreneurial events are actually realised (Binks and Vale, 1990)

\textsuperscript{33} An entrepreneurial infrastructure means those facets of the economic, political or social systems, which facilitate entrepreneurial activity.
CHAPTER 4

THE STUDY AREA AND ITS INFLUENCE ON THE INNOVATION PROCESS

4.0 Introduction:

Following the review of the literature on the influence of systemic factors and entrepreneurship on the processes of innovation, this chapter presents the background information of the study area, its enterprise and technological infrastructure as well as the public support and transportation, information and communication infrastructure and how these could influence the processes of innovation. This chapter has benefited partly from the FERP (2002) study that was conducted during the same period, interviews conducted with key informants by the researcher, analysis of secondary materials including Cumbria County Council brochures and informational materials gathered by the researcher. It is also based on the researchers own observation and knowledge during the empirical stage of the research and through Internet search. The chapter is organised in the following way: Section 4.1 begins by defining the study area while section 4.2 presents an analysis of the socio-economic characteristics of the study area. Section 4.3 provides us with an understanding of the location of the study area, its accessibility and relationship with major cities. Section 4.4 shows the population changes in the study area from 1981-1998 while section 4.5 the agrarian structures and agricultural practices in Cumbria. Section 4.6 presents the industrial structure and changes in the study area. Section 4.7 provides us with an understanding of the entrepreneurial activities in rural Cumbria and section 4.8 examines the existing policy intervention framework for entrepreneurship and innovation while section 4.9 addresses the issue of labour markets in the study area. Section 4.10 presents the physical, information and communication technology
infrastructure in the study area. Lastly, the chapter concludes in section 4.11 by analysing how the various factors discussed influence the processes of innovation in the study area.

4.1 The Study Area
Cumbria is England's second largest county, covering 6,810 square kilometres (2,629 miles). About half of the county is designated as National Park or Areas of Outstanding Natural Beauty. The majority of Cumbria's settlements are located round its periphery on lower lying land including larger towns of Barrow-in-Furness, Carlisle, Kendal, Workington, and Whitehaven. The settlement structure of Cumbria is defined by the predominance of two medium-sized towns, Barrow-in-Furness in the south and Carlisle in the North. The latter is the main market town and administrative and educational centre, and boasts a cluster of agro-processing industries, making it inextricably linked to the surrounding rural space. For the purposes of this study, Barrow-in-Furness is excluded altogether as it constitutes something of an 'anomaly'. Carlisle is included, alongside the rest of the county, in the contextualisation of the study (namely secondary data analysis, and key informant interviews), in order to understand the broader incidence and effectiveness of innovation support. The term rural Cumbria is therefore used to denote this broader area that has a population of 420,000 inhabitants spread over 6,732 square kilometres (population density of just 62). However, Carlisle is excluded from the primary research. This narrower area (Cumbria less Barrow and Carlisle), with a population of some 350,000 people in 6,600 square kilometres (population density of 53) is defined as the study area since the majority of the settlement areas have a population of less than 10,000 (North and Smallbone, 2000).
Map 1 (Map of Cumbria)
It is important to note that this study was conducted during the outbreak of foot and mouth disease (FMD) in the year 2001 in the UK. The effect of FMD had a major economic, environmental, and social effect on Cumbria. In economic terms, the disease had an impact on farming and related industries especially those related to dairy sub sector. Moreover, the message that ‘people should stay away’ from farmlands, together with restrictions on access, had significant effect on tourism, outdoor leisure businesses, and the outdoor amenities of local communities. This had an effect on the empirical stage of this research as certain areas and businesses became inaccessible due to the restrictions imposed on movement within the county. This meant that access to certain businesses that would normally have taken a shorter time had to take long due to route diversion and postponement of meetings as a result of some routes been total closed.

4.2 The socio-economic characteristics of Cumbria

Rural Cumbria is part of the Northwest government region, but historically maintained strong linkages with the North. Rural Cumbria itself is divided into five local authority districts: Allerdale and Copeland in the western coastal areas, Carlisle in the North, Eden in the east and South Lakeland in the South. A defining feature of Cumbria is that approximately half of the landmass is designated as a National Park or an Area of Outstanding Natural Beauty. This has significant implications upon recent developments. The dramatic scenery of the Lake District attracts large numbers of tourists underpinning the survival and growth of large numbers of local businesses.

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34 Large urban centres and a long tradition of manufacturing pursuits prevail in both regions, and especially the Northwest. At the regional level, the decline of manufacturing has left sizeable islands of inner-city unemployment and deprivation. Thus, Cumbria is often perceived both as different and in lesser need of external assistance.
At the same time, the severe planning restrictions on new developments in the National Park hinder significantly industrial expansion as well as new housing.

The settlement pattern is distinct, reflecting principally the topography. The Cumbrian fells, located in the centre of the area, ensure the majority of the population lives on the periphery of the County, leading to long travel distances between the main population centres. Partly as result of the topography, there is a profound divide between the Eastern and Western parts of the study area that is important for this study. Indeed, the Western coast (Allerdale and Copeland districts) boasts two small and three micro towns that grew around the mining and steel industries of the nineteenth century. The industrial traditions of the locality were underlined by the development of a major nuclear station (British Nuclear Fuels) in the post-war era, which constitutes the major employer in the West. However, the decline of mining and major structural changes in the county has led to a general decline of most traditional industries leading to what can be termed an 'economic gap'. In contrast, the Eastern parts of the county (Carlisle, Eden and South Lakeland districts) are defined by a much more dynamic industrial structure. It combines tourism, agriculture, and a small number of manufacturing industries, including those that tap into the image of the area (food processing), and others that draw upon the influx of newcomers attracted to the rural ‘idyll’ (electronics and instruments).

4.3 Location & accessibility and the relationship with the major cities

Rural Cumbria occupies a position in the geographical periphery of England. The distance between London and Carlisle, the main urban centre within the study area, is
some 440 kilometres. This can be translated to a five hours train journey, or anything between four and eight hours by car. The nearest major urban conurbations are Newcastle to the East (some 88 kilometres away) and Manchester to the South (160 kilometres). The nearest major international airport is located in Manchester, which is more than two hours drive away.

Accessibility in this context is defined by the state of the road and rail infrastructure. As far as the former is concerned, the M6 motorway constitutes the main north-south axis in the Eastern-most part of the study area. This enables fast and efficient transfer of goods and people along this corridor and beyond to the main population centres of the Northwest of England and West of Scotland. However, east-west road linkages are less well developed. Within the study area the main axis in this direction is the A66, a combination of single and dual carriageway. This goes on to connect the locality with the North and East of England. Travelling by road within the study area can also be relatively troublesome, as the restrictions within the National Park preclude large-scale infrastructural investment. As far as rail links are concerned, the Eastern parts of rural Cumbria are well served by the Western mainline. However, rail links in the West of the study area are virtually non-existent. Moreover, there is a need to upgrade the Northwest train line.

One of the main problems of improving communications within the county and between the county and the markets that local firms serve is low population density resulting in a sparse local market. Hence transport between some rural areas of Cumbria is non-existence and some areas are served by only one bus a week, especially in parts of Eden district. This has hampered the flow of goods and
services between the districts and the markets that local firms serve and also labour mobility within the county and between the country and the neighbouring counties.

4.4 Population Change

During the 1981-1998 period the population of rural Cumbria has increased modestly by some 3.2% (see Figure 4). This rate of growth is not significantly different from that reported in the UK as a whole (+4.7%). However, within Cumbria there were significant disparities in population change. Western parts reported a modest decline of the total population, from 168.6 to 165.2 thousand (ONS, 1991-2001). In contrast, the Eastern areas reported a much more robust performance, from 239.1 to 255.8, an increase of nearly 7% more or less in line with population change in England as whole. This increase in the East however, is mainly due to the inflow of individuals and families from elsewhere in the UK. Admittedly some of the new arrivals are of pensionable age, attracted by the ‘rural lifestyle’, leading to change in the age composition of the population. Hence, in South Lakeland those above the legal age of retirement accounted for 24% of the total population as of 1998, significantly above the 18% for England.

However, the fact that some parts of Eastern Cumbria have more pensioners per 100 inhabitants than the West is not reflected in rates of economic activity. Indeed, those economically active in Western Cumbria make up only 36.3% of the total population and 61% of those aged 15-59, as of 1998 (Annual Employment Survey, 1998). The corresponding figures for the East of the study area were 43.5% and 75%. This disparity is indicative of the effect that industrial decline had upon the West, where a
large proportion of the population that are less than 60 years old are not economically active.

Figure 4. Index of Population Change, UK, Western Cumbria, Eastern Cumbria (1981=100)

4.5 Agrarian structures and agricultural practices

In the year 2000, agriculture employed 4.2% of the economically active population in rural Cumbria, a figure well above that for England as a whole (0.9%). The total land under cultivation in rural Cumbria was 438,522 hectares, of which 285,755 hectares was privately owned with the remaining rented from large proprietors (MAFF, 2001). The agricultural land was divided into 6,621 holdings, giving an average size of holding of 66.2 hectares. This was modestly above the average for England (61 hectares per holding). These figures, however, provide a misleading picture regarding the prevailing conditions in the agricultural sector. This is because, given the mountainous and semi-mountainous terrain of the locality the vast majority of agricultural land comprises of grasslands – some 65.4% of the total in comparison to only 38.4% in England. Thus, the average size of land under cultivation was only 3.7
hectares per holding, well below the 27.2 hectares per holding for England (MAFF, 2001).

Despite the relatively low returns in agriculture (MAFF, 2001) and the hostile conditions prevalent during the best part of the 1990s, the total number of holdings increased from 6,220 to 6,621 between 1997 and 2000 – an increase of some 6%. This contrasts with England, where there was a decline of more than 15%. At the same time, the total employment provided in the sector declined from 14,432 to 13,802 – a modest drop of some 9%. This was well below the decline reported in England – 22.6%. Though direct comparisons are not readily available because of the way that statistics are presented, this relatively robust performance of Cumbrian agriculture could be linked with an expansion in part-time farming.

4.6 The industrial structure and change in the study area

Outside agriculture the single largest employer in rural Cumbria was manufacturing, accounting for 21.9% of the workforce, as of 1998. Trading activities were responsible for 17.7% of the non-agricultural workforce, whilst health and social work employed some 11.8%. The contribution of tourism related activities was supported by the significance of hotels and restaurants – employing one in ten of those working outside agriculture. The industrial structure in rural Cumbria differed modestly from that in England, where service and trading activities are relatively of greater importance, at the expense of manufacturing industries, and hotels and restaurants. There were some considerable differences in the industrial structure of Eastern and Western Cumbria. The former demonstrated a greater dependence on
trade and tourism related activities, whilst the latter depended more heavily on manufacturing – which employed nearly 30% of all those working outside agriculture.

The significance of manufacturing in rural Cumbria was maintained despite a process of industrial decline throughout the 1990s. Indeed, employment provided by the sector declined by nearly 10,000 between 1991 and 1998. Given the marginal increase in the non-agricultural workforce, the relative importance of manufacturing sector fell by five percentage points in seven years. During the same period, the decline in one sector was not replaced by the rise of another. Jobs were created in smaller numbers (between 2,000 to 3,000 in each case) in health and social work, trade, and hotels and restaurants. However, the vast majority of these new jobs in these growing and high impact sectors were realised in the Eastern parts of the study area. In the West, new employment creation by trading activities was less than 700, in comparison to 2,000 in the East, whilst in hotels and restaurants there were some 200 job-losses in the former as opposed to a gain of more than 2,000 in the latter. The industry where the reverse was the case was health and social work: more than 3,000 new jobs were created in the Western parts of the county. Interestingly, this is an industrial sector that is expanding because of the augmented problems of unemployment and deprivation in the coastal towns. A sector that generates jobs with a skill content that may not always be available locally.

As far as the size distribution of non-agricultural industries is concerned, rural Cumbria displays modest differences with England. More specifically, micro and small-scale industries tend to be somewhat more important in terms of employment

35 Statistical evidence provided by MAFF for the 1998-2000 period lends support to this argument.
generation (Smallbone and North, 1999). As shown in Figure 5, they accounted for 53.2% of the workforce in the former, in comparison to 46.9% in the latter (1998). This disparity was more or less exclusively on account of the importance of enterprises of this size in the Eastern parts of the locality. There, enterprises of this size made up nearly 57% of the non-agricultural workforce, whilst large firms accounted for just over one in five jobs. In the West – with a long tradition of factory production – large enterprises were responsible for 34% of employment, a figure above even that for England.

During the 1991-1998 period, there was only marginal change in the size composition of the non-agricultural sector. This involved 2% decline in the significance of large firms, and a comparable increase in the importance of micro enterprises. This trend was evident throughout the region and therefore no evidence to suggest that there is convergence or further divergence between the East and West.

4.7 Entrepreneurship in rural Cumbria

Measuring the incidence of entrepreneurship is usually a problematic issue. This is particularly the case when comparisons are an important consideration. In the UK there are two commonly used measures of entrepreneurship: the number of VAT registered businesses per 1000 inhabitants, and the rate of self-employment, both of which are problematic. More specifically, the former measure tends to reduce the incidence of entrepreneurship as it fails to register all those units that are below the VAT turnover threshold (currently set at £45,000). The latter measure tends to exaggerate the incidence of entrepreneurship as it includes large numbers of
professionals (doctors, lawyers etc) that are partners in independent entities but have nothing to do with actual decision-making. In this study the former measure will be used, as self-employment statistics at the district level are not readily available from the annual labour force survey. Even in instances where they are available they tend to fluctuate wildly as a result of the small samples involved. For example the number of self-employed in South Lakeland appears to have increased from 7,000 to 11,000 between 1998 and 2000.

Rural Cumbria appears to have an above average number of VAT registered business per 1000 inhabitants, some 36.6 in comparison to 28.6 for England. To put it in another way, there are nearly 3,400 more businesses operating in the study area than would be the case if there were an average propensity to entrepreneurship. The employment implications of this surplus are also considerable, though nearly impossible to quantify. However, this greater propensity to an enterprising behaviour is not equally shared between the East and the West. In the latter the number of VAT registered businesses per 1000 inhabitants is identical to that for England. In the former this stands at 41.8 – some 46% above the average. Thus, all the 3,400 additional enterprises are to be found in the Eastern parts of Cumbria.

The rate of net change in the business population suggests that there is a weak, if any tendency towards convergence in the entrepreneurial propensity of different spatial units. As shown in Figure 5, VAT registrations in rural Cumbria throughout the 1987-1998 period, were lower than those for the UK as a whole. However, de-registrations in rural Cumbria were also lower than those in the UK (see Figure 6).
Eastern Cumbria emerges as a much more changeable environment than the West. Rates of new business formation in the East are well above those in the West and during some years even higher than the UK as a whole. At the same time however, Western Cumbria had very low de-registration rates throughout the 1987-1998 period. As a result, there was no change in the gap between East and West.

Source: Nomis

Figure 6. VAT De-registrations, UK, Rural Cumbria, West and East, 1987-1998

Source: Nomis
The key informant interviews revealed that East Cumbria is more inclined to entrepreneurship than the rest of the county. Furthermore Cumbria Inward Investment Agency has been instrumental in attracting businesses into Cumbria and developing local businesses to grow. The main factor inhibiting the development of entrepreneurship has been a general 'resistance to change' amongst those in the old mining towns which had no tradition of people setting up their own businesses. The mining industry had an influence on the attitudes towards entrepreneurship because it provided stable employment for many decades. In such towns, most business start-ups tend to be in carpentry and plumbing.

There are important entrepreneurial characteristics found among the farming community such as 'sense of independence' deriving from a strong tradition of conservatism which can be used to stimulate greater entrepreneurial effort in the county. The Farm Link project has undertaken to influence the attitude of farmers towards entrepreneurship. Moreover, entrepreneurship is mainly found in large towns due to availability of markets and labour. Although the south east of the county is more entrepreneurial, there is not much entrepreneurial propensity amongst farmers since most of them tend to be 'stuck in their old ways', are resistant to change, and are risk averse. In the face of the structural changes taking place in the agricultural sector, most farmers have opted to 'tighten their belts' instead of diversifying into tool repair or tourism based business.

There are some community enterprises that have been set-up through the 'New Deal' programme including one for market gardening and a one-stop-shop credit union in
4.8 Policy intervention: the existing framework

A key instrument in translating new initiatives to the regional context is the Northwest Development Agency. This organisation, formed only a few years ago, has the onerous task of working throughout the region that encompasses the main population centres of Greater Manchester and Merseyside with intense problems of urban deprivation. A number of concerns have been raised at the level of the county about the willingness and effort placed by the Northwest Development Agency in articulating a strategy for rural areas. The main local agent that could effectively articulate these concerns is Cumbria County Council. This alongside the six district councils is responsible for economic development initiatives at the local level.

On the ground, economic development policy is delivered through a number of organisations themselves the result of formal partnership between local and regional authorities. In the coastal areas, the West Cumbria Development Agency is responsible for attracting Inward Investment, as well as providing premises for small and micro-scale enterprises. In contrast, in the Eastern parts of the county a multitude of micro initiatives (Alston, Kirkby Stephen etc) have emerged at the level of the village. They aim to bring the local business community together in order to enhance economic advancement.
Primarily the Business Link/Small Business Service delivers Enterprise support. It offers information regarding international markets, legal issues, company directories etc, as well as advice and counselling. This includes pre-start up (idea evaluation), start-up (business plan) and existing business support. The Business Link/Small Business Service also provides training, though this is invariably delivered by outside consultants. One important feature of the local support is the provision of advice for the sizeable farming community. Other organisations that provide similar services for specific socio-economic groupings and or geographic localities include the Prince’s Trust (recipients of support must be between 18-29 year old), the Way Forward for Farming Women, and the West Cumbria Development Agency. One area of concern regarding the delivery of enterprise support in rural areas is the issue of ‘rural premium’ i.e. the cost associated with the delivery of services in a sparse and geographically spread population of businesses (Smallbone and North, 1999). Lastly, there are a number of sector specific initiatives: trying to bring together producers, and market local produce in the food and craft sectors.

4.9 Labour Market

Table 4 below shows the employment pattern in the study area during the period 1997. From the table, we can see that a total of 201,800 people were employed in Cumbria in 1997 and that these were somewhat evenly distributed among the districts. South Lakeland, which relies more on tourism than agriculture, had the highest number of the self-employed in the county (17.1%).

Although there are pockets of unemployment in the county, such as some parts of Carlisle town, it still has one of the lowest unemployment levels in the country (below
3%). However, the wage level in the county is one of the lowest in country. Furthermore, the New Earnings Survey (1996) show that the average male wage rates are 6.5% below the UK average, while that for women are 12% below the national average.

Table 4 (Labour market in the districts of Cumbria)\textsuperscript{36}

<table>
<thead>
<tr>
<th>Table 4 (Labour market in the districts of Cumbria)\textsuperscript{36}</th>
<th>Allerdale</th>
<th>Barrow</th>
<th>Carlisle</th>
<th>Copeland</th>
<th>Eden</th>
<th>South Lakeland</th>
<th>Cumbria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total workforce</td>
<td>31,800</td>
<td>25,800</td>
<td>51,500</td>
<td>26,400</td>
<td>19,500</td>
<td>47,200</td>
<td>201,800</td>
</tr>
<tr>
<td>Number of employees (1997)</td>
<td>28,347</td>
<td>23,610</td>
<td>45,965</td>
<td>24,778</td>
<td>17,282</td>
<td>39,117</td>
<td>179,099</td>
</tr>
<tr>
<td>% of workforce employed</td>
<td>89.2</td>
<td>91.5</td>
<td>89.2</td>
<td>93.9</td>
<td>88.8</td>
<td>82.9</td>
<td>88.8</td>
</tr>
<tr>
<td>Number of self employed</td>
<td>3,433</td>
<td>2,192</td>
<td>5,551</td>
<td>1,597</td>
<td>2,175</td>
<td>8,069</td>
<td>22,694</td>
</tr>
<tr>
<td>% of Workforce self employed</td>
<td>10.8</td>
<td>8.5</td>
<td>10.8</td>
<td>6.1</td>
<td>11.2</td>
<td>17.1</td>
<td>11.2</td>
</tr>
<tr>
<td>Numbers unemployed (July 1999)</td>
<td>2,265</td>
<td>1,947</td>
<td>2,093</td>
<td>2,071</td>
<td>363</td>
<td>824</td>
<td>9,563</td>
</tr>
<tr>
<td>% Unemployed &gt; than 1 year</td>
<td>36.5</td>
<td>24.4</td>
<td>23.8</td>
<td>38.2</td>
<td>14.3</td>
<td>15.2</td>
<td>29.0</td>
</tr>
<tr>
<td>Sectoral employment (1997)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary sector</td>
<td>5.6%</td>
<td>1.6%</td>
<td>2.7%</td>
<td>3.2%</td>
<td>13.4%</td>
<td>5.1%</td>
<td>4.7%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>22.4%</td>
<td>30.2%</td>
<td>20.0%</td>
<td>37.6%</td>
<td>12.2%</td>
<td>16.0%</td>
<td>22.6%</td>
</tr>
<tr>
<td>Construction</td>
<td>5.5%</td>
<td>2.8%</td>
<td>4.2%</td>
<td>6.6%</td>
<td>7.2%</td>
<td>4.1%</td>
<td>4.8%</td>
</tr>
<tr>
<td>Distribution, hotels and restaurants</td>
<td>27.6%</td>
<td>20.6%</td>
<td>25.2%</td>
<td>15.4%</td>
<td>28.0%</td>
<td>33.5%</td>
<td>25.7%</td>
</tr>
<tr>
<td>Services</td>
<td>38.7%</td>
<td>44.7</td>
<td>48.0%</td>
<td>37.0%</td>
<td>39.3%</td>
<td>41.1</td>
<td>42.2%</td>
</tr>
</tbody>
</table>

Source: Cumbria.gov.uk

Labour relations in the county is reputed as being very good and according to key informant interviews with the Cumbria Chamber of Commerce, this has been one of the main factors that has influenced the location of some of the large companies in the county. However, due to the ‘thinness’ of the economy, labour made redundant tends to move away from the county and therefore reducing the existing ‘pool’ of skilled local labour.
According to key informant interviews, there is generally a basic skill shortage in the county coupled with low skills level in some districts. Largely, the pool of labour is unskilled or semi-skilled with the majority of skills being in traditional industries such as shipbuilding. According to key informant interviews, in some districts such as Eden, people from outside the district normally fill high skill jobs. The county has also a reputation of loyal workforce with few industrial disputes. However, the need to train workers is not being embraced by businesses with most of them tending to be 'insular' about their workers due to the fear of retaining trained workers. This has resulted in the supply of skilled labour not being able to meet the local demand.

Some of the districts such as Eden with a small working population have experienced incidences of lack of schools and shops in some villages. Hence, the 'quality of life' that is offered by the location has not been very appealing to younger people, who opt to go away, with the furthest areas of the county having higher proportion of elderly people. However, the pleasant environment has led to in-migration of labour in some areas such as East Cumbria due to pleasant villages and tourism attraction. In contrast, the poor image of decline in West Cumbria has not attracted in-migrants. This has mainly been due to the growth and decline of the defence and energy-related sectors during the post-war period. As a result, the urbanised areas of West Cumbria have turned from net employer of skilled labour to ones that are losing population particularly among younger and better-qualified working age. Interestingly, there has been an observed migration of labour from Scotland into Cumbria due to better employment opportunities although these have not been particularly high skilled labour.

36 Note: Employment in primary sector includes: agriculture, forestry, fishing, energy or water; Services includes: transport and communications, banking, finance and insurance, public admin,
4.10 Communication, Information and Technological infrastructure

Considering communication, information and technological infrastructure the county still experiences great difficulties due to lack of high-speed band equipment. However, there has been recent development in information technology infrastructure in Carlisle and Allerdale with the setting up of Telecottages. The success of the Telecottages for example in Brampton has largely been attributed to the quality of staff and the involvement of the local community. In Allerdale, the development of teleconferencing and PC facilities in community centres is being encouraged while the council is planning to develop rural IT networks with the aim of linking village halls to share information. However, despite the plethora of information and technology initiatives by the public sector, very few SMEs have adopted advanced telecommunication and information technologies with few having websites.

Regarding innovation, there are pockets of innovation that can be found within Cumbria, particularly in the food-processing sector, in some districts especially among the SMEs involved in local craft. According to key informant interviews, there is no record of widespread entrepreneurial innovation considering that there are over 30 industrial estates, business and science parks in the County. However, in the South Lakeland district, there are a good number of innovative SMEs with some firms having received SMART Awards. A major concern in the district has been that innovative firms tend to 'chase' their markets and therefore move closer to Manchester.
A recent development in the county has been the establishment of Westlake’s Science and Technology Park as an initiative to create a dynamic and self-sustaining concentration of knowledge-based activity in the region linking advanced, applied research and entrepreneurship. The County Council, the West Cumbria Development Fund and the Rural Development Commission, the European Union and the private sector have been the main supporters of this initiative. During the first phases, British Nuclear Fuels, which is one of the remaining large employers in the area, located its Bio-analytical and Cytogenetics laboratories at the Park alongside other enterprises. Building on the existing technological capacity, the extension of the facilities in 1994 broadened the range of technologies— from physical science through to environmental expertise, engineering and purchasing and contract services.

Part of the regional redevelopment strategy at Westlake has been linking research and education with business. Although the region has no scientific educational or training facilities through which technical experts could be trained or even retrained, the newly established Westlake’s International Research and Graduate Centre aims to provide the infrastructure that is currently lacking. The institute specialises in the environment and industrial pollution, it carries out and manages research projects on contract to local industries, engages in pure and applied research, provides project work for students and runs short residential courses. The institute is therefore likely to play a catalytic role in supporting technological innovation by managing research projects for innovative businesses. The European Regional Development Fund has also been actively supporting the development of innovation in local manufacturing at Westlake’s through the creation of a product development unit. This pairs
industrialists with researchers and technical experts to develop new products or systems.

4.11 Conclusions

Analysis of the case study area under different categories has provided us with an interesting understanding of the various factors that are inter-related and can have an influence on the processes of innovation. For instance, the socio-economic characteristic of the study area has been influenced to a large extent by its unique landscape, with approximately half of the landmass being designated as a National Park or an Area of Outstanding Natural Beauty. This has attracted tourism with the resultant increase in number of local businesses. This can be important in stimulating start-up of local businesses, which may include innovative firms. However, planning restrictions can also have significant implications in the establishment of innovative firms in the study area. Although the decline of mining and industrialisation in the Western parts of the county can be seen as having undermined industrial tradition of the local area leading to structural unemployment, this can be viewed as positive as it can have an influence on innovation due to the availability of low-cost 'pool of skilled labour'. Moreover, the influx of 'newcomers' in the Eastern parts of the county have contributed to a small number of manufacturing industries in electronics and instruments that can have important influence on innovation in the study area.

Regarding the location of the study area and its accessibility, the distance between it and the major urban conurbation's can have a negative influence on innovation due to lack of timely information flow between different actors. The dominance of agriculture and the agrarian structures can also have important implications for
innovation. The 'sense of independence' culture that are generally found among farming communities can be important in enabling would-be entrepreneurs from the area to start up in business. However, the agrarian structures can also be limiting to innovation due to lack of appropriate skills.

The prevalence of manufacturing activities in the western parts of Cumbria can be important in stimulating innovation in the study area by providing work environment where new ideas can be obtained and tested and also relevant skills developed for would-be entrepreneurs. Considering entrepreneurship in the study area, rural Cumbria was found to have an above average number of VAT registered businesses per 1000 inhabitants compared to the rest of England. This is important since some of the new registered businesses are likely to be involved in developing innovative products and/or processes.

Regarding available public policy which could influence innovation in the study area, the establishment of Northwest Development Agency and partnerships between local and regional authorities can be important in providing relevant support required by innovative SMEs. However the concern regarding 'rural premium' can limit the provision of public support to innovative SMEs. The prevailing good labour relations in the county can be important in the innovation process since employees will tend to work within one firm for a longer period. This is important since innovation tends to take time, there is a need for continuity by employees to enable learning by observing and learning by doing to occur. However, the basic skill shortage found in the study area can limit innovation, which generally requires available high skilled labour.
There exists an East-West divide regarding the physical, communication and technological infrastructure with the more rural parts of the county experiencing inefficient infrastructure than the rest of the county. There is therefore a need to upgrade infrastructure in the county since communication between the county and markets are important in timely information exchange during the innovation process. Moreover, lack of high-speed band equipment can limit the flow of information from 'strong-tie' and 'weak-tie' business and personal networks located within and outside the county during the innovation process. Chapter 5 will provide us with the methodological approaches that have been used in this study.
CHAPTER 5

METHODOLOGICAL APPROACH

5.1 INTRODUCTION

Before engaging in a discussion of the paradigmatic issues in social research and the subsequent rationale for the selection of a particular research approach for this study, it is important to consider the nature of SME research and the implications this has for the selection of the appropriate methodology and methods. Hill (2001) argues that the SME context reflects nuances and subtleties that force a new line of thinking on what is or is not an appropriate methodology for conducting research in such firms. Churchill and Lewis (1986, p.335) adds that because SME research "is a field in which the underlying concepts have not been adequately defined", the primary concern of researchers should be theory development, not theory testing. This view is supported by Bygrave (1989) who argued that the emerging nature of SME research demands that a qualitative approach that encourages the development of practical and theoretical understanding and the generation of new and alternative theories and concepts is appropriate. Bygrave adds that at the beginnings of a paradigm, inspired induction applied to exploratory, empirical reasoning may be more useful than deductive reasoning from them. Churchill and Lewis (1986) further warns that without existing theories grounded in empirical observations, the use of hypo-deductive approaches to understanding SMEs will restrict the generation of knowledge about their processes, activities and outcomes.

Another factor that impacts upon the selection of an appropriate research paradigm are the research "subjects" involved in SMEs (Shaw, 1999). Shaw argues that because SME research involve the study of human action and behaviour, it is
essentially concerned with the nature of reality in the social world. In contrast to the natural world, the human subjects of the social world possess the ability to think for themselves, comprehend their own behaviour and have an opinion about the social world of which they are a part (Gill and Johnson, 1991).

Consequently, the study of SMEs cannot be approached from the exterior standpoint demanded by the positivist approach but instead, researchers need to adopt an approach that allows them to "get close" to participants, penetrate their internal logic and interpret their subjective understanding of reality. Specific to small firm's research, Churchill and Lewis (1986) argue that the reduction of the process of creating, developing and growing small firms to individually measurable variables ignores real problems in order to fit neat packages. Others researchers agree with this position by stating that by 'stripping' SME problems of the context within which they occur naturally, the findings produced by positivist approaches are generalisable only to the extent that the conditions under which data are collected existed in the social world (Aldrich, 1992). However, Hall and Elliott (1999) have argued that practical research undertaken in an environment of methodological pluralism is of greater use in contributing to the body of academic knowledge and in translating that knowledge into effective policy recommendations, which are likely to be understood and implemented by those outside the realm of university. The choice of data collection methods that will be used for this research has taken into account issues related to time, costs and resource constraints. Furthermore, the focus of this research is on knowledge that can be used to build theory, while at the same time contributing to a theory of action that will generate benefits for formulating policies.
5.2 Methodological paradigms:

Understanding the range of possible frameworks and how others have used them is the first step to understanding the thought processes and the materials that will be applied in this research. Although sometimes difficult to articulate, the research frameworks provide a guideline on the way the researcher conceive his world and his own place within it. There are seven main paradigms or research frameworks that have been identified in the literature including positivism, critical rationalism or realism, constructivism and its related paradigms (interpretivism, critical theory, and feminism), and structuration. Guba and Lincoln (1994) have further classified these into what they refer to as 'basic beliefs or metaphysics of alternative inquiry paradigms (See Table 5 below). Structuration theory has not been included in the discussion because its ontology and epistemology is difficult to distinguish from constructivism.

5.2.1 Positivist paradigm:

Positivism ontology\(^\text{37}\) assumes that social reality\(^\text{38}\) exists independently of the observer and the activities of social science, that this reality is ordered, and that these uniformities can be observed and explained. Also known as naïve realism, an apprehendable reality is assumed to exist, driven by immutable natural laws and

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\(^{37}\) *Ontology* refers to the claims or assumptions that a particular approach to social enquiry makes about the nature of social reality- claims about what exists, what it looks like, what units make it up and how these units interact with each other.

\(^{38}\) Lincoln and Guba (1985) have classified ‘reality’ into four levels: (1) **Objective reality** also known as naïve realism or hypothetical realism asserts that there is a tangible reality and experience with it can result in knowing it fully; (2) **Perceived reality** asserts that there is a reality, but one cannot know it fully and it can only be appreciated from particular vantage points- perceptions which is a partial, incomplete view of something that is nevertheless real, and capable of different interpretation when seen from different viewpoints; (3) **Constructed reality** see reality as a construction in the minds of individuals and asserts that it is dubious whether there is a reality, and if there is, we can never know it. This ontological position argues that there is always an infinite number of constructions that might be made and hence there are multiple realities; (4) **Created reality** ontological position argues that there is no reality at all.

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mechanisms (Guba and Lincoln, 1994). Hence, only that which can be observed, i.e. experienced by the senses, can be regarded as real and therefore worthy of the attention of science. Further, the causes of human behaviour are regarded as being external to the individual. In terms of its epistemology\(^{39}\), positivists have adopted the extreme detached position whereby research is conducted from the ‘outside’, from the point of view of the researcher’s conceptual and theoretical frameworks, and the research methods used are linear and standardized.

<table>
<thead>
<tr>
<th>Item</th>
<th>Positivism</th>
<th>Postpositivism</th>
<th>Critical Theory</th>
<th>Constructivism</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ontology</strong></td>
<td>Naïve realism- &quot;real&quot; reality but apprehendable</td>
<td>critical realism- &quot;real&quot; reality but only imperfectly and probabilistically apprehendable</td>
<td>historical realism- virtual reality shaped by social, political, cultural, economic, ethnic, and gender values: crystallised over time</td>
<td>relativism- local and specific constructed realities</td>
</tr>
<tr>
<td><strong>Epistemology</strong></td>
<td>dualistic/ Objectivist; Findings true</td>
<td>modified dualist/ Objectivist; critical tradition/ community; Findings probably true</td>
<td>transactional/subjectivist; value-mediated findings</td>
<td>transactional/ subjectivist; created findings</td>
</tr>
<tr>
<td><strong>Methodology</strong></td>
<td>Experimental/ Manipulative; Hypotheses; Chiefly quantitative methods.</td>
<td>modified experimental/ manipulative; critical multiplicity; falsification of hypotheses; may include qualitative methods</td>
<td>dialogic/dialectical</td>
<td>hermeneutical/ dialectical</td>
</tr>
</tbody>
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Guba and Lincoln (1994)

The social actors’ concepts and meanings are either ignored or intentionally rejected and any hint of ‘subjective’ involvement on the part of the researcher is to be

\(^{39}\) Epistemology refers to the claims or assumptions made about the ways in which it is possible to gain knowledge of this reality, whatever it is understood to be- claims about how what exists may be known. An epistemology is a theory of knowledge, it presents a view and a justification for what can be regarded as knowledge- what can be known and what criteria such knowledge must satisfy in order to be called knowledge rather than beliefs.
deplored. Guba and Lincoln (1994) argue that under the positivist epistemology, the investigator and the investigated 'object' are assumed to be independent entities, and the investigator to be capable of studying the object without influencing it or being influenced by it. Guba and Lincoln goes on to explain that when influence in either direction, which can also be considered as threats to validity, are recognised or even suspected, various strategies are followed to reduce or eliminate it.

The epistemology of positivism considers knowledge as been derived from sensory experience by means of experimental or comparative analysis, and concepts and generalisations are shorthand summaries of particular observations. Keat and Urry (1975) argues that for the positivists, science is an attempt to gain predictive and explanatory knowledge of the external world. To do this, one must construct theories, which consist of highly general statements, expressing the regular relationships that are found to exist in that world. These general statements, or laws, enables the researcher to predict and explain the phenomena that he discovers by means of systematic observation and experiment. Hence, the approach suggests that it is not the purpose of science to get 'behind' or 'beyond' the phenomena revealed to us by sensory experiences, to give us knowledge of unobservable natures, essences or mechanisms that somehow necessitate these phenomena. Any attempt to go beyond this representation plunges science into the unverifiable claims of metaphysics and religion, which are at best unscientific, and at worst meaningless (Keat and Urry, 1975).

As a philosophy of science, positivism has been subjected to many criticisms. The interpretive critique of positivism has focused on what is regarded as positivism's
inadequate view of the nature of social reality, its inadequate ontology, and that it simply takes for granted the socially constructed world which interpretivism regards as social reality. Further, interpretivists argue that positivism cannot account for the way in which social reality is constructed and maintained, or how people interpret their own actions and the actions of others. The central feature of the critical rationalist critique of positivism is its process for ‘discovering’ knowledge and the basis for justifying this knowledge. First, because it regards experience as an inadequate source of knowledge, and as all observation involves interpretation, critical rationalism has argued that it is not possible to distinguish between observational statements and theoretical statements and that all statements about the world are theoretical at least to some degree. Secondly, it is argued that experience is an inadequate basis of justifying knowledge, because it leads to a circular argument: on what basis can experience be established as a justification for knowledge except by reference to experience? Positivists claim that reality can be perceived directly by the use of the human senses has been subjected to much criticism. Even if it is assumed that a single, unique, physical world exists independently of observers- and this assumption is not universally accepted- the process of observing it involves both conscious and unconscious interpretation. In ‘reading’ what impinges on our senses, we have to engage in a complex process that entails both the use of concepts peculiar to the language of a particular culture, and expectations about what is ‘there’. Furthermore, we do not observe as isolated individuals but as members of cultural or sub-cultural groups, which provide us with ontological assumptions. Therefore, observers are active agents, not passive receptacles. And the particular baggage of experience, knowledge, expectations and language an observer brings to research will influence what is observed. The realist solution to theory-laden nature of observation
and description is to draw the distinction between the transitive and intransitive objects of science. Hence, realist argue that reality is not there to be observed as in positivism, nor is it constructed but that it is 'just there'. The critique of critical theorists on positivism has been motivated not by a deep interest in the logic of the natural sciences, but by concern for the consequences of positivism's universalization of that logic for the human and social sciences. According to Habermas (1972), positivism suffers from an 'objectivist illusion' in believing that all knowledge is derived from 'objective facts' which are obtained free of the interests of the researcher.

5.2.2 Post-positivism or critical rationalism Paradigm

The ontology of post-positivism is critical realism, which assumes reality to exist but to be only imperfectly apprehendable because of flawed human intellectual mechanisms and the fundamentally intractable nature of phenomena (Guba and Lincoln, 1994). Cook and Cambell (1979) argue that the ontology is labelled as critical realism because of the argument of its proponents that claims about reality must be subjected to the widest possible critical examination to facilitate apprehending reality as closely as possible, but never perfectly. Hence, critical rationalism makes no distinction between observational and theoretical statements and argues that all observations are theory dependent and occur within a 'horizon of expectations'. Observation is therefore used in the service of deductive reasoning and theories are invented to account for observations, not derived from them. Rather than scientists waiting for nature to reveal its regularities, they must impose regularities (deductive theories) on the world and, by a process of trail and error, use observation to try to reject false theories. Theories that survive this critical process are
provisionally accepted but never proved to be true. Hence, all knowledge is tentative and subject to continuing critical evaluation.

Popper (1972) therefore argues that the belief that we can start with pure observation alone, without anything in the nature of a theory, is absurd and that observation is always selective. It needs a chosen object, a definite task, an interest, a point of view, a problem. Hence, it is quite true that any particular hypothesis selected will have been preceded by observations- the observations, for example, that it is designed to explain. However, these observations, in their turn, presuppose the adoption of a frame of reference, a frame of expectations, a frame of theories.

Guba and Lincoln (1994) explains that in terms of its epistemology, unlike positivism, dualism is largely abandoned as not possible to maintain but objectivity remains a 'regulatory ideal', with special emphasis being placed on external guardians of objectivity such as critical traditions (do the findings fit with pre-existing knowledge?) and the critical community (such as editors, referees, and professional peers). Replicated findings are considered to be probably true but always subject to falsification.

Guba and Lincoln (1994 argues that the methodology of postpositivism aims to redress some of the problems of positivism by conducting inquiry in more natural settings, collecting more situational information, and re-introducing discovery as an element in inquiry, and in social sciences particularly, obtaining emic viewpoints to assist in determining the meanings and purposes that people ascribe to their actions.
All these aims are accomplished largely through increased utilisation of qualitative techniques.

There have been several criticisms of the post-positivist paradigm. For example, the central requirement of critical rationalism is that hypotheses are to be compared with observation statements in order to eliminate those, which do not conform to reality. Hindess (1977) has argued that the rejection of the idea of a theoretically neutral observation language removes any possible rational foundation for the idea of testing a theory against the facts of observation. This epistemological difficulty of establishing the relationship between theories and reality is enough to undermine the claims that theory testing is a rational process. However, the most influential challenge to this claim, and to the critical rationalist view of scientific progress, has come from the seminal work of Thomas Khun (1970a) who came to the conclusion that traditional accounts of science did not reflect the historical evidence and therefore argued for a psychological and sociological view rather than a logical one.

5.2.3 Critical theory paradigm

Guba and Lincoln (1994) explains that the ontology of critical theory is historical realism which assumes that reality is apprehendable but, over time, it is shaped by social, political, cultural, economic, ethnic, and gender factors, and then crystallised into a series of structures that are now (inappropriately) taken as 'real', that is, natural and immutable. Critical theory ontology shares much in common with interpretivism. Hence, cognitive interests- strategies for interpreting life experiences- determine the objects of reality. Moreover, the paradigm posits that the world is not a universe of facts which exist independently of the observer and that theoretical statements do not
describe reality but are dependent on assumptions embedded in theoretical constructs and common-sense thinking. Hence, it is not possible to attain objective observation in both the natural and social sciences due to the assumptions held by the observer. Therefore, cognitive interests also determine the procedures used to discover and justify knowledge. Habermas (1972) has classified the processes of inquiry into three categories. The first form of knowledge is the empirical-analytical sciences based on technical interests of prediction and control, i.e. exploitable knowledge. The second form of knowledge is the historical-hermeneutic sciences based on practical interests of mutual understanding in everyday discourse, i.e. knowledge of human social existence. The third form of knowledge, derived from critical theory, is based on emancipatory interests, i.e., human autonomy freed from domination. In the empirical-analytical sciences the process is ‘monologic’ in which the researcher is a detached observer, while in the historical-hermeneutic sciences the process is ‘dialogic’ with the observer needing to become involved in the shared framework of cultural meanings. Critical theory involves all three forms of knowledge, the one used being dependent on the interests of the researcher: causal explanation, interpretive understanding, or human emancipation. However, under critical theory ontology, causal laws are not regarded as universal truths but have a practical function as the basis for action.

The epistemology of critical theory is transactional and subjectivist whereby the investigator and the investigated object are assumed to be interactively linked, with the values of the investigator (and of situated ‘others’) inevitably influencing inquiry. Guba and Lincoln (1994) argues that the findings are therefore value mediated since the traditional distinction between ontology and epistemology found in positivism
becomes blurred as what can be known is inextricably intertwined with the interaction between a particular investigator and the particular object or group. The method of critical theory is dialogic and dialectical in the sense that the transactional nature of inquiry requires a dialogue between the investigator and the subjects of inquiry and that dialogue must be dialectical in nature to transform ignorance and misapprehensions into more informed consciousness (seeing how the structures can be changed and comprehending the actions required to effect change).

5.2.4 Constructivism and interpretivist paradigms

Schwandt (1994) has argued that constructivism and interpretivism are terms used as general descriptors for a loosely coupled family of methodological and philosophical persuasions. The constructivists or interpretivists believe that to understand this world of meaning one must interpret it. Hence, the inquirer must elucidate the process of meaning construction and clarify what and how meanings are embodied in the language and actions of social actors. Schwandt (1994) argues that to prepare an interpretation is itself to construct a reading of these meanings, it is to offer the inquirer’s construction of the construction of the actors one studies. However, although the constructivists and interpretivism share this general framework for human inquiry, each offer a somewhat different conceptualisation of what we are about when we inquire into the world of social agents and historical actors.

Guba and Lincoln (1994) have argued that the ontology of constructivism is relativist whereby realities are apprehendable in the form of multiple, intangible mental constructions, socially and experientially based, local and specific in nature (although elements are often shared among many individuals and even across cultures), and dependent for their form and content on the individual persons or groups holding the
constructions. However, constructions are not more or less 'true, in any absolute sense, but simply more or less informed and/or sophisticated. Moreover, constructions are alterable, as are their associated 'realities'. Constructivists are deeply committed to the view that what we take as objective knowledge and truth is the result of perspective since knowledge and truth are created, not discovered by the mind (Schwandt, 1994). Constructivist ontology entails the assumption that social reality is produced and reproduced by social actors and it is a preinterpreted, intersubjective world of cultural objects, meanings and social institutions. Consequently, in any social situation, there may be multiple realities. Therefore, knowledge of the social world must be achieved by immersion in some part of it in order to learn the 'local' language, meanings and rules. However, Schwandt (1994) argues that what is then done with this 'inside' knowledge is a matter of considerable disagreement.

The epistemology of constructivism is similar to that of critical theory whereby the investigator and the object of investigation are assumed to be interactively linked so that the 'findings' are literally created as the investigation proceeds. In addition, the conventional distinction between ontology and epistemology disappears as in the case of critical theory. In terms of their epistemology, constructivists have various versions ranging from one where the researcher places him/herself in the shoes of the author or social actor to the other version that views the relationship as involving the investigator in the mediation of languages. Guba and Lincoln (1989) argue that the observer cannot and should not be neatly disentangled from the observed in the activity of inquiring into constructions. Hence, the findings or outcomes of an inquiry are themselves a literal creation or construction of the inquiry process. Constructions,
in turn, are resident in the minds of individuals and do not exist outside of the persons who create and hold them and are not part of some 'objective' world that exists apart from their constructors (Guba and Lincoln, 1989).

In its method, the individual constructions are obtained and refined only through the interaction between the investigator and respondents. These varying constructions are then interpreted using conventional hermeneutical techniques, and are then compared and contrasted through a dialectical interchange with the aim of distilling a consensus construction that is more informed and sophisticated than any of the predecessor constructions (Guba and Lincoln, 1994).

The interpretivism ontology is empirical realism, which places emphasises on the world of experience as it is lived, felt, undergone by social actors. Schwandt (1994) argues that their particular postures are notions of objectivism, empirical realism, objective truth, and essentialism. Hence, to the objectivist, the world is composed of facts and the goal of knowledge is to provide a literal account of what the world is since the facts of the world are essentially there for study and exist independently of the investigator. Interpretivism entails an ontology in which social reality is regarded as the product of processes by which social actors together negotiate the meanings of actions and situations resulting in a complex of socially constructed meanings. Its leading proponents like Giddens (1976) argue that the social world unlike the world of nature has to be grasped as a skilled accomplishment of active human beings, the constitution of this world as 'meaningful', 'accountable' or intelligible' depends upon language, regarded however not simply as a system of signs and symbols but as a medium of practical activity. The social scientist of necessity draws upon the same
sorts of skills as those whose conduct he seeks to analyse in order to describe it. Hence, generating descriptions of social conduct depends upon the hermeneutic task of penetrating the frames of meaning which lay actors themselves draw upon in constituting and reconstructing the social world (Giddens, 1976). Further, the ontology of interpretivism posits that human experience is characterised as a process of interpretation rather than sensory, material apprehension of the external physical world, and human behaviour depends on how individuals interpret the conditions in which they find themselves.

In the interpretive epistemology, knowledge is derived from everyday concepts and meanings. Hence the social researcher enters the everyday social world in order to grasp the socially constructed meanings, and then reconstructs these meanings in social scientific language. At one level, these latter accounts are regarded as re-descriptions of everyday accounts while at another level they are developed into theories.

Giddens (1984) has argued that the central concepts of interpretivism, 'intention', 'reason', and 'motives', are all potentially misleading in that they imply that competent social actors engage in a continuous monitoring of their conduct and are thus aware of both their intentions and the reasons for their actions. On the contrary, it is usually only when actors either carry out retrospective enquiries into their own conduct, or when others query their actions that this reflection occurs. Moreover, interpretivism fails to acknowledge the role of institutional structures, particularly divisions of interest and power relations (Giddens, 1984). Giddens has argued that the production and reproduction of the social world requires social actors to draw
upon resources, and to depend on conditions, of which they are either completely or partly unaware and that these structures are both the condition and the consequence of the production of interaction. On the other hand, Bhaskar (1979) has referred to the interpretivist view, those social actors’ concepts and meanings that cannot be criticised by the social scientist, as the linguistic fallacy. This fallacy is based on a failure to recognise that there is more to reality than is expressed in the language of social actors and that social actors’ constructions of reality are only one element in a realist social science, rather than being its entire concern.

5.2.5 The choice of methodological paradigm for this study

Having reviewed the leading methodological paradigms used in scientific and social research, the next task was to select which paradigm to use in this study. The main guiding principle was selection of a paradigm that will enable the study achieve its aim and objectives as articulated in Chapter 1 sections 1.1 and 1.2. From an ontological and epistemological point of view, the paradigm that should be used in this study is one which seeks to explain or enable us understand the processes of innovation in rural areas rather than test existing theories.

Hence, the positivist paradigm with its emphasises on apprehendable reality—only that which can be observed, i.e. experienced by the senses, as real and therefore worthy of the attention of science is not suitable for this study which will involve getting the unobservable opinions of the various actors involved in the innovation process. Moreover, its epistemology that advocates that the investigator can study the object without influencing or being influenced by it is not possible in a study of this nature since it will not be possible to understand meanings and thought processes without
getting close to the owner/managers and other actors who are involved in the innovation process.

Considering the constructivist/interpretivist axiom and the related paradigms including critical theory, their ontology which emphasises the construction of a relativist reality that is local and specific in nature and their epistemology that suggest the investigator and the object of investigation being interactively linked such that findings are literally created as the investigations proceed with the resultant effect that the distinction between ontology and epistemology disappears would suggest ignoring the conceptual frameworks in the study of innovation that have been developed in other contexts. Hence, instead of the researcher comparing the findings with those of other similar studies in areas of high agglomeration and rural areas, the researcher would have to have an ‘open mind with a blank head’. Considering the implications of using the constructivist/interpretivist paradigm on the selection of a deeply ethnographic method and the impact on the budget and time of this study, these paradigms will not be used.

The paradigm that is most suitable from an ontological and epistemological perspective is the post-positivism or critical rationalism. Its critical realism ontology captures the aim of this study which seeks to understand the processes of innovation among rural MSMEs by subjecting the reality as expressed through the opinions of owner/managers to the widest critical examination of other conceptual frameworks in the study of innovation and the opinions of other actors involved in the processes of innovation in rural areas. Its epistemology resonates with the objectives of the study
and allows the study to compare the findings with those of critical traditions, such as existing knowledge, found in the innovation literature.

5.3 From choice of methodology to choice of method

Having selected the post-positivism or critical rationalism paradigm with its critical realism ontology, the next step was to select the method best suited for collecting empirical information and materials from the various actors involved in the processes of innovation among MSMEs. Although there are an array of methods available within the qualitative research paradigm, what they all agree on is that there is a need for more than one data-gathering instrument, which 'borrows' from various methods to accommodate the situations, which arise in the research context (Hill, 2001). This section will briefly review various methods used in qualitative research, which are relevant for this study. These include case studies, ethnography, phenomenology, and grounded theory.

Stake (1994) has argued that not all case studies are qualitative, although many are and emphasises that case studies are not a methodological choice, but a choice of an object studied. Hence, a case study is defined by the interest in what can be learnt in from the individual case rather than the methods of inquiry used (Stake, 1994). A case study researcher will therefore seek both what is common and what is particular about the case. However, the end result regularly presents something unique, including the nature of the case, its historical background, the physical setting, other contexts (e.g. economic, political, legal, aesthetic), other cases through which this case is recognised, and those informants through whom the case can be known. Stake (1994) argues that qualitative case studies have broader purview than those of crafters
of experiments and tester of hypotheses because of its orientation towards complexities connecting ordinary practice in natural habitats to the abstractions and concerns of diverse academic disciplines, with the broader purview applied to the single case. Starting with a topical concern such as the aim of this study, the researcher poses foreshadowed problems, concentrate on issue-related observations, and interpret patterns of data that reform the issues as assertions. However, the issues used to organise the study (such as the theoretical frameworks discussed in chapters 2 and 3) may not be the ones used to report the case to others. Stake (1994) explains that ‘observing’ is a different work from presenting the case report and that it is not unusual for qualitative case researchers to call for letting the case ‘tell its own story’ due to the strong ethnographic ethos of interpretive study that seeks out emic meanings held by the people within the case. Hence, case study researchers enter the scene expecting, even knowing, that certain events, problems, relationships will be important, yet discover that some actually are of little consequence because one cannot know at the outset what the issues, the perceptions, and the theory will be. Moreover, even though the researcher may be committed to empathy and multiple realities, it is the researcher who decides what is the case’s own story, or at least what of the case’s own story he or she will report.

Another research method for collecting qualitative materials is ethnography. Atkinson and Hammersley (1994) have defined ethnography as referring to forms of social research having a substantial number of the following features: a strong emphasis on exploring the nature of particular social phenomena, rather than setting out to test hypothesis about them; a tendency to work primarily with ‘unstructured’ data, i.e., data that have not been coded at the point of data collection in terms of a
closed set of analytical categories; investigation of a small number of cases, perhaps just one case, in detail; and analysis of data that involves explicit interpretation of the meanings and functions of human actions, the product of which mainly takes the form of verbal descriptions and explanations, with quantification and statistical analysis playing a subordinate role at the most. Ethnography has been claimed to represent a uniquely humanistic, interpretative approach, as opposed to the scientific and positivist paradigms (Atkinson and Hammersley, 1994). Tedlock (2000) explains that ethnography involves an ongoing attempt to place specific encounters, events, and understandings into a fuller, more meaningful context and that it is not simply the production of new information or research data but rather the way in which such information or data are transformed into a written or visual form. Hence, it combines research design, fieldwork, and various methods of inquiry to produce historically, politically, and personally situated accounts, descriptions, interpretations, and representations of human lives (Tedlock 2000). However, various critics of ethnography have pointed out that the accounts produced by researchers are constructions, and as such reflect the presuppositions and socio-historical circumstances of their production, which contradicts the aspiration of social science (including ethnography) to produce knowledge that is universally valid and captures the nature of the social world. For example, Stacey, 1988) has directed some of the criticisms that have long been directed to positivism at ethnography by arguing that it claims illegitimate expertise over the people being studied since it is based on hierarchical relationship and control and indeed represent a subtler form of control than positivists methods because it is able to get closer to the people being studied.
Phenomenology constitute a family of qualitative research methods that are concerned with reality-constituting interpretative paradigms (Denzin and Lincoln, 1994). These approaches examine how human beings construct and give meaning to their actions in concrete social situations. Denzin and Lincoln (1994) argues that many researchers in this tradition use participant observation and interviewing as ways of studying the interpretive practices persons use in their daily lives. Stressing the constitutive nature of consciousness and interaction, Schutz (1964) argued that the social sciences should focus on the ways that the life world, i.e., the experiential world every person takes for granted is produced and experienced by members. Hence, subjectivity is paramount as the scientific observer deals with how social objects are made meaningful. The emphasis is on how those concerned with objects of experience apprehend and act upon the objects as "things" set apart from observers (Holstein and Gubrium, 1994). Holstein and Gubrium argued that under this approach, all ontological judgements about the nature and essence of things and events are suspended and the observer can then focus on the ways in which members of the life world themselves interpretively produce the recognisable, intelligible forms they treat as real.

Lastly, grounded theory is a general method for developing theory grounded in data that is systematically gathered and analysed (Strauss and Corbin, 1994). Strauss and Corbin explains that theory evolves during actual research, and it does this through continuous interplay between analysis and data collection. Under this method, theory may be generated initially from the data, or, if existing (grounded) theories seem appropriate to the area of investigation, then these may be elaborated and modified as incoming data are meticulously played against them (Charmaz, 2000; Strauss and
Moreover, researchers can also usefully carry into current studies any theory based on their previous research, provided that it is relevant to these and that the matching of theory against data must be rigorously carried out. Grounded theory studies share some similarities with other methods of carrying out qualitative research since the sources of data are the same; interviews and field observations, as well as documents for all kinds including diaries, letters, historical accounts etc. Furthermore, like other qualitative researchers, grounded theorists can utilise qualitative and quantitative techniques of analysis. The major difference between grounded theory and other approaches to qualitative research is its emphasis upon theory development (Strauss and Corbin, 1994).

Having reviewed several research methods associated with qualitative research and which are relevant to this study, the choice of which one to use becomes critical. From the brief discussion above, it is apparent that grounded theory will not be used in this study since its objective is theory development from data as research proceeds. This objective is not consistent with those of this study, which seeks to understand and explain the processes of innovation in rural areas rather than theory development. Similarly, phenomenology emphasises the constitutive nature of human consciousness and interaction and is mainly associated with reality as understood by interpretative research paradigm. Hence, this study will use a multimethod approach combining case study and some elements of ethnography. However, due to the timeframe of this study, the research budget and the need for multiple cases, the duration and number of interaction with the cases will be limited. In addition, because the issues under investigation are more likely to be post-event, i.e. previous innovation rather than innovation in action, the use of ethnography is not necessary. Furthermore, the use of
multiple cases and key informants under case study approach will help to minimise some of the criticisms of a purely ethnographic method.

5.4 The empirical phase

From a methodological standpoint, this study was divided into two stages: the early stage and the later stage. This approach was selected in order to allow the study select cases that were relevant for the research from secondary sources, namely those who have recently developed or are developing innovative products or processes, and have an overview of the institutional arrangements and policy environment in the study area from secondary sources and key informant interviews in the first stage. The use of face-to-face interviews with case study firm owner/managers, employees, and external actors who were involved or supported the development of innovative products during the second stage provided insights into the processes of innovation among the case study firms and also allowed the study explore issues of ‘interpretation, language and meaning’ (Schoenberger, 1991) that is often suppressed in studies using survey instruments.

5.4.1 The early stage

Selection of the study area

The first phase of this stage involved the selection of the study area. Several counties were considered which included Cornwall, Cumbria, Devon, Dorset, Lincolnshire, Norfolk, North Yorkshire, Northumberland, and Suffolk (See table 6). This phase involved mainly a quantitative research approach and involved obtaining information from local Business Links and Enterprise Agencies as well as national and local
statistical offices to gather sufficient facts that enabled the selection of the actual study area.

The selection criteria took into consideration factors as discussed in section 1.4.1 including that the area must have 50% of the population living in settlements of less than 10,000, the area must be rural in terms of having a predominantly agricultural economy, number of independent manufacturing enterprises and their employment size, population of working age as a percentage of the total population, accessibility of the area in terms of density of communication infrastructure, and budgetary constraints. This was conducted between the periods April 2000- May 2000.

This study will, therefore, focus on the County of Cumbria (excluding the district of Barrow-in Furness) as it exhibits the characteristics of rurality based on the criteria set above. This includes relative remoteness from the main urban conurbation’s, a dispersed settlement structure, population growth, an increase in employment provided by manufacturing industries, and a need for policy intervention identified under the Objective 5b status of the European Union. Table 6 presents DEFRA’s classification of county councils in England.
Table 6 (Classification of county councils in England)

<table>
<thead>
<tr>
<th>REMOTE RURAL</th>
<th>ACCESSIBLE RURAL</th>
<th>URBAN</th>
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<tbody>
<tr>
<td>Cornwall and Isle of Sicily</td>
<td>Bedfordshire</td>
<td>Derbyshire</td>
</tr>
<tr>
<td>Cumbria</td>
<td>Buckinghamshire</td>
<td>Durham</td>
</tr>
<tr>
<td>Devon</td>
<td>Cambridgeshire</td>
<td>Essex</td>
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<tr>
<td>Dorset</td>
<td>Cheshire</td>
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<td>Lincolnshire</td>
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<td>Norfolk</td>
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<td>North Yorkshire</td>
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<td>Northamptonshire</td>
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<td>Northumberland</td>
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<td>Suffolk</td>
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<td>Shropshire</td>
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<td>Somerset</td>
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<td>West Sussex</td>
<td>Wiltshire</td>
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Key informant interviews

The second phase of this stage involved key informant interviews with policy makers in the study area (see appendix). The aim of the key informant interviews was to elicit the views of key policy makers in Cumbria on the socio-economic activities in the area and the incidences of technological innovation. Letters of introduction detailing the aims of the study were sent to the respondents. The respondents were again contacted by telephone in order to set up the appointment dates for face-to-face interviews between the period of July and September 2000. The results of this was significant to progress with the study as only one (1) respondent refused to be interviewed out of a total of fifteen (15). Thus, an open-ended discussion based on key thematic areas derived from the literature of innovation and entrepreneurship was
used. Because this is an exploratory study, the understanding of the influence of the external environment on the processes of technological innovation required such an approach. The results of the key informant interviews was then used to inform the study in the context of understanding of the study area (Chapter 4) and also by illuminating the findings of the face-to-face in-depth interviews with owner/managers of SMEs in Cumbria.

Selection of the cases
Sarantakos (1998) has argued that qualitative researchers often employ sampling procedures that correspond to the philosophy of this type of research, and are less structured, less quantitative and less strict than the techniques employed by quantitative researchers. Similarly, Kuzel (1992) argued that normally, qualitative studies employ a form of non-probability sampling such as accidental or purposive sampling as well as snowball sampling. Sarantakos further argues that in qualitative research, sampling comes after factors and conditions become clearer and making decisions about sampling before the study has begun is neither proper nor useful. In all cases sampling is closely associated with theory. Miles and Huberman (1994) states that it is therefore either theory-driven, where respondents are chosen before data collection, guided by theory or, progressively, during data collection (theoretical sampling which is connected with grounded theory).

During the case selection, the first phase involved developing a database of innovative manufacturing SMES in Cumbria using the Business Link Directory and the Yellow Pages Directory. This produced a database of two hundred and fifty seven firms (257) to form a sampling population. To determine the sampling frame, a telephone
interview with owner/managers of all manufacturing companies in the sample population was undertaken to determine whether they were involved in any product or process innovation since 1996. Hence a telephone interview, lasting approximately 3 minutes, was conducted using a short questionnaire to select firms, which met the criteria for inclusion in the study. The questionnaire was first tested with the first 5 interviewees and amended before being applied to the rest of the population to ensure that the wording was correct and easy to understand by the respondents. Furthermore, the wordings of the questionnaire were not changed for every interview to ensure that the common errors that occur in this approach are minimized.

During this stage of the research, all the firms in the population of businesses were interviewed over the telephone, using a structured questionnaire on the independence status and size band of the firms, the sector of manufacturing, whether or not they have been involved in any technological innovation since 1996. This enabled the researcher to build a database of firms, which met the criteria for inclusion to form the sampling frame. From the telephone interviews, sixty-four (64) firms were independent and innovative while seventy-eight (78) firms were independent but not innovative. Of the remaining one hundred and eight firms, thirty-six (36) were not independent and the rest could not be included in the database. Using a combination of stratified and purposive sampling methods as recommended by Miles and Huberman (1994) four firms were selected for the pilot phase while a total of six for the main case study (including 3 from the pilot phase) based on the sectors found in the sample frame and the willingness of the owner/managers to participate in the pilot

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40 Thirty-one (31) were on answer phones, sixteen (16) could not be reached, eighteen (18) had changed their businesses or had wrong telephone numbers, six (6) were service businesses and two (2) firms did not want to be interviewed.
and main case study within the time frame suggested. These numbers are discussed below in more detail.

The pilot study

A pilot study is a small-scale replica and a rehearsal of the main study (Fontana, 1995). Fontana explains that pilot studies serve many purposes, but the following are considered to be the most common: to estimate the costs and duration of the main study and test the effectiveness of its organization; to test the research methods and research instruments and their suitability; to show whether the sampling frame is adequate; to estimate the level of response and form of drop-outs; to gain information about how diverse or homogeneous the survey population is; to familiarize the researcher with research environment in which the research is to take place; to test the response of the interviewees to the method of data collection and through that the adequacy of its structure. This study, therefore, conducted a pilot study in October 2000 involving four (4) firms using a semi-structured questionnaire to ascertain the significance of the study before proceeding with the main study.

5.4.2 The later stage

The results of the pilot study indicated the important role that the owner/manager played in the innovation process and highlighted the importance of understanding their specific contribution. This study considered that a further in-depth interview using a semi-structured questionnaire with owner/managers may not enrich our understanding of the processes of technological innovation and enable us address the objectives of the study, rather an in-depth interview involving a case study approach would be more desirable (Yin, 1994).
Case studies

It is important to provide a justification for the selection of the case study approach to data collection for this stage of the research. There are two factors that guided the use of case study methodology for this study. Firstly, the ontological and epistemological stances highlighted in section 5.2 and 5.3 necessitated the selection of a method that is consistent with the paradigm selected. The aim of the study and the post-positivisms critical realism ontology and epistemology dictated that a case study methodology be selected as it can provide this study with an understanding of the way in which individuals creates, modifies and interprets the world and their explanations of their unique experiences (Burrell and Morgan, 1979). Although several researchers have pointed to the problems of in-depth discussions used in case studies like gaining trust, obtaining and sustaining discussant interest and motivation, cost, time involved, and voluminous data amassed, bias and getting content relevance, they also focus on the benefits that result from this research instrument including insight gained, the advantages of probing, the ethnographic dimensions, access to informants that cannot be observed, and the ability of the researcher to take control of the discussion (Yin, 1994; Gummesson, 1991; Robson and Foster, 1989). Wright (1996) has also supported this view by arguing that the technique of using individual in-depth interviews helps to get under the surface of respondent statements and that informal ‘injections’ by respondents provide valuable insights to their logic, sentiments and emotional reactions to the situations in which they operated. Hence, the choice of method here reflected a particular ontological and epistemological stance rather than the application of a specific data-gathering technique (Perren and Ram, 2001).
Secondly, the boundary or unit of analysis was the owner/manager or the entrepreneur and not the organization. Stake (1995) has argued that setting well-defined boundaries is important as early as possible. However, Ragin (1994) has cautioned that strongly held beliefs might restrict conceptual development as the work unfolds. Miles and Huberman (1994) have suggested that the researcher should "think intuitively, think of the focus or 'heart' and build outward...and define the case as early as you can during the study" (pg. 27).

Yin (1994) has suggested that there are three conditions, which should be taken into consideration when using case studies. These include, the type of research question posed, the extent of control the investigator has over actual behavioural events, and the degree of focus on contemporary as opposed to historical events. The pilot phase of the study was mainly concerned with asking the "what" and "where" questions and hence explanatory thus implying the use of survey instruments. However, this phase of the research was concerned with the how and why questions which are more exploratory and necessitating the use of case studies as the preferred research strategy (Yin, 1994).

The advantages of using case studies include enabling the researcher to cope with the technically distinctive situations in which there will be many more variables of interest than data points (Yin, 1994). It also relies on multiple sources of evidence, with data needing a convergence in a 'triangulating fashion' and benefits from the prior development of theoretical propositions to guide data collection and analysis.

41 A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident (Yin,
From the pilot study, it became apparent that it would be necessary to delve deeper into the question of how systemic and entrepreneurial factors influence the processes of technological innovation and whether a convergence of the two factors is necessary to enrich our understanding of innovation in rural areas.

There has, however, been concern by researchers over the use of case studies. Firstly, the greatest concern has been that case studies lack the rigor required in a research. This is due to the researcher being unable to deal with biased views, which can influence the direction of the findings and conclusions. What is often forgotten is that bias is not only confined to the case studies but can also occur in the use of other research strategies such as in questionnaire design for surveys (Sudman and Bradburn, 1982). Secondly, case studies have been criticized on the ground that they provide little basis for scientific generalization due to the small sample size. However, case studies, like experiments, are generalisable to theoretical propositions and not to populations or universes. Thus, a case study does not represent a “sample” and the investigator goal is to expand and generalize theories (analytical generalization). Thirdly, case studies have been criticized as taking too long and result in massive, unreadable documents. This incorrectly confuses case study strategy with a specific method of data collection such as ethnography or participant observation. Ethnography usually requires long periods of time in the “field” and emphasizes detailed, observational evidence. Similarly, participant observation also assumes a hefty investment of field effort. In contrast, a case study does not depend solely on ethnographic or participant observation data.
Perren and Ram (2001) have suggested six (6) different types of case studies (Table 7). Concept driven case explanations are focused on the organization as the primary unit of analysis (Miles and Huberman, 1994) and boundary setting is often focused further through a specific theme such as innovation or export. In concept driven cases generally adopt an objective perspective that views the social world as external, deterministic and having hard concepts that can be identified. However, there are occasions when such an approach has been used in such a way that shields them from the pitfalls highlighted above. Another type of case study is the anthropomorphic organizational case studies, which tend to treat the organization as if it was a person. Although some concepts may be brought into the analysis as it progresses, the main focus is on the history or story of the organization (Vinnell and Hamilton, 1999). This approach focuses on the story of the case as the heart of the study and is not concept driven nor does it accept interpretations of the social world as a milieu of multiple social actors. Thus, there tends to be an acceptance of causation within the narrative logic of the organizational history, which is similar to Stake’s (2000) ‘naturalistic generalization’. This form of causation is less deterministic than the concept driven case studies and tends to lead to the ‘regular expectations’ of ‘taken for granted’ (Stake, 2000; Berger and Luckman, 1967). Stake (2000) argues that these causations and generalizations are implicit in the case story as tacit propositions, but they are not as formerly presented as conceptual frameworks.

Multiple stories organizational case studies tend to accept that there may be many social actors involved within an organization and they will have different interpretations of the social world. While some concepts may be called upon, the heart of such studies is to understand the individual interpretations of the social actors
themselves (Perren and Ram, 2001). The approach tends to favour voluntarism over determinism and views the resulting complexity as difficult to predict through positivist methods (Burrell and Morgan, 1979).

The concept driven entrepreneurial narrative explanations are focused on the entrepreneur as the primary ‘unit of analysis’ (Miles and Huberman, 1994) and boundary setting is often focused further through a theme linked to some form of success or failure of the entrepreneur (for example McKenna, 1996). Although the unit of analysis is the individual entrepreneur, the aim is not to try and understand his/her subjective interpretation or reality but rather to view his/her actions through a conceptual lens. In contrast to the aforementioned type of case, the heroic/child entrepreneurial questing story case studies tend to treat the entrepreneur either as a hero who wins against all odds or as a child that needs help in order to succeed (for example Godel, 2000). Occasionally, concepts or nuances may be injected into the story but a standard questing theme remains the core of these heroic/child entrepreneurial case studies. Like the anthropomorphic organizational case studies, there tends to be an acceptance of causation within the narrative logic of the entrepreneur’s plot. Lastly, the entrepreneurial personal story explorations case studies focus on the entrepreneur’s interpretation of events, while recognizing that this is only one subjective interpretation amongst the many different interpretations from social actors sharing the world (Gergen, 1994). Although some concepts may be called upon, the heart of such studies is to understand the entrepreneurs’ individual subjective interpretations of their social world.
Table 7 Types of case studies

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<tr>
<th>Type of case study</th>
<th>Advantages</th>
<th>Disadvantages</th>
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| **Concept Driven Case Explanations** | • Aids the transfer of meaning to other organizational domains  
• Focus and approach makes multiple organizational case studies more manageable  
• The potential to suggest causation and determinism can be satisfying and persuasive | • May blind the researcher to nuances and other explanations outside the organizational and conceptual framework  
• Voluntarism aspects of the organizational case study may be suppressed within the analysis  
• The role of the entrepreneur may potentially be subjugated to the deterministic conceptual story of the organizational case  
• The nature of the analysis may lead to policies and actions that are not robust in the face of the complexity of the social world. |
| **Anthropomorphic organizational case studies** | • Concentrating on the history of the organization allows temporal interpretation of issues and factors  
• The narrative style of presentation can be interesting and acceptable to a wide range of readers  
• The weaving of causal connections into the narrative logic links well to the case, mimics normal language structure and may resonate with readers' tacit experience | • The acceptance of 'taken for granted' tacit narrative based causation may blinker other more complex or conceptually driven explanations  
• The focus on the organization may miss opportunities to explore possible individualistic actions in the social world  
• The narrative analysis may lead to acceptable interpretations that have little influence or value adding potential as they confirm the readers' and authors' 'taken for granted' assumptions about the world. |
| **Multiple stories organizational explanations** | • The stories of multiple actors allows the complexity of the social world to be explored  
• The competing stories highlight the multiple realities of the social world and perhaps avoids the trap of over simplified models of answers  
• The presentation of multiple positions through narrative may produce a personal reflexive response within the reader | • The acceptance of multiple actors and complexity in the social world may inhibit the researcher from searching for patterns and blinker other more conceptually driven explanations  
• Accepting multiple subjective interpretations may result in some narratives being more 'equal' than others  
• The complexity of the interpretation may leave readers confused as to the key themes from the research and the actions or policy conclusions that can be drawn. |
| **Concept driven entrepreneurial narrative explanations** | • Resonates with previous entrepreneurial studies and aids the transfer of meaning to future research  
• The focus and approach makes multiple case studies more manageable as they reduce complexity  
• The potential to judge the entrepreneur's actions provides a platform for learning  
• The potential to suggest causation and determinism can be satisfying and persuasive | • May blind the researcher to nuances and other explanations outside the conceptual framework  
• The entrepreneur's potential voluntaristic actions and thoughts may be suppressed or judged against the constructs from outside  
• The nature of the interpretation may lead to suggestions and practices that are not robust in the face of the entrepreneur voluntaristic actions and the complexity of the social world  
• The focus on the entrepreneur may blinker the researcher to other actions. |
During the final stage, this study conducted six (6) case studies with innovative SME owner/managers using 'critical incidence analysis' technique to understand the processes of technological innovation within each firm. The owner/managers were asked to take a particular product or process, over the last 5 years, and describe its development from idea generation stage to final marketing. The results of the case studies were then 'pattern-matched' with related theoretical propositions and related studies for data analysis (Campbell, 1975).

The design of the case study was linked to theory development phase, which is essential, because existing works may provide a rich theoretical framework for designing the case study. Yin (1994) has argued that theory development does not only facilitate the data collection phase of the ensuing case study but also provides that level at which the generalization of the case study will occur (analytical

| Heroic/child entrepreneurial questing stories | • The story of the questing hero or fool can be engaging • The entrepreneurial story taps allows temporal interpretation of issues and factors • The weaving of causal connections into the narrative logic and naturalistic generalization links well to the case, mimics normal language structure and may resonate with reader's tacit experience | • The questing story may become a cage into which the entrepreneur's story is force fitted • The focus on the quest of the entrepreneurial hero or fool may diminish the role and influence of other social actors • The questing interpretation may lead to an engaging story that misses the opportunity to employ conceptual frameworks |
| Entrepreneurial personal story explorations | • Provides an opportunity to gain insight into the entrepreneur's subjective interpretation of the world, while not dismissing the existence of other social actors' interpretations. • Being given a window on the entrepreneur's world may engender empathy and a personal reflexive response within the reader • The entrepreneur's story may challenge some constructs and models from outside their world | • The concentration on the entrepreneur's narrative may inhibit other views • The acceptance of subjective interpretation of the social world may blinker pattern spotting and other more conceptually driven explanations • The explicit subjectivity of the research may leave readers confused as to the key themes from the research and the actions or policy conclusions. |
generalization as opposed to statistical generalization). The use of analytical
generalization is due to the fact that cases are not 'sampling units' but are selected
purposefully for the topic under investigation. Thus, the generalization is analytical in
that a previously developed theory is used to compare the results of the case study.

Number of cases

There are no precise guides to the number of cases to be included. Romano (1989)
points out that the literature recommending the use of case studies rarely specifies
how many cases should be developed with the decision left to the researcher. Eisenhardt (1989) recommends that cases should be added until theoretical saturation
is reached while Lincoln and Guba (1985) have recommended sampling selection 'to
the point of redundancy'. Perry (1998) however points that the views of these writers
ignore the real constraints of time and funding in postgraduate research and thus
necessitating some guidelines to plan their program around.

Thus, Eisenhardt (1989) suggests that while there is no ideal number of cases, a
number between four and ten cases often works well. While fewer than four cases
often leads to difficulties in generating theory with much complexity and it's
empirical grounding is likely to be unconvincing. Similarly, Hedges (1985) is of the
view that four to six groups probably form a reasonable minimum for a serious project
while twelve as the upper limit because of the high costs involved in qualitative
interviews and the quantity of qualitative data which can be effectively assimilated.
Further, Glaser and Strauss (1967) have recommended that when the themes and
issues in which the researcher is interested become 'saturated', meaning that no new
data are being found from the participation of additional case-firms, no further cases
should be approached and the process of data collection should come to an end. The study selected six (6) owner/managers of innovative SMEs for the case studies.

This approach was preferred because the use of multiple cases as the resultant evidence is considered more compelling and thus giving the overall study more robustness (Herriot and Firestone, 1983). Multiple cases should not be viewed in the same context as multiple respondents in a survey. However, it should be noted that the rationale for single-case designs usually cannot be satisfied by multiple cases because the unusual or rare case, and the revelatory case are all likely to involve only single cases. Further, the conduct of a multiple-case study can require extensive resources and time beyond the means of a single student. Similarly, multiple cases should not be mistaken to be similar to multiple respondents in a survey that follow a sampling logic (Yin, 1995).

From the ensuing arguments, the study conducted six (6) case studies in order to conduct theoretical replication from the theoretical framework developed during the pilot phase of the study. The choice of 6 cases was based on the discretion and judgmental choice of the researcher and the researcher's desire for a higher certainty about the multiple case results. However, because the externalities do not appear to produce much variation in the phenomenon being studied, a smaller number of theoretical replication was required (Yin, 1995). Thus, each case's conclusions will be considered to be the information needing replication by other individual cases. For each individual case, the report indicates how and why a particular proposition was demonstrated or not demonstrated.
Consolidating the findings from the case studies with those of the survey (interviews) requires an 'embedded' rather than a holistic research design. Because this study is seeking to understand the influence of externalities in the processes of technological innovation, an embedded design (where a study calls for the conduct of a survey at each case study site) will be used. Further, the results of the survey will not be pooled across the areas of the study but rather, the results of the survey will be part of the findings for each individual case. Some of this data may be highly quantitative and will be used alongside secondary data to interpret the results of the case studies.

From each case, the study then conducted interviews with one employee of the company who was directly involved in the innovation process, a supplier of the components used in the innovation, a customer of the innovative product/process, research and development organization/university involved in the innovation, and public and private support institutions. This generated an average of five (5) interviews per case and a total of twenty (20) in-depth interviews. Furthermore, extensive literature review in chapters 2 and 3 provided themes from which probe questions were derived toward the end of the interviews that ensured a very information rich output per case.

Criteria for case selection

In qualitative research like the case study methodology, the selection of cases is often purposeful and involves using replication logic and largely depends on the conceptual framework developed from prior theory (Perry, 1998). The underlying

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42 This is another type of non-probability sampling and is also known as judgmental sampling. This is where the researcher purposely chooses subjects who, in his/her opinion, are thought to be relevant to
principle that is common to all of the case selection strategies is selecting information rich cases, that is, cases worthy of in-depth study (Patton, 1990). The issue of information richness is fundamental to deciding on the number of cases (Perry, 1998).

Stake (1995) has recommended that the first criterion for case selection should be to maximize what we can learn. Hence it is important to identify the cases that are likely to lead us to understandings, assertions, and perhaps even to the modifying of generalizations. Secondly, because there is always a time constraint and access for fieldwork there is a need to select cases which are easy to get to and hospitable to our inquiry, perhaps for which a prospective informant can be identified and with actors (the people studied) willing to comment on certain draft materials. Although there is a need to carefully consider the uniqueness and contexts of the alternative selections as these may aid or restrict our learning, Stake (1995) argues that good instrumental case study does not depend on being able to defend the typicality. The criteria that was used to select the cases included:

1. Sectoral diversity
2. Rurality dimension
3. Size
4. Management structure
5. Type of innovation

From the database of innovative manufacturing SMEs, a letter was sent to the managing directors of ten (10) companies that were purposively selected according to the criteria set above, as identified in the database of innovative SMEs, which briefly

the research topic. In this case, the judgement of the investigator is more important than obtaining a probability sample.
explained the purpose of the research study (refer appendix 6) and requested an in-depth interview. After one week, the letters were followed up with a personal telephone call to explain the research in more depth and to try to negotiate access to the companies. The telephone conversations were very useful as it led many sceptical managing directors, who showed initial reluctance, to become involved in the research. One particular managing director, after overhearing the conversation between the researcher and the receptionist, sympathized with the researchers pleadings for an interview and agreed to participate in the research. It was not possible to gain access to the managing directors of two (2) companies after the telephone operators and/or personal assistants refused to allow the researcher to talk with their managing directors citing busy schedules or unavailability. One managing director refused to participate in the research because he could not see the direct 'benefit' of the research to his company. The above reasons may be a problem in management research in the UK, especially in the study of innovative companies. Hence, future research will have to seek more innovative ways of addressing this problem.

Overall, the reaction to the letter and the follow-up telephone call was favourable, with seven (7) companies indicating a willingness to participate in the study. However, three (3) of the companies could not be accommodated within the time frame of the interview schedule because they had indicated that an interview would be possible only at a time that was not suitable for the study. This left the study with four (4) new cases in addition to the two (2) that were part of the pilot phase hence giving a total of six (6) cases in the later stage. Table 8 is a summary of the empirical stage of the research.
### Table 8 (Summary of empirical research conducted)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Type of interview</th>
</tr>
</thead>
</table>
| Key informant interview with policy makers    | □ South Lakeland District Council  
□ Eden District Council  
□ Copeland Borough Council  
□ Carlisle City Council  
□ Allerdale District Council  
□ Cumbria Chamber of Commerce  
□ Carlisle Business Forum  
□ Cumbria County Council  
□ Business Link Cumbria                                                                 | Key informant interviews and focus group discussions                              |
| Population of businesses surveyed from Cumbria Business Link Directory | 257 interviews with owner/managers and contact persons                                                                                               | Telephone interviews                                                              |
| Population of Manufacturing businesses        | From the 257 interviews above, 140 manufacturing businesses were identified:  
**Composition by employment size**  
0-25 32.9%  
26-50 23.6%  
51-100 17.1%  
101-247 9.3%  
None response 17.1%                                                                 |                                                                                     |
| Total cases conducted                        | A total of 10 cases were conducted among innovative manufacturing SMEs (these are not the real names):  
□ Spreadstar Ltd (45 employees)  
□ Kendry Ltd (30 employees)  
□ Cumbria Polymers (5 employees)  
□ Farmbike Ltd (14 employees)  
□ HE&K Brass (1 employee)  
□ Frogies (2 employees)  
□ Datalog Electronics (4 employees)  
□ Northwest Ltd (2 employees)  
□ The blacksmith Shop (5 employees)  
□ AJ&D Chapelhow Ltd (30 employees) | Case study interviews                                                               |
| Cases retained for second stage              | Spreadstar Ltd  
Kendry Engineering Ltd  
Cumbria Polymers Ltd                                                                 | Interviewed:  
□ 1 owner/manager  
□ 1 employee  
□ 1 marketing company  
□ 1 owner/manager  
□ 1 employee  
□ 1 private R&D  
□ University department  
□ Owner/manager  
□ 1 employee |
Case study protocol and procedure

The in-depth case study discussions had two main purposes. The first purpose was to gain a better understanding of the issues that were discussed during the pilot phase. The second purpose was to fill the gaps that were identified in the pilot study by allowing aspects to be explored that it was felt had not been adequately addressed during the pilot study interviews. The in-depth discussions were unstructured with only a list of research topics used as a guiding framework. Discussions were audio tape-recorded in all of the cases after the interviewees readily gave permission. The list of research topics was compiled from the conceptual framework developed after concluding the literature review in chapters three (3) and four (4). This included the entrepreneur’s personal history and previous occupational background, the history and development of the company including ownership structure and employees, and the novelty and origin of company’s innovative product or process. However, probe

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44 A case study protocol contains not only the instrument for data collection but also the procedures and general rules that should be followed in using the instrument (Yin, 1994). It is a major tactic in increasing the reliability of case study research and is intended to guide the investigator in carrying out the case study. The protocol reminds the investigator what the case study is about and to anticipate several problems, including how the case study reports might be completed and the type of audience for the report. The heart of the protocol is a set of substantive questions reflecting the actual inquiry. The questions are posed to the investigator, not the respondent, and are a reminder of the information that needs to be collected and why. In some instances, the specific questions may also serve as
questions were included to remind the researcher in case the issues were not fully
discussed.  

After gaining access to the companies, there were no problems that were encountered
in the discussion process itself. All of the discussants were willing to discuss all of
the thematic issues under consideration. However two of the discussants refused to
give specific information about the names of their contact persons with their suppliers
because they considered that such and information could ‘land in the wrong hands’
and jeopardize a key innovation input. Some of the discussions lasted nearly three (3)
hours.

The archival records played only a small role in the data-gathering process of this
research because most of the firms under the study kept scant documentation in
respect to most areas of their business. Where possible documentation was gathered
or copied. These included product brochures (where available) and company
catalogues. During the data gathering two other vital activities were ongoing
including the field log, which was simply a record of how the research process was
evolving. The information recorded in this log included date, time, company name,
sector of manufacturing, name of discussant, position of discussant in the company,
location of the business, year the business started, current number of employees,
number of employees in 1996 or in year the business started operating, time spent
with discussant summary of the key issues discussed, and immediate reflective
analysis- the research issues raised.

prompts in asking questions during the case study interviews. Further, each question should be
accompanied by a list of probable sources of evidence.  

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The other activity was the field diary, which was a more personal account of the research process reflecting the researcher’s highs and lows, difficulties encountered, personal introspective aspects, personal experiences, feelings, and perceptions. More specifically, it shows the manner in which the research method actually evolved and provides insights as to why.

**Case study analysis procedures**

There are various approaches that can be used to analyse case study data. Tesch (1990) has classified them into three types: Interpretational analysis, structural analysis, and reflective analysis. Interpretational analysis is the process of examining case study data closely in order to find constructs, themes, and patterns that can be used to describe and explain the phenomenon being studies. However, structural analysis involves examining case study data for the purpose of identifying patterns inherent in discourse, text, events, or other phenomena. Whereas Interpretational and structural analyses involve explicit procedures that are performed in a somewhat prescribed sequence, reflective analysis is a process in which the researcher relies primarily on intuition and judgement in order to portray or evaluate the phenomena being studied.

Although this study adopted a more Interpretational approach to analyse the cases, there were instances when structural and reflective analysis were used. The first step was to transcribe all the case study data into a word processor. Similarly, handwritten notes and documents such as e-mails were also typed. The resulting word documents were carefully analysed to identify patterns and themes that summarized the data within each case. The overall purpose was to become intimately familiar with each
case as a stand-alone entity and to allow unique patterns of each case to emerge before the study could generalize patterns across the rest of the cases. Moreover, it provided this study with rich familiarity within each case, which was important for cross-case comparison.

The second step was to select categories or dimensions and then look for within-group similarities coupled with inter-group differences. The categories were derived from the theoretical frameworks discussed in Chapters 2 and 3 of the literature review. Hence, in order to address research question 1 on the characteristics of innovation among manufacturing SMEs in rural areas, this study used a 3 by 7 table to compare two categories (the 'innovation' and 'type of innovation') at once among the 6 cases. Using the definition of innovation adopted by the study in chapter 1 to develop a category of 'type of innovation', the table enabled the research to categorize the innovations either as product or process innovation. Moreover, using the SIC another category of 'the innovation' was developed and innovations classified accordingly to enable us make comparisons between cases. By applying these categories among the six cases, the study was able to analyse the characteristics of innovation among manufacturing SMEs in rural areas. Further categories such as 'nature and level of innovativeness' were identified and analysed accordingly. A similar approach was used in an attempt to answer research questions 3 (Where and how do innovative rural manufacturing SMEs derive their innovation inputs?) and 4 (How does the attribute of the owner/manager of innovative rural manufacturing SMEs influence the innovation process?).

This approach was driven by the reality that people are notoriously poor processors of information. They leap to conclusions based on limited data (Kahneman and Tversky, 1973), they are overly influenced by the vividness (Nisbett and Ross, 1980) or by ore elite respondents (Miles and Huberman, 1984), or they sometimes inadvertently drop disconfirming evidence (Nisbett and Ross, 1980).
However, a different approach was used to answer research questions 2 (How do rural manufacturing SMEs innovate?). This was mainly due to the fact that there were no known available literature that described in detail and developed categories that could be used as a reference point—a structural analysis approach. Hence, it was necessary for this study to develop its own categories using data available in each case to develop categories that were then applied across the six cases. From the data in each case, two main categories (‘from idea generation to market research’ and ‘from market research to product development’) were identified. Three more sub-categories were then developed under the ‘from market research to product development’. These included ‘internalised design and externalised manufacturing’, ‘externalised design and internalised manufacturing’, and ‘internalised design and manufacturing’.

From the within-case analysis plus cross-case approaches, tentative themes, concepts, and relationships between the variables began to emerge. The next step of this highly iterative process was to compare systematically the emerging frames with the evidence from each case in order to assess how well or poorly it fits with case data. The central idea here was to constantly compare theory and data thereby iterating toward a theory, which closely fits the data (Eisenhardt, 1989). This approach was particularly important since it takes advantage of new insights from the data to yield an empirically valid theory.
5.5 Limitations of the study and how they were handled

The main limitations of case studies include the difficulty of generalizing the findings to other situations. This limitation and how it was addressed in this study has been discussed under the section on 'defending the value and logic of the research'- External Validity below.

Another limitation is that ethical problems can arise if it proves difficult to disguise the identity of the organization or individuals that were studied when reporting the case study. This limitation and how it was handled is discussed in detail under the section on ethical considerations below.

Lastly, case studies are highly labour-intensive and require highly developed language skills in order to identify constructs, themes, and patterns in verbal data and to write a report that brings the case alive for the reader (Gall et.al, 1996). This limitation was addressed in this study by using various data collection strategies including the use of telephone, e-mail, and face-to-face interviews and observations. However, although a recorder was used during telephone and face-to-face interviews, the researcher could not limit the labour-intensive nature of transcribing the interviews. Although an attempt was made to use voice recognition software to help with transcription, his was abandoned after it became clear that there were too many errors, which became labour-intensive to correct.

5.6 Ethical Considerations

Because much of qualitative research shares interest in personal views and circumstances, it is important that those whose lives and expressions are portrayed do
not risk exposure and embarrassment, loss of standing, employment and self-esteem (Stake, 1994). It is therefore important that issues of reportage should be discussed in advance and limits of accessibility should be suggested and agreements adhered to. Stake (1994) suggests that it is important but not sufficient for targeted persons to receive drafts of how they are presented, quoted, or interpreted, and for the researcher to listen to issues of concern that arise. It is therefore important that great caution be exercised to minimize risks.

In order to deal with ethical issues relating to sensitive information provided by the interviewees, the research sent the draft case studies to the owner/managers for their consideration. There were cases where the owner/managers asked that certain information that were recorded verbatim be removed since they felt that these were confidential. There were also instances where the owner/managers asked that certain parts be re-written since they felt that the views were not recorded correctly, even where these were from audio-recorded interviews. After the corrections had been made, the cases were again mailed to the owner/managers. Subsequently, after due consideration and approval, the cases were then included in this study.

5.7 Defending the value and logic of the research

The following are the criteria that were used to assess the quality of the case studies:

5.7.1 Construct validity

The study developed sufficient operational sets of measures and took care against subjective judgments during the collection of data. Hence, the study used multiple sources of evidence in a manner that encouraged convergent lines of enquiry and also had the draft case study report reviewed by the key informants and interviewees. The
feedbacks received from the key informants and interviewees were then used to ensure that subjective judgment during data collection was minimized and therefore ensure construct validity.

5.7.2 Internal validity

This concern is not important in exploratory studies, which are not concerned with making causal relationships. In case studies, inference is often made each time an event cannot be directly observed as in the topic of the research (Yin, 1994). An investigator will therefore 'infer' that a particular event resulted from some earlier occurrence, based on interview and documentary evidence. In this study, the use of inferences was kept to a minimum and where used, triangulated with the literature to ensure external validity.

5.7.3 External validity

External validity is concerned with the problem of knowing whether the findings of the study are generalisable beyond the immediate case study (Yin, 1994). Yin (1994) has argued that whereas survey research relies on statistical generalization, case studies rely on analytical generalization. Analytical generalization involves an attempt at generalizing a particular set of results to some broader theory. However, for the result to be generalized, a theory must be tested through replication of the findings in a second or even a third case. Hence, within this study the theoretical frameworks in chapter 2 and 3 provided a basis from which the results of the case studies could be analytically generalized.
5.7.4 Reliability

Yin (1994) explained that the objective of reliability is to be sure that if a later investigator followed exactly the same procedures as described, and conducted the same case study all over again the results will be the same. The goal of reliability is to minimize the errors and biases in a study. This was achieved in this study by documenting the procedures that was followed in the case studies and which have been detailed in this chapter. However, it is important to note that since the study relied on the 'memory' of key informants, it is not possible to assure that a later investigator following exactly the same procedure as described and conducted in these cases will have the same results due to the passage of time. Moreover, it is possible that the key informants had not provided all the information to the researcher, which a later investigator might 'unearth'.
CHAPTER 6
ANALYSIS AND FINDINGS

6.0 Introduction

This chapter presents the analysis and findings of the data gathered using the case study approach as detailed in Chapter 4 (methodology). This chapter is divided into two parts: Part 1 of the chapter will focus on the 'the characteristics of the firms and owner/managers of innovative rural SMEs' while Part 2 of the chapter will focus on how rural firms innovate and the external innovation environment. Part 1 begins in section 6.0 by analysing the background of the case studies. Section 6.1 follows by presenting the analysis and findings that attempt to answer research question 1 regarding the characteristics of innovation in rural areas? Section 6.2 follows by presenting the analysis and findings that attempts to answer research question 2 on how the attributes and functions of the owner/manager of innovative rural manufacturing SMEs influence the innovation process?

Part 2 of the chapter is organised in the following manner: It begins in section 6.3 by presenting the analysis and findings, which attempts to answer, research question 3 on how rural manufacturing SMEs innovate. Section 6.4 follows by addressing research question 4 on where and how rural innovative manufacturing SMEs derived their innovation input.
PART 1

THE CHARACTERISTICS OF THE FIRM AND THE OWNER MANAGERS
OF INNOVATIVE RURAL MSME’S

The background characteristics of Innovative MSMEs

Before undertaking analysis of the functions and attributes of the owner/managers and their influence on the innovation process, it is important to provide an overview of the characteristic of the case study firms. This will provide us with an understanding of the context from which we can undertake an analysis of the functions and characteristics of owner/managers.

Age, start-up and independence status: From Table 9 below, we can see that the classification of firms according to their age shows that the ‘youngest’ company was Spreadstar formed in the 1990’s followed by Northwest (1988), and Cumbria Polymers (1987) whereas the ‘oldest’ company was Farmbike (1972) followed by Kendry (1978), and Datalog (1980). Further, the oldest companies were in the agricultural sector while the youngest were mainly in electronics and non-agricultural sectors. Moreover, the oldest companies were managed by ‘second-generation’ indigenous Cumbrian owner/managers while the youngest companies were predominantly owned and managed by in-migrants first generation owner/managers.

The importance of second-generation owner/managers has been highlighted in the growth and development of Kendry Ltd where the managing director, Mrs Connolly, stated that:

Box 1:
Having had a successful time from inception, the company started a steady growth in 1992 with the development of its market in the UK, Europe and abroad.
Table 9 Characteristics of independent rural innovative firms

<table>
<thead>
<tr>
<th></th>
<th>Kendry</th>
<th>Farmbike</th>
<th>Cumbria Polymers</th>
<th>Datalog Electronics</th>
<th>Spreadstar</th>
<th>Northwest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independence status</strong></td>
<td>Family owned, private limited liability company</td>
<td>Family owned, private limited liability company</td>
<td>Private limited liability company</td>
<td>Private limited liability company</td>
<td>Family owned, private limited liability company</td>
<td>Private limited liability company</td>
</tr>
<tr>
<td><strong>Main business</strong></td>
<td>Manufacture and distribution of commercial laundry equipment</td>
<td>Dealer in franchised farm and garden machinery</td>
<td>Manufacture and installation of commercial insulation and fibre glass fabrication for refrigerated facilities</td>
<td>Design, development and production of electronic Datalog system</td>
<td>Dealer in franchised farm machinery and own equipment for spreading lime, manure etc</td>
<td>Design under contract electronic application systems for the automobile and aerospace industry</td>
</tr>
<tr>
<td><strong>Sector</strong></td>
<td>Dry cleaning/laundry</td>
<td>Agricultural engineering</td>
<td>Fibre glass</td>
<td>Electronic engineering</td>
<td>Agricultural engineering</td>
<td>Electronic systems</td>
</tr>
<tr>
<td><strong>Employment size</strong></td>
<td>Thirty (30) employees, including owner/manager</td>
<td>Fourteen (14) employees, including owner/manager</td>
<td>Five (5) employees, including owner/manager</td>
<td>One (1) employee - self-employed</td>
<td>Forty-five (45) employees, including owner/manager</td>
<td>Two (2) employees, including owner/manager</td>
</tr>
<tr>
<td><strong>Management structure</strong></td>
<td>Hierarchical with formal design team</td>
<td>One-layer management with owner/manager leading the design</td>
<td>Single owner/operator/designer involved in product development</td>
<td>Single owner/operator/designer involved in product development</td>
<td>One-layer management with owner/manager leading product design</td>
<td>Dual owner/operator with owner/managers involved in product design</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td>Inception-to-date in present location</td>
<td>Inception-to-date in present location</td>
<td>Changed location in the last one year but within same county and nearby to previous location</td>
<td>Inception-to-date in present location</td>
<td>Inception-to-date in present location but originated from a family business based in Manchester</td>
<td>Inception-to-date in present location</td>
</tr>
</tbody>
</table>

The steady growth in Kendry highlighted in Box 1 can be attributed principally to the leadership of the current chairman, Mr. Croft. Similarly, although Spreadstar is an off-shoot of a family business, its growth and development can also be attributed to
the decision of the ‘founder’, Mr. Marcus, to design and manufacture its own range of products rather than remain within the confines of the original family business of selling and servicing agricultural machinery through franchise agreements with large suppliers. Although there has been a tendency to view farming background as being negative, the Project Manager of Cumbria Farm Link stated that: “there is a strong conservatism tradition among farmers in the County and a sense of independence. This can be used to influence farmers positively towards entrepreneurship”.

Another finding similar to that of Smallbone et al. (1997) is that Kendry, Cumbria Polymers, Datalog, and Northwest were started by in-migrant first generation owner/managers. Further, the in-migrant owner/managers originally worked in local large firms before starting their own enterprises. Moreover, the youngest firms were predominantly owned by in-migrants and were in non-agricultural sectors indicating the important role they play in diversifying rural economies. This finding supports the result of the key informant interviews and those of Tarling et al. (1993), which suggested that there has been in-migration of labour from Scotland into Cumbria. To provide us with an insight into the phenomenon of in-migration within the county, the Chairman of Cumbria Chamber of Commerce explained that:

**Box 2:**

This has particularly been observed in East Cumbria due to its pleasant villages and tourism attractions. However, the poor image of decline in West Cumbria has not attracted in-migrants in that part of the county. Moreover, East Cumbria people are more inclined towards entrepreneurship.

The local variation in attracting in-migrants was explained by M/s Teresa Williams of West Cumbria Development Agency who stated that: Theoretically in-migration would be as a result of migrants seeking better quality of life but in West Cumbria, ‘who wants to come and live here’?
This has resulted in more firm formation in East Cumbria than in West Cumbria. However, key informant interviews with the Chairman of Carlisle Business Forum indicated that not all in-migrants into the county are skilled or entrepreneurial:

**Box 3:**
There is a fair number of Scots from the North due to better employment opportunities. They are not particularly high skilled.
The Head of Economy and Development at the South Lakeland District Council Mr. Alexander added that:
South Lakeland district has an increase in ageing population due to the influx of elderly people and an exodus of young people to universities outside the district.

Although the narratives in Box 3 support the findings of Smallbone et al. (1997) about in-migration of economically active households from elsewhere in the UK into rural areas resulting in the expansion of labour supply and an increase in the pool of potential entrepreneurs, it also suggests that in some parts of the county especially in the South Lakeland District in-migration has not result in an increase of potential entrepreneurs and new firm formation. Rather what we find is an increase of ageing population, which might put a strain on social support systems. The Head of Economy and Development at the South Lakeland District Council explained:

**Box 4:**
The contribution of in-migrants to the local economy is minimal. Although they have disposable income, depending on their age, they depend on doctors and hospitals therefore increasing demand on the local health service. Further, they do not necessarily bring their working skills. The district has only been able to attract ‘footloose’ small businesses and consultancy founded by those who are basically looking for a livelihood.

However, despite the ‘mixed’ contribution of in-migrants in the local economy their more fundamental influence has been in changing the social-cultural factors within the county. The Project Manager of Business Link Cumbria explained that:
Box 5:

This has resulted in the changing structure of communities and has broadened the local people’s experience.

The influence of in-migrants in changing the social structure of local communities by making them more open and accommodative to ‘outsiders’ is important in transforming the communities from being ‘closed’ to being ‘open’. Dakhli and De Clercq (2004) have argued that this process can enable local communities to appreciate new ideas and accept new information, which is essential for new firm formation and innovation. However, the impact of in-migrants in changing the social structure of local communities can also result in ‘resistance’ and resentment towards outsiders by local communities and thereby constraining information exchange and networking which are essential for innovation. A Key informant interview with the Chairman of Cumbria Chamber of Commerce explained that:

Box 6:

The community in most of Cumbria can be described as ‘close-knit’. However, they do not like to interact with ‘outsiders’.

To evaluate the utility of being ‘close-knit’ in firm formation and networking, the Chairman of Carlisle Business Forum explained:

There is no such thing as ‘Carlisle Community’...individually there are about 6 or so strong communities. However, only a few has resulted into community enterprises being set-up...most of these initiatives fizzled out once funding was exhausted indicating that they were not grass root initiatives but externally induced.

Similarly, the Chairman of Cumbria County Council stated that:

In most communities there are voluntary organisations, which seek to stimulate community initiatives. This is mainly because funding was available for such initiatives rather than them being community generated.

The narratives in box 6 suggest that contrary to the prevailing view in the systemic approaches to innovation as presented by Maillat (1995), Keeble et al. (1992), and
Simmie (1997), which suggest that existing long established and close-knit communities with stable common value systems can provide essential non-economic preconditions for industrial districts, clusters and milieu and important ingredients for the occurrence of innovative SMEs, the findings are similar to those of Dakhali and De Clercq (2004) and suggests that close knit communities has not resulted into economic action but rather 'closed it' to external inputs. This has resulted in the failure of the county to use its untraded interdependencies to evolve into a local or regional innovation system and networks that are important for learning, information exchange, and innovation. To explain this further, the Economic Regeneration Manager of the Allerdale District Council:

**Box 7:**
Due to isolation, there is 'closed' close family relations. There is little migration and each town is different from the other and in competition with each other historically. The family life revolves around two strong rugby clubs resulting in local rivalry. There is parochial competition.

Similarly, M/s Teresa Williams of the West Cumbria Development Agency explained that:
There is a strong cultural tie with strong family structure in West Cumbria. However, some areas are 'inward-looking'.

Mr. Jonathan Miles and Ms. Doherty Daniels of the Carlisle City Council added that:
Farmers have traditionally been independent and insulated from each other. It will take a long time for co-operation and collaboration...there are strong communities but no tradition of community working together

The narratives in Box 7 indicate that there are social relationships existing in Cumbria that can be essential for the emergence of an innovation system. However, the characteristics of the social relationships that has been highlighted, including 'closed' family relations, little migration, local rivalry, parochial competition, and lack of cooperation and collaboration can inhibit information exchange and the development of 'strong-tie' business networks that are necessary pre-conditions for the evolution of
an innovation system as suggested by Julien et al. (2004) and Lawson and Lorenz, (1999). A key informant interview with M/s Teresa of West Cumbria Development Agency indicated that:

**Box 8:**

The private sector in West Cumbria is not strong and do not engage in networking. This is because of a lack of critical mass of entrepreneurs. Similarly, the Chairman of Eden District Council explained that:

There is a general lack of a networking culture among communities in Eden and a regional economic development forum meeting has been organised to address this.

However, there is local variation in co-operative activities among communities. The Head of Economy and Regeneration at South Lakeland District Council explained:

There are strong cultural ties with strong family structures in West Cumbria. People are good at getting together...there is a co-operation among communities.

The narratives in box 7 and 8 suggest that the non-economic linkages suggested by Lorenz (1999) which emphasises the key role played by the social and political infrastructure within the county has not evolved to the extent of promoting economic co-operation and trust that is essential for the emergence of a regional innovation system. However, the lack of a local networking culture is not unique to Cumbria as found in other studies by Keeble et al. (1999) and Varaldo and Ferrucci (1996). This supports the views by Varaldo and Ferrucci (1996) who suggested that participation in national and global networks might be important in enabling rural firms to access the latest technological knowledge and avoid technological 'lock-in'.

Another finding emerging from the analysis of the case studies is that regardless of whether or not they were first generation owner-managed, the start-up of the firms was as a result of several factors that can broadly be classified as 'push' and 'pull' factors. For example, in Kendry, Cumbria Polymers, and Datalog the businesses were
established as a result of the founders being ‘pushed’ into starting their own businesses to get out of unemployment.

**Box 9:**
In Kendry Ltd, Mrs Connolly stated that it was established as a result of:

Mr. Croft's father- Jeff- being made redundant from a big engineering company here with a part of its product portfolio in the laundry business

Similarly in Cumbria Polymers the founder, Mr. Rodgers, stated that:
The initial process of wanting to do my own thing was triggered by the fact that my employer wanted me to move on to another location, which I didn’t want because my kids were in school.

While in Datalog the founder, Mr. Paul Knight, stated that the firm was established after he:

Kept getting sacked from other people’s jobs so I decided that I’d do it myself. They kept closing the companies down or closing the departments down which I was working in.

The narratives in Box 9 suggest that the founders did not start the firms as a result of the attraction or lure of their ideas but due to pressure of being unemployed.

However, in the remaining firms, Farmbike, Spreadstar and Northwest, the businesses were established because the founders were ‘pulled’ into starting a business as a result of the attraction to do something different and the potential reward.

**Box 10:**
For example the owner/manager of Farmbike, Mr. Farmer, stated that the firm was established as a result of his father:

Doing the same job working for other people and also at home he was milking cows and farming at the end of the day. During the weekends people would come to him saying have a look at this and have a look at that. It got to a point where he had so much demand for ‘out of hours work’ than he had the time to work. So, one day he packed up...took that up.

The findings provide us with an explanatory framework for the motivational factors that lead one into starting a business in the study area with potential implications for innovation. Although the results do not provide enough information on whether push
or pull factors stimulates innovativeness among would-be entrepreneurs, they act as a 'catalysts' for new firm formation.

The importance of push and pull factors can also be linked to the results of the secondary data of the study area analysed in chapter 4 that indicated the declining role of agriculture in employment creation with an increase in manufacturing activities in the county (22.6%) compared to the national average of 18%. This can be attributed to the decline in agriculture in the study area resulting in redundancies in agricultural-related businesses hence 'pushing' some employees into starting up their businesses in related sectors. The role of the crisis in the agricultural sector in 'pushing' people into non-agricultural activities was highlighted during a focus group discussion with Mr. Jonathan Miles and M/s Doherty Daniels of the Carlisle City Council who explained that:

**Box 11:**

There has been business diversification out of agricultural. For example CARRS milling company diversified into engineering. Diversification is seen as a solution to rural problems. However, Mr. Miles and M/s Daniels explains that farm diversification has been rather slow because:

To diversify from farming can be seen as 'giving in' since it is a change of a way of life and therefore much more difficult to achieve. Unlike in industrial sectors where a loss of market could mean a change of production lines, agriculture is a sentimental occupation.

The pull factors can be important explanatory variable emerging from this finding and suggests that the rural environment did not constrain the would-be-entrepreneurs to start-up their businesses. Further, the findings supported the views of the key informants regarding the importance of spin-offs from employment in the start-up process (Kendry, Cumbria Polymers, Datalog, and Northwest). A key informant
interview with the Chairman of Cumbria Chamber of Commerce revealed that business start-ups in the study area were as a result of “spin-off from employment and in-migration from urban centres” and hence broadly in agreement with the findings of Perhankangas and Kauranen (1996) and Acs and Audretsch (1993). Spin-off from employment can also be seen as enabling the ‘spin-off of embodied technological and managerial expertise’ from large firms in the form of entrepreneurs, which is important for learning and therefore innovation as suggested by Keeble et al. (1999).

Regarding the independence status of the case study firms, all the firms were independent and owner/managed firms. However, although Spreadstar evolved out of a family business in a related sector (agricultural engineering), the firm is independent from its ‘parent’ company and has no linkages including management, financing and product development with its parent company.

**Employment size and management structure:** From table 7 (page 241), it can be observed that all the case study firms were small firms employing between 1 and 49 employees (including the owner/managers). Three of the companies can be classified as micro-businesses using the criteria set out in Chapter 1 (Cumbria Polymers-5 employees, Datalog Electronics- 1 employee and Northwest Ltd-2 employees) while the other three as small firms (Kendry- 30 employees, Farmbike-14 employees, and Spreadstar—45 employees). However, Northwest Ltd. has remained ‘micro’ by choice due to its strategy of subcontracting the production of its innovative products. This finding suggests the role of micro and small enterprises in the study area with potential influence in the study of innovation in rural areas. This finding supports the analysis of the study area presented in Chapter 4 (the study area), which suggested
that there has been an increase in the importance of micro and small enterprises in rural Cumbria as represented by these six case study firms. To explain the growing importance of micro and small businesses in the County, the Chairman of Carlisle Business Forum stated that:

**Box 12:**

The business forum has 900 members...out of this membership, 400 businesses employ less than 10 people (micro-businesses).

Similarly, the Chairman of Eden District Council stated that:

90% of businesses are small businesses (micro-enterprises).

The Head of Engineering Department at the University of Lancaster also explained that:

This area apart from BNFL and BA Systems has no companies of significant size apart from SMEs and there are quite a lot of them particularly in the South of Cumbria...so yes, this is an important sector.

This finding supports the findings of Lowe and Talbot (2000) that businesses in rural areas tend to be smaller with a higher proportion of micro-and one-person businesses with implications for their support needs which they are less likely to meet from their own internal resources. Further, the higher proportion of rural businesses that are found in this size band makes it particularly important for policy in a rural context as suggested by Smallbone and Major (2003).

The management structures varied between the firms with Cumbria Polymers and Datalog having single owner/manager structure, Northwest had two-owner/manager structure, while Farmbike had a one-layer management structure. However, Kendry and Spreadstar had what can be termed as ‘hierarchical structures’ that corresponded with their employment size (Kendry 30 and Spreadstar 45).
All the firms regardless of their management structure were managed by the owner/manager in a personalised way. Hence, in all the cases, the owner manager ‘championed’ the product development by taking the ‘lead role’ in all decision making. However, Kendry has a hierarchical management structure comprising of a board of directors, company chairman, managing director and a management team with the development of the innovative product undertaken by a design and development team headed by the company chairman and an employee as ‘product/innovation champions’. In contrast Spreadstar, although having a hierarchical management structure similar to that of Kendry, does not have a design or development team but the managing director undertakes all the design of the innovative products.

These findings are important for this study as the single-layer management structure and the management of the firms in a personalised can have significant implications for the management of innovation within the firm. Moreover, because the case study firms did not have ‘innovation teams’ or ‘product development departments’ and thereby necessitating that the owner/manager, together with some employees, be involved in the innovation process their opinions are important in enabling our understanding of innovation among SMEs. Further, the management of the firms in a personalised way implies that the innovative capacity of the firms are to a large extent dependent on the capacity and capability of the owner/managers which can either constrain or facilitate innovation. This implies that understanding the functions and characteristics of the owner/manager can enrich our understanding of innovation in rural areas.
Origin of the founder: All the case study firms with the exception of Spreadstar\textsuperscript{46} originated within the local area and were started in their present locations. However, although the founders of Kendry and Datalog were not originally from Cumbria, they started their firms as a result of being made redundant from a local company. Furthermore, the owner/manager of Spreadstar originated from Manchester in order to start-up a business similar to that of the parents. The findings indicate that in-migrants owner/managers started their businesses after they moved into Cumbria rather than bring them along. Hence, 'in-migration' of workers/employees to local firms did eventually result in 'spin-offs' from employment into self-employment.

Moreover, the sectors that the in-migrants started their businesses were similar to those of their last employment. For example, the founder of Kendry started in Laundry/dry cleaning, Cumbria Polymers in moulding, and Spreadstar in farm machinery. This finding supports the view in the innovation literature that the derivation of the business idea leading to the formation of a new firm from previous employment of the founder who may be either a scientist of engineer can provide us with an explanatory framework for understanding the occurrence of innovative SMEs (Perhankangas and Kauranen, 1996). However, the start-up process was not due to a lower valuation of the new product by the employer but rather as a result of push and pull factors. Moreover, although the findings are consistent with those of Acs and Audretsch (1993) and Keeble et al., (1999) that suggested that the decision to pursue the development of an idea for a new product by an employee of a large firm in rural areas appears to be the same as those in areas of high agglomeration, it suggest that

\textsuperscript{46} Spreadstar originated from the parent group of companies based in Manchester
these are likely to be based on push and pull factors rather than internal constrains within large firms.

Hence, the recent improvements in infrastructure development in the UK has increased the efficiency in transport and communication leading to diminishing distance which has encouraged the movement of economically active and skilled labour from urban to rural areas. These findings are consistent with those of Keeble et al. (1992) that drew attention to the fact that most rural entrepreneurs were in-migrants, even if they had moved in some years prior to setting up their businesses. More recently, the role of in-migrants in contributing to the entrepreneurial capacity of rural areas has been recognised by the Countryside Agency (2003) as an important policy issue since they represent one of the potential sources of new businesses.
6.1 Research Question 1: The characteristics of innovation among the case study firms

<table>
<thead>
<tr>
<th>The innovation</th>
<th>Type of innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kendry</strong></td>
<td>Hygienic commercial towel cleaning laundry machine</td>
</tr>
<tr>
<td><strong>Farmbike</strong></td>
<td>Petrol to gas conversion kit for farm bikes</td>
</tr>
<tr>
<td><strong>Cumbria Polymers</strong></td>
<td>Polymer moulding for valves used in cold storage facilities</td>
</tr>
<tr>
<td><strong>Datalog</strong></td>
<td>Electronic vehicle monitoring equipment for traffic monitoring in national parks and heritage sites</td>
</tr>
<tr>
<td><strong>Spreadstar</strong></td>
<td>Multi-functional farm machinery for spreading lime, fertiliser, tar without altering the modules</td>
</tr>
<tr>
<td><strong>Northwest</strong></td>
<td>Miniaturised electronic control device for automotive</td>
</tr>
</tbody>
</table>

From table 10, we can observe that the innovative firms were mainly involved in agricultural engineering and electronics sectors. However, there was diversity in the types of innovations that the case study firms were involved. These ranged from hygienic commercial towel cleaning machinery in Kendry, gas conversion kit in Farmbike, Polymer valve moulding for cold storage in Cumbria Polymers, electronic...
data log equipment in Datalog, Multi-functional farm machinery in Spreadstar and a miniaturised electronic control device for the automotive industry in Northwest.

Further, we can also observe from table 8 that with the exception of Kendry, Cumbria Polymers, and Northwest, the remaining innovations were in industrial sectors related to agriculture and natural resources (Farmbike, Datalog, and Spreadstar). The analysis suggests that innovations in Farmbike, Spreadstar, and Datalog were influenced to a great extent by the environment in which the firms were located, namely the rural environment.

Table 8 also shows that all the case study firms were mainly engaged in product rather than process innovation. However, it should be noted that although the study has characterised most of the innovations as being product innovation, there were difficulties in assigning the categories. The difficulty in assigning categories was more evident in Kendry and Spreadstar where the product innovation also necessitated process innovation. For example in Kendry, the head of engineering department at the University of Lancaster that provided technical support to the firm explained that:

**Box 13:**

"What happened then was that the process expertise of this 'elderly expert' (referring to the consultant who helped generate the idea') was put together with the computer aided engineering knowledge of the skilled employee...to design with some help from the process side, basically a completely new machine...”

Similarly, the owner/manager of Kendry explained that:
The narratives of the Head of Engineering department at the University of Lancaster, the owner/manager and employee of Spreadstar support the definition of process innovation adopted by this study in chapter 1 that ‘process innovation is the production of a given product in a new way’. However, although the firms were mainly innovative in their process of manufacturing the results were innovative products. In this case, it was difficult to assess which came first “the process or the product”. This difficulty was mainly due to the fact that product innovation sometimes results in the introduction of a new or improvement of an existing process.

An important question arising from the case studies was whether the owner/managers and interviewees considered the innovation as being distinctly either product or process innovation. The results suggest that from the owner/managers perspective, their main objective was to develop an innovative product, which necessitated the use of a cost effective process. Hence, we can conclude that from the owner/managers perspective, they ‘were just innovating’.

This finding suggests that the distinction between product and process innovation can be a subjective exercise, mainly by the researcher, for the purpose of generating theory or measurement, as the owner/managers themselves seemed unaware of the different categories. The findings support the views of Shioriya and Perlwlan (1994) that the definition and measurement of innovation have fuzzy boundaries and have

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**Box 14:**

We converted the design...utilising the best manufacturing method, which used laser cutting...we reduced the manufacturing time from 4-5 weeks down to 5-6 days. Therefore, the process was much more cost effective and the cost of the product significantly less.

In addition, the employee of the firm, Mr. Stephen, explained that:

In its method of manufacture...it actually utilises laser technology, which greatly aids the method of manufacture.
practical difficulties. In addition, the findings also support the view in the literature, including Hall (1994), which suggests that some product innovations are also process innovation and that some product innovations can result in or necessitates process innovation. Furthermore, the categorisation used for product innovation supports the definition adopted by this study in chapter 1 that ‘product innovation involves the alteration of current products of the firm or rival firms, or a new product’.

Box 15:
This was clearly illustrated by the managing director of Kendry, Mrs. Connolly, who stated that:

It doesn’t do something that is different from the old machine...but it does it faster, more reliable and to a high standard...I don’t think the actual product is necessarily innovative, but it is actually innovative how we went about it, and produced it.

Mr. Gavin, the employee of the firm involved in the development of the innovative product supported this view:

Although this product was new to this company, the actual towel machine is not unique...the processes are similar...but the engineering design, you couldn’t recognise the machine.

The pattern of ‘alteration of current or new products’ stated in Box 15 was also found in Farmbike, Cumbria Polymers, Spreadstar and Northwest. However, a departure from this definition is found in Datalog where the product innovation involved the introduction, rather than alteration, of a new product. This finding suggests that although the majority of the innovative firms, and perhaps rural firms, altered existing products in the process of developing their own products there are also firms that have developed new products. Hence, our definition would not be complete without recognising/accommodating ‘newness’ of the innovation. Further, the findings supports the criticism of O’Gorman and Kautonen (2004) on the prevailing public policy that focuses on the supply of innovative ideas from universities and research institutions while ignoring R&D activities and outputs at the level of individual firms.
6.1.1 Level of innovation: In order to gain an understanding of the levels of innovativeness of the various products/processes developed by the case study firms, opinions of owner/managers and sectoral representatives, and whether or not the firm has received any awards or national recognition were used as proxies. Hence, applying the indicators developed in chapter 1 for the case study firms:

**Box 16:**
Mr. Croft of Kendry stated that:
Nobody produces the old machine...we are the only people in the world to produce a machine that does this...certainly for our industry.

In a follow-up interview with the employee whose responsibility included the innovative product/process indicated that:
This product although new to this company...there was a design 30 years ago...the processes are the same

To gain an understanding of the level of innovativeness in the design, an interview with the owner/manager of the private R&D Company that the firm used to manufacture the product stated that:
We would work very closely with a company who is good at design, development, and research, above all knows the market place...they probably are near the stage where they want to do their own assembly...it is all the time, it is their product and they have the intellectual rights to that product.

The narratives in Box 16 above suggest that the innovation was of an incremental nature and not industry wide because the product has not received an innovation award or national recognition for its innovativeness and was not new to the industry. However, triangulation of the interview with the owner/manager and that of the employee indicate that in regards to its design, the innovation was new to the firm and to the industry. Hence, the narrative of the owner/manager and employee suggests that the innovation was of an incremental nature.

In the case of Farmbike Ltd, we find that the level of innovativeness was different from that of Kendry. Mr. Farmer, the owner/manager, stated that ‘...Gas kits are
common in cars but nobody has bothered with this ‘niche’ of motorbikes’. This suggests that the product was innovative since it was ‘new’ in the niche ‘bikes’ motor industry sub-sector. The owner/manager indicated the level of innovativeness of the product by explaining that nobody had bothered with the niche of farm-bike. Further the ‘push’ by the Yamaha dealership can be viewed to be indicative that the product was innovative within the industry and therefore qualifying as an ‘industry-wide’ innovation. However, in order to establish independently the level of innovativeness of the product, a follow-up interview was conducted with the technical manager of the private R&D facility that Farmbike derived innovation ideas from.

Box 17:
The manager of the R&D Company explained that:

Two years ago...one of the manufacturers of All Terrain Vehicles (ATV’s) developed a small bike with a diesel engine which made all the other manufacturers to ‘prick up their ears’ and ask why they have converted a diesel engine...the potential was enormous due to the cost savings to the farmer...so we contacted a specialist company to look into it...gas emission is more environmentally friendly and the government is very interested and supports such initiatives.

The interest shown by the R&D Company on the potential for the innovative product suggests that it was innovative because of its newness to the farm-bike motor industry ‘sub-sector’ and therefore ‘industry-wide’ innovation. To support this observation, a follow-up interview with a customer of the company (Andrew Smith) indicated that ‘...in general, ...it was a new technology’.

Hence, from the opinions of the owner/manager of Farmbike, the technical manager of the private R&D Company that Farmbike derived innovation inputs from, and the customer who purchased the innovative product, the findings suggests that the innovation can be classified as ‘industry-wide’ in terms of its innovativeness.
Furthermore, the interest shown on the innovation by the private R&D Company and the customer was indicative of its innovativeness. Although the opinion of the technical manager of the private R&D Company indicated that the government has shown an interest in the innovation, the product has not received formal national recognition or an innovation award. However, we can still classify it as industry-wide based on the opinion of the customer, the owner/manager, and the technical manager of the private R&D that suggested the 'newness' of the product to the company and the farm bike sub-sector.

Similarly, in Cumbria Polymers although the product has not received any national award, the owner/manager has appeared on National Television once with the Rural Development Commission in 1995. In addition, the results of the case study indicated that although there were competing traditional ways of insulating valves, the approach that the firm used was indicative of its innovativeness. Further, according to the opinion of the owner/manager the innovation is in a niche market where there are few players. The results also suggested that the process of insulating valves that the firm introduced was different from those used by the competitors and therefore innovative. Hence, although the process that the firm has developed has not won an innovation award, it has received National Press recognition, which can be used as a proxy for innovativeness. The result therefore suggests that the product was innovative due to its 'newness' or 'distinctiveness' compared to other similar products.

The level of innovativeness of the product developed by Datalog was explained by the owner/manager, Mr. Rodgers, in Box 8 below. The narratives suggest that the innovation can be classified as 'industry-wide'. Although this classification is similar
to that used for Cumbria Polymers and Farmbike, it recognises the innovation award as being indicative of the level of innovation and is consistent with that proposed in Chapter 1, namely that the opinions of the owner/managers can be strengthened with whether or not the firm has received a national innovation award such as the SMART Award.

Box 18:

Well, you don’t seem to buy just anything that does the same job...the invention has been taken to prototype and the technology has been shown to work.

In order for us to gain an independent assessment of the level of innovativeness of the product, the programme manager of NESTA explained:

The device that Datalog had invented was of particular interest to us because it takes advantage of modern developments...NESTA awarded Datalog Electronics an invention and innovation award of £42,270 to support further development of the equipment.

Similarly, in Northwest the innovative product received a SMART award. Explaining why he thought the product was innovative, the owner/manager, Mr. Harvey, said:

There are no better guys to know what is available than one of the large luxury car manufacturers whose vehicles this is going on...they are looking for the edge all the time...we have done some research, we know who the competitors are and we know there is nothing on the market to the best of our knowledge that can offer the features that this can offer.

An interview with the owner/manager of the firm’s sub-contractor revealed that “I think they produce something that is better than anybody’s...if you have something on the market, they can normally come up with a vast improvement...they normally work on it until it is 100% better than anyone else’s.

However, it is important to note that although both Farmbike/Cumbria Polymers and Datalog/Northwest have been classified as innovative using similar but differing indicators, the approach emphasises the need for a robust classification to reflect the nature of innovation among SMEs in rural areas. An interesting classification of innovation was that of Spreadstar. This particular innovation differs from those of the other case study firms because it involved strong elements of both product and process innovation.
Box 19:
Explaining the innovation, the owner/manager of Spreadstar stated that:

The design idea was quite good...we converted the design into a fast manufacturing method of utilising the best manufacturing method...the development of the product was much easier”.

To assess the level of innovativeness, an employee of the firm whose duties included the development of this particular product stated that it is:

“Fairly...in its method of manufacture...it actually utilises...laser technology, which greatly aids the method of manufacture...when we first started doing it, it was highly innovative in the industry. We just got a sister product to this which has just got a silver medal at the Royal Agricultural Institute for its economic and innovative design.

The narratives of the owner/manager and employee in Box 19 suggests that although the product itself was incremental in its innovativeness, the process of manufacture was ‘industry-wide’ because it was new to the industry at that time. Hence within this innovation, we can classify the product as incremental since it was not new to the industry and the method of manufacture, the process, as industry-wide. This is because the process innovation in this case meant development of the product in a radically new way with slightly increased efficiency and effectiveness as discussed by Davenport (1993) as opposed to an improvement. A follow-up interview with the owner/manager revealed that the latest version of the product/process has been awarded a silver medal at the Royal Agricultural Institute Show for “its economic and innovative design”.

Although the results were mainly obtained from sources internal to the firm, the approach used to obtain the views of the responds ensured independence and therefore increased the reliability of their opinions. This finding supports the definition adopted by the Elam (1993) who defined innovation as combining of materials in a novel
fashion to produce other things, or the same things by a different method. Moreover, it supports the findings of Davenport (1993) that what is new and distinctive about this combination is its enormous potential for helping an organisation achieves major reductions in process cost or time, or major improvements in quality and flexibility.

Table 11 Classification of nature and level of innovativeness

<table>
<thead>
<tr>
<th>Case Study Firm</th>
<th>Nature of innovation</th>
<th>Degree of innovation</th>
<th>Method of verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kendry</td>
<td>Product</td>
<td>Incremental</td>
<td>□ Owner/manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ Employee</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ Private R&amp;D</td>
</tr>
<tr>
<td>Farmbike</td>
<td>Product</td>
<td>Industry wide</td>
<td>□ Owner/manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ Customer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ Private R&amp;D</td>
</tr>
<tr>
<td>Cumbria Polymers</td>
<td>Product</td>
<td>Industry wide</td>
<td>□ Owner/manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ National press recognition</td>
</tr>
<tr>
<td>Datalog</td>
<td>Product</td>
<td>Industry wide</td>
<td>□ Owner/manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ Representative of national innovation award organisation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ National innovation award</td>
</tr>
<tr>
<td>Spreadstar</td>
<td>Product/process</td>
<td>Industry wide</td>
<td>□ Owner/manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ Employee</td>
</tr>
<tr>
<td>Northwest</td>
<td>Product</td>
<td>Industry wide</td>
<td>□ Owner/manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ Sub-contractor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ SMART award</td>
</tr>
</tbody>
</table>
Notes:
1. Industry-wide: an innovation is categorised as being industry-wide when it is new to the industry/sector and/or has received an innovation award or a national recognition.
2. Incremental: an innovation is categorised as incremental when it is not new to the industry/sector but is of an incremental nature.
3. Non-Innovative: an innovation is categorised as being non-innovative if it is neither new to the industry/sector nor incremental in nature.

In conclusion, using the opinions of owner/managers, employees and representatives of sectoral organisations, strengthened with awards and national recognition as proxies for the degree of innovativeness, we can develop a classification of the degree of innovation among the six case study companies as shown in Table 11 above. Due to the nature of its innovation, Spreadstar developed a product that could be classified both as product and process innovation. Further innovation in Kendry and Spreadstar could be classified as incremental while the remaining four as industry-wide. Although classifying innovation in this way tends to emphasise innovation award as being an important measure, this study has used the opinion of the owner/managers, employees and other sectoral representatives to add more dimensions in the measure of innovation.

Regarding patents for their innovation, analysis of the data indicates that all the case study firms had not sought patents for their products. When asked about patents for their products, some firms expressed the view that they had not thought about patenting their innovation. Further discussions with the owner/manager revealed that
the firm did not want their potential competitors to see the product during the Royal Summer Show and were afraid that their idea could be ‘stolen’. Moreover, the results are similar to those of Kalantaridis (1999) and suggest that all the case study firms did not seek patents for their innovation. Lawson and Lorenz (1999) explains that this can partly be attributed to the fact that for SMEs, seeking patents and copyrights may mean restrictions in the information that they can exchange within their networks. Since SMEs rely on these networks to access their innovation inputs as well access to markets, the use of patents for their innovation may eventually limit how much information they can share and eventually reduce their ability to participate in the network.

6.1.2 Conclusion: There are two main findings with implication for theory that the case studies have provided regarding the characteristics of innovation in rural areas. Firstly, that there are difficulties in assigning categories on whether the innovation was product or process. Secondly, combining different ways of measuring innovation including using the opinions of owner/managers, employees, representatives of support organisations and the use of innovation awards and national recognition as proxies for the level of innovativeness is important for our study.

Relying on the opinion of owner/managers was important in enabling us classify innovation because most owner/managers did not seek patents for their innovation nor were there patent offices located within the study area. Moreover, because most owner/managers of SMEs lack awareness of innovation awards such as the SMART award they are unlikely to participate in such awards. Further the use of patents, as proxies for innovation would be unreliable because the evidence presented indicates
that SMEs do not seek patents for their innovation. This was highlighted by the owner/manager of Spreadstar who explained that ‘...I don’t think there is anybody here who can advice on SMART awards for local business...we’ve always had to go to Manchester’.

Hence over reliance on such awards as a measure of innovativeness would result in many innovations in the study area being excluded. Moreover, SMEs located in areas such as Cumbria may be at a disadvantage if innovation awards were used exclusively a proxy for innovativeness since there is a lack of local offices to facilitate the processing of such awards.

Another important conclusion that is similar to those of Feldman (1994) and Rothwell and Zegveld (1982) is that rural innovative SMEs are likely to be relatively strong in innovations where effects of scale are not yet important but where they can make use of their flexibility and proximity to market demand, such as new products or product-market combinations, modifications to existing products for niche markets, and small-scale replications. However, there was diversity in types of innovations that the case study firms were involved. These ranged from hygienic commercial towel cleaning machinery, gas conversion kit, Polymer valve moulding for cold storage, electronic data log equipment, Multi-functional farm machinery in and a miniaturised electronic control device for the automotive industry.
6.2 Research Question 2: Influence of the functions and attributes of the owner/manager of innovative rural SMEs on the innovation process

6.2.1 Functions of the owner/manager in the innovation process: This sub-section provides us with themes that reflect the functions of the owner/manager, which were derived from the literature on entrepreneurship. The study has used the narratives of the owner/managers to understand their behaviours during the innovation process when faced with critical incidents\(^\text{47}\) such as lack of information to develop their innovative products.

Co-ordinating function and the innovation process: The function of the entrepreneur as co-ordinator during the development of the innovative products was explored using critical incident technique. The results show that the co-ordinating function of the owner/managers varied depending on the availability of qualified employees or co-owner/managers or qualified and experienced owner/managers. In some cases, where owner/managers were not technically qualified, a qualified employee (Kendry) undertook the co-ordinating function related to the development of the innovative product.

However, where the owner/manager or co-owner/manager was experienced and qualified, the co-ordinating function was undertaken by the owner/managers themselves (Cumbria Polymers, Datalog, Spreadstar, and Northwest). Where the co-ordinating function did not fall on the owner/manager regarding the development of

\(^{47}\) Critical incidents are episodes or behaviors deemed to have a special positive or negative impact in a situation (Flanagan, 1954). The critical incident technique gives a detailed description of what happened, why it happened and what specific actions were taken to solve the problem emphasizing
the innovative product, as was the case in Kendry, the owner/manager still maintained the important role of determining ‘what sort of contracts should be entered into’. The head of engineering at the University of Lancaster explained this:

**Box 20:**
"...The key here in the innovation step is getting the commitment to move ahead"

More importantly the findings indicate that during the innovation process, it is not necessary that the entrepreneur or owner/manager ‘applies theory and directs execution’ as suggested by Say (1821) but that this function can be ‘delegated’ to the ‘workman’ or employee who has the experience and skills to apply theory and execution. However, although the application of theory was delegated to the ‘workman’, the owner/manager retained the function of supervision and decision-making. Similarly we find that in Farmbike, whereas the function of application of theory and direction of execution was ‘delegated’ to a private R&D Company, the owner/manager retained the function of supervision and decision-making.

**Box 21:**
Mr. Farmer explained the function of the owner/manager:

My position in the company involved attending to farm activities...do sales work as well and day-to-day management this also includes a place for invoices as well as handling customer queries.

This narrative suggests that where the owner/manager is less skilled and experienced to apply theory and direct execution during the development of the innovative product, this function tends to be delegated while the owner/manager retains the function where they have more competence in, i.e. supervision and decision-making.

crucial and decisive moments. However, even short events (captured by the critical incident technique) can generate relevant behavioral accounts when faced with challenges during the innovation process.
In contrast, where the owner/managers were experienced and qualified we can develop a further categorisation between those who endeavoured to use the knowledge of the man of science as suggested by Say (1821), Cumbria Polymers, and those who used their own knowledge of science based on their technical qualification and work experience (Datalog, Spreadstar, and Northwest) to develop innovative products. An example where the owner/manager endeavoured to use the knowledge of the man of science was that of Cumbria Polymers who sought assistance from a regional university when faced with lack of information and knowledge about the innovation (See Box 22 below).

**Box 22:**
I talked to Lancaster University for a while...they had a department involved in polythene's...I thought well, if I've got a sort of 'research guy' investigate it and 'reformulate it' basically- which is a matter of 'jiggling around with a few formulations' to get the different characteristics...it was quite interesting because they did a search for me on their computer on polythene's and all the papers that have been published about them dating back 20 years. They did do a lot of work, they gave me these wads of papers...and there was the research how the product had moved and developed, the blowing agents and thermal conductivity of the product etc...so, they gave me that sort of insight, which was quite interesting.

Analysis of the narrative Box 22 above suggests that although the owner/manager wanted to use the knowledge of the 'man of science' he had a 'narrower' predisposition towards research, which according to him basically meant 'jiggling around some formulas'. Although the owner/manager suggested that the knowledge of the man of science in this case was not useful, further analysis suggest that these 'knowledge' provided him with important suggestions that enabled him develop the innovative product. This finding did not support the views of Julien et al. (2004) who argued that SMEs tend not to use the services of public and quasi-public agencies such as universities but agrees with those of Fuellhart and Glasmeier (2003) assertion
that information from such sources are unlikely to be tacit and can be obtained by anyone who knows where to look and who has the resources to obtain it.

From the foregoing analysis, the findings also suggest that where the owner/manager did not possess the skills and experience necessary to develop their innovative product, they retained the 'power of deciding what to do with the means of production at their disposal'. Moreover, owner/managers with limited skills and experience tended to 'delegate' the co-ordinating function regarding the development of the innovative product to either a qualified employee or an innovation support organisation but retaining the 'managerial' function. This is because technical training and background can be seen as contributors to the reservoir of knowledge from which one can draw alternative solutions and that without substantial task knowledge, the choice of potential solutions would be largely arbitrary, resembling blind trial and error suggested by Staw (1990) and demonstrated in Farmbike (Staw, 1990). However, where owner/managers possessed the skills and experience, they tended to perform both the co-ordinating function regarding the development of the innovative product as well as the managerial function.

**Uncertainty and Risk bearing:** The case study data was analysed to ascertain the theme of uncertainty and risk bearing function of the entrepreneur. Analysis of the case studies indicated that firms used different strategies and reacted differently to uncertainty during the development of the innovative product. For example in Kendry and Farmbike, the owner/managers relied on external support when faced with uncertainties associated with the development of the innovative product. These included the use of personal/business contact network in Kendry and a private R&D
Company in the case of Farmbike when the R&D Company decided not to continue with the development of the product due to lack of economy of scale. It is important to note that in both Kendry and Farmbike, the owner/managers were second generation and were born and raised within the case study area.

However, in Cumbria Polymers, Datalog, Spreadstar and Northwest the owner/managers relied on internal skills and experience developed during their previous work experience when faced with uncertainties associated with the development of the innovative product due to their educational and technical backgrounds. For example, in Cumbria Polymers when faced with the uncertainty of limited information provided by a public university research department, the owner/manager sought to develop the product by assuming the responsibility, motivating the production and becoming the responsible owner of the product (Barreto, 1989). The owner/manager explained:

**Box 24:**
I talked to the University of Lancaster for a while...but there was not enough information...for me to go into what we were trying to do...The more people I spoke to that I though were experts the more I realised that they were not. Therefore, I have had to learn and develop things myself really to suit our requirements....I have had to glean all of the information...sort it out to suit myself...virtually filtered out what I wanted to know, what I didn't want to know and put it together.

Ford (1994) explained that uncertainty is present when an individual cannot provide a complete set of the feasible outcomes from some particular action, decision or experiment or when having been able to specify that set his or her knowledge does not permit the selection of one of the competing outcomes as certain to occur. Hence we find from the narrative in Box 24 that when faced with the uncertainty of lack of
sufficient information and external help in developing his idea, the owner/manager took responsibility for decision-making by internalising the development of the idea to reduce the uncertainty. The analysis also suggests that depending on the technical and educational background of the owner/manager, uncertainty in itself can be a powerful motivational factor to innovate. Under this conception, firms whose owner/managers have the technical skills or relevant educational qualifications to a large extent tend to internalise uncertainty and vice versa.

An interesting finding that has emerged from the case studies is that firms that tended to 'externalise' uncertainty during the development of the innovative product such as Farmbike, faced the risk of having the 'external uncertainty and risk bearing private support organisations' taking over or stealing the innovation. Moreover, the finding suggests that not all entrepreneurs involved in the innovation process bears uncertainty by 'taking chances and shielding those who are unwilling to gamble from the effect of uncertain environment'. Hence, some innovative owner/managers externalise uncertainty and therefore 'share and lower the uncertainty' accruing to them.

Regarding the risk taking propensity, the findings of the study are similar to those of Brockhaus (1980) and indicate that the owner/managers of the case study firms developed a moderate to high risk preferences during the 'adoption' of new product idea or starting up in business to exploit the new ideas. For, example the owner/managers of Kendry and Farmbike can be categorised as having a moderate risk preference propensity regarding the adoption of the new product idea. In Kendry we find the owner/manager 'asking within the firm' and using 'spreadsheets' to
calculate if there was a potential to make a profit while at the same time externalising the development of the innovation process and providing the finance (and therefore the risk associated with the innovation). Similarly, in Farmbike, although the owner/manager externalised the risk associated with the development of the new product to a private R&D Company he still bore the risk associated with the product by providing the capital that was required and therefore undertook moderate risk. However, in Cumbria Polymers, Datalog, Spreadstar, and Northwest, we find the owner/managers having a higher risk-taking propensity by implementing the idea for the development of a new product by (1) starting up an innovative firm (Cumbria Polymers and Datalog) and (2) undertaking internal development of the innovative product by committing their own resources (Cumbria Polymers, Spreadstar, and Northwest). However, the findings suggest that owner/managers who had a higher risk-taking propensity tended to sustain their entrepreneurial abilities (Cumbria Polymers, Datalog, and Northwest) than has been suggested by Brockhaus (1980). We can conclude that the ability to bear the risk associated with innovation was dependent on the personal and sociological attributes of the owner/manager rather than the rural environment where the firm operates.

Judgmental decision-maker: The function of the entrepreneur as a judgemental decision-maker was explored in this study. Analysis of the case studies indicates that owner/managers could be classified as either 'neo-classical' (Kendry and Spreadstar) or 'Schumpeterian' decision-makers (Farmbike, Cumbria Polymers, Datalog, and Northwest). Firms whose owner/managers were classified as neo-classical decision-makers tended to follow what can be termed as a 'logical' or 'sequential' approach to the development of the innovative product resulting in the
use of spreadsheets as an aid to decision-making. For example, when the idea for the innovative product was introduced to the owner/manager of Kendry he can be described to have followed a logical approach in its development. The owner/manager explained:

**Box 25:**
We need to look at market research to see whether this system would be a good idea or trying to impose it on a market that doesn’t exist...then we were prepared to go to the next stage...I got the spreadsheet as well...hopefully I’ve got the skill to chuck away the stuff that’s not right and collect the stuff that’s important and quite often I come up with a decision. And if you’d say why did you make a decision at that time to go forward I can’t really give you specifics...it’s a gut feeling.

It is important to note that the nature of the innovation undertaken by Kendry and Spreadstar were of an incremental nature and therefore were not new to the industry. However, in the remaining firms we find that the nature of innovation had no precedent in the industry and could be termed as industry-wide requiring new ways of doing things as evidenced from innovation awards and national press recognition they have received. Hence in these firms we find that judgement was important in improving the quality of decisions that had to be taken urgently. In the entrepreneurial decision-making firms we find the owner/managers employing subjective probabilities rather than objective frequencies as suggested by Knight (1921). However, despite the difference in decision-making approaches by the owner/managers, the study did not find sufficient evidence to warrant further categorisation of decisions into high or low level of judgement as suggested by Casson (1995).
Moreover, the study found that some firms who used neo-classical judgemental decision-making approaches only ‘adapted what was previously done to the new combination’. This was clearly demonstrated in Kendry who explained that:

**Box 26:**
It does exactly what the old machine did...the same concept...the company that produced the old machine went out of business 10-15 years ago.

The narrative in Box 26 suggest that objective neo-classical judgemental decision-making was important during incremental innovation while the subjective entrepreneurial decision making was important in industry-wide innovation. Interestingly, owner/managers of firms who used objective neo-classical judgemental decision-making did not posses characteristics and work experience that were significantly different from those who used subjective Schumpeterian decision-making. Hence, rurality did not appear to influence the Schumpeterian decision-making as suggested by Casson (1982). However, the results did not provided us with enough information to assess the quality of decision-making based on the personality of the owner/manager.

**Arbitrageur:** Analysis of the case studies indicates that all owner/managers of the firms demonstrated alertness to profitable opportunities as suggested by Kirzner (1973) during the idea generation and subsequent development of the innovative products. Although the results are limited to only those products that were actually developed and therefore difficult to ascertain other ideas that had been rejected in the past resulting in missed opportunities because of mistaken perception about the environment. However, the results provide us with some information to suggest that even where past opportunities were missed, the owner/managers had learnt and were
now able to recognise new opportunities and exploit them. Moreover, the results also indicate that the development of innovative product does not entail a ‘pure’ arbitrage of buying and selling something at a price higher than that at which it was bought but rather ‘arbitrage of information’ where the owner/manager feels that he/she can act on the information to make an innovative product and thereby gain a competitive advantage. However, the narratives of the owner/managers suggest that arbitrage theory though useful does not provide us with a useful explanatory framework on why and how owner/managers act on information such as new innovative ideas to develop a product. For example, when determining the price for their innovative products, the owner/manager of Northwest explained:

**Box 27:**
So at the end of the day I can come up with a price, which is probably...within 15% of what the actual cost will be. And we submit that at the higher side because...it is easy for things to come down but incredible difficult for things to go up...a lot of people find it terribly difficult to estimate what the price will be even though you have not done the final design.

However, further analysis indicates that the majority of owner/managers (Farmbike, Cumbria Polymers, Datalog, and Northwest) proceeded with the development of the innovative products without establishing whether or not it would be profitable. For example the owner/manager of Northwest explained:

**Box 28:**
Some jobs we just did it blind, we hadn’t a clue what we are getting. Sometimes we just do it at cost. We probably didn’t make a lot of money on this particular product

This finding is closely related to that found in judgmental decision making and suggests that owner/managers who are classified as ‘subjective entrepreneurial decision-makers’ did not appear to have formally evaluate the profitability of the
'innovation information' before proceeding to develop the products and therefore did not engage in arbitrage. Hence, the arbitrage theory although useful, did not appear to provide us with a sufficient explanatory framework in understanding innovation in rural areas.

**Innovator function:** The function of the owner/manager as an innovator under the Schumpeterian conception was analysed in this study. The findings suggest that the majority of case study firms introduced products that could not be described as ‘discontinuous breaks from the past’ as discussed by Schumpeter (1934). For example the categorisation of the product developed by Kendry was classified as incremental since it was an existing product that was manufactured using a different method. However, the method of production does not qualify as ‘discontinuous break from the past’ and therefore not a ‘Schumpeterian’ innovation as described in Box 29 below.

**Box 29:**
I don’t think the actual product is necessarily innovative, but it is actually innovative how we went about it, and produced it, certainly for our industry. The way it looks is different, and that’s quite innovative...this machine was built from day one...to do a process which required easy assembly, ease of servicing and maintenance...yeah...the control panel, yeah, the touch screen...it gives you a huge amount of information but is not complicated.

Moreover, the difference between the rural innovative manufacturing case study firms and those of the Schumpeterian conception is the fact that (Cumbria Polymers, Datalog, Spreadstar, and Northwest), the owner/manager or the ‘same people who control the productive process’ are the one’s who carried out the innovation. However, because in Cumbria Polymers, Datalog, Spreadstar, and Northwest it is the
owner/managers who directed and supervised the development of the new products, they can be described as having performed the function of the 'innovator'.

Regarding how the function of the owner/manager as innovator influenced the development of the innovative product, the findings suggest that although work experience and technical qualifications has been found by Rizzello (1999) to be important in enabling the entrepreneur perform his or her innovation function especially in the development of the idea, analysis of the case studies shows that the supervision and managerial experience was also important in supervising and co-ordinating the development of the innovative product. This was particularly important in firms where the owner/manager had limited work experience and technical qualifications than other firms.

Hence, although the Schumpeterian conception of the function of the entrepreneur as innovator provides a powerful framework for understanding innovation, the case study rural manufacturing SMEs, especially owner/managers of micro- and - small firms, often involved in innovations where scale is not important and in niche markets are not likely to develop innovative products that can be classified as 'discontinuous breaks'. However, they are likely to be involved in the development of 'small-scale, industry-wide' innovations mainly in niche markets such as those found in Northwest, Cumbria Polymers, Datalog, Spreadstar, and Farmbike.

Section 6.2.3 will analyse how the attributes and characteristics of the owner/managers influenced their functions during the development of the innovative products

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6.2.2 Influence of the attributes and Characteristics of owner/managers on the innovation process

In order to understand how the attributes and functions of the owner/manager influenced their functions as during the innovation process, the study used themes identified in the literature in chapter 3 to provide the analytical framework. Table 12 provides us with the attributes of the owner/owner managers that were derived using the narratives of the owner/managers from the case study data. The study used critical incident technique to analyse the attributes and functions of the owner/managers from the case study data. In particular, the study uses critical incidences before and during the development of the innovative products to determine whether the owner/managers displayed certain personality characteristics. Hence, in the determination of the attributes the study does not use quantitative measures but focuses rather on determining their occurrence by the actions of the owner/managers during the innovation process.
Table 12 Attributes of owner/managers of independent rural innovative firms

<table>
<thead>
<tr>
<th>Classification</th>
<th>Attribute</th>
<th>Kendry</th>
<th>Farmbike</th>
<th>Cumbria Polymers</th>
<th>Datalog</th>
<th>Spreadstar</th>
<th>Northwest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trait attributes</td>
<td>Need for achievement</td>
<td>Identified</td>
<td>Not identified</td>
<td>Identified</td>
<td>Identified</td>
<td>Identified</td>
<td>Identified</td>
</tr>
<tr>
<td></td>
<td>Locus of control</td>
<td>Internal</td>
<td>External</td>
<td>Internal</td>
<td>Internal</td>
<td>Internal</td>
<td>Internal</td>
</tr>
<tr>
<td></td>
<td>Deviance</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
<td>Present</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>Sociological attributes</td>
<td>Family background</td>
<td>Business</td>
<td>Business</td>
<td>Business</td>
<td>Employed</td>
<td>Business</td>
<td>Employed</td>
</tr>
<tr>
<td></td>
<td>Technical and educational qualification</td>
<td>Secondary</td>
<td>Secondary</td>
<td>Tertiary</td>
<td>Tertiary</td>
<td>Tertiary</td>
<td>Tertiary</td>
</tr>
<tr>
<td></td>
<td>Relevant work experience</td>
<td>Moderate</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

Need for achievement:

**Box 30:**
This section will explore the need for achievement attribute by their behaviour during problem-solving situation, how they set targets and strives for these targets through their own efforts (McClelland, 1961). This approach differs from those of other similar studies that have used largely quantitative approaches that attempt to ‘measure’ locus of control using Likert Scale formats McClelland, 1961) and produces more generalised results

McClelland (1961) identified individual’s with high need for achievement as those preferring to be responsible for solving problems as well as setting goals to be reached by their own efforts. Hence, in analysing whether or not the owner/managers had a high need for achievement narratives of owner/managers in particular problem-solving situations were used. From the interview data, we find that owner/managers of Kendry, Cumbria Polymers, Datalog, Northwest and Spreadstar demonstrated a
need for achievement attribute during the design and development of the innovative product. However, the owner/manager of Farmbike cannot be described to have had a need for achievement.

The theme of need for achievement and how it influenced the innovation process was best illustrated in Cumbria Polymers. Explaining how the firm developed the product, the owner/manager stated that:

**Box 31:**
I did not want to do a business of just buying and selling stuff, although an opportunity came up...that did not appeal to me, I wanted to do something that I was involved in the creation process.

The narrative in Box 31 suggests that the owner/manager wanted to start a business that involved the ‘creation’ process with ‘reasonable return’. This suggests that the owner/manager had a need for achievement associated not with commercial exploitation of the idea and therefore increases in status, but with technical achievement of finding a solution to a problem. This observation is supported by the critical incidence where the support from the university department was not sufficient to enable the firm develop the innovative product. We find that the owner/manager did not abandon his efforts to develop his innovation but rather intensified his search for solutions.

Although the remaining case study firms (Datalog, Spreadstar, and Northwest) did not explicitly make statements that could be attributed to a need for achievement, analysis of the innovation process indicate that the owner/managers had a high need for achievement associated with technical achievement. This was demonstrated by the
fact that the owner/manager of Datalog although located in an ‘isolated’ environment explained that during the innovation process ‘...I just tried to think of different ways that it could be made to work and tried a few of them out until I found one that seemed to work’. This narrative suggests that the owner/manager had a need for achievement demonstrated by his ability to solve problems and set goals to be achieved. Similarly, we find that the owner/managers of Spreadstar and Northwest explained that:

**Box 32:**
In fact in many respects its better to be away because if you can isolate your problems cleanly and tidily...you can get a clean tidy answer. If you were close to each other there would be a lot of discussions and pointless conversations are not useful. And;
A lot of times people don’t know what they want. They’ve got an idea of what they want...sit down like we are now and will describe the problem and what their objectives are and between us we develop the specification for it.

The narratives in Box 32 above combined with that of Cumbria Polymers indicate that the owner/managers demonstrated a high need for achievement by (1) wanting to do something where one is involved in the creation process, (2) trying through own initiative to find different ways of making the innovative product (Datalog), and (3) isolating the problem and finding solutions by oneself (Spreadstar). To the owner/managers, the result suggests that need for achievement meant technical achievement rather than commercial exploitation of the innovation.

In contrast, the owner/managers of Kendry and Farmbike had interesting attributes regarding their need for achievement. In Kendry, for example, we find that the owner/manager realised his own limitations in terms of skills and qualifications and therefore sought external assistance in enabling him solve the problems of designing...
and developing the innovative product. Although this might appear to indicate a low need for achievement, the fact that he sought external assistance to remedy his own weakness suggests a high need for achievement to address a technical problem. However, in Farmbike the owner/manager sought the assistance of two private R&D companies to enable the firm design and develop the innovative product and only got involved as a last resort. Moreover, the owner/manager admitted, "...rather than redesign the way it looked, what we really wanted to do was 'copy' someone else's".

This approach to innovation suggests that the owner/manager although having the desire to solve technical problems had a low need for achievement because the firm did not seek to develop its own product but wanted to be an imitator rather than design something new. Interestingly, the owner/managers of Kendry and Farmbike are second-generation owner/managers unlike those of the other case study firms whose owner/managers had high need for achievement. Further, the owner/manager of Kendry had worked as a salesman of a larger shoe manufacturing company based locally before settling back into family business whereas the owner/manager of Farmbike only had work experience within the family business. Hence, the analysis suggests that high need for achievement associated with technical achievement can be constrained by limited relevant work experience.

However, the reason for start-up of the case study firms whose owner/managers had high need for achievement indicated that they were mainly 'pushed' suggesting that high need for achievement is not an 'innate-inborn' or a result of 'child rearing' characteristic but is socially formed through the situation one finds themselves in life and how they respond to those situations. Another finding of interest that emerges
from this analysis is that firms whose owner/managers had a high need for achievement 'internalised' the design and development of the innovative process compared to those with low need for achievement who 'externalised' the process.

Further analysis of the case studies indicated that firms that tended to use internal resources to reduce uncertainty associated with the development of the innovative product had owner/managers with a high need for achievement than those who relied on external support. This finding is important for the theory of entrepreneurship and innovation as it suggest that owner/managers of rural innovative firms with a high need for achievement characteristics will tend to use 'internal resources' to reduce the costs associated with their innovation than those with lower need for achievement.

Regarding the influence of rurality on the need for achievement motivation, the findings suggest that recent structural changes in rural areas including contraction of manufacturing sector and diminishing importance of agriculture resulting in large firms relocating and laying-off workers can act as a 'push factor' that enables would-be entrepreneurs to develop a need for achievement motivation associated with increase in status. Hence, structural changes in rural areas can facilitate the development of a need for achievement motivation, which is important for the innovation process. This suggests that a need for achievement attribute can be developed rather than being in-born.

**Locus of control:** The theme internal locus of control of owner/managers was explored. Analysis of the interview data shows that the owner/manager of Farmbike demonstrated attributes that can be categorised as having 'external locus of control'
while in the remaining firms, the owner/managers had attributes that could be
categorised as ‘internal locus of control’ (Kendry, Cumbria Polymers, Datalog,
Spreadstar, and Northwest). Using critical incidence analysis technique, the
owner/manager of Farmbike explained how he obtained the idea for the innovative
product and his motivation to design and develop it (See box 34):

Box 33:
Belief in personal control (or lack of it) is considered in this section as both a
general disposition that influences individuals’ behaviour across a wide range of
situations and a rather specific belief that may apply to a limited number of
situations (Phares, 1976). Hence, using critical incident technique, this section will
seek to understand whether owner/managers perceived they had control the
contingency between behaviour and reinforcement and when they perceive that they
lacked such control during the innovation process to develop a schema of their locus
of control profile. This approach puts greater emphasis on situational factors more
than dispositional variables.

This approach differs from those of other studies that have used largely quantitative
approaches that attempt to ‘measure’ locus of control using Likert Scale formats
(Rotter 1962) and produces more generalised results. This is because while the
scale offers the opportunity for multidimensionality, the relatively few items that
comprise the scale temper this opportunity.

The narrative in Box 34 below suggests that the firm seemed to be prompted to
innovate by external organisations rather than through own initiative. The fact that
they chanced upon a customer, had a recurrent push from their dealer shows a strong
inclination of the owner/manager towards luck, chance, fate and powerful others and
therefore an ‘external locus of control’.

Box 34:
We tried to develop the product using an outside company for with these bikes...we
then chanced on a customer... we were having a re-currently big push shortly from
our Yamaha dealers with what we've got because it is a lot better product than we
had.
In contrast, we find that the owner/managers of the remaining firms using critical incidence analysis demonstrated that:

**Box 35:**
When you are entrepreneur there are lots of things to be done and your nature is not to sit down at your desk...it is to do...to dream...to go out looking and asking (owner/manager of Kendry);

Similarly, the owner/manager of Cumbria Polymers stated that
I have had to glean all of the information together and sort it out to suit myself...virtually filtered out what I wanted to know, what I didn’t want to know and put it together.

Further, the owner/manager of Datalog stated that
I thought 'well I could make something...so I asked a little bit...got on and designed it...sought some advice

Perhaps the best illustration of locus of control was that provided by the owner/manager of Spreadstar who stated that
If you’ve got a design issue with a part of the product that keeps causing you trouble you’ve got to resolve it...quickly...and properly...to make sure that the solution you’ve got has finished the problem...no partial fix.

The analysis of the narratives above suggests that firms whose owner/managers had internal locus of control were alert to profitable opportunities leading to spontaneous learning and resulting into entrepreneurial behaviour as found by Gilad (1982).

Interestingly, firms whose owner/managers had internal locus of control also demonstrated a high need for achievement. This suggests that internal locus of control is closely associated with high need for achievement and may perhaps not be separate explanatory variables.

**Deviance:** DeVries (1977) described this theme to be mainly associated with persons who have unhappy family background, an individual feeling displaced and a misfit in his particular environment with remarkable resilience in the face of setbacks, and an ability to start all over again when disappointments and hardships come his way. This attribute can provide a useful explanatory variable in innovation, which is
essentially an iterative process with many setbacks that necessitates that the innovator ‘starts all over again’. Analysis of the case study interview data indicate that only the owner/manager of Datalog appeared to have displayed characteristics and behaviour patterns that could be considered to be “deviant”. Explaining his decision to start-up his own business, the owner/manager explained:

**Box 36:**
“I kept getting sacked from other people’s jobs so I decided that I’d do it myself...they kept closing the companies down or the departments which I was working...so I got a bit tired of that and started Datalog”.

From box 36, and considering that the study did not probe into the childhood development of the entrepreneur, the owner/manager appears to display some of the characteristics highlighted by De Vries (1977) such as a ‘loner, isolated and rather remote from his closest relatives, drifting from job to job’. This characteristic was strongly evident especially when the researcher was undertaking the case study where the owner/manager refused a face-to-face interview, preferring instead a telephone interview. This was perhaps to prevent the research from ‘intruding into his world’. Further, his responses to probe questions tended to be short and ‘remote’ as if to ‘protect him’.

Although De Vries (1977) suggested that the ‘hostile, aggressive’ actions associated with a deviant attribute can constrain the ability of the would be entrepreneur, the owner/manager of Datalog sought market information and advice during the start-up stage from potential customers. Moreover, the innovative product has received an ‘Innovation Award’ that has helped finance its development. These findings suggests that deviance attribute of the entrepreneur can be important in enabling the
entrepreneur engage in bold actions and proactive moves during the development of the innovative product. Although limited to one case, this result can help us in our understanding of how the attributes of the owner manager are important in the processes of innovation. However, the recent structural changes in rural areas resulting in large firms relocating to urban areas and diminishing role of agriculture provide 'preconditions', such as drifting from one job to another, that can trigger 'deviant' behaviour with important implications for innovation.

In conclusion, these findings support the views of Hampson (1982) that personality traits are multifaceted and is used here as a description of the behaviour of owner/managers of innovative SMEs. The multiple dimension of personality is highlighted by the owner/managers of Datalog who comes out as having an internal locus of control and a deviant characteristic. Although these two personality traits may appear to be contradictory, they both refer to a person's ability to have control over his/her situation whether it be as a result of finding solutions to a technical problem or an 'uncomfortable' situation. Furthermore, deviance theory as articulated by De Vries (1997) suggests that a deviant person is one whose actions do not derive from inner strength and self-assurance that is characteristic of a person with internal locus of control but rather from a reaction to situations out of inner insecurity. However, the evidence presented, although limited, does not support the thesis of a 'reaction out of inner insecurity' but rather a reaction to 'external insecurity' of being sacked from one job and another. This 'external insecurity' may have been beneficial in propelling the entrepreneur towards starting his innovative business. Further, although Gibb and Ritchie (1985) suggested there is little applicability of the stereotyped notion of the prospective entrepreneur as being a behavioural deviant
employee, this study found the ‘notion’ to be applicable and could have some use in understanding the behaviour of the owner/manager of Datalog electronics in the innovation process and therefore an important explanatory framework in the study of innovation which is essentially an iterative process requiring one to be resilient in the face of setbacks and when disappointment and hardships occur.

6.2.3 Sociological attributes

The sociological attributes aim to understand the relationship between one’s decision to start-up in business and the types of situations encountered or social groups to which the individual relates. Hence, this sub-section will analyse the case study interview data to find out how family backgrounds, educational background, and work experience of the owner/managers influenced the development of the innovative products.

**Family background:** The importance of family background in the decision to start-up in business and subsequently innovation was cited in four of the case study firms. Box 37 below presents the various statements that the owner/manager made that could be attributed to the influence of their family backgrounds in the decision to start-up in business.
In the entrepreneurship literature, various researchers (Blackburn and Curran, 1993; Goldthorpe, 1987; Watkins and Watkins, 1984, 1986) have identified parental influence on one’s decision to start-up in business and can help us understand the motivational factors that enabled the owner/managers start-up their businesses after identifying the innovative idea. The importance of this sociological factor is to help us understand that the innovation process is not an end in itself but a means to an end, the end being a ‘need for independence, to do something for oneself, the freedom…” These ‘end motivation’ factors enables the would-be entrepreneur and ‘practising entrepreneur’ want to do something different and hence facilitate the process of innovation.

Although family background has been found to positively influence the decision to start-up one’s business, there was no direct link between family background and the innovation process. For example, in Kendry it was apparent that “it was an affinity that John had for the owner of that company… who is older, just turned 60 and John is
in his 40's...having dealt with that company as a competitor for a long time he also admired him...he likes you to trust him...actually he makes the right decision at the end of the day it's the correct decision. However, in Cumbria Polymers it was the spouse who had an influence during the innovation process because “my wife was also a teacher which gave us some stability while starting up...and by providing the financial and emotional support that was required”.

From the results of these two cases, the findings of this study suggests that the supportive role played by the entrepreneur's family together with other positive role models are as important as family role models in the start-up but not necessarily on the innovation process. For example, without the ‘stability’ provided by the spouse of the owner/manager of Cumbria Polymers the start-up process of the firm would have been constrained. Hence, within the case study firms, the importance of family background was apparent in the start-up of firms but did not appear to provide us with an explanatory framework for understanding the processes of innovation in rural areas. However the results also supports DeVries (1981) thesis that parental nurturing can provide the owner/manager of innovative SME with the familiarity with the fact that obstacles, such as those encountered during the innovation process, have to be overcome in some way and therefore providing an ‘assuring quality’.

**Educational qualifications and technical skills:** The role played by educational qualifications and technical skills in the innovation process was found in varying degrees among the case study firms. These ranged from those with high educational and technical skills (Kendry, Datalog, Spreadstar, and Northwest) to those with limited educational and limited technical skills (Kendry and Farmbike). The firms
whose owner/managers had limited educational qualifications and limited relevant work experience explained the level of their educational and work experience.

**Box 38:**
For example, the owner of Kendry, the Chairman, began work straight from school and did not go for further education while the Managing Director “Attained a BA honours first class... in Business Management with International Finance”.

Similarly, the owner/manager of Farmbike stated that “My father has run this business for 30 years. He has been a mechanic since he was thirteen years old...only up to O’ level...personally I have never studied further, I have always worked at the firm...I went up to sixth form (A’ Level), so I am more qualified than my father”.

Considering the influence of educational and technical qualifications on the process of innovation, the owner/manager of Farmbike stated that “What we’ve done isn’t technical, we’re very basic...although it takes time to get the correct kit. Whether we could have sat down with a formula and ‘mixed’ the idea ... we certainly couldn’t, other people could.”

From Box 38, it should be noted that while the chairman of Kendry had limited educational and technical qualification, the managing director had high educational but low technical skills. This narratives suggest that during the innovation process, technical qualification is perhaps more important than educational qualification. This is more so considering that firms where the owner/managers had low technical qualification tended to access external assistance during the design and development of the innovative product.

The influence of educational and technical skills on the development of the innovative product was also explored among firms whose owner/managers had high educational and technical skills. The owner/managers of Cumbria Polymers, Datalog and Northwest explained:
Box 39:

“I was educated in Scotland...I stayed at school until I had completed my A’ level...when I went to university” and “I have a Masters degree in Electrical engineering from the University of Manchester Institute of Science and Technology (UMIST)” respectively.

Similarly, the owner/manager of Spreadstar stated that

“I got normal education right through to comprehensive education to University”

And in Northwest, the owner/manager stated that

“I never went to the University...never even thought about it. But my colleague has a BSC., MSc in control engineering from the University of London and Leeds”.

Interestingly, firms whose owner/managers had the lowest educational qualifications and technical skills were ‘second generation’ SMEs while those whose owner/managers had the highest qualifications were new start-up micro-enterprises.

Further analysis indicate that of firms where the owner/manager had university education, Datalog and Northwest have been awarded a SMART award for their innovation while Cumbria Polymers and Spreadstar have won national press recognition and Royal Agricultural Institute award respectively. The findings confirms the results of various studies (Staw, 1990; Farr and Ford, 1990; Campbell, 1960) which have shown that educational qualification and technical skills have a strong influence on the innovation process since the variety of potential solutions encountered by the owner/managers during the innovation process can be addressed by applying an individual's background knowledge and skills that enables the innovator to choose an alternative course of action. Hence rural environments often lacking in institutions that support the development of and formation of a ‘pool’ of technical skills can be seen to constrain innovation. However, the recent infrastructural development in rural areas have improved mobility and attracted
technically skilled labour from other regions with important influence on availability of skills and thereby on innovation.

**Work experience:** The theme of work experience of the owner/managers was explored in relation to its relevance in the design and development of the innovative product. From the case study interview data, we can categorise firms under (1) limited relevant work experience (Kendry, Farmbike, Spreadstar), and (2) high relevant work experience (Cumbria Polymers, Datalog, Northwest). Among firms whose owner/managers can be categorised as having limited relevant work experience:

<table>
<thead>
<tr>
<th>Box 40:</th>
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<td><strong>The owner/manager of Kendry stated that the Chairman</strong></td>
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<td>Has worked within this company for just over twenty (20) years...it was his fathers company...joined the company as a salesman and then worked up from there. However, the managing director's work experience included; Formerly in banking then a little bit in the oil industry and then with Kendry Engineering initially in a financial capacity and then in an operational capacity and now as Managing Director...in the banking (seven years, 1978- 1985) and in the oil industry for only one year...as financial analyst and then the rest of my career has been here in Kendry Engineering which I joined thirteen (13) years ago&quot;.</td>
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<tr>
<td><strong>In contrast, the owner/manager of Farmbike stated that</strong></td>
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<td>&quot;I stumbled into the firm really...after school...started off as a ‘bottle washer’...as an apprentice in 1988 doing all the rubbish jobs that no one else wants to do...went on to do workshop training and ...just internal training and a bit of off site courses...mainly in sales...my role would be general management...people like to give me their problems and I sort out customer problems and management jobs as well”.</td>
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<tr>
<td><strong>Similarly, The owner/manager of Spreadstar stated that</strong></td>
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<td>&quot;I have been in this business in different sites...since the age of fifteen...I have not been traditionally employed outside by anyone. I was employed initially as an apprentice, then right through to supervisor/works manager and then set up a new factory as managing director”.</td>
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Interestingly, the firms whose owner/managers had limited relevant work experience were family owned businesses. Moreover, the owner/managers ‘rose’ through the
ranks within the business and had limited external relevant work experiences that could enable them to design and develop the innovative product. However, although the owner/manager of Spreadstar had limited relevant external work experience, he had high educational qualification and technical experience, which enabled him internalise both the design and manufacture of the innovative product.

Firms whose owner/managers can be classified as having high relevant work experience had worked in large firms located in the case study area. The owner/managers explained their relevant work experience in Box 41 below:

**Box 41:**
The owner/manager of Cumbria Polymers stated that:  
"I got into this industry which was engineering based initially...doing project engineering to begin with, I was buying machinery and installing machinery, doing proposals and costing...working closely with sales, with marketing and all these other people are involved in producing our product. I was sort of the driving force from the engineering point of view...Then I got an opportunity to go into the production side and control the production and all the labour, the payroll problems, the discipline problem of people taking time off and the warnings, and the all the things that go with it. I found that to be a very broad based background so starting my own business was no hardship from that point of view.”

Similarly, the owner/manager of Datalog Electronics stated that he has “Worked as an electrical engineer in a small number of jobs mainly in this locality...worked for an electrical panel making company in Ulverston for two years...then worked for Vickers and successive companies to them for five years…”

Moreover, the owner/manager of Northwest stated that “I served a five-year apprenticeship with United Kingdom Atomic Energy...then joined an American company in Workington who were involved in industrial control instrumentation...stayed with them for about 18 months and then one of the contractors that they were using offered me a job...I realised it wasn’t going anywhere...so I decided to leave and joined one ...where I was the production manager, this meant ‘Jack of all trades’ in a small company...then they offered me a job as production director. My colleague...did an apprenticeship at ICI...then he went to work in America for a large company for 3 years...and decided to come back to England where he worked for Vickers at Barrow...he then persuaded another guy...to start this business which went horribly wrong within the first few months”.
The narratives in Box 41 suggest that firms headed by 'second-generation' owner/managers (Kendry, Farmbike and Spreadstar) had owner/managers whose experiences were mainly derived within the firm and firms whose owner/managers were first time start-ups had owner/managers whose experiences were derived from large firm employment. Further, firms whose owner/managers 'rose through the ranks' within the firm were small firms while those with owner/managers with experiences from large firms were micro-enterprises. Furthermore, SMEs introduced innovations that were industry-wide in terms of their innovativeness suggesting the important contribution that they can make in innovation output in rural areas. Moreover, the results suggest the role played by large firms in the study area in enabling would-be entrepreneurs to acquire and develop the necessary skills and experience through learning by doing necessary for the founding of innovative firms. Hence, whereas the recent structural changes in the study area has resulted in the closure or 'scaling down' of large firms on the one hand can lead to lack of appropriate environments for skills formation, on the other hand it can lead to the founding of small innovative firms by skilled workers who have been made redundant.

6.2.4 Conclusions:

The age and start-up of the firms indicated that the 'youngest' companies tended to be in electronics and non-agricultural sectors and were owned by in-migrants who previously worked in large firms located within the case study areas. An important finding was that the start-up of firms was due to push and pull factors. All the firms were found to be small with 1-49 employees suggesting that particular care should be
taken in the study of innovation in rural areas where small firms tend to be predominant.

All the case study firms were founded within the local area and were started in their present locations and hence were not as a result of 'in-migration' of entrepreneurs 'bringing' with them previous enterprises from urban areas but in-migrants of skilled workers into the area who later started-up their businesses in similar sectors as those of their previous employers. Moreover, the findings suggested that the decision to develop an idea into a new product by an employee of a large firm in a rural area appeared to be similar to those in areas of high agglomeration. Hence, the recent improvements in transport and communication infrastructure in the UK leading to diminishing distance has facilitated the movement of economically active and skilled labour from urban to rural areas.

There was diversity in the types of innovations that the firms were involved with some suggesting the influence of the local environment on their innovation. Further, all the innovations could be classified as product innovation contrary to the prevailing view in the innovation literature which suggests that because product innovation requires frequent interaction and therefore proximity to customers, rural SMEs are more likely to be involved in process rather than product innovation. However, although the innovations were characterised as product innovation, there were difficulties in assigning the categories and therefore supporting the views in the literature that the definition and measurement of innovation have fuzzy boundaries and practical difficulties and that some product innovations are also process innovations. Hence, the categorisation used for product innovations supports the
definition used in this study that product innovation involves the alteration of current products of the firm or rival firms, or a new product.

Regarding the level of innovativeness of the various products, the findings suggest that with the exception of Kendry, the remaining case study firms were involved in what can be termed as ‘industry-wide’ innovations. Industry-wide innovations were defined as been new to the industry/sector and/or has received an innovation award or national recognition.

The study explored the functions of the owner/managers during the innovation process. The findings suggest that the co-ordinating function can provide us with a useful conceptual framework and definition for understanding the role of the entrepreneur during the innovation process. The co-ordinating function of the owner/managers was found to vary depending on the qualification and technical skills of employees or owner/managers. Where owner/managers were not technically qualified a qualified employee undertook the co-ordinating function related to the development of the innovative product whereas where the owner/manager were qualified, the co-ordinating function was undertaken by the owner/manager. More fundamentally, the findings showed that during the innovation process, it is not necessary that the entrepreneur or owner/manager be the one who applies theory and directs execution as suggested by Say (1821 but that this function can be ‘delegated’ to the workman or employee who has the experience and skill to apply theory and execution.
Regarding the influence of the attributes of the entrepreneur on the processes of innovation, the results indicated that achievement motivation and internal locus of control among owner/managers of rural innovative firms were found to be closely associated and may not be separate explanatory variables. Hence, achievement motivation and deviant attributes (developed by the structural changes in the rural environment) were found to be important attributes of owner/managers of rural innovative firms that can have an influence on the innovation process. This finding supports the view presented in the literature that personality traits are multifaceted.

Considering the influence of the sociological attributes of the owner/managers on the innovation process, the results of the case studies did not find the influence of owner/managers family background to be important on the innovation process. Although the supportive role of the family was found to be important during the start-up process, the findings suggest that this did not necessarily influence the innovation process. Moreover, technical rather than educational qualification was found to have been important in enabling owner/managers to internalise the design and development of the innovative product and therefore had a strong influence on the innovation process. Further, owner/managers who had high educational and technical qualifications were mainly in-migrants engaged in new start-up micro-enterprises resulting from push factors from local large firms while those with low educational and technical skills were from traditional farming backgrounds.

However, the technical skills developed by the qualified in-migrants were mainly from large firms located within the case study area. This suggests that the recent structural changes in rural areas could have resulted in the formation of a pool of
technically skilled labour hence enabling such environments to develop their innovative capabilities. In conclusion, the findings presented above suggest that recent changes in rural areas of the UK, including the case study area, has produced certain ‘intended and unintended’ benefits that can facilitate the process of innovation among SMEs.
PART 2

THE PROCESSES OF INNOVATION AND EXTERNAL INNOVATION

INPUTS

The structure

The second part of the analysis and findings chapter will attempt to answer two research questions. Section 6.3 will present the analysis and findings of the research question 3, how do rural MSMEs innovate? While section 6.4 will address research question 4 regarding where and how innovative rural MSMEs derive their innovation inputs?

6.3 Research Question 3: How do rural MSMEs innovate?

This section will analyse the processes of innovation among innovative rural MSMEs by using narratives of the owner/managers, their employees and various actors within and outside the case study area who participated and contributed to the innovation process. In order to do this, the study uses themes that have emerged from the case studies following discussions with different actors, namely idea generation and the processes of innovation. The study draws conclusions in each subsection by comparing the findings to those in the literature discussed in chapter 3.

6.3.1 Idea generation:

In some of the case study firms (Kendry, Farmbike, and Spreadstar) the development of the innovative product/process was as a result of the owner/managers receiving ideas for their innovation from different sources external to the firm. For example, in Kendry, although the owner/manager had adopted different approaches for obtaining
innovative ideas such as visiting places and talking to people, the idea for its innovative product was from a consultant working in one of the plants of the company based in another county. The Managing Director of Kendry, Mrs Connolly, explained how the idea was generated:

**Box 42:**

Sometimes a bit of luck comes into it, for example with the new product someone who was working as a consultant for one of our divisions approached us, with an idea. I tried to extract from him...why what he was proposing could become better than what had been done before.

This was confirmed in a follow-up interview with an employee of Kendry who was involved in the development of the innovative product who explained that the consultant:

Brought to the attention of our chairman that there was a market niche that needed to be filled up.

Similarly, the head of Engineering Department at the University of Lancaster explained that:

They have some association with...Mr. Spear, who is a self-employed sort of technical consultant...who has spent the last 20 years or so going round the country and Europe mending these old towel cleaning machines and keeping them going. And he’s getting old...and didn’t want to do this for the rest of his life. In some conversation, I think, with John the idea came up to make a completely new toilet towel cleaning machine...”

Although the narratives in Box 42 suggests that the idea was brought to the attention of the chairman, it is important to note that it was through the ‘prodding’ of the managing director that he finally took notice of the innovation. Hence, if the engineer working with the consultant did not bring the idea to the attention of the managing director who then communicated to the chairman, the company would not have accepted the innovative product. This finding is similar to that of Julien et al. (2004) and suggests the importance of ‘gatekeepers and boundary spanners in absorbing information. In addition, the strategy that Kendry has adopted of having an ‘open door’ policy where employees have access to the chairman enabled it to receive
critical inputs including ideas for new product development. In addition, the decision whether or not to innovate was based on the owner/manager and the firm determining that there was a market for the product. Moreover, the method used to obtain the innovative idea was through ‘face-to-face’ interaction between Kendry and the source of idea and therefore emphasises the findings of Grimmie (2000). This finding highlights the role of face-to-face interaction during the idea generation stage. This is more so given the fact that at the idea generation stage, the information tends to be sticky or impacted as suggested by Carnagni (1995) and Lundvall (1992) and therefore limiting its ability to be transmitted over long distance using ICTs.

Another source that the case study firms used to generate ideas for their innovative firms was a trade representative/salesperson of a large national farm machinery sale and leasing franchise company based outside the region.

**Box 43:**
Explaining how the firm received the idea for its innovative product, the owner/manager of Farmbike explained that:

The sales manager of the Yamaha Dealership mentioned to us that gas conversion had been tried unsuccessfully in the country but the idea itself is good- the cheap running engine...so that sort of ‘latched us on’

It is important to note that prior to undertaking this innovation, Farmbike had some earlier experience in converting petrol engines to run on gas and this is what triggered the conversation with the trade representative. Hence when the idea of converting petrol engines to run on gas was introduced, it was already within their existing knowledge base as argued by Fuellhart and Glasmeier (2003) and Lawson and Lorenz (1999). Further, the decision whether or not to innovate was based on the fact that because the firm is located in the ‘middle’ of the farming area they were close to the
customers and therefore had a ‘feel’ of the market demand. This finding is similar to that of O’Gorman and Kautonen (2004) and emphasises proximity to customers to be important for product innovation. Hence, for some innovative rural MSMEs proximity to customers’ means that rural location can be an advantage rather than a disadvantage. Moreover, the findings support the views of Pavitt (1984) who explored the sectoral influences on the level and composition of firms’ innovative activity and found that technical change comes predominantly from the suppliers of equipment and that these firms conducted mostly process innovation using the product innovation of other firms. However, the findings also support the views of North and Smallbone (1996) that it is likely that in the majority of small firms the pace of technical change is slow and originates from outside the firm itself and that in firms where technological change is more important, many firms will be ‘imitators’ than ‘innovation leaders’.

Another source of ideas for the innovative products came from the inventor of the product from Australia who wanted to refine it but lacked the equipment and finance. This was illustrated in Spreadstar where the owner/manager explained that:

Box 44:
The Spreadstar equipment that we manufacture originated from Australia...then the designer...came into this country with the product...contacted me because I have some specialist equipment in this country... that came from Australia. The man...approached me because he wanted someone to make it in an efficient manner.

It is worth noting that Spreadstar received the innovation idea using face-to-face interaction with the inventor because it had certain ‘technology’ that could help the inventor further develop the product. The method used by Spreadstar to receive its
innovative idea is interesting for this study because it suggests that rural firms, despite their location, are able to derive their innovative ideas from international sources if they possess certain technological advantages. This finding is consistent with those of Varaldo and Ferrucci (1996), who found that SMEs in the Italian Industrial District have evolved networks beyond their community for external sources of learning, knowledge, and innovation. However, in Kendry and Farmbike, the ideas were from sources that the firms or owner/managers interacted with on a regular basis. Hence in Kendry, the consultant was working in one of the divisions of the company while in Farmbike the sales manager of Yamaha farm machinery dealership often visited the firm to discuss sales and service performance with the owner/manager. The results suggest both external sources of innovation knowledge as well as personal and business contact network can enable rural SMEs obtain ideas for their innovation. Hence contrary to the prevailing view in the literature that suggests that customers are the main source of innovation ideas, in Kendry and Farmbike, the ideas although coming from customers were derived from what can be termed as ‘secondary sources’ i.e. the consultant and the trade representatives. The findings suggest that innovative rural SMEs have had to rely on sources located nationally and internationally to derive the ideas for their innovative products. Hence rural location did not appear to have constrained the ability of innovative firms to obtain innovative ideas from sources located external to the study area and from those based internationally.

The remaining case study firms, Cumbria Polymers and Datalog, obtained the idea for their innovative products during previous work experience of the owner/managers in large engineering firms located within the case study area where they noticed a gap in
the market and therefore consistent with the findings of Keeble et al. (1999) and Perhankangas and Kauranen (1996).

**Box 45:**
For example, in Cumbria Polymers, the idea for the innovative product came: During my previous contracting job, I used to see dozens of men cutting metal; making boxes out of them and then insulating them around valves in submarines...I thought there should be a better way of doing this.

The narrative in Box 45 suggests that work experience in a large firm enabled the owner/manager to understand the processes and identify a gap in the process of making the valves. This supports the findings of Prajogo et al. (2004) and that large firms can play a role in the study area by providing would-be entrepreneurs with the skills and experience necessary in identifying innovative and profitable opportunities that can be exploited. Considering the decision whether or not to innovate, the owner/manager explained that:

**Box 46:**
I had been toying around with the idea at the back of my mind...and I did put a few ‘feelers’ out...and it sounded feasible and logical and I thought well, no one else is doing it...I’ll do it.

Although the finding suggests that the owner/manager went through a rational process of evaluating whether or not to innovate, the decision to innovate came when he was ‘pushed’ out of employment and had to implement his idea as a way of escaping from imminent unemployment. Further, the ‘do nothing’ option would have been more risky because of the potential danger of unemployment. Hence, this finding suggests that the circumstance under which would-be entrepreneurs find themselves prior to making a decision whether or not to innovate can help us understand why the
owner/manager decided to innovate. Similarly, in Datalog the owner/manager explained that:

**Box 47:**
I saw that there...wasn't anything in particular that would do that job...so I thought that 'well I could make something' and so I asked a little bit and confirmed what I thought so I got on and designed it.

The narrative above suggests that the generation of the idea for the innovative product within Datalog is similar to that of Cumbria Polymers where the owner/manager 'observed' or 'saw' an opportunity in the market during their work experience in a large firm. However, in order to exploit these ideas, the would-be entrepreneur had to be alert in order to 'see or observe' the current products and processes, identify their limitations in order to develop an innovative product hence highlighting the importance of the characteristics of the owner/manager in the innovation process. It is important to note that the identification of the gap in the market can strongly be linked with the ability of the owner/manager to understand what the market needed. In Datalog, the owner/manager understood the limitation of the 'current' products in counting traffic in national parks and heritage sites and decided to develop a product that would meet the market requirements.

A different process of idea generation was observed in Northwest where the owner/managers obtained the idea for the innovative product through personal contact network within the automotive industry. The owner/manager of Northwest explained that:

48 The structural adjustment that has been going on in rural areas in the UK has resulted in many large firms in rural areas, including Cumbria, relocating or closing down. This has resulted in a reduction of
Box 48:
The product idea came from the people that I know...I have established a lot of contacts with people so...you capitalise on your assets and the assets are the people that you've met...and these are the marketing opportunities. Typically we have a friend of ours who develops the product and did not know what to do with it or how to market it at all. My colleague, Mr. Kenneth, he travels about 2-3 days a week and he is forever going round not looking particularly for new people but people that we've known for many years. And they in turn come around and say 'a friend of mine down the road has got this...and has a problem'.

The narrative in Box 48 suggest that the owner/manager used his personal network with people in the same sector, but in large automotive firms based nationally, to generate new product ideas. The use of personal network with people within the automotive industry suggests that the information and ideas reflected strong market need or demand from 'strong ties'. Hence, although the owner/manager did not 'pick up the signals' from the market itself, the members of his personal network closest to the customers did. This finding suggests that personal networks can be important in enabling innovative rural SMEs obtain innovative ideas from customers located in geographically dispersed locations. This finding supports those of Pavitt (1984) who found that Large-scale production intensive firms such as motor vehicles tend to produce their own process innovations, and few product innovations whereas smaller scale mechanical and instrument engineering firms such as Northwest Ltd tend to concentrate on product innovations for use in other sectors, such as large-scale production intensive firms.

Interestingly, although the ideas from the personal contacts were communicated through information and communication technologies, one of the owner/managers

opportunities for would-be entrepreneurs to develop relevant skills.

49 The type of relationship and reasons for the owner/manager entering into the network relationship did not appear to be transactionary in nature. The reason appears to have been 'as a source of new
still travelled 2-3 days a week searching for ideas and developing its personal and business contact network. This has implications for innovation in rural areas as it suggests that the use of information and communication technologies may not be appropriate during the early stages of idea generation but once face-to-face contact has been established, the contact can be maintained by means of communication technologies as suggested by Carlson and Jacobsson (1991).

These findings suggest that although the regional innovation system and other systemic approaches to innovation discussed in Chapter 2 tend to support geographic concentration of innovation inputs, including sources of ideas, what we find is that rural innovative firms are able to derive their innovative inputs from various sources and are able to combine and decode both codified and tacit knowledge originating from multiple sources located regionally, nationally, and internationally. The use of personal networks can enable SMEs located in rural areas to obtain innovative ideas from sources that are based nationally and internationally through the use of information and communication technologies. Hence a rural location, such as Cumbria, can have relatively similar advantages as those where firms are located in close proximity to innovation inputs by accessing spatial sources of innovation. However, the findings also shows what can be termed as a paradox of innovation in the era of a much more globalised local economies whereby although information can be transmitted over long distances, knowledge is often tacit and sticky and require that firms have face-to-face interaction and frequent and repeated contacts with the sources of innovative ideas as argued by various researchers (Hippel, 1998; Frybourg, 1997; Audretsch and Feldman, 1996; Feldman, 1994).

ideas' rather than lack of essential resources such as specialist skills and research equipment (Dickson and Hadjimanolis, 1998).
It is important to note that in Kendry, Farmbike, and Spreadstar, the innovative ideas were in similar sectors to those of their current activities. Hence, although the ideas were ‘new’ to the firms, there was likelihood that the owner/managers accepted them based on the fact that they were familiar with similar products in their previous employment. Hence in Kendry and Spreadstar, the idea was for the development of better machines than those the firms were already trading. Similarly, in Farmbike the firm was already trading in petrol-run Farmbike and therefore gas conversion of these bikes was not unfamiliar because the owner/manager was already converting cars to use gas. An important question that arises from this analysis is whether the owner/managers would have selected the ideas if these were ‘radically’ different from their product ranges. It is also important to note that where the innovative ideas were generated external to the firm these did not result in products or innovations that received innovation awards or national recognition as opposed to those that were generated internal to the firm or as a result of spin-off from employment. Moreover, the analysis of the characteristics of innovative rural SMEs indicated that firms whose innovations were classified as industry-wide are received the ideas for their innovation from work experience in large firms.

**Conclusion:**

The results of the analysis has shown how rural SMEs generated ideas for their innovation by deriving the ideas from work experiences of owner/managers in large firms and a variety of sources from the external environment located both nationally and internationally (consultants, Trade representatives, Inventors, and personal network in large firms). However, this finding is interesting as it supports the view in
the literature that it is unusual to find all the knowledge and information required for
innovations within a single regional economy (Simmie, 2003).

Further, where sources of ideas were external to the firm, involving consultants and
trade representatives, the innovations tended to be of an incremental nature to the firm
and the industry. This could be because consultants or trade representatives generate
ideas mainly in areas that require improvements on the products that they deal with
based on the feedback that they derive from their customers. Hence, they are unlikely
to be looking for something new or radically different from what they know and
therefore resulting in incremental innovation. Another explanation could be that
where consultants and trade representatives introduced the idea to the firm and the
owner/managers did not have the technical skills or experience or ability to access and
use knowledge from sources external to the firm and region, their innovation tended
to be of an incremental nature. For example Kendry produced a better version of the
towel machine while Farmbike produced a gas conversion kit that was based on their
previous technological experience.

Interestingly, the introduction of industry-wide new products occurred within firms
where the sources of innovative ideas were from large firms where the
owner/managers previously worked or from personal networks in large firms. This
can be attributed to the fact that the ideas having been rejected by their supervisors or
superiors or the scale of the innovation might have been too small to warrant the
attention within the large firms. Hence, when the owner/managers were finally
'pushed' from employment, they decided to exploit the ideas. This explanation is
supported by the fact that the owner/managers did not resign from their previous
employment to exploit the 'new' ideas but were pushed. This finding suggests the importance of large firms in rural areas in providing environments where new ideas can be developed and later exploited by would-be entrepreneurs. Hence spin-off from previous employment can help us in our understanding of where and how rural innovative firms derive the idea for their innovative products and are consistent with other similar studies based in areas of high agglomeration (Keeble et al., 1999). The findings suggest that rural environment does not constrain the 'spin-off' of innovative ideas from large firms. Section 6.3.2 will analyse how the case studies firms developed the products/processes from idea generation stage to the final marketable products.

6.3.2 Development of the innovative products: In order for us to understand how the case study firms developed the innovative product/process, opinions of owner/managers, employees, and private and public support organisations were considered. Analysis of the processes of the development of the innovative products from idea generation into marketable products has been organised along two main themes that have emerged from the case studies, namely 'from idea generation to market research' and 'product/process development'.

From idea generation to market research

The case study interviews indicate that from the idea generation stage, the firms used different marketing research approaches before developing the products. This ranged from systematic to 'ad hoc' approaches in determining whether the idea would result in a profitable product. Firms that adopted systematic approaches included Kendry, Datalog and Spreadstar while the remaining firms adopted ad hoc approaches. The
narratives in Box 48 below suggest that Kendry and Datalog undertook what can be termed as ‘customer oriented’ market research of the idea before proceeding to develop the product. Although the depth of market research varied between the firms with Kendry conducting a more detailed market analysis than Datalog, they both used what can be described as a systematic approach.

**Box 49:**
To enable us understand the systematic approaches used by the firms, the chairman of Kendry explained:

The key element were really where the customers were spending money and where they were...likely to spend money, what makes money, how much would they spend, then...the spreadsheet...which then puts you into the process of putting figures of the alternatives...that begins to dictate the selling methods, the price, the market price.

Similarly, the owner/manager of Datalog explained the approach:

I thought ‘well I could make something’ and so I asked a little bit and confirmed what I thought so I got on and designed it...I mainly asked potential customers who were mainly the local authorities.

However, this was different in Spreadstar who used what can be termed as a ‘product-led’ market research by developing the product first and then determining customer acceptance for the product later.

**Box 50:**
The owner/manager of Spreadstar explained:

The first thing we did was build the product and evaluate its strength and weaknesses, evaluate whether it works properly in the field, evaluate the farmers and the contractors acceptance for the equipment...the next step was to decide ‘does anybody want this machine out there, is it needed’. To assess the demand for the product, we got in touch with a marketing company in Manchester to go to the market, identify the competition, identify what the market required and from that we decided on whether what we were proposing to do would go into the market place with success.

The narratives in Box 49 and 50 above suggest that although the approaches could be termed ‘systematic’, Kendry and Datalog used a customer or demand-led market
research while Spreadstar used a product or supply-led market research. The choice of the two approaches can be linked to the idea generation where Kendry’s idea was introduced by an experienced consultant based on customer need while Spreadstar’s was an already developed product requiring further improvement. The analysis suggests that the source and stage of development of the innovative idea had implications on the approach that the firm selected in undertaking market/product research.

Considering the influence of rurality on the approaches used by the three firms, whereas the customers of Kendry are located nationally and internationally and therefore the market research activities tended to be outside the case study area, those of Datalog (natural heritage sites) and Spreadstar (local authorities with public parks and farmers) were located close to the firms. Hence in these case study firms, rurality did not appear to have constrained the market research approach that firms adopted. Moreover, in the case of Datalog and Spreadstar, rurality appears to have provided a suitable environment for market research since most of the would-be users or customers were located locally close to the companies. Moreover, in the case of Kendry the potential national and international markets provided opportunities for economies of scale and scope for its innovation.

The remaining case study firms used what can be termed as ‘ad hoc’ product/market research, For example, in Farmbike the owner/manager explained:

**Box 51:**
Most of our customers are using the Yamaha and Japanese models...some of our customers don’t favour diesel models because they are expensive to run...so we tried to find a way of saving fuel on reliable bikes.
From Box 51, we can observe that although the approach used by the firm to understand customer needs was ad hoc, it was based on a deeper understanding of customer needs as a result of staying very close to the customers. However, unlike in Kendry where information was being collected by several divisions of the firm, Farmbike relied only on their knowledge of the customer needs gathered over the years through informal interactions. In addition, whereas Farmbike is located close to its customers who are predominantly farmers, Kendry’s customers are located nationally. This finding challenges the prevailing thinking in the innovation literature that tends to view agglomeration economies rather than rural locations as providing suitable environments including proximity to customers that provide rapid feedbacks during the processes of innovation (Malecki and Poehling, 1999; Hippel, 1998; OECD, 1993; Carlson and Jacobsson, 1991; Nelson, 1990). For example, whereas Carlson and Jacobsson (1991) suggested that proximity to customers and suppliers tend to favour agglomeration economies because constant specification and design changes make it too costly to get involved with distant customers and suppliers, we find that Kendry whose customers are based nationally was able to innovate despite their rural location relying on a combination of face-to-face contact and the use of ICTs. Similarly, although the locations of Farmbike and Spreadstar do not seem to have any semblance of an ‘agglomeration economy’ they are located close to their customers who are farmers. The findings suggest that the effect of agglomeration economies may be important in certain industries and not others as argued by Frenkel (1998) and that rurality does not appear to affect the ability of SMEs to obtain critical information from customers during the innovation process. For some innovative rural MSME, depending on the nature of innovation and the industry, what may be
important is the concentration of farmers who are their customers within a geographic space without the effect of agglomeration economy.

Similarly, in Northwest the owner/manager relied on strong customer demand to determine the viability of the innovative idea. Although the process of idea generation was different whereby Farmbike relied on a sales representative while Northwest relied on personal network to obtain information about customer demand, there were similarities in the approach used during market research, which relied mainly on 'knowledge of customer’ demand and therefore less ad hoc. Cumbria Polymers also used an ad hoc approach to market research. The owner/manager explained that:

**Box 52:**
I just got the idea and ...I did put a few feelers out at the time and it sounded feasible and logical, and I just took it from there...I thought, well, no one else is doing it, I’ll do it

From the narrative in Box 52 and the foregoing analysis, it is interesting to note that there was no relationship between the approach used to undertake market research and the innovativeness of the firms. Moreover, the push and pull factors were not found to influence the approach used in market research. Hence, although Cumbria Polymers and Datalog were ‘pushed’ into starting their businesses, Cumbria Polymers used an ad hoc approach while Datalog a systematic approach. Similarly, Farmbike, Spreadstar and Northwest who were ‘pulled’ into starting their own businesses used different market research approaches. Further analysis indicates that there was no link between the approach used in market research and the sources of innovative ideas.
Interestingly the findings also indicate that, with the exception of Datalog, firms with single-layer and hierarchical structures (Kendry and Spreadstar) used systematic approaches in their market research while those with single-owner/manager structures (Farmbike, Cumbria Polymers, and Northwest) used ad hoc approaches. This may be indicative that small firms are unlikely to be bound by the internal decision making processes found in larger firms and are therefore more likely to use ad hoc ‘gut feel’ market research approaches. Moreover, due to the small number of employees in SMEs, market research is unlikely to be a separate function from that of the owner/manager who will tend to be his own marketing specialist.

**From market research to product development:** The approaches used by the firms to develop their products from the idea generation stage can broadly be categorised as those who ‘internalised the product design and externalised manufacturing’ (Kendry and Northwest), ‘externalised design in the first instance and then internalised the final design and manufacturing’ (Farmbike and Cumbria Polymers), and ‘internalised design and manufacture’ (Datalog and Spreadstar).

**Internalised design and externalised manufacturing of product:**

To provide us with an insight on how the product was developed in Kendry an employee, Mr. Marcus who was involved in the development of the innovative product, and the Head of Engineering Department at Lancaster University explained in Box 53:
Box 53:

I worked with the maintenance engineer because I did not have the experience...at all...I started absolutely from scratch...but this guy served as a consultant to guide me through some of the processes...then he left. There are three other people who joined the project. Sometimes I consulted with people outside the company mainly on...the area of different arrangements of the pneumatics system or the...control or the pump system...all those areas I didn't have any experience...these people would advice me what to get, what to do.

However, the head of Engineering Department at the University of Lancaster explained:

What happened then was that the process expertise of the 'elderly expert' was put together with the computer aided engineering knowledge of Marcus with a bit of help from me and it formed this 'synergetic relationship'. So Marcus was then able to design with some help on the process side. And because of using 3-D computer aided engineering design, he was able to get this machine from concept to prototype in 8 months whereas previously the company would have done it in 18 months...basically it was Marcus but then involving all the design engineers within the company in using these techniques.

During the development of the innovative product within Kendry, whereas the chairman and the managing director managed the idea generation stage, an engineering graduate employee (Mr. Marcus) was specially recruited through a government grant to co-ordinate the actual design and development of product internally. Although the narrative in Box 53 broadly support the views of O’Gorman and Kautonen (2004) that investments in generating new graduates only supply ‘raw recruits’ and that it is industry specific knowledge and experience that is most valued by firms, the technical educational skills of the new graduate was valuable during the design of the product/process.
Figure 7 above presents the processes of innovation within Kendry. From the narratives of the various actors involved in the innovation process and discussed earlier in this chapter, figure 7 shows that the idea was generated by a consultant who
was working in one of the plants owned by the company who had an affinity for Kendry and wanted to see the successful design of the product. He shared his ideas with an employee of the company who then informed the owner/manager about the innovative idea. The owner/manager subsequently mobilised the resources required to successfully execute the development of the product. This included undertaking market research, identifying and recruiting skilled staff, facilitating the use of relevant business contacts to provide technical advice to the employees, and outsourcing the manufacture of the product to a private R&D facility. The role played by the owner/managers during the innovation process supports the views of (Barron and Harrington, 1981; Cambell, 1960) that an individual’s background knowledge and skills that are necessary for choosing the variety of potential solutions during the innovation process requires factual knowledge, at least moderate intelligence, and specific knowledge of the field in which the problem occurs.

In addition, within this case study the employees played an important role and were at the centre of the innovation process including draughtsmen and a skilled employee. The involvement of employees was important because of the technical nature of the innovation and considering that the owner/managers were not technically skilled. However, this did not reduce the role of the owner/managers as they were aware of and appreciated the technical expertise required and therefore recruited a specialist employee to ‘champion’ the design of the product. It is important to note that the ‘specialist employee’ was recruited through a public support grant (Teaching Company Scheme). The head of engineering at Lancaster University explained:

**Box 54:**
In the TCS there are what we call ‘associates’ and they are paid the same sort of salary as a graduate with a number of years experience. The university employs them but for all practical purposes they look like company employees because that’s where they spend their time.
The important role played by the graduate employee supports the arguments of Schoenberger (1989) that the more specialised and skilled the demand for labour, the more constrained is the potential location choices for the firm with production likely to remain in regions of high agglomeration or supportive milieu. However, the results also show that rural innovative SMEs are able to obtain innovation inputs despite their location and therefore rurality did not appear to constrain innovation. Furthermore, the ‘consultant’ played a critical role in the early stages of product design when the employee, and perhaps the company, did not know how to proceed with the development of the innovative product. After the product had been designed, the company sought the assistance of a private R&D Company to help in its manufacture. The owner/manager of the private R&D Company based in Morecambe near Lancaster City described their involvement:

**Box 55:**

We did not provide them with ideas as to how they could make things work...their people sketched the idea and gave us the basic fundamentals of what they are trying to achieve from the machine...but they are leaving the manufacture for us...the assistance that we gave them was basically to try to educate their design people into manufacturing methods.

The narrative in Box 55 suggests that the role of the ‘innovation team’ at Kendry included providing sketches for the idea and the basic fundamentals of the product and then taking this to the manufacturer to finish its development. This clearly shows the importance of some form of internal R&D capacity as argued by Oakey et al. (1988). Hence, by externalising the manufacture, the firm is likely to have reduced its overall investment, including costly equipment. Hence, the technological variable that appears to have influenced the firm to use its personal network with the R&D
Company is the product development and design. The analysis indicates that the type of product development and design that was found in this network relationship was the design-approved type (manufacture according to specifications approved by the customer). Interestingly, to minimise the risks associated with this type of relationship such as extent of information and uncertainty over performance, potential loss of propriety knowledge, and the extent of bargaining power, the firm had to rely on the R&D Company that it had long relationship with hence the perceived likelihood of gaining further work for their assistance. Further, the findings suggest that the firm searched for new co-operative methods of producing components that required high skills and innovative efforts.

The findings also suggest that because the firm managed to attract a qualified employee to help design the innovative product, used its ‘strong tie’ business network with firms based outside the study area to further refine and manufacture the product is indicative that rural innovative SMEs are able to adapt and adjust to their local environment as argued by Smallbone et al. (1999) by using innovation inputs from outside the study area. Although the private R&D firm was located in Morecambe Bay, Lancashire, which is approximately 2 hours drive from Kendal this did not appear to have constrained innovation because of the use of ICT to support the face-to-face interaction and good physical infrastructure (M6) that made face-to-face meetings easy. It is important to note that by using the regionally based R&D Company, Kendry also avoided costly investment in plant and equipment that would have been required to manufacture the product. This was explained by the owner/manager of the R&D Company:

Asanuma (1989) argued that the from the suppliers perspective, the willingness to help their customer with improvement ideas will be influenced by the perceived likelihood of gaining further
Box 56:

They are leaving the method of manufacture for us to put forward on the basis that they have invested all their money into the product development, market research, and assembly. We don’t have any of those costs but we do have very high costs of plant and machinery.

Moreover, the firm used a government grant to help finance the recruitment of a technically skilled employee, which is indicative of available local public support for innovative MSMEs in the study area. However, despite the availability of public and private support institutions in the study area and regionally, innovative MSMEs can still face difficulties in attracting qualified technically skilled and qualified labour as discussed in Chapter 4. Further, the use of qualified staff, consultant, private R&D Company, and a public support organisation, though indicative of the existence of some form of systemic factors to innovation as presented by Storper (1995) innovative MSMEs in rural areas were able to develop their innovative products using innovative inputs from local, regional, and national sources. More importantly, the finding also supports the views of Kaufmanns and Todtling (2000) and Gregersen and Johnson (1997) that innovation is carried out interactively between firms and knowledge suppliers and that it is supported by policy institutions. Although this interaction has been associated more with agglomeration economies, the findings of this study shows that rural environments did not constrain the ability of firms to interact with various support organisations during the processes of innovation. Similarly in Northwest, we find that the firm after obtaining the idea from an external source designed the product internally but externalised its manufacture. This work in return for their assistance as well as design input asked for.
approach can be attributed to the strategy adopted by the firm in specialising in design
and sub-contracting the manufacturing process.

Box 57:
The owner/manager explained how the product was designed and manufactured:
That is typical documentation for a new product (he shows me a copy of an
e-mail)...now that is a customer’s specification...now having got that...a lot
of times people don’t know what they want...they’ve got an idea of what
they want...then we sit down and describe the problem and what their
objectives are and between us we develop the specification for it...our man
Kenneth who lives a few miles from here will absorb it all, he’ll probably
spend a week on it and he will come back with a block diagram design and
against that we will quote a development fee...that fee will enable us
develop both the hardware and the software...the samples so that having
agreed the proposal with the customer, all the questions and all the doubts
have been answered, and he then gives an order. Once we’ve got the
order...Kenneth will go back to his block design and make it work...I will
then organise sufficient parts for him to build the prototypes.

The processes of innovation described in Box 57 above have been illustrated in figure
8 overleaf. The idea for the innovative product based on market/customer need was
obtained through a ‘strong-tie’ personal network that had long standing relationship
with the owner/managers of Northwest. Members of the personal network provided
regular innovative ideas to Northwest because of their skill and experience in
electronic design and development. After obtaining the idea for the innovative
product, the owner/managers undertook the design of the innovative product
including mobilisation of the necessary resources that was required to execute its
development and manufacture. Moreover, unlike in Kendry where employees assisted
by the consultant and technical advice from the personal network undertook the
design and development, the design and development of the innovative product was
undertaken by the owner/managers.
It is important to note that this approach was possible because of the technical skills of the owner/managers of Northwest. This finding suggests that educational qualifications and work experience of the owner/managers are important as suggested in the entrepreneurship literature (Rizzello, 1999; West and Farr, 1990; Farr and Ford, 1990; Staw, 1990) in enabling rural SMEs undertake successful performance of the innovation process as it contributes to the reservoir of knowledge from which one can draw alternative solutions.

Figure 8 (The process of innovation in Northwest Ltd.)
The firm designed a prototype, which they sent to the customer through courier services and supported by information communication for assessment. This iterative process, similar to those argued by Abrunhosa (2003) and Deakins and Freel (2003), continued until the correct design had been achieved. This approach supports the arguments of Powell (1990) that due to strong competitive pressures firms will search for new co-operative methods of producing components that require high skills and innovative efforts while externalising the production of highly standardised components.

After the product had been designed, the actual manufacturing was sub-contracted to a local firm, which is located 2 miles away from Northwest. During the initial stages of manufacture, the owner/manager of Northwest held face-to-face discussions on the method of manufacture and what they expected from the sub-contractor. Again, the process was iterative with feedback being provided until the finished product was delivered. The use of a local sub-contractor is interesting for this study as it suggest that rural environments are not totally deficient of the factors that are favourable to innovation that has mostly been associated with agglomeration economies as suggested in the literature (North and Smallbone, 2000; Porter and Solvell, 1998; Lundvall, 1992) but that the scale may be limited. Hence, if we broaden our understanding from the traditional concepts and analytical categories that defined rurality as 'thinly-populated space which derives its economic and social structure from agriculture and traditional industries such as mining and distance from cities (Ilbery, 1998; Smallbone et al., 1997; Cloke, 1977; Cloke and Edwards, 1986) to a more recent rural reality that takes into consideration the influence of Information and Communication Technologies (ICTs), the marked improvement in rural infrastructure,
accessibility of rural areas and the spread of information then the absence of a local sub-contractor may not constrain innovation as rural SMEs are likely to develop personal and business networks beyond their immediate environments to obtain inputs from sub-contractors that are located across geographic space as was seen in Kendry and Farmbike.

Analysis of the case study firms indicate that whereas in Kendry the product that was designed and developed belonged to the firm, in Northwest the product belonged to the customer and the firm only acted as a product designer and developer. Moreover, the input of the customer was critical during the design of the product in Northwest than was the case in the other firms. The involvement of the customer in the design of the product suggests that the owner/managers of Northwest participated in a ‘buyer-supplier’ network as argued by Sayer and Walker (1992). Further, analysis of the case study indicates that whereas in Kendry the ‘specialist’ employee did not have the experience and know-how of the innovative idea but was skilled and had to rely initially to a great extent on the consultant, the owner/managers of Northwest had the experience, skills and knowledge of the product and designed it themselves due to their technical, educational, and work experience.

Another observation regarding the processes of designing the products within the two firms is that in Northwest we find iteration occurring during product development whereas in Kendry, the feedback from customers was only during the idea generation stage. Interestingly, this iteration between Northwest and the customer occurred mainly through the use of information and communication technologies despite the geographic location of the firm away from its customers. This finding suggests that
although the ability of innovative firms to access ‘sticky’ or ‘impacted’ information has been thought to be constrained by geographic distance (Nelson, 1990), the findings support the views of Romano (1999) and Davelar and Nijkamp (1997) that use of Information and Communication Technologies can help rural SMEs innovate despite their perceived locational disadvantages.

The findings also suggest that the strategies adopted by the two firms of internalising the design and externalising the manufacture of their innovative products were as a result of unique characteristics and externalities specific to them. Hence we find that Kendry internalised the design due to available external support through a government grant and consultant while Northwest due to available internal expertise and a deliberate strategy to outsource manufacturing. Hence rurality did not appear to constrain innovation since the two firms adopted strategies that were unique to their characteristics and externalities suggesting a process of adjustment or adaptation as argued by Smallbone et al. (1999).

**Externalised design and internalised manufacturing:**

In the case of Farmbike and Cumbria Polymers we find that although the firms used different approaches during the idea generation stage, they sought the assistance of external organisations to help develop the idea into a marketable product, two private R&D Companies and a university research department respectively, and then subsequently designed and developed the products on their own. The processes of innovation is described in Box 58 and presented in figure 9 overleaf.
Box 58:
The owner/manager of Farmbike explained:

So we set off to develop the product using an outside research and development company (R&D), however, after they developed the initial product, they faltered and didn’t work correctly. So we decided to develop the product ourselves and got some advice from a different company to finish it off...the technical drawings were done between my father and myself...based on what the private R&D Company had done. The technical guy there was ‘ready and happy to help us’...so we got some pointers off him on what he thought...needed finishing. Although we had limited or no knowledge in gas conversion, we had experience in repair work and the time required for developing the product. So we knew in our minds what we needed to do...then we looked at why it was not satisfactory...we pointed to a part of the gas mixer, a restrictor in the intake pipe. So we invested in a little fluid dynamics book and it was just ‘copying’ all the mixer designs but scaling them down to suit our engine needs. So we put the ‘new gas mixer’ in, tried it, and know in a minute if it is better or worse. The bit that mixes the gas we fabricated in-house because we could ‘tinker’ with one, modify it, and try another one rather than waiting weeks...as was the case with the private R&D company.

Hence, within this case study, the original idea for the innovative product was provided by the sales representative of a multinational Company dealing with the sale and lease of farm machinery through its franchised dealers such as Farmbike. However, the sales representative’s ability to provide the idea for the innovative product is likely to have been motivated by his regular interaction with the market and customers based locally, regionally, and nationally. From the analysis of the case study and the researchers interaction with the owner/manager, the decision whether or not to accept the idea for the innovative product was based on the fact that the firm is located right in the middle of its customers who are the farmers and therefore the owner/manager had sufficient knowledge of potential customer acceptance of the product.
After receiving the idea for the innovative product, the owner/manager contacted a regionally based R&D Company, located in Manchester, who provide the technical expertise that was required to design the product. However, the product development was not successful partly because the R&D Company was not interested due to the small quantity required. Farmbike then decided to try another private R&D Company
that was located 1 hour away in Lancaster. The product was then successfully
developed and manufactured but the quantities were too small and the R&D Company
was not interested in further development because they could not see a return. It is at
this juncture that Farmbike decided to develop the product on its own through a
process of ‘tinkering’. The marketing was done through a chanced meeting with a
customer who wanted 32 bikes converted and by word-of-mouth.

Although the failure to design the product by the private R&D Company located in
Manchester can be viewed to be indicative of the locational disadvantage, unlike
Kendry and Northwest the firm did not use ICT to support its communication but
preferred to physically travel to the source of innovation input. Hence, failure by the
R&D Company to help Farmbike design the product cannot wholly be attributed to
locational disadvantages but due to commercial considerations. This implies that
rurality per se did not constrain the development of the innovative product. However,
the findings suggest that although SMEs generally have difficulties in attracting
qualified employees and often have to rely on external sources, some form of internal
R&D capacity is essential for the development of innovative products/processes.

Further analysis indicate that unlike in Kendry, externalising the initial process of
product development may have provided the firm with an opportunity to ‘learn-by-
observing’ that could have helped it during the subsequent development of the
product. Although this meant that the firm ‘tinkered’ with the development, it
resulted in a marketable product and developed the ability of the owner/manager
through a combination of learning by observing and learning by doing which was
important for subsequent product development. This finding suggests that without
substantial task knowledge, the choice of potential solutions during the innovation process would largely be arbitrary resembling blind trial and error as argued by Staw (1990). Furthermore, due to its employment size and the scale of the innovation, it is unlikely that the firm had the resources to hire the services of a qualified technical employee with the resultant cost of establishing a full R&D unit to help develop the product. Another finding is that during the design of the product, the firm was 'copying' other people's designs but modifying them to suit farm bikes. However, it is important to note that the firm had the 'experience in repair work and the time' required to develop the product. This was crucial in the development of the product because the private R&D Companies lacked the time and incentive due to the small quantity of product that was being developed. This finding supports those of Keeble (1994) and Storey (1994) that small firms may be at an advantage in developing small scale innovation for niche markets that may be ignored by larger firms and require low technical skills to develop.

Moreover, the result of the case study also indicated that reliance on private R&D companies in product development had its disadvantages and risks.

**Box 59:**
The owner/manager of Farmbike explained:
The method of mixing the gas was a poor mix in the design...they couldn't cope, they didn't have the time or the expertise to finish it off...they were also far away, we were travelling 2 hours to pick a bike...

Although the firm indicated that the design of the initial product by the private R&D Company was 'poor', without this initial development the firm would have been unlikely to develop the product. The narrative in Box 59 indicates that distance between the firm and the R&D Company could have been a contributing factor to
some of the difficulties in the design. This finding is particularly interesting for our study because on the one hand it shows that rurality could have influenced the processes of innovation in this firm while on the other hand it suggests that it is not rurality, and more particularly distance, per se that has an influence on the innovation process but rather the strategy that the firm adopted and the nature of innovation.

Similarly in Cumbria Polymers the firm began the process of developing the innovative product by contacting a research department of a regional university. This initial enquiry was to enable the owner/manager differentiate the innovative product from those offered by the competitors by obtaining all the latest research developments using the university database. The owner/manager, Mr. Rodgers, explained:

**Box 60:**
I thought, well if I’ve got a sort of research guy investigate it and reformulate it...I talked to the University of Lancaster for a while...but I think when I started talking... it fell by the wayside but it was interesting because they did a search for me on their computer on polythene’s and all the papers that have been published...they did a lot of work...they gave me these wads of papers...but there was not enough information...for me to go into what we were trying...then another wad of papers came along and I thought ‘oh, that is interesting someone is trying to do that’. The more people I spoke to that I thought were experts the more I realised that they were not. Therefore, I have had to learn and develop things myself really to suit our requirements...I have had to glean all of the information...sort it out to suit myself...virtually filtered out what I wanted to know, what I didn’t want to know and put it together. We’ve done a lot of things wrong, but done it right the second time...

The narrative in Box 60 supports the views presented by Fuellhart and Glasmeier (2003) that information from universities are unlikely to be tacit and therefore can be accessed by anyone who knows where to look and who has the resources to obtain it. Figure 10 shows the processes of innovation in Cumbria Polymers.
Figure 10 (The process of innovation in Cumbria Polymers Ltd.)

Figure 10 shows that the original idea for the innovative product was developed by the owner/manager during his work experience in a local large engineering company by observing the processes that were used in moulding and analysing the customer needs.
needs. After developing the idea for the innovative product the owner/manager recognised his limitations and sought assistance from a university research department based in Lancaster to undertake desktop research on his behalf and help design the product. However after conducting desktop research, which was informative to the owner/manager, the research department was not interested in undertaking the design. The finding supports the views in the literature (Shefer and Frenkel, 1998; Enright, 1998; Grefsheim et al., 1991), which suggests the importance of research departments of universities in the innovation process. It should be noted that the role played by the research department of a university in this particular case study firm should not be conflated to imply that rural innovative SMEs without access to such departments could be at a disadvantage as suggested by Harrison (1997). Rather, this can be interpreted to mean that in certain industries, the nature and complexity of innovation, requires that innovative SMEs should have access to research materials and databases.

This finding also supports the view in the literature (Toddling, 1990) that some universities have an ‘ivory tower’ mentality with little interest to co-operate with SMEs. The head of engineering department at the university of Lancaster supported this observation by stating that:

**Box 61**

Until fairly recently Lancaster University was not particularly interested in SMEs in this region. However, there is significant and progressive cultural change taking place...but it is a very recent development.

Further analysis of the case study shows that unlike in Kendry where a specialist employee was recruited to supervise and facilitate the development of the innovative product, the approach used by the firm was similar to that of Farmbike where the
initial design of the product was ‘outsourced’ to a public R&D Company, in this case a university research department. Although the owner/manager stated that this initial development ‘fell by the wayside’, the information that the University research department provided enabled the firm understand the technical details of the innovation that the owner/manager used for subsequent development of the product.

The owner/manager then undertook the design and development of the product using what can be termed as a ‘trial and error approach’ using his knowledge and skills but also seeking technical advice from his ‘strong-tie’ and ‘weak tie’ personal/business networks and suppliers. The public support organisations including the Rural Development Commission and the local Farmers Link provided office space and equipment grants respectively during the start-up phase. This finding in interesting since other studies suggests that rural areas have only a small number of potential collaborating firms locally as well as sparsely distributed research and development facilities, educational institutions, and business support providers (North and Smallbone, 2000; Smallbone and North, 1999). This study argues that the observed sparcity of support organisation could be a reflection of the sparcity of SMEs more than a characteristic of the support environment in rural areas.

Since the owner/manager lacked the technical know-how of the product, we find here another case similar to that of Farmbike of ‘tinkering’ with the innovation resulting in difficulties in the development of the product. We can infer from this case study firm that lack of technical expertise on the innovative product resulted in the firm being ‘outward orientated’ during the initial design of the innovative product. Although the owner/manager stated that the employees were not involved in the development of the
innovative products, a follow-up interview with one employee revealed that they provided important inputs during the design of the product. This included suggestion on how certain shapes could be achieved within constraints that the firm was operating.

An interesting finding from the analysis of the innovation process in the two firms is the ‘tinkering’ and ‘learning’. Hence we find the two firms externalising the initial design of the idea into a product to enable them learn as they had limited experience and expertise in the products. Contrasting the two firms with Kendry and Northwest where the firm employed a qualified staff and had expertise respectively, we find that Farmbike and Cumbria Polymers did not posses these important inputs that could have facilitated internalisation of the design of innovative product. The findings also demonstrates that because of the sparcity of networking opportunities and available qualified labour, owner/managers of rural SMEs can ameliorate some of their locational advantages through the use of their own ‘embodied’ knowledge and skills through ‘spin-offs’ from large firms to start-up their own businesses as argued by Keeble et al. (1999). Hence, rather than the innovative behaviour of SMEs been dependent on favourable variables that are related to the local or regional milieu as suggested by Maillat et al. (1994), we find that the sparcity of rural support infrastructure meant that SMEs had to use their own unique competencies and capabilities to innovate.
Internalised design and manufacturing:

The last category is that of Datalog and Spreadstar who internalised both the design and manufacture of the innovative product. To help us understand how the product was designed and developed, the owner/manager of Datalog explained:

**Box 62:**
It uses modern materials on an old principle...well I just tried to think of different ways that it could be made to work and tried a few of them out until I found one that seemed to work...I just thought of things for myself. After I got the thing working, I got a potential customer who was interested to come around and give me an opinion on how he wanted it to work and how it would look and how he would use it...the invention has been taken to prototype stage and the technology has been shown to work.

When asked whether he sought any advice during the design and development of the innovative product, the owner/manager explained:

**Box 63:**
The engineering one...if you’ve got engineering background you just apply that experience...but sometimes I sought advice...I spoke to people I know who are in engineering...there is also a great deal of ‘stuff’, if you are in electrical engineering, in the internet...I also got information from trade magazines which have technical articles in them.

The narratives in Box 62 and Box 63 are presented in Figure 11 to help us understand the processes of innovation within Datalog.
Figure 11 (The process of innovation in Datalog Ltd.)

It can be observed that the initial process of idea generation for the innovative product was during the work experience of the owner/manager when he ‘noticed a gap’ in the market for the electronic data-logger for monitoring traffic in national parks and heritage sites based within the study area. We can infer from the case study data that because the owner/manager worked in a large firm located in the case study area, his ability to notice the gap was based on the fact that he interacted with the customers who were mainly large national parks and environmental agencies located locally.
This finding is similar to that of Farmbike where rural environment was found to provide the customer base that was relevant to the particular innovation.

Subsequently he set about designing and developing the innovative product by applying and receiving an innovation award from the National Endowment for Scientific and Technological Advancement (NESTA), a national based organisation that works with local public support organisations. Moreover, the owner/manager used his experience and skills to develop the product with technical and financial assistance provided by the public support organisation.

Considering that this was a ‘new’ product, which has won an innovation award from a national organisation, the results suggests that the reason why the firm internalised the design was because the owner/manager was technically skilled to design the product. This is confirmed by the fact that the owner/manager mainly used his ‘own experience’, ‘personal network’, the Internet and trade magazines to address engineering problems. Although the component suppliers who were based locally and nationally provided components that were required, there were no indications that they provided technical support. This finding is similar to those of Cumbria Polymer, Northwest, and Spreadstar who used the technical and educational qualifications and work experiences of the owner/managers to develop their innovative products.

Interestingly, due to national and local public support that the firm received it was able to access private technical support within the local environment. These were mainly from technical experts that were paid by the public innovation award organisation. This finding is important because it suggests that there is available local
private technical support but that innovative firms may be constrained by limited resources in accessing them or may be unaware of their existence. Hence, the innovation award that Datalog received from the national public support organisation enabled the firm to access local technical support, which contributed significantly to its innovativeness.

Another firm that internalised the design and manufacture of its innovative product was Spreadstar. In this case study firm, the idea had already been designed but was 'rough'. Hence the firm did not go through the process that the other five case study firms used but only enhanced or improved the existing design using more advanced manufacturing methods. The owner/manager explained the development of the innovative product:

**Box 64:**
The Spreadstar equipment that we manufacture originated from Australia...from farm equipment...then the designer ...decided that he was going to take it to the rest of the world. He came into this country with the product, which at that time was extremely rough built, rough quality, but the design idea was quite good...we got hold of the design idea...and then perfected the design ...the first thing we did was build the product and evaluate its strength and weakness, evaluate whether it works properly in the field, evaluate the farmers and the contractors acceptance for the equipment and then develop all the positive points to get rid of all the negatives...we then developed it into different environments that the equipment was going into...using the same basic core piece of equipment. So that's how we started to prove the product in the field...then we went into trials...sent it out to various customers for utilisation to see what they think. If you've got the prototype right, the trial part gets very quick...its just a question of checking the strengths of the component, suitability of material etc.

The narrative in Box 64 is presented in Figure 12 to help us understand the processes of innovation within Spreadstar. Hence within this firm we find that after the inventor of the product had introduced the idea to the firm based on customer needs outside the
local environment, the owner/manager embarked on improving the original design using more advanced manufacturing methods.

Figure 12 (The process of innovation in Spreadstar Ltd.)

The firm then went about testing customer acceptance among the local farmers and contractors to determine market response to the product. Subsequently, the prototype of the product was developed and sent to various customers for further testing from where it was developed for different environments. The finding is similar to that of
O’Gorman and Kautonen (2004) that there are local customers in rural areas who are willing to pioneer new products. This process was similar to that in Datalog and Farmbike where the firm did not engage in a formal market research during the idea stage but had a more intense interaction with the customers during the design and development of the product.

Moreover, the owner/manager used his technical skills and engineering experience to design the innovative product. This was particularly important when comparing Spreadstar’s employment size (45) with that of Datalog (1) suggesting that technical skills and experience of the owner/manager rather than size of the firm can play an important role during the innovation process especially in rural environments.

6.3.3 Conclusions:

The findings from the case studies have provided us with important insights into how rural SMEs innovate. The results have shown that firms received the ideas for their innovative products from various sources both within the study area as well as nationally and internationally. These included (1) Consultants, (2) Sales representatives, (3) owner/managers, (4) inventor, and (5) contact network. Where the idea was from owner/managers, these were derived during their work experience in large firms based locally. This finding suggests that large firms in rural areas can enable would-be founders of rural innovative firms to develop their skills and experience that can result in ‘spin-off’ of ideas. Further, those firms whose innovations were classified as industry-wide were those who derived their innovative ideas during their work experience in large firms as suggested by Keeble et al. (1999). Hence, the recent structural adjustments in rural areas in the UK including the study
area resulting in reduction and relocation of large firms can reduce local opportunities for generation of innovative ideas and start-up of innovative SMEs. The implication is that to remain innovative, rural SMEs will have to rely more on a few large firms based locally and increasingly on sources based outside the study area for innovative ideas. Although this may appear to put such firms at a disadvantage, this 'outward-orientation' can enable them to tap into dynamic agglomeration sources of innovation with the resultant effect of increasing their innovativeness.

Where ideas were generated from sources outside the study area, these tended to be based on face-to-face interaction and also certain comparative advantages that the firms possessed including ownership of specialised technologies (Spreadstar), previous experience in similar innovations (Farmbike), and specialised skills of the owner/managers (Northwest). Hence, the findings support the views of Varaldo and Ferrucci (1996) that rurality did not appear to constrain the ability of SMEs to obtain innovative ideas from sources based outside the study area if they possessed certain technological and skills advantages. Moreover, in terms of sectoral dimension, the finding in Northwest are similar to those of Pavitt (1984) and suggests that smaller scale mechanical and instrument engineering firms tend to concentrate on product innovations for use in other sectors such as large-scale production intensive firms. The use of ICTs during idea generation stage was found to constrain innovation since owner/managers expressed that face-to-face interaction was important during the early stages of idea generation but once this is established, the contact can be maintained using ICTs.
The approaches used by firms during product development could be categorised as (1) internalised design and externalised manufacturing, (2) externalised design and internalised manufacturing, and (3) internalised design and manufacturing. Firms who internalised design and externalised manufacturing were found to either possess or to have acquired experienced and skilled employees or had qualified owner/managers. However, firms who internalised design and manufacturing were found to have experienced and highly qualified owner/managers and employees who facilitated the design and development of the innovative product with limited external assistance but in some cases relied on personal network. These findings support the view in the literature on innovation, which suggests that innovation often requires specialised personnel (Hippel, 1998). Moreover, although analysis of the study area in chapter 4 indicated that there is a shortage of skilled labour in Cumbria, the presence of large firms has attracted ‘skilled’ workers from outside the county as evidenced in Cumbria Polymers and Datalog. Further, employee lay-off from such firms as a result of structural changes can help provide technically qualified would-be entrepreneurs in the local economy. Hence, the approaches developed by the firms in the design and development of the innovative products can be termed as being as a result of a proactive strategy of ‘adjustment’ to the environment by either internalising the design by acquiring technically qualified employees using public support or externalising the design and manufacture of the innovative products through the use of private R&D facilities.

Further, firms who internalised the design and externalised the manufacturing had different experiences during the idea generation stage. Kendry received support from its contact network during the idea generation stage while Northwest did not receive
external support during the idea generation stage. It is important to note that the personal network was not comprised of a formal contractual arrangements or alliances as argued by Penrose (1995) but rather had a general pattern of interaction where sanctions were typically normative and tended to create 'indebtedness' and reliance over the long term (Powell, 1990). However, firms who internalised the design and manufacture (with the exception of Spreadstar) received external support during the idea generation stage. Further, firms that externalised the design and manufacture received external support during the idea generation stage, market research and product development. These findings suggest that the strategy adopted by the firm in developing the innovative idea was dependent on the internal capacity and technical skills available within the firm. Where the firm had internal capacity and technical skills to develop the product, the design and manufacture was undertaken internally and vice-versa. Hence, although firms in rural and peripheral areas may encounter greater environmental constraints than their counterparts in core regions, these constrains may in fact stimulate greater pro-active entrepreneurial behaviour (Vaessen and Keeble, 1995).

Moreover, the information required during idea generation, design and development of the innovative products were of a 'tacit' nature requiring face-to-face interaction during the initial stages. This necessitated that owner/managers or employees in charge of product development travel to sources of information. Interestingly, innovative firms did not relocated their problem solving to the locations with sticky information as suggested by Hippel (1998) but rather they tended to access the information by travelling to the source of information, using information and communication technology, and by exploiting their business relationships as argued.
by Dickson and Hadjimanolis (1998). In addition, the information received was not through labour market as proposed by Hudson (1999) and Nonaka and Takeuchi (1998) as was the case in Kendry but rather through exploiting their business and contact network located outside the study area. Moreover, the contact network between colleagues from previous work experience was found to be more important than from research institutions during the development of the products.

Firms also utilised private R&D facilities during the development of the innovative product. However, because these were located outside the study area in Lancaster and Manchester (some 2-3 hours away by road) and the considering the small scale of the innovations, these were found to have affected the firms differently. This necessitated that the firms develop different strategies to overcome their limitations, which included (1) compromising on quality; and (2) internalising the development of the product through 'learning by interacting', which is arguably a more advanced form of learning than learning by doing and learning by using (Asheim and Isaksen, 1997). This finding is significant because it demonstrates that it is not only the presence of private R&D, which is important, but also the ability and willingness of the firms backed by available incentives to support SMEs in product development. Hence, because the majority of SMEs in rural areas are likely to be micro-small enterprises whose innovations often require the development of small quantities of products, private R&D Companies may not see a 'return' and therefore fail to support their innovations. Therefore, without public support in product design and development in rural areas, innovation among SMEs is likely to be constrained.
Regarding the importance of customers during the innovation process, the findings of the study indicated that whereas some firms were located away from their customers based regionally and nationally (Kendry, Northwest, and Cumbria Polymers), there were firms whose rural location meant being close to their customers (Farmbike, Spreadstar, and Datalog). This finding challenges the prevailing thinking in the innovation literature that geographic concentration such as agglomeration economies provides certain advantages such as proximity to customers (Malecki and Poehling, 1999; Hippel, 1998; OECD, 1993; Carlson and Jacobsson, 1991). This study argues that agglomeration economies may be important in certain industries and not others and that rural environments can provide proximity to customers to innovative SMEs in certain industries or sectors.

Although the findings above do not explicitly suggest the emergence of a regional innovation system, certainly there are elements of an innovation system that has been identified. Moreover, we also see that the various elements discussed clearly have national rather than regional distinctiveness. Hence the results of this study suggest that national innovation system may provide us with a better explanatory framework for understanding innovation among manufacturing rural SMEs. Further, the regional innovation system and other systemic approaches to innovation such as agglomeration economies have tended to emphasis proximity to complementary activities as promoting information transfer, which lowers the cost and reduces the risks associated with innovation (Feldman, 1993). However, the findings of this study supports the views of Davelar and Nijkamp (1997) and Romano (1999) which suggests that in the web economy firms may gain dynamic agglomeration economies from the global learning environment and that digital networks can partially support
the transferability of the locational economies across regional boundaries thereby reducing location constrains. Section 8.3 will discuss in details where and how rural innovative manufacturing SMEs derives their innovative inputs.

6.4 Research Question 4: Where and how do innovative rural MSMEs obtain their innovation input?

6.4.1 Introduction: It should be noted that much of the analysis in this subsection has already been dealt with in Section 6.3. However, this subsection will seek to analysis in detail how the inputs were provided during the innovation process. This section will analyse where and how innovative rural manufacturing SMEs obtained their innovative inputs by using the narratives of the owner/managers, their employees and various actors within and outside the local environment who participated and contributed to the innovation process. In order to do this, the study uses themes that have emerged from the case studies following discussions with different actors, namely idea generation and the processes of innovation. The study draws conclusions in each subsection by comparing the findings to those in the literature discussed in chapter 3 and the study area in chapter 4.

6.4.2 Sources of innovation inputs:

During the design, development, and manufacturer of the innovative products, the firms used inputs from different sources within and outside the study area.

Personal and Business Networks: To provide us with an insight on how the firm obtained the support from the business contact network, Mr. Marcus explained that:
Sometimes I consulted with people outside the company mainly on the degree of contracting part of the design...it wasn’t that they were going to design some of the parts for me, it was in the area of different arrangements of the pneumatics system... these people would advice me what to get, what to do.

...They are based mostly in Cumbria but there are some national one’s... Most of these things I prefer to meet face-to-face. So they always came over here. But there would be obviously e-mail communications and telephone conversations. Mostly I met them first before I went ahead with designing something...through different contacts. The company itself had contacts in different areas; the previous associates of the company introduced some of the contacts to me; and the others through researching databases, Internet, yellow pages until I got an idea who was the best for the advice. So they come over and discuss what’s happening and you get their competitors to do the same until you get an idea they know what they are talking about.

We can derive from the narrative in Box 66 that the firm obtained technical advice during the process of innovation from both personal and business networks through face-to-face meetings, e-mail, and telephone. The findings are similar to those of Julien et al. (2004) and suggest that the firm used ‘strong-tie’- personal network comprising of previous associates of the company. However, the associates also enabled the company to develop ‘weak-tie’ networks that later evolved into ‘strong-ties’. The narrative also suggests that although there could be limited opportunities for developing business network within the study area, innovative SMEs have had to rely on ‘strong-tie’ business networks outside the study area. However, proximity to local or national sources of technical advice did not appear to affect the firm’s access to technical support that was required. The narrative also indicates that the early stage of innovation did necessitate face-to-face interaction between the firm and the sources of technical advice. Hence we find that the firm tended to ‘bring’ the sources of advice to discuss things within the firm. Further, due to its geographic location, the firm used yellow pages and business directories to identify sources of advice and then
used the Internet and telephone communication to obtain technical advice once it had established contact with them. Hence, the use of ICTs can help ameliorate locational disadvantages of rural innovative SMEs and can help them to reduce uncertainties associated with innovation by the firms participating in information exchange networks to exploit new developments in the industry in a timely manner.

**Private R&D Companies:** Another source of input that firms used during the innovation process was private R&D Companies. To describe how Kendry received the advice from the private R&D Company, the owner/manager of the private R&D Company explained that:

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<th>Box 67:</th>
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<td>Their people will sketch it out and give us the basic fundamentals of what they are trying to achieve from this machine and then they'll come and talk to us about how to make it. So they know what they want and they know what they want it to do but they are leaving the method of manufacture for us to put forward on the basis that they have invested all their money into the product development and market research and the assembly. ...we did not provide them with ideas as to how they could make things work. But what we did do was to say 'if you make the parts in this way, it is cost effective.'</td>
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From the narrative in Box 67, we can derive that the private R&D Company provided Kendry with a production facility/capability and also expertise on how to make the different parts in a cost-effective manner. However, the narrative supports the view in the literature (Oakey et al., 1988) that although SMEs often have to relay on external sources, some form of internal R&D capacity is essential. To describe how this input was provided, the owner/manager of the private R&D Company explained:
Box 68:

A lot of it was done face-to-face but with the modern technology that we've got now much of it is also done by electronic transfer of data so that we can take drawings down the other end of the line feed them straight into the computer, make any modifications that we might consider necessary and then we'll send them back again by e-mail and... but by far the vast majority of developments like this are done on a face-to-face basis. I am still a great believer that telephone communications is great, e-mail communications to me has got its place in the world but 'heaven help us' if it ever-ever replaces face-to-face interaction. Because at the end of the day we're human beings, we are people and to me for a project to work, there has got to be this relationship built on two people, three people, four people working together and that sort of relationship is built very rapidly face-to-face round the table. Over the telephone, it isn't and I think even if you say well 'its got to be because of distance there can't be many face-to-face meetings'...we noted that this 'bond' between these two people or three people does transpire, it doesn't work over the telephone.

It is important to note that Kendry had developed and maintained business relations with the private R&D Company over a long time based on trust. The narrative in Box 68 suggests that the technical input was provided through a combination of face-to-face interaction and the use of information and communication technologies. Further, the results suggest the importance of that face-to-face interaction for exchange of 'codified information' as well as building 'trust' during the early stage of developing the innovative product as suggested by various researchers in the innovation literature (Hippel, 1998; Frybourgh, 1997; Ilbery et al., 1995). It is important to note that in this case study firm ICT was used to support the face-to-face communication during the later rather than early part of production. Although the owner/manager acknowledged the importance of using ICT during the production process, he points out its limitation in 'creating a bond' that is necessary for 'teamwork'. However, reliance on external R&D facility for the production of innovative products was not without its disadvantages.
Box 69:
The owner/manager of Kendry explained:

We allowed for the fact that you couldn’t afford necessarily to change the players to someone who could do more precision engineering and still make money with the machine...we had to adjust some of our thinking really to what was available to us...we were not necessarily able to demand because we did not have the right buying power...the quality that we might have initially preferred in certain areas of the machine was less than we wanted...its just that we had to adapt and compromise in some areas.

The narrative in box 69 suggests that the firm’s innovativeness was constrained as a result of lack of economies of scale that limited their bargaining power and hence could not demand better quality. These limitations meant that the firm had to ‘adapt and compromise in some areas’. Another firm that received inputs from private R&D Companies was Farmbike Ltd. The owner/manager of Farmbike explained where and how the innovative inputs were provided:

Box 70:

We set up to develop the product using an outside company but they faltered and didn’t work correctly...the guys there are just interested in the drawings rather than the know-how...there weren’t many alternatives...They couldn’t really cope, they did not have the time nor the expertise to finish it off...they were also too far away, we were travelling 2 hours to pick a bike and bring it back and it wasn’t right... so it was not ideal. So we found another firm an hour nearer...so they did a model for us and that was fine...but when we asked them to look at another model they just did not have time and they were not interested because they couldn’t see a return on it.

From the narrative in Box 70, and unlike in Kendry, the input from the first R&D Company did not result in the development of the product because of (1) lack of economy of scale, and (2) were too far away and therefore could not help the company develop the product. However, the input received from the second company enabled the firm complete the development of the product but due to the small
quantity involved they could not see a return. The findings suggest that lack of economy of scale more than the availability of local R&D Companies can constrain access to innovation inputs and hence innovation among rural SMEs.

A follow-up interview with the technical manager of the LPG Gas Company who introduced Farmbike to the private R&D Company highlights some of the problems that SMEs can face when accessing innovation inputs from private support organisations.

**Box 71:**

What happened with Farmbike is that they started with Precision Technology...then because they have the expertise, because they convert cars, they developed the kit themselves from then on...we went out to the market place, to be honest we could only find one company that was dealing with that small end of the market...what we actually did we bought off Precision Technology and brought them to our premises for their development work. So you have the natural spin-off, they continue to develop kits for themselves and as a gas company we are at the leading edge of this development work...we have discovered there is a real market, it needs further development and we’re buying in again to help other companies like Farmbike...we’ve come to the point where you need to refine the product. The level of refinement required a different skill. So we’re going to bring the consultant to help people like Farmbike where they would like somebody to go out in the field, to actually go to their premises spend the day with their best mechanic and say this is how it works... we are a gas company but...we want to be at the leading edge of gas applications.

The narrative in Box 71 suggests that (1) private support organisation can exert pressure on small firms to innovate where the innovations is likely to help them maintain or increase their market share; (2) private support organisations can provide technical expertise during product development beyond the capability of the firm. This is because they can ‘mobilise’ resources that can enable the provision of
technical support during the innovation process; (3) there is the risk of the propriety knowledge being lost.

Although not explicitly stated by the LPG Company, their activities suggest that they were interested in the product. This risk is increased by the fact that SMEs rarely seek patents or trademarks for their innovation. This can discourage SMEs from seeking external assistance for the development and manufacture of their innovative products and therefore constrain innovation.

Northwest also received support for the manufacture of its innovation from a local private R&D Company. However, the firm has a deliberate strategy of subcontracting its manufacturing so that they can concentrate only on design and development, which is broadly similar to the one adopted by Kendry and Farmbike that aims at avoiding incurring investment in expensive manufacturing equipment. Describing how the firm obtained its innovation inputs during the manufacturing process, the owner/manager of Northwest explained:

**Box 72:**

Our products all go to a niche market, which is the automotive industry... I will then...organise the printed circuit boards, organise a man to do the art work- the actual design of the printed circuit board itself...invariably I will use a local man to do that...within 30 minutes of receiving the product specification from the customer...we can place my order six miles away...giving my delivery date maybe in two weeks time...its that quick.

A follow-up interview with the owner/manager of the company that Northwest subcontracted for the manufacture of its products explained how the innovation input was provided:

So, Mr. Harvey normally comes in on the first day when we’re starting a new job for him...and the two of us will sit together and I’ll actually build two or three of the products to see if we can come up with any production problems...sometimes you find someone has designed the printed circuit board so when you want to put the components it doesn’t ‘line-up’. They do the artwork when they are designing the board, sometimes when you get the actual parts it just doesn’t fit. For example, during the artwork they may drill round holes for a particular part but when you actually get the part, it has square leg and you want to put a square pin in a round hole.
The narratives in Box 72 explaining how the firm used the services of a local private firm to undertake the design of its circuit board and another 'sub-contractor' to manufacture the product. Further, the results show the presence of local sub-contractors within the case study area that SMEs can use to develop and manufacture their innovative products. The existence of local sub-contracting Companies may be attribute to an increase in technical skills arising from the decline in the shipping industry resulting in unemployment from engineering related large firms within the case study area. It should be noted that Northwest is located in Whitehaven, an area that had a long history of the shipbuilding industry but has been decline in recent times. This result when compared to Kendry and Farmbike who had to travel for more than 2 hours to access their inputs suggest that innovation within Northwest could have been improved by availability of local sub-contractors. Hence, the advantage of proximity is that it can facilitate easy and quick face-to-face interaction between the firm and its sub-contractors, which is essential during the manufacture of its products since it enables the firm to receive tacit information.

**Private and Public support organisations:** Another source of innovation support that was available to the firms were from private and public support organisations. These ranged from commercial bank loans, innovation awards, and innovation technical assistance funds. Hence, we find that Farmbike and Cumbria Polymers used bank finance while Kendry, Cumbria Polymers, Datalog, Spreadstar and Northwest received financial support from public support organisations and limited internal cash-flow (Spreadstar) to finance the design, development and manufacture of their innovative products, and office space for Cumbria Polymers.
The firms who received financial support from the bank varied in the method in which the support was obtained. On the one hand Kendry received a loan through formal application while Farmbike received a bank overdraft without informing the bank of its intended use. Explaining how he received a bank loan, the owner/manager of Cumbria Polymers stated that:

**Box 73:**

I've used the bank once in the past to finance the innovation and I've got to the point where we're now self-financing. The bank was aware that the loan was for new product development and they had no problems at all and they keep coming back to me saying do you want to take a loan and I say 'no thank you'. Some of the equipment we have we got a lot of help from the bank (Nat West).

When asked how the firm financed the innovation, the owner/managed explained: “...by sticking it in the overdraft...the cost wouldn’t be that great...”

When asked whether the company had to explain to the bank manager the intended use of the overdraft, the owner/manager said, “...Oh, no, no...it was just blended in with the rest of the business requirements...it wasn’t something on the side”.

The ‘strong reaction’ to the question on whether the company had informed the bank manager on the purpose of the bank overdraft can be viewed as indicative that the owner/manager might have anticipated not receiving a favourable approval from the bank or possibly a lack of appropriate financial products from the local bank and therefore he opted to ‘conceal’ the use of the funds. This observation was supported by the owner/manager of Northwest who complained that:

**Box 74:**

The banks are the same...at the end of the day the banks don’t want to know ...in my opinion...the quality of information is not good at all. They give you all theses standard information...20 sheets of the does and don’t. I mean you need somebody who can sit out there and explain what’s behind the sentence.
The narrative in box 74 suggests that the products or method of providing the financial support by the banks may not be suitable for innovative MSMEs. This could be as a result of the way they are packaged rather than availability of financial support. Further, the type of bank finance used by the innovative manufacturing SMEs can have implications for their innovativeness. This is because the use of bank loans rather than overdrafts are viewed to offer more flexibility and likely to meet the needs of the firms during the innovation process because product development takes a long time and therefore expensive to finance using bank overdraft.

The limited use of bank finance and reliance on internal cash flow by the case study firms can be interpreted to be indicative of a lack of available long-term debt or equity related private financing options in the study area. This is likely to constrain innovation as there is unlikely to be many 'young' innovative SMEs in the area with sufficient internal cash-flow or credibility to access significant overdrafts to finance innovation. This finding is similar to that of Freel (2001) who concluded that reliance on precarious funding such as short-term loans and bank overdraft compounds what can be termed as short-terminism of small firms in general and is reflective of the often intangible and uncertain return on innovative investment. Hence lack of finance is likely to limit small firms in introducing new technology (SBRC, 1992). However, although White et al (1988) and North et al (2001) suggested that the problem of financing is a more serious obstacle in process development than in product development, the findings indicate that innovative SMEs involved in both process and product development face appropriate financing obstacles.
Firms who received financial support from public support organisation explained how it was provided.

**Box 75:**

For example, in Kendry the owner/manager explained that:

We managed to get some DTI funding to help with this project, and it was just a bonus, we got that in place and then a 'couple of events came along'. The DTI Funding helped bring a graduate designer into the business with links to the local university...there is something called TCS- Teaching Company Scheme... and you have to find a graduate who is willing to participate in the project and someone who is willing to develop professionally. I was just in a hole looking for help, I always get frustrated when we can't do what we are able to do and I'm always looking for information of 'money helps', not always as easily available as it might be, we are in the wrong geographical location here. If we were on the West Coast...there is a lot more funding for enterprise and development.

The narrative in Box 75 suggest that the financial support that the firm received from a public support organisation enabled it employ a technically qualified graduate to help with the development of the innovative product and that there are available public support organisations in the study area that can provide financial support to innovative SMEs. Similarly, the owner/manager of Cumbria Polymers explained the importance of the financial support that it received:

**Box 76:**

Farmers Link is the local one... they helped me once with advertising and development grant that I used to try and develop this other material that I was talking about. And they gave me a grant...They have been helpful in the past and they send plenty of information through the post but it would be nice for somebody to just call around and talk to people...they used to have a chap that did that...to see what's happening and he also gave you some sense of what they were doing and they got a sense of what we were doing...he would be the catalyst really and I think they've lost the way on that...what happens now is if you've got the cash in the bank you don't need a grant...I don't have the time or the inclination to fill out great long forms and wait to see if I was going to get the money or not.
Although Cumbria Polymers used bank finance, it also received support from FarmLink during the development of the innovative product. The narrative also suggests that the support was provided through both a grant and face-to-face advice during the start-up process. This finding suggests that innovative rural SMEs can be at a disadvantage due to their location away from areas of agglomeration where density of firms can provide lower cost advantages in the provision of innovation input by public support organisations. However, it is also important to point out that due to low density and sparcity of SMEs in rural areas, it is unlikely to find dense concentration of public support organisations similar to those found in areas of high agglomeration.

The importance of financial input from public support organisations during the innovation process through innovation awards was found in Datalog and Northwest. For example, the program manager of a public support organisation (NESTA) that provided Datalog with the innovation award explained how the financial support was provided (see Box 77 overleaf):
Box 77:

NESTA recognised that the new equipment could help inform debate about access to the countryside... NESTA awarded Datalog Electronics an invention and Innovation award of £42,270 to support further development of the equipment and for more extensive trials over a two-year period. The aim is that this will lead to further developments such as integration with other devices, better discrimination of vehicle types, better software to allow more convenient methods of data collection and data processing by the user, and longer-term installations. The award will also enable the company to contract additional expertise in marketing. There are two things really one is the financial...the other thing that... we do...is by contracting what we call a 'project champion' so that there is somebody with us with relevant expertise close to the project giving formal advice and guidance. The reason why this financial support was provided was because the company would not have been able to obtain funding for this work through conventional sources at this stage in the development process because the commercial viability of the product is not yet proven.

Similarly, Northwest who received a SMART award of 42,000 pounds explained the input:

The best success that we’ve had and it has been a fight in many cases, it’s a bit of a frightening thing, is the SMART award. They do make you think about the project financially and the project. But for small business its quite a challenge to fill out the forms, apply then get the money...its going to get all the attention that it deserves...I found them to be good for us...but they are based in Manchester so they are way out of the county. I don’t think there is anybody here who can advice on SMART awards for local business...we’ve always had to go to Manchester.

Further, the owner/manager of Spreadstar explained that:

I think grant aid also gave me some financial assistance for product development but I’m not sure how much it was so long ago...and that “from own cash-flow...just used my own cash...”

The narratives in Box 77 suggest that the support provided to the firms through innovation awards were important in enabling the firms to design and develop their innovative products. Hence we can derive that the support enabled the firms to have (1) a product champion who could provide technical skills and inputs to the firm and therefore eliminating the need for employment of skilled workers to complement the skills of the owner/manager; (2) ‘early seed’ financial support, and (3) additional expertise in marketing. However, the geographic location of the firms has meant that they travel far to access these support. Moreover, the use of internal cash flow,
although a lower risk option than other sources of finance can limit innovation because it is often restricted.

Although the analysis shows that financial support from public sources were important, the owner/managers whose firms received such support were not satisfied with the services. The owner/manager of Kendry stated that public support organisations did not trust SMEs when providing financial support, preferring to use and pay consultants rather than trust SMEs to utilise funds transparently.

Box 78:
The Chairman and owner/manager of Kendry explained:
   Sometimes help is available in the form of consultants but they can be very frustrating because they take a lot of time in the business and the money is spent on them instead of the businesses. Mrs. Connolly...'remember when we wanted money a few years ago but the money really ended up just being for the feasibility study carried out by a consultant'. John- (really getting agitated) it was £18,000 quid to the consultants and we never got a penny

The narrative in Box 78 suggests that the main problem in financial support from public support organisations is that a large proportion goes to consultants whose services are not readily appreciated by SMEs. Considering the amount of funding provided through consultants, this has created cynicism among SMEs towards consultants who may genuinely provide much needed innovation support to SMEs such as marketing expertise in Datalog, which enabled the firm access technical advice from a more experienced and qualified 'consultant'.

This finding emphasises the importance of understanding the role of the individual traits of the owner/manager, which can result in reluctance, or even a resistance to,
taking external help for a variety of reasons including doubts about the value for money and scepticism about generalist advice (North et al, 2001). This can result in a greater use of informal rather than formal channels of support in cases where professional management resources are limited (North et al, 2001; Smallbone, 1997). However, key informant interview with the Chairman of Cumbria County Council provided an important insight into the limitations faced by public support to SMEs:

**Box 79:**
Business advice is not well meaning because it is based on meeting targets set up by government.

The narrative in box 79 suggests that business advice provided from public sources are designed to meet certain pre-conceived public agenda which may not be based on the real needs of innovative rural SMEs. This may result in generalist advice being provided leading to dissatisfaction among SMEs about the quality of services.

Regarding the importance of public support to innovative SMEs, we can derive from Box 80 overleaf that it helped to 'infuse' new product development and general management skills to the owner/manager as well as current developments in the field during product design and development. However, because the support had to be provided through face-to-face interaction, the program manager of NEST A explained that Datalog was ‘isolated’ and therefore difficult to provide technical support. This result is important for this study as it suggests that rural innovative SMEs can be at a disadvantage in accessing innovation support from public support organisations due to geographic distance resulting into the ‘dispersed’ nature of their location as argued by Smallbone and Major (2003). The locational disadvantage can lead to what has been
termed as 'rural-premium' with regards to the delivery of support services (North and Smallbone, 2000; Smallbone and North, 1999).

Box 80:
Describing how the public innovation support organisation provided support to Datalog, its operations manager explained:

Datalog Electronics has had a lot of technical advice although he is a very technically able man. MAREL has 15 associates majority of them are professional engineers and many of them have also been very senior managers/ directors within big companies but have retired. I have also got another group...who have the same qualities but are still active as consultants. Now what Datalog has received is the benefit from a man who was at a technical director level giving him advice on new product and general management. Apart from that we know that he has received some ideas that are quite new to him, which is not unusual and he has been very receptive to the advice. Essentially because he is very much a technical man but with a nose for commercial opportunity but he wouldn’t have the time to come into contact with current developments in his field in local management 'speak'. While the former technical directors, being from a large company, they ‘trickle around’ as you may well appreciate and so are familiar with new developments. On the other hand, in terms of technical design methods, the former technical directors are more advanced.

However, the program manager of NESTA who provided the innovation award to Datalog explained the difficulties encountered:

There are not that many network of people...because Datalog Electronics is isolated, I wanted someone temporarily to be with him but regularly and giving him feedback and knowing 'his world'...it is necessary to have a 'project champion' not too far away

This view was supported during a key informant interview with the Chairman of the Cumbria County Council who explained that:

Box 81:
Moreover, the quality of public support service delivery is not very good due to geographic distance.

Customers: Lastly, customers were an important source of innovation input for firms during the design and development of the innovative products. They mainly provided advice, tested the products (Farmbike, Datalog and Spreadstar), and
sometimes contributed in the design and development through assessing the prototypes (Northwest).

**Box 82:**
For example the owner/manager of Datalog explained that:

After I got the ‘thing’ working, I got a potential customer who was interested to come around and give me an opinion on how he wanted it to work and how it would look and how he would use it and things like that...

It is important to note that proximity to customers was important in enabling the firm to obtain tacit innovation inputs using face-to-face interaction (Farmbike, Datalog, and Spreadstar). However, some firms also obtained customers suggestions using ICTs (Northwest) implying that information could be transferred at no or little cost. Although lack of proximity to customers is often seen to imply locational disadvantage, the results indicate that it could be sector specific whereby firms in electrical and electronics engineering (Kendry, Northwest) did not have to use face-to-face interaction compared with firms in agricultural and natural resource based sectors (Farmbike, Spreadstar, and Datalog). In the innovation literature, proximity to customers and suppliers has often been argued to favour firms located in agglomeration economies (Carlson and Jacobsson, 1991). However, the results show that innovative rural manufacturing SMEs in natural resource based sectors are likely to be located in close proximity to customers than suppliers and other innovation support organisations. This can be argued to be a ‘trade-off’ but is also based on the fact that the firms were started by founders who originated from farming backgrounds and therefore the location of their firms are not based on ‘innovation locational logic’ but rather on historic reasons.
Regarding the use of information and communication technology (ICTs) in obtaining innovation inputs, the results show that firms used (1) telephone/fax, and (2) email/Internet. The use of ICTs varied between the firms with some using only telephone/fax while others using a combination of telephone/fax and email/Internet. To explain how the firm used telephone/fax to obtain its innovative inputs, the owner/manager of Cumbria Polymers stated that:

**Box 83:**
These days I have resorted to getting customer specifications through the phone or fax then send a sample back to the customer for evaluation, after which the customer gives feedback and so forth until the correct product is achieved over several weeks or months... if you want some information you pick the phone up, you don't have to be right in the doorstep of everybody...So there is nothing really that needs a hands on approach for many things, near the big centres.

The narrative in Box 83 suggests that the firm obtained customer specifications using telephone and fax. Although the owner/manager explained that this did not constrain the development of the innovation process, we can observe that the process takes weeks and months due to geographical distance between the customer and the firm. Hence, while physical distance may be unimportant, the time it takes to receive feedback from customers is important. This finding supports the argument put forward by Frybourg (1997) that there are some types of knowledge that are more difficult to codify and exchange in a market. However, Hippel (1998) stated that it is the amount of information to be transferred that can result in stickiness, which can constrain the speed of innovation as seen in Cumbria Polymers.

Considering the geographic location of Spreadstar and Cumbria Polymers in areas surrounded by farms and away from centres of agglomeration economies, the
narratives in Box 84 suggests the importance of modern communication systems including ICTs in enabling innovative SMEs obtain innovation input from customers located outside the study area by reducing physical distance.

**Box 84:**
For example, the owner/manager of Datalog explained that in communicating with the customers

I send stuff out by post and if I'm communicating with them normally I use
the normal methods...telephone, e-mail...there is a great deal of stuff if
you are in electrical engineering in the Internet.

Similarly, the owner/manager of Spreadstar stated that:

Technology as it stands now gives you the ability to communicate through
e-mail, Internet, video conferencing, telephone...especially with the ability
to put attachments on e-mails has helped quite a lot. In fact in many
respects its better to be away because if you can isolate your problems
cleanly and tidily through one of those mediums, you can get a clean tidy
answer. If you are close to each other there would be a lot of discussions
and pointless conversations is not useful. But you do need those tools to
be able to work away in a rural area.

Moreover, the manager of Cumbria Rural Enterprise Agency stated that:

A lot of people are now on e-mail, probably more than half the farms are
now on e-mail than three years ago...so they are using them and there are
initiatives being set up to help get people onto ICT systems...it is not an
issue.

**Component suppliers:** Kendry, Farmbike, Cumbria Polymers, and Spreadstar obtained the components for their innovative products/processes from regional and national suppliers while Northwest from a local supplier. In Box 85 overleaf, the main reasons cited by the firms for the use of national and international component suppliers included (1) the complex nature of the innovation required different components which were not available locally, (2) lack of available local suppliers; and (3) the components cost less from sources outside the study area. Moreover, innovation may require components from various suppliers who are unlikely to be co-located in one area of agglomeration. This means that depending on the nature and type of innovation, proximity to component suppliers may not be possible for all
SMEs. Hence, the recent improvements in the physical infrastructure, availability of courier companies, and the use of ICTs can help ameliorate some of the locational disadvantages for rural MSMEs.

**Box 85:**
To explain how the firms obtained the components from regional and national suppliers, the owner/manager of Kendry stated that:

> All the different components came from different suppliers...who are mainly companies we’ve bought things from before...based all over the UK...not necessarily local, it was something that was too complex.

The owner/manager of Farmbike stated that:

> We needed a supplier for components...the makers of the components are out in the West Midlands and quite a few companies down there seems to be on the same job...our component suppliers are based in Birmingham.

Similarly, the owner/manager of Cumbria Polymer stated that:

> One of our suppliers is based in Lancashire, probably about forty miles away, and the other one is probably sixty miles away...very few of the main suppliers are in this locality.

Spreadstar’s components come from different countries

> “We use components from all over...they go from Denmark to America and back to me at 50% cheaper than I can buy them from Denmark”

However, some firms who sourced their components from suppliers based outside the study area had various difficulties as shown in Box 86 overleaf. To address the difficulties, the firms have had to be patient and also hold high stock levels of the components so as not to “run out”. This is likely to affect the innovation process by firstly, increasing lead-time from development-to-market of the products. Secondly, this would require higher capital for the firms to enable them finance high stock levels. Furthermore, high stock levels can results in less flexibility and therefore lowering the propensity to innovate.
Box 86: 
For example, Farrnbike stated that:

It is difficult to source some bits quickly...we are relying on delivery
companies to get parts to us whereas I suppose that if we were nearer you
can go on face-to-face and pick parts up...yes, it is quite a distance from
us...we have addressed the difficulties of sourcing the components through
patience, it just takes some time to adjust.

Similarly, the owner/manager of Cumbria Polymers stated that:

Very few of the main suppliers are in this locality...because we rely on
road transport, we have to make sure that we don’t run out of things by
ordering in plenty of time...if we get pretty desperate then I’d jump in the
car and go and pick something up.

Highlighting the importance of proximity to component suppliers, the owner/manager
of Kendry explained that:

Box 87:
Lots of help just discussing and trying to work out the best components that we
would need and if we couldn’t afford or get quite what we wanted, we worked out
a situation where we could get something that could do the job or change the
design to fit inside...lots and lots of discussions with key suppliers. I buy
materials from them and they are quite open and really talk about things...it can be
various things, but usually it is quality and sometimes we are having problems
with our mix and we go back to them and find out what the problems are...what
they tend to do is maybe send another component up and say add percentage of
that and see what happens.

This narrative demonstrates the advantages that firms can have by being located close
to a component supplier. It is clear from the narrative that the ability of the firm to
‘change the design’ during the innovation process is closely linked to their ability to
get alternative components quickly. Moreover, we find that the component supplier
also helped with ‘trouble-shooting’ during the development of the innovation process.
It is important to note that the innovation support that the firm obtained from the
component supplier was based on face-to-face interaction as opposed to that of firms
who relied on national and international sources who had to rely on a combination of
face-to-face and ICTs. This finding contrasts with that of Simmie (2003) who found
in his study that contrary to much of the literature on the importance of local supply chains, most firms based in the Greater South East appear to rely on national than local suppliers and attributed this phenomenon to the strength of the transport and communication networks that radiate from the Greater South East to other parts of the country.

**Labour:** Availability of qualified local labour as input in the innovation process was explored. Analysis of the case study data indicated that the case study firms appeared not utilise skills 'embodied' in local labour. Rather, firms that used local employees considered characteristics such as 'loyalty, reliability, and honesty' rather than qualifications as being important. Hence, firms whose employees were involved in the innovation process explained that their role was not 'explicitly' in the development of the innovative product but rather in contributing towards the practical development of the product.

From the narrative in box 88 overleaf, we can observe that employees in Cumbria Polymers provided practical rather than technical ideas during the innovation process and is consistent with the arguments of O’Gorman and Kautonen (2004). However, the narrative also suggests that owner/managers often do not appreciate the role played by employees during the innovation process.

**Box 88:**
For example, the owner/manager of Cumbria Polymers explained that staffs were involved:

To some degree, I mean I do talk things over with them and constantly keeping in touch with them on what’s on...I tell them what jobs are coming up...I do also get them involved in the design of things as well...they’re the one’s that make the things and I go and ask them what they think...they would put their ideas forward, which is more of the practical than technical ideas...they don’t have the experience of the technicalities of the materials.
The ‘hands-on’ contribution of employees in the design and development of the innovative product was also found in the remaining case study firms.

**Box 89:**
For example, the owner/manager of Farmbike explained that:
Different lads would probably do the spanner work and the fitting of the kits, the nuts and bolts of it, but the theory side we would tinker with...this is something that happened in and among the other work, everyone is busy.

Similarly, the owner/manager of Datalog stated that in the development of the innovative product “on the technical side it was just me…” The owner/manager of Spreadstar stated that it was “just myself” and was not assisted by other people; while Northwest does not have employees because they subcontract the manufacture of the innovative product. The main reasons given by the firms for the staff not being involved in the design of the innovative products/processes included lack of staff time (Farmbike) and lack of technical knowledge of the product/process (Cumbria Polymers and Spreadstar)

However, firms where employees were involved the owner/manager in the development of the innovative product/process suggested that they were “reliable and loyal rather than skilled” (Farmbike); “good commonsensical with a good attitude to learn, and flexible minded…” (Spreadstar); and they have “basic skills and numeric, and less highly skilled” (Kendry). These findings suggest that although the prevailing view in the literature on innovation has emphasised qualified and experienced labour as being an important input during in the innovation process (North et al., 2001; Schoenberger, 1989), the characteristics of labour found in rural areas and therefore likely to be employed by innovative rural manufacturing SMEs is important. Hence,
qualified and experienced labour may be more important in high-technology based innovative SMEs (Rothwell and Zegveld, 1982) more than the sectors that the case study firms are engaged, namely mechanical engineering and scientific instruments.

The use of reliable rather than highly skilled labour was also due to the nature of innovation that the firm was involved with. For example, in Kendry where there was a lack of internal or local labour for the type of innovation, the firm had to look for a qualified employee from outside the study area. However, in Cumbria Polymers the owner/manager explained that:

**Box 90:**
The moulding side is less high skilled...you need somebody who is accurate, prudent and careful...I can't sort of go and pick somebody who knows what we are doing...I need somebody who is accurate, prudent, careful, and numerate.

Hence within this case study firm we find that the nature of innovation required a less skilled but accurate and prudent labour. Moreover, it also required reliable labour because of the need to 'learn by doing' which takes time and is not easily codified. However, reliance on reliable and loyal labour has its disadvantages. The owner/manager of Kendry Ltd explained that:

**Box 91:**
There is very low staff turnover...that can be a problem because it means not enough new ideas coming into the business.
Secondly, the owner/manager of Farmbike stated that:
A lot of lads are needing computer skills...to go and diagnose a tractor you need to take a lap-top for some jobs...some have been in this job and are in their 40's they just don't want to use a computer.
The narrative suggests that low staff turnover among rural firms can result in lack of enough new ideas coming into the firms and resistance to new ways of doing things with the potential for constraining innovation. Supporting this view, a key informant interview with the head of Cumbria County Council revealed that:

**Box 92:**
Cumbria is generally a low wage economy. There is low high education and skills are mainly craft-based. The main issue is that of loyal workforce versus ‘trapped’ workforce.

The narrative in Box 92 raises a fundamental issue on whether loyal and reliable rather than skilled labour is important in the innovation process in rural SMEs or whether these are ‘trapped’ workforce. Due to limited opportunities the Chairman of Cumbria Chamber of Commerce explained that:

**Box 93:**
Skilled labour made redundant tends to move away and thus reducing the existence of a ‘pool’ of local labour.

The inability of the county to retain skilled labour reduces the degree of local movement and spin-off of embodied technological and managerial expertise in the form of entrepreneurs and the formation of a pool of skilled labour that is essential for the emergence of a regional innovation system. This is more crucial in the development of localised codified knowledge that can provide the basis for ‘learning by interacting’ which represents a more advanced form of learning than ‘learning by doing’ and ‘learning by observing’ as argued by Asheim and Isaksen (1997). A further complicating factor is the reluctance among SMEs to invest in training their employees. The Chairman of Carlisle Business Forum explained that:
The need for training workers is not being embraced by businesses. Businesses are 'insular' about their workers. This has resulted in the supply of skilled labour not able to cope with demand. Hence there is need to improve higher education so as to increase the number of skilled labour.

The quality of labour force is relevant in the innovation process especially in product and process innovation that are not limited to R&D activities where learning-by-doing can be an important input. Hence the limited number of institutions of higher learning can constrain innovation since the availability of a mobile labour force ready to move from one occupation to another within the study area can mainly be possible through availability of education and training institutions. The Economic Regeneration Manager of the Allerdale District Council explained:

Box 95:

West Cumbria has no university and therefore generating and retaining skills is a problem. Young people go outside the area for further studies but do not come back. Top end skills are in short supply.

It is important to note that the two universities available in the county offer teaching, healthcare, fine arts, and tourism courses. Hence, there is a lack of science or engineering based universities that would be important in the development of a pool of skilled labour required by innovative SMEs. However, since the innovations developed by the case study firms appeared to be non-science based, the argument of Storper (1995) that the presence of technical universities as opposed to science-based universities may be important for innovative SMEs in Cumbria. The problem of skills shortage and lack of institutions and opportunities to develop the required skills can
be circularly. A focus group discussion with Jonathan Miles and Ms. Doherty Daniels of the Carlisle City Council explained:

**Box 96:**
There is also a problem of graduate employment due to the fact that SMEs have a poor reputation of not employing graduates and the demand for graduates in the county is low.

Hence rural innovative manufacturing SMEs who, unlike large firms, do not have the advantage to locate where there are skilled labour have to rely on the labour that the county can offer as argued by Karlsson and Olsson (1998). Oakey et al. (1988) have argued that this can constrain innovation because even where they are involved in product or process innovation, some form of internal R&D capacity is essential. These factors have implications for innovation as it suggests that rural innovative SMEs are likely to innovate in areas requiring less skill.

More fundamentally, although owner/managers did not attribute qualified and experienced labour to be an essential factor in the innovation process the use of low-skilled, reliable and loyal labour can be interpreted as a coping mechanism in reaction to shortage of skilled labour in the study area. This was highlighted by the head of engineering department at the University of Lancaster that supplied Kendry Ltd with qualified labour through public support, who explained that:

**Box 97:**
“We found it very difficult to recruit a young person/graduate with a little bit of an industrial experience... We got the grant approved and we hadn't actually appointed anybody and we were getting into a situation where the grant could disappear...Well, we eventually interviewed a number of people and one person came forward that was outstanding... He was Albanian and had been trained...in computer aided engineering”.

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The narrative in Box 97 suggests that shortage of skilled labour in the study area and regionally may not be unique to innovative SMEs but symptomatic of a general problem of lack of available skilled labour in the region besides the common difficulties that SMEs face in attracting qualified labour as found by Oakley et al. (1988). This has important implications for innovation as it could mean that SMEs are unlikely to move beyond the technological capacity of their owner/managers and that ‘industry-wide’ innovations in rural areas can be constrained. The head of engineering at Lancaster University explained:

**Box 98:**
We needed somebody who has proven experience... has a personality that would integrate well in a small company who has an established team in the electronics and control side of things... but in terms of mechanical design I think they were somewhat behind. Marcus has those skills...he has spent as part of his 4-year course, 15 months working in a large reputable company in the hydraulics field and had developed various production aides for them.

The narrative supports the view in the literature that the more indirect policy initiatives by the state aimed at stimulating innovation such as education and employment policies, and those in regard to communication infrastructure can influence innovation (O’Gorman and Kautonen, 2004; Gregersen and Johnson, 1997). This is because for the innovative SMEs to learn, there is a need for the county to increase labour mobility, face-to-face contacts, and interconnections with suppliers within and outside the county. This will bring dynamism into its innovation system and help ameliorate its proximity related disadvantages.

**Marketing:** Some of the firms obtained their marketing inputs from private companies based outside the case study area (Kendry, Datalog, and Spreadstar) while
others used their own 'entrepreneurial marketing' and Contact Network to obtain their marketing inputs (Farmbike, Cumbria Polymers, and Northwest). Kendry used its own resources to access inputs from a marketing company while Datalog used finance that was available from a public support organisation to access the input from the marketing company. To discuss how firms received marketing input, the owner/manager of Kendry described the process:

**Box 100:**
The marketing people helped a lot with the image, branding...I've got a long relation with them, they've done a lot of work for our company in the last five years...we tend to discuss our requirements with those people so that their company grow to a greater knowledge of us and what we want, what we like and what we don't like...the input we got was...luck, appearance, product ideas, colour, a very strong image in a market that is not really image conscious.

The narrative in box 100 suggests that the firm received the marketing input from the company that it had prior working relation with and hence a business network. Interestingly, Kendry has adopted a deliberate strategy of using companies from among its business network to obtain 'customised' innovation inputs. This suggests that SMEs who are often not well resourced may not be able to afford to pay market-based fee for obtaining appropriate marketing input and developing the market for their innovative products. Hence, the use of marketing companies who are 'members' of its business network can enable the firm lower the cost of marketing and therefore successful commercialisation of their innovation. Moreover, the type of marketing input received was important in enabling the firm to design, develop and manufacture a product that incorporated 'strong' marketing elements for its commercialisation.

However in Datalog and Spreadstar, the firms obtained marketing inputs from marketing companies through finance obtained from public support organisations.
The narratives of the two case study firms in Box 101 shows that the marketing input received enabled the firms to access (1) expertise in marketing and (2) understanding the market. This finding is important for this study as it suggests that although the owner/managers were experienced and qualified 'technical' people, they could have lacked appropriate marketing skills, which were necessary to help develop and promote the innovative products.

**Box 101:**
The Operations Manager of NESTA explained the importance of the innovation award that Datalog was awarded:
The award will also enable the company to contract additional expertise in marketing.
The owner/manager of Datalog explained further:
I got some advice from the people that NESTA sent around to assess the project at first...they thought that it would be necessary to do some more marketing and they suggested this particular company.
Similarly, Spreadstar utilised the service of a marketing company based nationally to help develop the market for its innovative product:
We got in touch with a marketing company in Manchester to go to the market, identify the competition, identify what the market required, and from that we decided on whether what we were proposing to produce would go into the market place with success...and they spent 2 years developing the market before we were able to produce any volumes. It was...through the utilisation of grant aid...because the finance was available from an external source to utilise the service of the marketing company, it made the take-up of that service much easier.

In contrast, Cumbria Polymers and Northwest used what can be called 'entrepreneurial' marketing inputs. To enable us understand the process that the firm used to access this input, the owner/manager of Cumbria Polymers explained:

**Box 102:**
I used to do a lot of cold calling, I'd target towns and cities especially consulting engineers...now we do advertising in trade journals or product cards and we get a lot of responses from that...I'm in the process of getting my sales literature revamped then I'll have another splash in the market and see what responses we get.
The narrative in Box 102 indicates that although the firm's marketing approach has been described as entrepreneurial the use of 'cold calling', and lately advertisement through trade journals and product cards can be considered as systematic and suitable within the resources of the firm. This suggests that for SMEs such as Cumbria Polymers, this could be suitable and help lower the cost of marketing. Moreover, where the owner/manager is aware of the different marketing strategies, like in Kendry, there is likely to be a demand for assistance from an external marketing company. Hence SMEs in rural areas with sufficient marketing knowledge can develop and commercialise their innovative products using entrepreneurial marketing strategies.

Analysis of the narratives therefore suggests that innovative rural SMEs obtained marketing inputs from different sources ranging from formal to informal sources. Moreover, the approach to marketing used by the firms did not appear to have influenced the development of the innovative products. Hence, the location of the firms did not appear to have constrained their ability to access marketing inputs and therefore innovation.

**Rural physical environment:** The influence of rural physical and environmental conditions on the innovativeness of the case study firms was explored. Analysis of the case study data shows that rural environment provided 'soft' inputs to firms during the development of their products. Kendry, Datalog, and Spreadstar stated that they derived 'aesthetic' value from the rural environment that had an influence on their innovation while Cumbria Polymers cited cost as the main reason.
for its location. Farmbike did not cite any reason other than the fact that it is established where the original founder was born and raised and hence historical reasons. To enable use understand how firms derived aesthetic value from the rural environment, the owner/manager of Kendry explained that:

Box 103:
From John’s perspective, he enjoys very much living within the Lake District…I (the Managing Director) moved here from London in 1998…for a better quality of life…personally wouldn’t be keen to move back into an industrial area or a city, really unless I have to…so, there is a cultural aspiration to stay within this location rather than a hard business reason.

When asked further how the rural environment has influenced their innovation, the owner/manager of Kendry explained:
Probably…increased it…the fact that you are leaving where you’d like to be…that’s it really…I wouldn’t say that we’ve got a ‘local pool of innovative, creative thinkers’ if anything probably it’s the opposite, I think its more perhaps someone like John being in an environment where he is happy and isn’t bogged down with the stresses living in a place that he is not happy, can let our imagination ‘flow’ a bit, perhaps.

An important theme that emerges from this narrative is that of ‘better quality of life’ which can let one’s ‘imaginations flow’. This input although hard to quantify was important not only in the innovation process but the decision for the managing director to locate in the study area. This finding suggests that rural environment provided an influence on the Managing Director’s decision to be employed in the firm and the owner/manager and therefore facilitated innovation.
Similarly, in Datalog, the owner/manager explained that:

I moved here for my first engineering job just because I was offered a job...if I had been given the choice I would have been very pleased to suggest here because I like the area...it is a very attractive place to live.

Moreover, the owner/manager of Spreadstar stated that the decision to set up the business in this location was influenced by:

Quality of life basically...it's a very selfish reason but that was the reason...its my quality of life (he laughs)...getting to work in the morning is a five (5) minute job down a nice country road. No hassles, generally the type of people I deal with in this place are nice and straightforward, loveable people not really stressed, they're quite happy with what they are doing in life. Its just a very...you know much more relaxed type of atmosphere...much better working conditions, yeah. Definitely the quality of life you'd say is the real reason.

The narratives in Box 104 suggest that rural environment provided certain 'aesthetic' value to the firms during the innovation process. This was mainly 'quality of life', which enabled firms to be innovative as they were in a more 'relaxed' environment.

This result is important because it provides us with a link between rurality and its influence on the processes of innovation. However, the owner/manager of Cumbria Polymers attributed the rural environment not in terms of the quality of life but rather due to the low cost advantage:

I think we're relatively happy where we are and the cost is far less than if we would have been based in the London area- labour costs and overhead costs of buildings in terms of rents and rates. So I think it is probably more beneficial being here actually...I think it is a more professional operation now, I've got this office space here, the men have got a 'mess room' of a similar size whereas before they were having their meals on the 'factory floor' which was not ideal. It is a better laid out operation and we've got everything under one roof.

The narrative in Box 105 suggests that unlike in Kendry, Datalog and Spreadstar where the main benefit of the rural environment was 'quality of life', whereas in Cumbria Polymers it was lower costs. The narratives also suggests that aesthetic
values of the rural environment such as ‘no hassles’, ‘loveable people’, ‘relaxed atmosphere’, ‘better working conditions’, ‘attractive place to live’, ‘low overhead costs’, did provide certain qualitative benefits such as enabling ‘your imagination flow’. The findings supports the views of Tarling et al. (1993) that within rural areas, preferences for physical and environmental conditions are a contributing factor in attracting skilled labour and would-be entrepreneurs to the ‘peace and quiet’ of the countryside.

However, the chairman of Eden District Council explained that:

Box 106:
The quality of life doesn’t attract young people who opt to go away. The further away the area is from the centre, the higher the proportion of elderly people.

The narrative in Box 106 suggest that out-migration may in fact result in SMEs located in peripheral areas of Cumbria not being able to attract younger skilled workforce and therefore be at a disadvantage during innovation.

Considering the influence of topography on the physical infrastructure of the study area and its impact on innovation, the study examined how innovative SMEs accessed innovation input from within and outside the study area. The topography of Cumbria discussed in chapter 4 shows a East-West divide within the county with the Eastern parts of Cumbria having proximity to the M6 and larger regional urban centres with better transportation, information and communication infrastructure. The Lakeland Fell cuts across the county, further isolating the west from the east and making the development of transportation infrastructure a challenge. However, the extent to
which the East-West divide has an influence on the processes of innovation was not be explored using data from the case studies and key informant interviews.

The foregoing discussion is important particularly considering that case study firms indicate that they relied on road transport to access their customers and components from suppliers.

**Box 107:**
For example the owner/manager of Cumbria Polymers explained that:

"We rely on road transport...and if things get pretty desperate, then I'd jump in the car and go and pick something up...and we do send all our materials on next day deliveries...so we don’t have any problems."

Similarly, the owner/manager of Spreadstar explained, "the infrastructure in the UK is only part of the required infrastructure required to make things move around...so yes, that’s not a problem at all". This statement was supported by an interview with the manager of Cumbria Rural Enterprise Agency who stated that:

Physical infrastructure including roads and communication is not a barrier...because...the road system is perfectly adequate and the communication system is now much better than what they were.

However, key informant interview with the Chairman of Carlisle Business Forum and the Chairman of Cumbria County Council indicated that:

**Box 108:**

There is also need to improve communication to facilitate labour mobility. Road and rail transport in the district is not very good. There is a need to upgrade the North West train line. The district lacks air transport.

And;

Public infrastructure tends to be better in the larger urban centres due to higher rate of return on investment.

The narrative in box 108 suggests that although there has been general improvements in physical infrastructure throughout the UK, road and rail transport within the county are still limited. Hence the observed improvements in transport and communications
infrastructure, that can reduce both the absolute cost of remoteness and overall importance of distance/travel time costs and its relative role in locational decision-making as suggested by Copus (2001) has been uneven within the County. This is likely to constrain innovation among MSMEs located in West Cumbria. To explain the effect of poor infrastructure on mobility within the county, the Chairman of Eden District Council stated that:

**Box 109:**

Rural transport is non-existence with some areas having only one bus a week.

Similarly, a focus group discussion with Carlisle City Council indicated that:

Employment opportunities are not reflected in the transport system thereby making labour mobility difficult.

It is important to note the contrasting views of owner/managers of innovative SMEs regarding the efficiency of transportation and communication infrastructure with those of policy makers. Whereas the owner/manager of innovative MSMEs have described these to be adequate, policy makers suggest that there are limitations. The difference in opinion can, perhaps, be attributed in part to the owner/managers being able to weigh the limitation of transport and communication infrastructure vis-a-vis other advantages of being located in Cumbria. However, labour mobility has been identified in the literature as being important in the performance of an environment that supports innovation (Gregersen and Johnson, 1997). The inefficiency in the transport and communication infrastructure in some parts of the county can limit the ability of innovative MSMEs to develop both local and non-local markets for their products which can enable them to fully exploit their innovation and also hinder labour mobility.
6.4.3 Conclusions:

The findings of this study support the central argument of this thesis that in a country such as the UK, where there has been a general improvement in physical and communication infrastructure, the locational advantages of urban/core visa vie rural areas is increasingly becoming 'blurred'. This is reflected in the current debates discussed in chapter 1 concerning the definitions of rural areas. In particular, the findings suggest that firms derived their innovation input from sources based locally and nationally including regional and national-based private R&D Companies; (Kendry and Farmbike); regional and nationally-based Public support organisation (Kendry, Cumbria Polymers, Datalog, Northwest); component suppliers/business contact network (Cumbria Polymers and Northwest), and national, and local customers. To enable them have access their innovation inputs, they relied on a combination of 'strong-tie' and 'weak-tie' networks using face-to-face interaction as well as ICTs and that the nature of information to be transferred affected the effectiveness of ICTs. The findings are similar to those of (Smallbone et al., 1999; Vaessen and Keeble, 1995) and suggest that the case study firms have had to adapt and adjust to their rural environments by developing effective strategies that enabled them to overcome their locational disadvantages such as proximity to sources of innovation.

During the manufacture of the innovative product, the case study firms received inputs from private R&D Companies based both locally and nationally and internal resources (including the skills of the owner/manager). However, firms that had externalised the manufacture of their innovative product were found to have been constrained during the manufacture of their innovative products because of (1) lack of
other players and therefore competition in precision engineering, (2) limited buying power and volume and therefore inability to demand better quality for their products, (3) lack of time by the private R&D Company, and (4) distance between the firms constraining timely face-to-face interaction and therefore innovation. This finding supports the views in the innovation literature, which suggests that some form of internal R&D capacity is essential (Julien et al., 2004; North et al., 2001; Cohen and Levinthal, 1990; Oakley et al., 1988) for rural MSMEs to remain innovative.

Moreover, the use of private R&D Companies and the fact that case study firms did not seek patents for their innovations meant that they risked losing proprietary knowledge of their innovation. Although this was limited to one case study, it provides us with additional insight into the limitations of relying on ‘weak –tie’ networks. Further, due to a limited number private R&D Companies in the study area, the case study firms did not have easy alternative sources of supply and therefore risked being held at ‘ransom’ not by the supplier demanding higher prices as suggested by Perry (1999) but by the lack of alternative suppliers and therefore compromising on quality (Kendry Ltd.) and lack of time to follow through the development of the product (Farmbike Ltd.). However, the ‘design-approved’ relations could be a solution as was the case in Kendry since it was based on long standing relation (‘strong-ties) based on the likelihood of the supplier gaining further work as argued by Asanuma (1989). This was, however, not the case in Farmbike where the units produced were small and the supplier could not see a ‘return’ due to low demand/growth conditions. This finding suggests the limited opportunities for rural MSMEs to develop ‘strong-tie’ networks could limit their ability to innovate due to the low volume of transaction of their innovations.
Other systemic support during the development of the innovative product included hard and soft support as well as the ‘aesthetic value’ of the study area. Firms received hard support (finance, skills, and office premises) both from the local and national private and public organisations. Firms that received financial support from private organisations mainly relied on bank overdraft rather than long-term debt and did not inform the bank of the intended use of the loans. In addition the hard support provided by the public support organisations were mainly aimed at enabling SMEs access private technical support that was required to develop their innovations.

Further, public support to innovative SMEs enabled them to have a (1) product champion who had high technical skills, (2) early seed capital unavailable from formal sources, and (3) expertise in marketing during the innovation process. However, the findings also indicated general distrust and cynicism about the public support with owner/managers showing their displeasure of the approach used by support organisations to spend most of the financial resources on consultants rather than the firms. This could have resulted in a reluctance of innovative firms to access public support during the development of innovative products and hence constrain innovation. However, there has also been limited interest among public support organisations in the study area towards SMEs. The head of the Engineering Department at the University of Lancaster explained:

**Box 110:**
Until fairly recently…Lancaster University was not particularly interested in SMEs in this region. However, there is a significant and progressive cultural change taking place…but this is a very recent development.
Lack of interest in SMEs can result in public support organisations not been able to find innovative ways to provide services citing geographic distance and therefore 'rural premium'.

The analysis of the case studies indicated that the majority of the firms used components form sources based nationally and internationally because (1) the complex nature of the innovation required different components, which were not available locally, and (2) lower cost. The components from national sources were mainly obtained either by owner/managers travelling to where the suppliers were based or through overnight deliveries and those based internationally through courier services. However, the use of national and international component suppliers was likely to have affected the innovation process by limiting the ability of firms to change the design by finding alternative components quickly.

Available transportation and information and communication infrastructure in the study area was found to have been important in the ability of firms to access innovation inputs from sources locally and outside the case study area. However, owner/managers also expressed the view that available transportation infrastructure does not compensate for proximity to some of sources of innovation input which often requires face-to-face interaction. Hence, despite the available transportation infrastructure in some parts of the county, innovative case study firms could still be at a disadvantage because of reduced opportunities for face-to-face interaction that is important in the exchange of codified information.
Local labour although described as reliable rather than skilled was found to be another source of innovation input especially during the development of the innovative products. However, analysis of the case studies also indicated that where employees were involved in the development of the innovative product owner/managers tended to underestimate their contribution (Farmbike, Cumbria Polymers, and Spreadstar). The results suggested that employees provided important input by providing ideas for the practical design and development of the products rather than the technical aspects.

Another important input during the innovation process was marketing. Firms were found to have accessed marketing inputs from private companies located outside the study area through their own resources and also funding from public support organisations. This enabled firms to access (1) expertise in marketing, and (2) understand their markets. However, the marketing input tended to be based on face-to-face interaction and therefore constrained due to the locational disadvantages of innovative SMEs. However, some innovative firms also used informal marketing methods by being their own marketing managers. This involved the use of business/personal network, cold calling, and advertising in trade journals. This approach was indicative of either the sparcity of marketing companies or innovative MSMEs adapting and adjusting to their environment.

Lastly, the influence of the ‘rural environment’ on the innovation process was explored. The results indicated that owner/managers expressed different characteristics of the rural environment as being important for their location and influencing the processes of innovation. These included but not limited to: (1) better quality of life, (2) stress free environment, (3) better working conditions, and (4) low
overhead costs. These were important in providing the right environment that enabled the 'imagination of the owner/managers flow' and therefore contributed to their innovativeness. In conclusion, although the rural environment is important in terms of its aesthetic inputs it was the national innovation environment that was found to be important supply architecture in the innovation process as argued by Gregersen and Johnson (1997) and Kalantaridis and Pheby (1999) and that the range of institutions that supplied innovation inputs transcends the region. The results of this study supports the views of Fuellhart and Glasmeier (2003) that while locational factors can be important, least in some sectors such as high-technology based SMEs, location alone cannot be assumed to be the most important factor-or even relevant- in some instances and that innovative rural MSMEs have developed strategies that enabled them to adapt and adjust to their rural environment to remain innovative as suggested by Smallbone et al. (1999) and Vaessen and Keeble (1995).

Chapter 7 will discuss how the findings of this study can contribute to knowledge and or confirmatory to previous research, develop a conceptual framework for understanding of innovation among rural MSMEs, areas for further research, and suggest policy recommendations.
CHAPTER 7

CONCLUSIONS

7.0 Introduction

This study explored the processes of innovation among innovative rural manufacturing SMEs by using the narratives of the owner/managers of case study firms and other actors involved in the innovation process to provide us with a rich and detailed account of innovation in the study area. This was consistent with the ontology of critical realism that was selected which entailed the use of case study method as a tool for data collection. This chapter concludes the research by highlighting the contributions to knowledge, recommending areas for further research, and discussing the limitations of the study.

7.1 Contribution to knowledge

This study makes a number of incremental rather than radical contributions to innovation theory and our understanding of innovation among rural MSMEs. The following are the main areas of contribution to knowledge:

- Measurement and Characteristics of innovation in rural areas
- Influence of the functions and attributes of the entrepreneur in the innovation process
- How rural SMEs innovate
- Influence of rurality on the innovation process
7.1.1 Measurement and characteristics of innovation in rural areas:

Measurement of innovation among rural SMEs: This study has shown the importance of opinions of owner/managers regarding whether or not their products were innovative. This is particularly important given the fact that owner/managers of innovative SMEs were either unaware of the need to register their innovation or there is a lack of support organisations in rural areas who can advise SMEs on the need for patents and the registration process. Hence studies of technological innovation in rural areas need to reconstruct the incidence of innovation using the opinion of owner/managers in order to obtain more policy relevant information.

To reduce the subjective nature of this measure, this study included proxies of innovation such as innovation awards, the opinion of employees and other actors to enrich the opinions of owner/managers. This approach enabled this study to overcome the limitations of a single measure of innovation especially for rural small firms who rarely register their innovation for patents and where availability of innovation data is scarce due to sparsity of innovation support institutions. Moreover, because most owner/managers of SMEs lack awareness of innovation awards such as the SMART award they are unlikely to participate in such awards. Hence over reliance on such awards as a measure of innovativeness would result in many innovations in the study area being excluded.

However, the results of this study have also highlighted the need for a robust measure of innovation, which includes a combination of the opinion of owner/managers, participation and receipt of innovation awards such as SMART Awards, etc. This is
particularly important considering that rural SMEs are located in spatially dispersed locations with varying degrees of remoteness and accessibility which can significantly influence availability of public support that is necessary for participation in innovation awards. Hence, even in a rural context, SMEs who are located nearer smaller towns or centres of population are more likely to have access to public support and therefore participate in innovation awards than those that are located in less accessible rural locations.

Therefore, the measure of innovation that this study used by combining different ways of measuring innovation including using the opinions of owner/managers, employees, representatives of support organisations and the use of innovation awards and national recognition as proxies for the level of innovativeness provided a robust measure that is less likely to be affected by limitations of one single measure and reduce the likelihood of self-reporting by owner/managers.

**Characteristics of innovation among rural SMEs:** Considering the characteristics of innovation in rural areas, the findings of this study are similar to those of Feldman (1994) and Rothwell and Zegveld (1982) who concluded that rural innovative SMEs are likely to be relatively strong in innovations where effects of scale are not yet important but where they can make use of their flexibility and proximity to market demand, such as new products or product-market combinations, modifications to existing products for niche markets, and small-scale replications. However, there was diversity in types of innovations that the case study firms were involved. These ranged from hygienic commercial towel cleaning machinery, gas
conversion kit, Polymer valve moulding for cold storage, electronic data log equipment, Multi-functional farm machinery and a miniaturised electronic control device for the automotive industry (Electrical and Electronics).

Further, innovations were (in the main) found to be product innovation contrary to the prevailing view in the literature, which suggests that because product innovation requires frequent interaction and therefore proximity to customers, rural SMEs are more likely to be involved in process rather than product innovation. However, although the innovations were characterised as product innovation, there were difficulties in assigning the categories and therefore supporting the view in the literature that the definition of innovation has fuzzy boundaries and practical difficulties and that some product innovations are also process innovations. Hence, the categorisation used for product innovation supports the definition stated in Chapter 1 that product innovation involves the alteration of current products of the firm or rival firms, or a new product. Regarding the level of innovativeness of the various products, the findings suggest that with the exception of one case study firm, the remaining case study firms were involved in what can be termed as ‘industry-wide’ innovations. Industry-wide innovations were defined as those innovations that were new to the industry/sector and/or have received an innovation award or national recognition.

7.1.2 Influence of entrepreneurial functions and attributes on the innovation process

The results of this study showed that the co-ordinating function of the owner/managers was closely related to the qualification and technical skills of
owner/managers. Hence, where the owner/manager was not technically qualified a qualified employee undertook the co-ordinating function related to the development of the innovative product and vice versa. More importantly during the innovation process, the findings suggested that it is not necessary that the entrepreneur or owner/manager be the one who applies theory and directs execution as suggested by Say (1821) but that this function can be 'delegated' to the workman or employee who has the experience and skill to apply theory and execution.

Regarding the influence of the attributes of the entrepreneur on the processes of innovation, the results indicated that achievement motivation and internal locus of control among owner/managers were closely related and as such may not be separate explanatory variables. Hence, achievement motivation and deviant attributes (developed by the structural changes in the rural environment) were found to be important and have an influence on the innovation process since they enabled the owner/manager overcome obstacles without support from the immediate environment.

An important sociological attribute of the owner/manager that appeared to be important during the innovation process was technical rather than educational qualification. Technical qualification was found to have been important in enabling owner/managers to internalise the design and development of the innovative product and therefore had a strong influence on the innovation process. Interestingly, owner/managers who had high educational and technical qualifications were mainly in-migrants engaged in new start-up micro-enterprises resulting from push factors from local large firms while those with low educational and technical skills were from traditional farming backgrounds. This suggests that the recent structural changes in
rural areas appear to have resulted in the formation of a pool of technically skilled labour hence enabling such environments to develop their innovative capabilities. Hence, the findings suggested that the structural changes in rural areas of the UK, including Cumbria, have produced certain 'intended and unintended' benefits that can facilitate the process of innovation among rural SMEs.

7.1.3 How rural SMEs innovate:

The results of this study have shown that firms received the ideas for their innovative products from various sources both within the study area as well as nationally and internationally. These included (1) Consultants, (2) Sales representatives, (3) owner/managers, (4) inventor, and (5) contact network. When the idea came from owner/managers, these were derived during their work experience in large firms based locally suggesting that 'spin-off' of ideas from large firms contributed towards the founding of SMEs in the study area and the subsequent development of innovative products/processes. This suggests that the recent structural adjustments in rural areas in the UK resulting in reduction and relocation of large firms can reduce local opportunities for generation of innovative ideas and start-up of innovative SMEs. The implication is that to remain innovative, rural SMEs will have to rely more on a few large firms based locally and increasingly on sources based outside the study area for innovative ideas. Although this may appear to put such firms at a disadvantage, this 'outward-orientation' can enable them to tap into dynamic agglomeration sources of innovation with the effect of increasing their innovativeness. This finding supports the views of Varaldo and Ferrucci (1996) that rurality does not constrain the ability of SMEs to obtain innovative ideas from sources based outside the study area if they possessed certain technological and skills advantages.
From idea generation, analysis of the approaches used by firms during product
development can be categorised as (1) internalised design and externalised
manufacturing’, (2) externalised design and internalised manufacturing, and (3)
internalised design and manufacturing. The approach used by firms was dependent
on the internal skills and experience available within the firm or the firm’s ability to
acquire those skills, availability of private R&D facilities locally and the scale of the
innovation. Hence, firms that internalised design and externalised manufacturing
were found to either possess or to have acquired experienced and skilled employees or
had qualified owner/managers. However, firms who internalised design and
manufacturing were found to have experienced and highly qualified owner/managers
and/or employees who facilitated the design and development of the innovative
product with limited external assistance. Interestingly, firms who externalised design
were those whose owner/managers did not have technical and academic qualifications
and also lacked qualified staff. However, the scale of their innovation was also small
resulting in lack of interest from external R&D facility hence forcing the firm to
internalise the remaining processes due to lack of an alternative.

The information required during idea generation, design and development of the
innovative products were of a ‘tacit’ nature requiring face-to-face interaction during
the initial stages. This necessitated that owner/managers or employees in charge of
product development travel to sources of information. However, innovative firms did
not relocate their problem solving to locations with sticky information as suggested by
Hippel (1998) but rather they tended to access the information by using a number of
strategies, including travelling to the source of information, using ICTs, and by exploiting their business relationships developed from previous work experiences.

Regarding the importance of customers during the innovation process, the findings of the study indicated that some firms whose rural location meant being close to their customers (Farmbike, Spreadstar, and Datalog), whereas there were firms based regionally and nationally located away from their customers (Kendry, Northwest, and Cumbria Polymers). This finding challenges the prevailing thinking in the innovation literature that geographic concentration such as agglomeration economies provides certain advantages such as proximity to customers (Malecki and Poehling, 1999; Hippel, 1998; OECD, 1993; Carlson and Jacobsson, 1991). This study argues that agglomeration economies may be important in certain industries and not others and that rural environments can provide proximity to customers to innovative SMEs in certain industries or sectors.

During the manufacture of the innovative product, case study firms received inputs from private R&D Companies based both locally and nationally and internal resources (including the skills of the owner/manager). However, firms that externalised the manufacture of their innovative product were found to have been constrained during the manufacture of their innovative products because of (1) lack of other players and therefore competition in precision engineering, (2) limited buying power and volume and therefore inability to demand better quality for their products, (3) lack of time by the private R&D Company, and (4) distance between the firms constraining timely face-to-face interaction and therefore innovation. This finding
emphasises the importance of some form of internal R&D capacity as suggested by Julien et al. (2004) and North et al. (2001) for rural SMEs to remain innovative.

A finding that emerges from this study regards the use private R&D Companies and the fact that SMEs do not generally seek patents for their innovations meant that they risked losing proprietary knowledge of their innovation. SMEs however, have to balance between seeking patents for their innovations which means restricting how much information they can share within their strong tie network and the advantages of sharing information within the network with its subsequent benefits. From the analysis of the case study firms, it is apparent that participation in 'strong-tie' network outweighs the benefits of seeking patents. This implies that faced with the dilemma, SMEs are unlikely to seek patents for their innovations, choosing instead to participate in the strong-tie networks which provides them with innovation inputs.

During the design and manufacture of the innovative products, firms received hard support (finance, skills, and office premises) both from the local and national private and public organisations. Firms that received financial support from private organisations mainly relied on bank overdraft rather than long-term debt. In addition the hard support provided by the public support organisations were mainly aimed at enabling SMEs access private technical support that was required to develop their innovations.

Further, public support to innovative SMEs enabled them to have a (1) product champion who had high technical skills, (2) early seed capital unavailable from formal sources, and (3) expertise in marketing during the innovation process.
However, the findings also indicated general distrust and cynicism about public support with owner/managers showing their displeasure of the approach used by support organisations to spend most of the financial resources on consultants rather than the firms. This could have resulted in a reluctance of innovative firms to access public support during the development of innovative products and hence constrain innovation.

In addition, case study firms used components from sources based nationally and internationally because (1) the complex nature of the innovation required different components, which were not available locally, and (2) lower cost. The components from national sources were mainly obtained either by owner/managers travelling to where the suppliers were based or through overnight deliveries and those based internationally through courier services. However, the use of national and international component suppliers was likely to have affected the innovation process by limiting the ability of firms to change the design by finding alternative components quickly.

7.1.4 Influence of rurality on the innovation process:

The influence of the ‘rural environment’ on the innovation process was also explored. Owner/managers described different aspects of the rural environment, which they viewed as being important for their location and influencing the processes of innovation. These included but not limited to (1) better quality of life, (2) stress free environment, (3) better working conditions, and (4) low overhead costs. These were important in providing the right environment that enabled the ‘imagination of the owner/managers flow’ and therefore contributed to their innovativeness. Although
the rural environment is important in terms of its aesthetic inputs it was the national
innovation environment that was found to be an important supply architecture in the
innovation process as argued by Gregersen and Johnson (1997) and Kalantaridis and
Pheby (1999) and that the range of institutions that supplied innovation inputs
transcends the region.

The results of this study supports the views of Fuellhart and Glasmeier (2003) that
while locational factors can be important, at least in some sectors such as high-
technology based SMEs, location alone cannot be assumed to be the most important
factor-or even relevant- in some instances and that innovative rural SMEs have
developed strategies that enables them to adapt and adjust to their rural environment
to remain innovative as suggested by Smallbone et al. (1999) and Vaessen and Keeble
(1995). Hence, the findings of this study supports the central argument of this thesis
that in a country such as the UK, where there has been a general improvement in
physical and communication infrastructure, the locational advantages of urban/core
visa vie rural areas is increasingly becoming ‘blurred’. This is reflected in the current
debates discussed in chapter 1 concerning the definitions of rural areas.

7.2 Areas for further research

There are five main areas of further research that has emerged from this study that
need to be explored further. Firstly, although the use of case study approach was not
aimed at seeking statistical generalisation, more case studies with similar firms in
areas of high agglomeration or innovative milieu should be conducted for the purpose
of making a comparative study for the purpose of theoretical generalisation. For
example, the findings indicated that innovative MSMEs were able to adjust and adapt
to their environment by designing and developing their innovation internally, deriving some of their innovation inputs from outside the study area, and relying on non-local customers. It would therefore be appropriate to compare these results with those of MSMEs located in areas of high agglomeration or innovation milieu to enable researchers determine whether the findings of this study are based on the context of the study, namely Cumbria, or are generally applicable to MSMEs based in other areas.

Secondly, the finding has suggested that owner/managers of innovative rural MSMEs are able to derive certain aesthetic values from the quality of the rural environment that can be important for innovation. These included better quality of life, stress free environment, and better working conditions. Hence, further research is required to study in detail how these characteristics of the rural environment influence the processes of innovation with a view to making a theoretical generalisation.

Thirdly, a longitudinal study should be undertaken to enable the processes of innovation among the case study firms who participated in this study to be explored over a period of time. Although the case study methodology used suggested that this approach should not be confused with other research approaches such as ethnography, a longitudinal study would enable researchers to have confirmatory findings. Thus, a longitudinal study would enable the researcher to test and refine the findings framework over a period of time and to incorporate emerging changes and also to have a more in-depth understanding that will enrich the results of this study.
Fourthly, the application of entrepreneurship theory in enabling us understand the processes of innovation among MSMEs suggest that further research into the influence of the personality of the entrepreneur in the innovation process be investigated. For example, the findings indicated that technical skills and relevant skills were important in new firm formation and enabling owner/managers internalise uncertainties associated with innovation and also to develop some in-house R&D capacity. Hence, the influence of need for achievement, internal locus of control and other personality variables on the innovation process needs further research.

Lastly, the study aimed to explore the processes of innovation among rural MSMEs. However, the results show that medium-sized firms were not included in the case study. The main reason was that the few medium-sized firms in the area were not willing to take part citing time constrain and lack of interest in the study. Hence, it would be important that further research be conducted among rural medium-sized firms to explore their experience of the processes of innovation in order to determine whether or not these are the same as those expressed by small firms.

7.3 Limitations of the study discussed in greater detail

The present study has certain limitations that need to be taken into account when considering the study and its contributions to knowledge. Some of the limitations that have been identified include reliability of the case study data, external validity, effect of externalities, generalisation, and bias.
7.3.1 Reliability:

To ensure the reliability of the data used, this study documented the procedures that were followed in the case studies as detailed in Chapter 5. The aim was to minimise errors and biases in the study. However, since the study explored innovations that case study firms had introduced during the last 5 years, it was apparent that at the time of conducting the study most of the innovations had been developed. This meant that the study had to rely upon the memory of the owner/managers and the various actors that were involved. Hence, it is possible that a later investigator following exactly the same procedure described in this study with the same case study firms may not have exactly the same results. This is because of the passage of time and the fact that some of the actors may not be available. It is also possible that the owner/managers and key informants had not provided all the information to the researcher, which a later investigator might ‘unearth’.

7.3.2 External Validity:

External validity refers to whether the evidence presented in this study reflects reality as expressed by the various actors who were interviewed. Moreover, it also seeks to examine whether the case made is convincing, given our existing knowledge, and supported by other evidence (Shipman, 1997). However, Shipman (1997) argued that there are no established bodies of knowledge in the social sciences against which validity can be assessed. Hence it is the responsibility of the researcher to lay out the claim for review and the reader to take up the offer. In this study, the researcher has attempted to interpret the meaning of ‘reality’ as presented by the various actors (owner/managers, employees, and support organisations) and juxtaposed against the existing body of innovation literature against which to judge validity. However, there
is the possibility that the manner in which some claims were interpreted could be open to criticism since there could be multiple realities and ways of interpreting the meanings and actions that were provided by the respondents.

7.3.3 External intervening factors:
The data collection phase was undertaken during the period when the Cumbria was in the midst of foot and mouth disease outbreak. This meant that there were restrictions in movement within the case study area, several roadblocks for sanitising motor vehicles all of which made travel slow and at times difficult. There were instances when the researcher had to seek alternative routes to the case study firms and in some cases, postponed the interview due to total restriction. Moreover, the foot and mouth disease outbreak made some owner/managers ‘suspicious’ of outsiders and therefore declined to be interviewed. Hence, there is the possibility that some of the owner/managers could have withheld vital information because of the prevailing situation and that restrictions in movement slowed down the data collection process, time of which could have been used to delve deeper into issues being investigated.

7.3.4 Researcher Bias
Shipman (1997) has argued that it is easy to detect subjectivity in social research but impossible to confirm objectivity. Although objectivity is a central concern to all researchers, when the research is about human action, truth will be socially constructed and hence there will be different versions since there are many involved in that construction. In this study, the research attempted to avoid bias by collecting evidence from multiple sources before interpreting the meanings. Moreover, this study commenced with the assumption derived from the prevailing literature on
innovation which suggest that rural areas with small markets, limited numbers of businesses and networking opportunities, deficient in factors of production and agglomeration are hostile environments for innovation in the SME sector. Hence this study sought to explore the experiences of owner/managers of innovative SMEs in rural areas. This approach allowed the researcher to suspend his judgement and also allowed him to find out what the experiences of owner/managers and other actors were really saying. The results were then analysed and compared to the literature on innovation to maintain objectivity. However, Shipman (1997) has argued that most researchers probably accept that humans, including social scientists, construct their own knowledge of the world around them and that there is no detached position for neutral observation. Hence, detachment is difficult among those who claim it.
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Key informant interviews- public support organisations

1.0 Background Information:

Date of the interview

Name of the organisation:

Name of the interviewee:

Position in the organisation:

2.0 Briefly discuss the background and purpose of the organisation

3.0 Discuss the policy interventions for SMEs in the county
Probe: physical infrastructure; information and communication; education; skills and labour; innovation; employment

4.0 Are you aware of any innovative SMEs in the county?
If yes, where are they located; names of the companies; contact details; nature of innovation; whether they have won any innovation awards; any support they have received from your organisation?

5.0 Briefly discuss the recent developments in communication and physical infrastructure in the county and their influence on SMEs and innovation.

6.0 How does rural location affect/influence the start-up, growth, and development of SMEs within the county?

7.0 What have been the recent positive and negative socio-economic trends within the county?

8.0 Are there public and/or private institutions that support innovative SMEs within the county? If yes, briefly discuss- type of support and challenges they face.
Telephone interview guideline

1. Greetings and introductions

2. How many people are currently employed in your business?

3. Has the business introduced any new products/processes in the last 5 years?

4. If yes, what were the product(s)/process(es)?

Thank you for your cooperation.
CASE STUDY GUIDELINES

A STUDY OF THE PROCESSES OF TECHNOLOGICAL INNOVATION AMONG RURAL MANUFACTURING SMES:
EXTERNALITIES AND BEYOND

1.0 Antecedent entrepreneurial factors

Principal owner/Manager
Where owner/manager was born- if born outside this area when did you move to the area and why;
family background- parents place of origin, occupational status of parents, education; Educational
qualifications; Technical and business skills; Work experience?
Please describe your childhood life especially your relationship with your parents.
Please describe your educational and work experience

Reasons leading to the start-up of the business
What were the factors that led to your decision to start-up in business and why were these factors
important (Economic, social and cultural factors that influenced or supported your decision)? – Why
were these factors important? Probe on: Need for independence- 'wanted to be my own boss', identified opportunity;
previous employer did not see potential in product/process; lack of career advancement in previous employment; need for
achievement, to get a recognition; whether Society encourages risk-taking and supports entrepreneurial activities- family
role models; private and public institutional support- availability of advice, finance, educational facilitation etc.

Did parental occupations influence decision to start-up in business?

2.0 Systemic Factors

What influenced your decision to locate the business here? Probe on Public support- universities/ business
link/local authority support; availability of skilled labour; good transport and communication infrastructure; private
support- banks/consultancy services/ research institutions- Key founder lived locally, cost of premises, car parking
facilities, access to markets, access to materials and components, proximity to firms in similar industrial sectors, to enjoy
quality of environment/life).

For each of the factors stated, probe why this was important.

If owner/manager lived locally- why did they locate here and not elsewhere; probe on opinion about
public support in the area; knowledge of any providers- how did you get information about the
providers, whether or not the company has utilised the support, what type of support and experience in
accessing the support?

Are there locational barriers that you had to overcome? What are the barriers and how did you
overcome them? What were your initial attitudes to the locational barriers/disadvantages? (Probe on
internal locus of control, adaptation, and risk-taking propensity)

3.0 The processes of Technological Innovation- Systemic and entrepreneurial
influences

Audit of innovative products/Processes
What are the innovative products/process (es) that the company has developed since 1996?

Why do you think they are innovative? (Probe on definition of innovation, are there some measurement criteria-
whether patents/copyrights have been obtained)
How long did it take from idea generation to marketing of the product/use of the process?

**The processes of innovation (Critical incidence technique)**

Taking a particular innovative product/process, could you please explain the entire process from how you first came up with the idea to its final production and marketing? (Probe on Sources of ideas: Information from customers/market, work experience, business contacts, trade association etc; describe how the original idea was conceived; any external information used; how this was then translated into innovative product/process; were there alternative use for these information; why the alternative was not selected?). Is this a typical way of doing things or was it a one-off approach?

During the innovation process, were you aware of other similar products/processes? Why did you decide to innovate your own product (s)/process (es) rather than purchasing the already developed ones? What were the factors that influenced your decision? (To be different; prove myself; to be innovative and be at the forefront of technological development etc) (Probe on the importance of physical infrastructure, available market, and research and development facilities, work experience- awareness of potential product/process, educational qualifications).

Who was involved in the development of the innovative product/process?

Why were the people/person above selected for the development of the innovative product/process (Probe on technical know-how/qualifications, risk-taking propensity, need for achievement, technical background-personality of the people involved)?

Were the experiences and qualification of personnel involved in innovation important in the process? (Probe on whether this enhanced or constrained innovation? If enhanced, how and if constrained, how have you addressed this).

During the innovation process, are there other external environmental factors that facilitated or constrained the process? Probe on the role of research and development facilities, presence of universities, sectoral organisations, qualified labour, private and public financial support, supportive social attitude towards entrepreneurship, available information etc?

How and why were the above factors important in the innovation process? Explain the process of accessing or engaging with the external innovative inputs (Probe on the use of ICT's-telephone, fax and computers/internet, adequacy of rail and road network to access markets).

Has the location (physical infrastructure) of the business influenced/affected the innovation process in any way? If so why and how have you been able to overcome this? (Probe on coping/adaptation mechanisms-accessing information from outside the county; “improvising”-creativity etc)

Do you find the local and regional environment to be supportive to your innovation?

If yes, how?

If no, in what way and how has the business been able to overcome this?

How did you finance the innovation? Probe on where from, the nature of support, why was this source selected?

After the product had been developed, were there particular features that had to be re-designed to meet customer expectations? Probe on what they were, how you were made aware of them and how this process was undertaken?

**4.0 Problems and solutions**

Are there any problems that you encountered during the development stage of the innovative product/process? Probe on financial/risk; personnel/qualification; technical know-how; market access/information; time/organisation; strategy.
How did you address these problems (own/other staff; external assistance (where and how did you learn about them))? 

Why did you choose this approach(es) in addressing the problem(s), were there alternative solutions and why did you ignore/not pursue them?

6.0 External relations

What is the nature of external relation(s) that the firm has developed? Probe on Customer/suppliers in or outside the county; technology centres in or outside the county; consultants/services in or outside the county; Universities/research organisations in or outside the county; public support institutions in the county; national public support institutions; sectoral organisations.

Why has the firm developed these external relations?

How does the firm engage in these relations? Probe on frequency, mode of interaction etc)?

Has these external relations been of any importance in the development of innovative products/processes? Why/How?

| Follow-up Leeds |
|-----------------|-----------------|
| 1. Company/institution | Contact address |
| Contact person | Positions |
| Issues to follow-up: | |
| 2. Company/institution | Contact address |
| Contact person | Positions |
| Issues to follow-up: | |
| 3. Company/institution | Contact address |
| Contact person | Positions |
| Issues to follow-up: | |
Employee Interview Guidelines

Background Information:

Name:

Male/Female:

Age:

Position in the company:

Year Joined company:

What were you doing before you joined this company?

Why did you leave your previous occupation? If interviewee was from college or has worked here all their lives, skip question.

Educational and training background:

What is your highest educational level? Have you attended any training courses relevant to your job? If yes, what type of training? Who conducted the training and where was it done? How long did it take?

Employment

How many jobs have you had in your working life? Could you please briefly describe your duties and responsibilities at each employment? How did you become aware of a job opportunity in your current employment? How did you get employed in your current job? Please describe the process that you went through, for example from application to interview? What were the main reasons for you wanting to work with this company?

Duties and Responsibilities:

Could you please briefly discuss your duties in the company? Are there occasions when you have had to do something unusual, unusual production process? Who communicated this to you? How often are you consulted on new product development? Why are you consulted?

Product/Process innovation:

Could you please discuss a recent product/process that the company innovated that you were involved? How and why were you involved in the production of this product/process? Is there a selection criteria that was used? What specific inputs did you give to the management in regards to how the product should be produced? How did you become aware of this type of innovative process? Why did you think that your input was important?

Sources of ideas:

How did you get the information about the contribution you made towards the new product/process development discussed above? What was the method of communication? Were you aware of other ideas similar to the one that you gave? How did you become aware of the alternative ideas?

Note: The information provided will be treated in strict confidence. Under no circumstance, except with express permission on the interviewee, will the identity of the respondent or his/her contacts be revealed to third parties.
Supplier/Customer/Public/Private Support organisation Interview

Background Information
Date:

Name of company/individual:

Position in company:

Type of organisation:

Year formed:

Number of employees (where applicable)

Nature of relationship with primary company (case study company):

Number of years of relationship:

Location of the company/individual:

Objectives/mission
Could you please discuss briefly the history of the company? What are the objectives of the company/organisation?

Innovation input
How and why did you first establish contact with the case study company? Could you please briefly discuss the nature of your relationship with the case study company? What sort of advice/support do you provide the company? Why do you provide this advice/support? How do you provide the advice/support? probe on communication methods used? Why do you communicate this way? Are there difficulties/limitations that you experience in communicating this way? How have you been able to address these difficulties/limitations?

Innovation
Taking a particular product/process that the case study firm recently innovated, could you briefly discuss how you provided advice/service to the company? How did you first become aware of the need for advice/service? Who communicated the need? How was this need communicated? Why did you think that this need was important? What type of advice/service did you provide? Who provided the advice/service? Why did the person(s) give the advice/service? How was this advice communicated to the case study company? Why was it communicated this way? Did you consider other advice/services before recommending this one? How did you become aware of the alternative advice/service? Who provided the alternative advice/service? Why did the person provide the advice/service?

Note: The information provided will be treated in strict confidence. Under no circumstance, except with express permission of the interviewee, will the identity of the respondent or his/her contacts be revealed to third parties.
Interview guidelines- Public support organisations

1. Briefly describe the activities of your organisation/department in relation to small business development and innovation
2. What are the current business related issues affecting the county

Industrial centres

Carlisle and Kendal are significant industrial centres in the county. Barrow has experienced significant decline. There is a general lack of entrepreneurship in Barrow despite the redundancies.

In-migration of labour

This has particularly been observed in East Cumbria due to its pleasant villages and tourism attractions. However, the poor image of decline in West Cumbria has not attracted in-migrants in that part of the County.

Entrepreneurship

East Cumbria people are more inclined towards entrepreneurship. Cumbria Inward Investment Agency has been instrumental in attracting business into Cumbria and to develop local businesses to grow.

The old mining towns had no tradition of people setting up their own businesses. Business start-ups tend to be carpentry/plumbing etc.

Factors influencing location

Some of the big companies established have identified the following as being important:

♦ Prefer local labour force due to good labour relations.

Incidences of Technological innovation

Veterinary research laboratory in Windermere
DAV Data Systems which exports computer software. Its customers tend to be in the South.

Policy Support

♦ Little financial support
♦ Local authority support is minimal. Tends to exception rather than the norm.
♦ Land, premises and infrastructure. Carlisle Business Park, Road developments have also been going on.
♦ Northwest Development authority has been planning the development of business clusters.
♦ Business Links. Lack of sufficient resources but provide quality of advice.
• CREDITS uses European funding to provide ICT to schools and the community.
• INESCO makes model houses.
• Made in Cumbria based in Kendal has been instrumental in promoting local craft.

Clusters

There exists a cluster of electronic firms around the Carlisle railway settlement.

Industrial strength

Food and packaging

Weaknesses

• 'Thinness' of the economy.
• Skilled labour made redundant tends to move away and thus reducing the existence of a 'pool' of local labour.

Tele Cottages

The Carlisle City Council and the Business Link has set up one in Brampton. An earlier private initiative did not succeed. There is a successful one in Aliston.

Community initiatives

There have been local initiatives to set up own economic development agencies in Allston and Hoverston. They are however difficult to maintain. Those that promote local business have been successful.

They have been initiated by local business people, chamber of trade, Links etc.

Business start-ups

Mainly as a result of:
• Spin-off from employment
• In-migration from urban centres to 'escape the stress of urban life'

Social Structures

The community in most of Cumbria can be described as 'close-knit'. However, they do not like to interact with 'outsiders'.

Community Businesses/Enterprises

There are some in Copeland. LETs are fairly widespread.
Education and training

Being a 'thin' economy, colleges tend to train for the current business needs. Thus they tend to be reactive to the demands of industry (Refer survey results of the Business link at a conference titled 'working in West Cumbria').

Demographics

There is a high population of elderly people.