

The Role of Knowledge in Enhancing SME Innovation: The Case of Knowsley – Northwest Region of England

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ABSTRACT

This study examines the knowledge of entrepreneurs on the complex concept of innovation before assessing how they apply this knowledge to increase the propensity to develop new products and services. Within this context, considerable emphasis explores the assertions that knowledge management can enhance the adoption of new technology through collaborative networks. The aim of the study is to build a body of work in the area of innovation and entrepreneurship that spans the divide between theory and practice by empirically harnessing the perspectives of the case study companies on their innovation behavior. The design of this study adopts the characteristics of a case study research which was applied extensively to provide qualitative data. To be included in the study, firms had to be in existence for at least a year, and firms of the same age were avoided. The findings revealed that the concept of innovation is heterogeneous and elusive. Therefore, the study concluded that innovation is a global concept that requires knowledge acquisition through collaborative networks.

KEYWORDS

Case Study, Innovation, Knowledge, Qualitative, Small Medium Enterprises

INTRODUCTION

SMEs are the essential elements responsible for driving innovation and competition in many economic sectors. To be a competitor in such economies those SMEs should support strategic management decisions successfully. The problem could be in decision phase according to market conditions with many dynamic external and internal factors. To cope with ambiguity executives have to consider appropriate strategies. Innovation transforms a firm fundamentally by enhancing knowledge management capabilities, making it more flexible and adaptable to the market, (Adhikari, 2010). Indeed, knowledge is the driving force behind innovation and the evolutionary process of superior performance as well as strengthening competitive position for the companies studied. (Teixeira et.al.

DOI: 10.4018/IJKM.2021010106

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2019). As a consequence innovation is cited as one of the key factors that affect competitiveness. Hence, the following research questions assessed the factors that influence management of innovation in SMEs and examined how these factors interact through knowledge.

1. How is innovation conceptualized from the perspectives of the case study companies?
2. To what extent are the case study companies involved in innovative market development?
3. To what extent do the companies enhance their knowledge on innovation through forming collaborative networks with centres of excellent such as universities?
4. How innovative are the companies in terms applying knowledge that help them to adopt new technology?

Furthermore, innovation models have shown that SME size classification affects behaviour, structure, decision-making and change implementation, (OECD 2010). For example, the European Commission Green Paper on innovation produced a range of sizes which attempted to reflect that over 99% of EU and UK businesses are SMEs, representing more than 60% of the turnover and 65% of employment. Thus, size classification studies are essential in initially investigating innovation incorporation in SMEs, where innovation is seen as affecting the entire business. Therefore, the size classifications chosen for this study were, 10-19, 20-49, 50-99 and 100-250 employees.

The analysis helped the researcher not only to define the world we need to consider when studying innovation, but also to define the scope of knowledge. However, anecdotal evidence still suggests that a virtuous circle exists between capacity to innovate and business performance. While, scientific evidence to confirm or refute this association appears rare and inconclusive. The empirical study cautioned that business performance is not an outcome due solely to innovation.

Literature Review

The literature on innovation is very voluminous and diverse. For instance, Joseph Schumpeter is among the first economists who used the innovation concept in his studies. When Schumpeter published “The Theory of Economic Development”, he described the motor of development as the innovation itself (Schumpeter 1934). He further explained that innovation keeps the capitalist engine in motion through consumers, goods, new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creation (Bayarçelik and Taşel, 2012). Innovation could be the implementation of a new or significantly improved product for example change in product properties, process delivery methods, marketing methods for instance, new product packaging or organizational method such as changes in workplace organization in business practices, workplace organization, or external relations. It should be emphasized that innovations need to be successfully diffused in the market in the form of products or processes to achieve an economic impact (Klewitz and Hansen, 2014).

Furthermore, there are lots of studies in the literature concerning innovation. For instance, successful innovation can be achieved through an integrated development of a firm’s business strategy and market positioning, organization of work, technology and people. As local SMEs having limited resources what extent they can be able to implement innovative approaches and they can perform innovative growth in competitive business life.

Conceptualizing Innovation

Camagni and Capello, (2014) adopted the view that innovation involves making fundamental or radical changes comprising transformation of a new idea or technological invention into a marketable product or process. Consistent with the above view, OECD (2010) defined innovation as a significant technical advancement within a given industrial context. However, Fagerberg et al. (2012), viewed innovation as an attempt to create competitive advantage by perceiving or discovering new and better ways of

competing in an industry and bringing them to the market. In his work on economic development Schumpeter distinguished between four different types of innovation:

- New products
- New methods of production
- The exploration of new market
- New ways to organize business

Most current definitions of innovation focus on the first two of these: *new products* and *methods of production (processes)* as the most distinctive ones for the purpose economic impact analysis of the innovation. The argument for focusing particularly on the distinction between product and process innovation often rests on the assumption that their economic and social impact may differ, (Battistella et al. 2017). The introduction of new products is often associated with a clear, positive effect on growth of income and employment.

Thus, innovation is a complex and elusive concept, which is difficult to define (Linton and Walsh, (2008). The authors defined innovation as an introduction of newness into an organisation, by application of a new idea or approach. These authors emphasised that there has to be discontinuity in the organisation with its prior status quo, in terms of the skills mix required to produce its products or services. The key component of such an approach to innovation is the issue of discontinuity which differentiates innovation from other forms of organisational change such as development. According to Chakraborty, (2012) innovation is a system where innovative activities are carried out interactively between firms and knowledge suppliers and is supported by policy institutions, technology transfer agencies and higher education institutions.

According to Igartua, et al. (2010), organisation change is considered as either discontinuous (revolutionary or transformational) or continuous (evolutionary or transactional). This kind of distinction can be useful in helping organisations to understand and diagnose the nature of organisational change required. The author suggested that if the required change is discontinuous, “a big leap”, the focus will be on the organisation’s interface with its external environment. However, if the required change is not as revolutionary and more resembles continuous improvement, the focus may be on certain organisational aspects such as management practices or work processes. But complexity theory argues that an uncertain and rapidly changing environment serves to reduce structural rigidity and organisational inertial, thereby opening up opportunities to innovate (Godin, 2008).

Radical and Incremental Innovation

Accordingly, differentiating between incremental and radical innovation is somewhat a matter of degree. Verganti and Öberg (2012) examined four major organizations and found that technology evolves through relatively long periods of incremental change punctuated by relatively rare innovations that radically improve the state of the art. Most innovations simply build on what is already there, requiring modifications to existing functions and practices, but some innovations change the entire order of things, making obsolete the old ways, Linton (2009) describes higher order innovations as those that serve to create new industries, products, or markets (for example, lasers). Lower order innovations, by contrast, involve three types of innovation: (1) continuous innovation, the introduction of a modified product (for example, product line extensions), (2) modified innovation, slightly more disruptive innovation such as the introduction of a technology that performs the same basic functions (for example, electric pencil sharpener), and (3) process innovation or improvements in the way existing products are being produced.

In accordance with the work of Norman and Verganti (2012), incremental innovation is defined as (first or lower order) innovation and refers to the following broad categories of innovation: procedural management determined innovations in rules and procedures); personnel-related (innovations in selection and training policies, and in human resource management practices); process (new methods

of production or manufacturing); and structural (innovative modifications to equipment and facilities and new ways in which work units are structured). However, radical (higher or second-order) innovation is defined by Wilby (2012) as major in scope, breadth, and cost that refers to strategic innovations or the creation of new products or services offered or markets served.

Although not formally tested as a hypothesis, incremental and radical innovations require different degrees of change that may be explained by a different mix of environmental, organizational, structural, and managerial forces, and therefore may need to be managed differently Norman & Verganti, (2012) argued that different cultural characteristics (individualism versus collectivism) affect incremental and radical innovations differently. Birkinshaw et al. (2008) found that the conditions that favoured high-order or radical innovations (for example--computers) differed from those favourable to incremental innovation (for example—new and improved products). The authors further highlighted that some organisations may be better suited to one type of innovation but not the other, and different degrees of novelty need to be managed differently. For example, structural variables that increase the degree of incremental innovation may simultaneously decrease the degree of radical innovation. Complexity theory argues that organizations are characterized by a continuous pattern of large and small changes, and that larger systems change occurs exponentially less frequently than small ones do (Fagerberg et al. 2011).

The Significance of Innovation in SMEs

Because of globalization of markets with a higher rivalry environment, rapid technological changes and shorter product and technology lifecycles, many firms, especially the small and medium enterprises (SMEs), are focusing on making innovation which is the key driver for sustainable competitive advantage (Dadfar et al.,2013). Small and medium sized enterprises (SMEs) as they are increasingly recognized as central contributors to innovations play a pivotal role in the national economies of countries all around the world.

In Italy, Japan and France, the number of SMEs accounted for 99% of the total number of enterprises. In the United States there were more than 2000 million SMEs, accounting for 98% of total number of enterprises although America was famous for its large enterprises (Liu,2012). In UK Small and Medium-Sized Enterprises (SMEs) constitute 99.9% of total number of enterprises,76% of employment, 53% of wages and salaries, 63% of turnover, 53.3% of value added at factor cost and 53.7% of gross investment in tangible goods (ILO 2017),

Factors That Determine Innovation in SMEs

A firm's operating environment, and strategic posture affect innovation. Because of this reason firms place a greater emphasis on innovation in difficult operating environments, characterized by short product cycle, rapid technological change, and intense rivalry (Laforet, 2011). Innovation allows organizations to better meet consumer needs, stay ahead of the competition, capitalize on strategic market opportunities, and align organizational strengths with market opportunities (Rujirawanich et al., 2011). In examining the literature, innovation in SMEs is determined by many factors and some of the factors are highlighted below.

Finance Factor

Innovation capacity refers to availability of resources, collaborative structures, and processes to solve problems. In the SME context, available resources are mainly related with financial factors and skilled workforce (Laforet, 2011). According to Xie et al. (2013) financial capital is one of the resources required by a firm to start, operate or grow. It is important to have adequate level of finance and also it is an essential condition to make a technological innovation. The authors pointed out the importance of financial factors for SME's and indicates that small firms placed greater emphasis on finance than medium and large-sized firms (Xie et al., 2013). However traditional innovation literature stresses that larger firms have an advantage in innovation. This idea is based on three important arguments.

First, larger firms have stronger cash flows to fund innovation. Equally, larger firms may have higher assets to use as collateral for loans. Second, a larger volume of sales implies that the fixed costs of innovation can be spread over a larger sales base. Third, larger firms may have access to a wider range of knowledge and human capital skills, which are pre-requisites for innovation OECD. (2010). SMEs. Furthermore, larger organizations may have greater access to the resources needed to implement innovations. Lacking such resources, smaller organizations are forced to make difficult tradeoffs in their investment choices and often give up implementation of expensive technologies.

Technological Capability

It is very costly to develop new products or technologies. As a result, competing firms are forced to bring together their mutual resources and competencies and combine them to speed up the product development task and to develop unique products or technologies. However, cooperative relations are not easy and involve high costs and risks (OECD, 2017g). According to Xie, et.al (2013) the technological innovations of the enterprise were based on in-house technological capability. Thus, Gnyawali and Park, (2009) argued that it is important that in-house training of labor was a continuous process.

Consumer Preferences

As customers can particularly drive innovation in SMEs, companies work closely with their customers on contractual work, and often have to develop new products to meet their requirements. Sometimes new ideas may come from the customers themselves. Customer orientation has an impact on product development. Their influence is particularly important in new product ideas, new product launches, process innovation, cross-functional teamwork, interdepartmental connection, and to a lesser extent, in business strategy (Laforet, 2011). The indicators such as strong brand awareness, expressions of consumer preference, and high levels of market share are important factors for overall firm performance in SMEs (Lamprinopoulou and Tregar, 2011).

Economic Factor

Economic structure plays a crucial role in innovation (Rujirawanich et al., 2011). The financial and economic crisis has impact on all areas of business activities and results in problems with accessing to financial sources which are needed to finance investments, especially for innovations (Lesáková, 2014). Moreover GNP affects the development of SMEs (Karpak, 2010). To encourage SMEs growing eventually leads to growth, innovation, and employment in the economy (Volchek et al., 2013). And also the role of SME's are very important in achieving economic growth and creating new employment opportunities. Consequently SMEs are responsible for much of the innovation which leads to new higher value products and services (Karpak, 2010).

Management Skills

Manager/leader management style is one of the most important organizational characteristic predicting innovation adoption among organizations. Managers tend to be in more indirect roles that allow for experimentation, open mindedness, and collaboration (Yongyoon and Kim, 2012). Middle managers can communicate and reinforce objectives for innovation. They can facilitate and promote entrepreneurial activity in the firm, provide resources and expertise, reduce bureaucratic layers, and promote collective understanding and interpersonal (Sahar and Rostom 2013), These broad actions can shape the organization's culture and value systems, increasing its receptiveness for innovation (Kelley et al., 2011).

Knowledge and Learning Capability

Organizational learning defined as a collective capability based on experiential and cognitive processes and involving knowledge acquisition, knowledge sharing, and knowledge utilization. It

supports creativity, inspires new knowledge & ideas and increases ability to understand and apply them (Gjini, 2014). The processes of learning at organizational level involve key components that support knowledge productivity processes, which include searching for information, assimilating, developing and creating new knowledge on products, processes, and services. (Günsel et al, 2011) Thus, Organizational learning have noted a positive relationship between organizational learning and innovation (Kelley et. Al, 2011). This literature underlines the importance of organizational learning capability (Klewitz and Hansen, 2014). The authors defined set of actions that ensures learning capability: effective generation of ideas by implementing a set of practices such as experimentation, continuous improvement, teamwork and group problem-solving, observing what others do, or participative decision making. Learning capability much more important for SME's to identify and respond to market cues better, faster, and cheaper than rivals as well as underpins the SMEs' competences needed to efficiently develop new products (Orcas, 2011).

Market Orientation

It is defined as “the organization-wide generation of market intelligence pertaining to current and future customer needs, dissemination of the intelligence across departments, and organization-wide responsiveness to (Laforet, 2011). The authors used three core concept customers' focus, marketing coordination and profit of marketing and covers three basic activities: 1) integration of market information related to customers; 2) the dissemination of market information inside enterprise and 3) design and implementation of an answer to such information (Lamprinopoulou and Tregear 2011). Market Orientation is typically involved with doing something new in response to market conditions, it is considered as an antecedent of innovation (Lecerf, 2012). Empirical research has found that the degree to which a firm is involved in new product development activity is significantly associated with the extent and nature of its market orientation Lesáková, (2014), are all found that the market orientation strongly influence innovation. So companies get involved in market orientation, they higher their level of innovation.

Competitive Advantage

In knowledge economy, innovation becomes a key source of competitive advantages (Wang and Chung, 2013). Thus, if company has valuable and rare resources like physical assets, capacities, organizational culture, patents, trademarks, information, and knowledge, it can use these resources to implement value-creating strategies that cannot be duplicated by other companies to obtain sustainable competitive advantages (Chen, 2009; Serna et al, 2013).

The Impact of Knowledge on Innovation

According to Abraham (2008), the major intention of knowledge management is innovation. This argument was supported by Kostas et. al (2006) who proposed a conceptual model that links between knowledge management, innovation, and competitiveness. The author researched and found out that there is a relationship between knowledge management, innovation and competitiveness and further highlighted the strategic nature of knowledge development.

Furthermore, knowledge management influences innovation and competitiveness in that successful knowledge management acts as a coordinating mechanism to enhance both innovation and organizational performance (Ju et..al., 2006); Eardley, and Uden, 2011). Through proper knowledge distribution and sharing, organizations can build knowledge management systems that improve the innovation process through quicker access and movement of new knowledge, (Lopez-Nicolas, et.al. 2011).

In addition, effective knowledge management is a critical success factor when launching new products. Authors such as Du Plessis (2007), Eardley, and Uden, (2011) highlighted the impact of value proposition of knowledge management on innovation process as follows:

- Knowledge management ensures the flow of knowledge used in the innovation process;
- Knowledge management provides platforms, tools and processes to ensure integration of an organization's knowledge base;
- Knowledge management assists in identifying gaps in the knowledge base and provides processes to fill in the gaps in order to aid innovation;
- Knowledge management assists in building competencies required in the innovation process;
- Knowledge management provides a knowledge-driven culture within which innovation can be incubated.;
- Knowledge management facilitates collaboration in the innovation process.

Thus, knowledge management assists in creating tools, platforms and processes for tacit knowledge creation, sharing and leverage in the organization, which plays an important role in the innovation process. (Paterson, 2013). Knowledge management ensures the availability and accessibility of both tacit and explicit knowledge used in the innovation process, using knowledge organization and retrieval skills and tools such as taxonomies, (Du Plessis, 2007).

According to Liu and Zhang, (2012), knowledge management is a management function that creates or locates knowledge, manages the flow of knowledge and ensures that knowledge is used effectively and efficiently for the long-term benefit of the organization. In the authors' opinion an organization that demonstrates competence in knowledge. Many knowledge management definitions exist. Xie, et.al, (2013) describe knowledge management as the formalization of and access to experience, knowledge, and expertise that create new capabilities, enable superior performance, encourage innovation, and enhance customer value.

The authors also describe knowledge management as an umbrella term for a variety of interlocking terms, such as knowledge creation, knowledge valuation and metrics, knowledge mapping and indexing, knowledge transport, storage and distribution and knowledge sharing. The author defines innovation as the creation of new knowledge and ideas to facilitate new business outcomes, aimed at improving internal business processes and structures and to create market driven products and services. Innovation encompasses both radical and incremental innovation.

Yongyoon and Kim, (2012) is of the opinion that knowledge management is about supporting innovation, the generation of new ideas and the exploitation of the organization's thinking power. Knowledge management also includes capturing insight and experience to make them available and useable when, where and by whom it is required. Knowledge management allows easy access to expertise and know-how, whether it is formally recorded or in someone's mind. Knowledge management further allows collaboration, knowledge sharing, continual learning and improvement. It underpins better quality decision-making and ensures that the value and contribution of intellectual assets, as well as their effectiveness and their exploitation, is well understood.

In the author's opinion, knowledge management is as a planned, structured approach to manage the creation, sharing, harvesting and leveraging of knowledge as an organizational asset, to enhance a company's ability, speed and effectiveness in delivering products or services for the benefit of clients, in line with its business strategy. Knowledge management takes place on three levels, namely the individual level, team level and organizational level.

It is a holistic solution incorporating a variety of perspectives, namely people, process, culture and technology perspectives, all of which carry equal weighting in managing knowledge. Liu and Zhang, (2012) argued that knowledge management is not solely focused on innovation, but it creates an environment conducive for innovation to take place.

Methodology

The literature acknowledges the importance of grounded data collection in the study of entrepreneurship Thomas, (2011). Thus, this study employed the qualitative research methodology to ensure that the innovative practices of the companies studied were captured. This approach provided a basis for

understanding the behaviour of case study SMEs, which helped to answer the core questions relating to innovation behaviour of these companies. An important element of this approach is its capability to assess every aspect of the actions of the companies studied. The use of qualitative methodology was necessary because rather than testing concepts, it allowed experiential understanding while still allowing comparison (Creswell, 2013b).

Research Design

The case study approach was central to the research and was employed extensively to provide qualitative data. The approach explored the “how” and “why” questions relating to process, Yin, (2009), which allowed a deeper, individualised understanding of the process of decision-making in companies. The study involved in-depth organisational analysis with a view to obtaining comprehensive knowledge of innovative behaviour in particular SMEs. The research required considerable time to observe and document the data on individual and organisational behaviour and activities.

Methods of Data Collection

The combination of interviews and observation applied in this study is known as triangulation (Thomas, 2011), because it enabled the researcher to explore the differences between what participants actually do and what they say they do, thus offering a degree of verification (Tight, 2010). This approach helped to eliminate any defects associated with any one method and the data from each can be used to illuminate the other Baxter and Jack, (2008) considers a combination of interviews and direct observation to be an optimal approach for the study of process.

Face-to-face interviews were conducted with owner managers and other relevant senior management personnel, in order to explore subjective perspectives and establish their versions of the reality of innovation. The interviews were semi-structured, a technique which allowed firstly, flexibility which in turn, enabled the topics to be covered, but not necessarily in any prescribed order, and secondly, the opportunity to follow up issues raised during the course of the interviews (Flyvbjerg, (2011). The interviews provided an opportunity for the researcher to probe deeply to “uncover new clues, open up new dimensions of a problem and to secure vivid, accurate inclusive accounts that are based on personal experience” Crowe, et al. (2011). Therefore, interviews provided an understanding of how participants constructed the meaning and significance of the framework of innovation perceptions and practices. The social context of an interview is intrinsic to understanding the data collected.

A series of up to five in-depth interviews per firm were conducted. Although owner-managers were the prime focus of attention for the interviews, operational managers such as, marketing and production managers were also interviewed. Selecting interviewees in accordance with manager’s line of work helped in checking and stabilising conflicting evidence (Piekkari, et al. (2009). The first interview, which was mostly targeted at owner managers, took the form of sensitising propositions generated through the literature review and exploratory discussions which were semi-structured in nature. They also focused on company business objectives and attitude to innovation. This helped to highlight the major issues of the research and was also useful in building rapport.

The interest in the background of owner-managers was a preliminary assessment of whether certain types of background/characteristics influence creative thinking and innovation within the organisation.

The Sample

Given that the research was designed to be inductive, involving longitudinal data collection over a 12-month period, a sample size of four firms was decided upon for the qualitative case study. The choice of four firms was influenced by Rosenberg and Yates, (2007) who argue there is no ideal number of cases to include in the sample, however, a number between 4 and 10 usually works well. The authors further explained that with fewer than 4 cases it is often difficult to generate theory,

while with more than 10 cases, it quickly becomes difficult to cope with the complexity and volume of the data.

To be included in the study, firms had to be in existence for at least a year and firms of the same age were avoided. The firms had to be of different sizes possibly up to 250 employees. Therefore, the sample was stratified into four employee groups of 10-19, 20-49, 50-99 and 100-250 employees, with at least one firm selected in respect of each group. Whatever the number and composition of sample firms, the adoption of any research method often involves trade-offs (Abebe, (2014). In common with any research project, this study had its own methodological limitations for instance, the amount of data collected may not accurately reflect the views of the wider population (Patton Mills et al. 2010). Below is a matrix showing the profiles of the case study companies.

FINDINGS AND DISCUSSION

This study has attempted to shed light on the characteristics of innovative activities in SMEs. The research began by examining the motivations of owner-managers as a logical first step to understanding innovation behaviour in the context of small and medium enterprises. The approach adopted involved detailed accounts from the actors themselves and is based on the philosophy that the objects studied are in fact subjects, who can produce accounts of their world. The approach was based on one key principle: the need to adopt a fairly broad view of what constitutes innovation by including changes across four different dimensions, namely:

- **New Products:** Where innovations comprise novel products that have been introduced on the market. Such innovations can involve radically new technologies, or can be based on combining existing technologies in new uses, or can be derived from the use of new knowledge.
- **Improved Products:** This dimension of innovation involves an existing product whose performance has been significantly enhanced or upgraded and may have been improved in terms of better performance or lower cost, through the use of higher-performance components or materials. The characteristics or intended uses of improved products are likely to differ significantly from those of previously produced products.
- **Process Innovation:** This is the adoption of technologically new or significantly improved production methods, including methods of product delivery. These methods may involve changes in equipment, or production organisation, or a combination of these changes, and may be derived from the use of new knowledge.
- **Organisational Innovation:** This includes: the introduction of significantly changed organisational structures; the implementation of advanced management techniques and the implementation of new or substantially changed corporate strategic orientations.

The results complement complexity theory, which suggests that innovative firms are connected and interdependent with the environment, and that these firms exhibit a continuous pattern of large and small changes Battistella, et al. (2017). For instance, in sample companies C and D owner managers reported incremental innovations most frequently than radical innovations. Among the incremental innovations identified were efforts to identify the “best practices” throughout their firms to improve efficiency (a procedural innovation). They also created a conducive environment for innovation which allowed an “entrepreneurial spirit” to flourish (a structural innovation), and designed parts both mechanically and digitally (a technological innovation).

Furthermore, among the incremental innovations identified in company C for example, were satellite communications services between clients and engineers, allowing the engineers remote access to all their computing applications connect with client files either occasionally or routinely (a personnel innovation). The company also reported expanding into mobile commerce and devices that included Internet and email access, (a strategic innovation). The results are consistent with complexity

Table 1. Matrix: Case Study Company Profile

Company	Type of Business	Date Established	Legal Status	Number of Employees	Turnover < (Million)	Innovation Perspective
A	Recycling	1985	Limited	54	3.6	Radical innovation comprising transformation of a new idea or technological invention into a marketable product or process.
						Actively involved in developing new markets
						Introduced the most advanced technology
						Little manifest demand for university supplied services.
B	Liquid Systems	1989	Limited	120	4.2	
						Fundamental and radical innovation
						Developed new exports markets
						Introduced advanced technology
						Expanded products to foreign markets
C	Wind Turbines	1993	Limited	35	3.8	Developed links with universities on R&D, but could foster more collaboration.
						Incremental modification of processes
						Confined to domestic markets
						Improvement of current technologies and systems
						No great penetration of relationships with universities.
D	Commercial Lifts	1991	Limited	18	2.8	
						Incremental innovation
						Small domestic customer base
						Lower level of adopting start-of-art technology Minimal collaboration with universities, but would like to foster relationships in the area of R&D and graduate work placements.

theory in that the organisational processes and structures conducive to innovation are embedded in environments characterised by uncertainty and rapid and unpredictable market and technical changes.

The results indicated that radical innovation such as conducted by sample companies A and B was linked to environmental dynamism, a finding that is consistent with Fagerberg et al. 2012 who suggested that “effective organisations in environments with substantial technological and/ or legal/social uncertainty” tend to undertake reorientations or quantum (radical) change. Whether environmental or organisational variables most strongly affected innovation remains open to question. However, the managing director from sample company A commented that identifying environmental problems often opened up new possibilities for innovation. The following are the results per each question researched:

Research Question 1: How is innovation defined from the perspective of case study companies?

The associations with the term “innovation” varied considerably between the sample companies and ranged between the origin of every innovative idea to the listing of concrete products and service innovations, market adaptations and organisational combinations. This rather heterogeneous view

of the term “innovation” Verganti and Öberg, (2012), as exposed by the interviews confirms that there is also not only one definition of innovation in business nor is there one single definition in the literature. Innovation has been analysed for a very long time already and has been defined in several different ways depending on the research focus and interest. However, the emphasis of most of the definitions Baregheh, et al. (2009) has been to include product, market, and process innovations, and technological absorption capability. Notwithstanding this, some of the empirical studies already undertaken have analysed product and process innovations and disregarded market and introduction of new organisational forms (BIS, 2011)

The analysis was based on the framework, of different levels of innovation meaning as prescribed by the European Commission European Commission, Innovation Union Competitiveness Report (2011) which distinguished central dimensions of innovation according to the questions “new to whom?” and “new in what context?” That, in essence, helped to classify companies A and B products as new to the market, while companies C and D modified products and enhanced processes that already existed in the market. By allowing for the fact that innovation needs to be interpreted through an analytical distinction between different classifications, it is clear from the study that different types of innovation have different potentials to different organisations.

Furthermore, companies A and B were considered to have introduced radically new technologies and therefore could be classified as highly innovative. However, C and D could be judged to be fairly innovative since their incremental or modification innovations Linton, (2009) significantly improved production methods that were new to the firms. For example, company C re-organised its skill base and a result was able to modify gas engines to high-speed wind turbines. While D significantly enhanced its range of special lifts in terms of design modifications, better performance and lower cost. According to Norman and Verganti, (2012, innovation can be broadly defined to include both improvements in technology and better ways of doing things in all aspects of the business. Hence, companies C and D can still broadly be classified as innovative.

Research Question 2: To what extent are companies involved in market development?

All the four sample companies proved that intimate knowledge of the market was regarded as key to the success of their innovative activities. They believe that marketing can be a battle of perception, not ideas or products because all truth is relative to what people perceive to be true, and that becomes the truth. For instance, company C proved that sometimes it is better to be first in the mind than to be first in the marketplace.

However, as found in OECD (2010), the possession of an innovative product appears to significantly increase a firm’s export potential. For instance, companies A and B, with highly innovative products, had developed new export markets as compared to C and D which had developed incremental innovations and remained confined to their domestic markets. Companies C and D shared the same features for instance, they developed niche products and are small players that sell products to a small domestic customer base. The companies indicated that great ideas are one thing; and getting them into the minds of others is another.

Despite these differences, four innovative firms are clearly making an important contribution to economic development through generating income from non-local sales. Geographical market development including exporting constitutes an important way in which local firms can engage in national and global networks which, as Chakraborty, (2012) has argued, are essential for long term regional growth and likely to be beneficial to the learning and innovation process within SMEs.

In relation to the ways in which new customers were sought, all the sample companies were looking to find new customers using the internet as a marketing tool, although all introduced some aspect of marketing (particularly sources of market information and promotion such as customer visits, using trade literature and attending trade fairs and exhibitions). However, only in A and B was the internet used as an innovative marketing tool. As such, e-commerce technologies appeared

to have been of key benefit to these two companies, and the internet in particular when used, as a communication tool appeared to give them the ability to find and disseminate information with very quick turn-around times.

As others have noted by Pickernell, et al. (2013) the Internet promises to extend the market reach of SMEs in various ways, including advertising products and services using websites, and providing better customer support through remote diagnostics. According to Jones et al. (2014) comparative evidence suggest that this is an area where SMEs are generally lagging behind big companies since 16% of UK firms with less than 100 employees using the Internet.

Research Question 3: How innovative were the firms in terms of introducing new technology?

Although classic models of technological development suggest a straightforward linear path from basic research and development to technology commercialisation and adoption, in practice technology diffusion is more often a complex and interactive process (Norman and Verganti, 2012). Indeed the findings of the present study suggest that technology can be adopted and adapted in multiple ways and with significant variations, (depending on the particular technology) across time, over space, and between different industries and enterprise types. At a more detailed level, it was companies A and B which introduced the most advanced technology, with the latter reporting committing 15% of its turnover to research and technology development. These two companies also received support for R & D from the UK SME supporting agencies such as Business Angels and the Merseyside Special Investment Fund. This is clear evidence that these two companies emphasised the development of new knowledge, product and processes, which in turn shifted advanced technology out of the laboratory and into commercial use.

If we focus solely on the use of computer technology in the main production process, all the four firms showed a high level of use of computer-aided and computer-controlled technology. This is because in many cases, diffused technologies are neither new nor necessarily advanced (although they are often new to the user). Yoo, et al. (2012) suggests that diffused technologies may be acquired from a variety of sources, including private vendors, customers, consultants, and peer firms, as well as public technology centres, government laboratories, and universities. Of the sample companies, D was found to use less advanced technology less intensively than the other three sample companies. However, even though the technology was one-step behind the leading edge it was still new to the firm.

The evidence of a lower level of adopting of state-of-art technology by company D may be a reflection of an inferior approach to process technology absorption compared with its counterparts because of the cost involved. The owner manager of company D argued that the company's limited investment in advanced state-of-art technology does represent a rational response to the cost of production, since the company found it to be the most efficient way of producing products.

With the view that market failures and strategic interests also exist in the process of technology adoption, Hanna, (2008) this finding was also supported by (Tidd and Bessant, 2009). In their argument, those authors noted that potential users of new technology face uncertainty, and with it information and learning costs, and other externalities, which may result in under-investment in available technologies. Company D reported that it did not want a fully automated, Web-based marketing capability, as the company believed that their present approach of visiting and talking to their UK clientele worked very well; the company only needed increased exposure to existing customers.

In contrast, companies A and B being more technically proficient companies, appeared able to use e-commerce technologies to achieve benefits quite comfortably. For example, their high expectations of broadening their customer base have indeed become a reality for the companies. The continued interest of these organisations in taking e-commerce further has been fuelled by their experience of numerous hits on their Web sites and numerous enquiries from individuals and agents. Although it can be difficult to gauge the conversion of enquiries into orders (due to the use of agents and other complicating factors, the two companies reported never having been busier. They reported that efficient

communications had improved relationships with customers and enhanced customer and supplier service. Godin, (2008) finds that increased e-commerce technology usage is positively correlated with business success. Nevertheless, it is asserted that the potential benefits of increased technology usage include more efficient planning and operations as well as integration of activities (OECD, 2010).

Company B reported that it had recently invested in a new technological centre which in its turn had caused the company to respond to the market more effectively. The result demonstrated the unquestionably technological capabilities of the firm. In that regard, (OECD, 2010, confirmed that the main competitive advantage of SMEs are their ability to react quickly to changing technological conditions, because of their short internal means of communication, and their non-bureaucratic internal structure giving incentives to innovative behaviour.

The effort to enhance technological absorptive capabilities thus involves a complex series of network of issues, such as, information provision, management training, and raising questions of structures for the company. In support of this view, Commission of the European Communities, (2010), noted that it is necessary to stimulate the adoption of technology within SMEs as these type of firms are running behind larger companies regarding the application of new technology.

Research Question 4: To what extent do the companies acquire knowledge through collaborative networks to innovate?

An important proposition arising from the literature review (see Fagerberg and Shrolec (2008) confirmed that the ability of firms to innovate is linked to the extent to which they enter into interactive relationships. The sample SME managing directors were therefore asked to verify the scope and nature of collaborative relationships in existence. They were further asked to explain how such collaborative networks increase their knowledge and permit innovation, (Fink and Ploder, 2009). Special attention was given to the extent to which collaboration was enhancing innovation through knowledge flows and individual and organisational learning. Insofar as less engagement with centres of excellence has affected innovation levels in some firms, the conclusion of this study is rather equivocal. However, according to Yeşil, (2013), innovation requires firms to go beyond internal boundaries and break knowledge barriers through linking with centres of excellence such as universities.

Evidence from the case material provided by company A suggests that if an idea is fundamental and has not been experienced elsewhere, linking with a university could not provide answers because the idea is unique. For example, the managing director believed that consulting a university is regarded as merely igniting a thought. Central to this argument is the belief that if the university had the answers, they would have developed the idea first. Contrary to the above view Gordon, (2012) suggested that many contemporary innovations demand a new type of entrepreneur, one that can act within and across established organisational boundaries. Gordon further explained why that is essential by highlighting the complex nature of many of today's technologies. The sort of risks faced by SMEs, and opportunities open to the enterprises willing to collaborate and pool resources and expertise require collaborative relationships.

In the case of company D, the managing director indicated R&D to be a potential area of activity that might link the company to a university. The managing director highlighted other areas of need for the company as including improving the employability of future graduates through work experience placements. This area has always been regarded as a strong tradition within modern universities linked to combining vocational and academic content. Evidence provided by Burke, (2011) illustrated how university/industry partnership mechanisms can range from grants to collaborative research, consortia agreements and training. In terms of functional goals, such partnerships often seek to enhance the commercialisation and diffusion of technology, support strategic research and technology objectives.

However, all the four sample companies investigated found it particularly important for sources of creative ideas to emerge through feedback loops of interactive processes between customers and suppliers. According to Tidd and Bessant, (2009) it is precisely in this type of communication where

collaboration can provide a distinct advantage, even in an age of rapid communication and sophisticated information systems. Concentrations of firms, suppliers, and buyers found in many areas can provide short feedback loops for ideas and innovations.

The data showed that the SMEs studied were less likely to engage with a university in the fields of continuing education and training. A key consideration in education and training is that flexibility should exist in the nature of collaboration that educational and training bodies enter into with adjacent firms. BIS (2012) suggested joint development of specialised courses and curricula, although national curricula may be too slow to change and be unsuited to the technical specificities of particular enterprise training requirements. The scope for interaction in these areas is also curtailed by the relatively small number of SMEs engaged in fundamental technological and service innovation. However, the relatively high levels of projected involvement and the fact that the companies studied felt it was desirable to improve industry-academic links.

Company B in many respects developed links at a number of levels and in several instances appeared to be well served by university contacts although not by local universities. The managing director highlighted that most engagements for the company focused on R&D. However, company A, C and D seemed to find it exceedingly difficult to obtain greater penetration in their relationships because of the perceptions that the companies hold about getting support from a university. Specifically company A appeared to have little manifest demand for university supplied services. According to the managing director, support would be difficult to achieve because the company's products are unique and novel. The managing director was of the opinion that it will not be easy to find solutions to ideas that have never existed before. However, he admits that limited involvement could be a potential hindrance to innovation on his company's part.

Evidence provided by the European Commission, Innovation Union Competitiveness Report (2011) echoed the above concern and confirmed that a weak collaboration at the commercial level between the business community and Centres of Excellence is believed to be hindering performance on innovation in SMEs. It is perhaps these assumptions, more than anything else, which need conceded action by local universities to convince such companies that there is still a lot to offer despite the fact that ideas may be fundamental and unique.

CONCLUSION

Depth of Debate on SME Exploratory Research

In this exploratory research based on a multiple case study, important differences between the several dimensions of SMEs' innovation capacity have been highlighted. The study demonstrated that SME specificities are determinant of innovation and market competitiveness factors. Because SMEs lack of resources and competencies, they need to design and plan a deliberate innovation strategy to detect, use and integrate external resources and competencies. Furthermore, the findings contribute to the literature on SME specificities by more deeply engaging in the debate on SMEs' heterogeneity some scholars recommend building a diversified framework that depends on SMEs' heterogeneity, but they disagree as to what heterogeneity factors influence SMEs' innovation. By contrast, other scholars consider heterogeneity to have a minor impact on SMEs' innovation and encourage future research to focus on dominant characteristics shared by innovative firms

Contribution to Knowledge

The study offers added value by showing that innovation is less a question of radical technological advancement than a way of thinking and of viewing the enterprise and its surroundings. The study makes a conceptual contribution to knowledge, adding value to the work of Linton (2009) who believes that innovation has to involve making a fundamental or a radical change comprising transformation of novel ideas or technological invention into a marketable product or process. The study recognises

that innovation is such a broad concept and that all its facets which include product, process and organisational innovation must be simultaneously activated.

The study conducted by Drucker, (2001) focuses on innovation as a significant technical advancement within a given industrial context. But this present study suggests that innovation has to be broadened to include an introduction of newness into an organisation by application of a new idea or approach. This can only work as long as there are creative individuals to do this as well as an effective mechanism to stimulate creativity within the organisation.

Policy Implications

The implication of this study for policy makers is that, success in innovation depends critically on collaborative relationships. The study has highlighted that innovation should be a system where innovative activities are carried out interactively between firms and knowledge suppliers through collective learning processes. Yet, few SMEs have access to a ready-made 'innovation' network' linking them with centres of excellence such as a university, or technology and innovation agencies. Therefore, it is suggested that policymakers should facilitate networking opportunities where SMEs can interact with centers of excellence. There is strong evidence that successful entrepreneurs capitalize on networking activities to obtain key information that facilitates the development of tacit knowledge and creativity, which in turn, lead to innovative activities. (OECD, 2010). Furthermore, the findings are an encouragement to the universities to continue strengthening and extending their relationships with local SMEs.

Limitations

The implications for further research result partly from the limitations of this study, and partly from new insights, which it has generated. As with most academic studies, the findings of this research are limited to the extent to which they can be generalized to a wider population of SMEs because the sample was not random, but convenient sampling was employed on the basis of ease of access and from one geographic location.

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