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# **Understanding the Adoption of Clusters by SMEs in Australia using Innovation Diffusion Theory: A Case Study**

**A thesis submitted in partial fulfilment of the**

**requirement for award of the degree**

**Master of Information and Communication Technology - Research**

**from**

**THE UNIVERSITY OF WOLLONGONG**

**by**

**Ye Ryung (Claire), Kim**

**(MICT, University of Wollongong)**

**School of Information Systems and Technology**

**2007**

## **Thesis Certification**

### **CERTIFICATION**

I, Ye Ryung, Kim declare that this thesis, submitted in fulfilment of the requirements for the award of Master of Research, in the School of Information Systems and Technology, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Ye Ryung, Kim

6 June 2008

## **Author's Publication Relating to This Research Topic**

‘Understanding the Adoption of Clusters by SMEs ’,  
Presented at the 15<sup>th</sup> *Science and Technology and Economic Progress ( STEP)*  
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presented at *the 3rd IEEE International Conference on Management of Innovation  
and Technology*. Singapore, 21-23 June 2006.  
<http://www.icmit.net/program/>

## **Author's Award Relating to This Research Topic**

The 2006 Annual Research Poster Presentation, Received award “Runner-up (IT) for  
best Research Poster”, 20 October 2005.

*Trust in the LORD with all your heart, and lean not on your own understanding; in  
all your ways acknowledge Him, And He shall direct your paths.  
Do not be wise in your own eyes; Fear the LORD.  
(Proverb 3:5-7)*

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## List of Acronyms

The following are the list of abbreviations used in the text.

Abbreviation	Meaning
ABS	Australian Bureau of Statistics
ISIG	Innovation Summit Implementation Group
KBE	Knowledge-based Economy
OECD	Organisation for Economic Cooperation and Development
R&D	Research and Development
SME	Small to Medium-sized enterprise

## Abstract

SME clustering has attracted much attention to date as it encourages SMEs to achieve competitive advantage through co-operation. Although the Australian government advocates and actively promotes the formation of SME clusters, much academic commentary is dissatisfied with the theory on clusters, in particular its reliance on geographic proximity. The literature primarily addresses the benefits of industry clusters but overlooks the processes of how clusters are formed. This leaves some sections of the SME population underserved particularly those involved in horizontally integrated value chains. This thesis explores the formation process of a horizontal alliance and compares this to Rogers' innovation-diffusion theory. Through a case study of an Australian carpet buying group, SMEs were surveyed to collect data on the characteristics of buying group growth over a 13 year period. Our results show that the S-shaped innovation diffusion pattern of Rogers' theory accurately describes the growth of the buying group over this time. In particular, strong support was found for the opinion leadership theory. The use of Rogers' theory led to a better understanding of the role of networks and ICTs in promoting information sharing. In particular, the research finds that the dominant theory of geographical proximity advanced by Porter (1998a) needs to be qualified in relation to horizontally integrated value chains where SMEs share a high degree of homogeneity.

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## Chapter 1

### 1. Introduction

#### 1.1 Introduction and Overview

This study seeks to understand the processes that underpin cluster formation within Small to Medium Enterprises (SMEs). Using innovation diffusion theory, it explores the process of cluster formation by a group of SMEs in Australia. To that end the thesis addresses two fundamental issues that affect SMEs. The first relates to cluster formation in SMEs as a way of generating more efficient economies of scale. The second relates to the difficult issue of promoting innovation diffusion in a group in the economy that is severely limited in its capacity to do so (Burgelman et al., 1996). In tandem, the thesis provides a penetrating insight into the formation of a horizontally integrated cluster over time.

#### 1.2 Background of the Study

The domain of this study focuses on SMEs and SME clusters within Australia. SMEs play a key role in the development of the emerging knowledge based economy (KBE) by contributing to the national gross domestic product (Davis et al., 1996). In a KBE, knowledge is a driver of productivity and economic growth. It leads to a focus on the role of information, technology and learning in economic performance (OECD, 1996). A knowledge based economy is characterised by continuous innovations and positive externalities thereby needing a wide range of knowledge resources (Hearn & Mandeville, 2005, p. 225). While SMEs are usually a source of new products and inventions, its potential to innovate is usually limited by budget, capital, and staffing

skills (Mueller, 1988; Riemenschneider & Mykytyn, 2000). Accordingly, these problems are not effectively addressed by using methods that are suitable for larger companies.

This issue has implications also for establishing broad-based guidance to SMEs in their adoption and use of information and communication technology (ICT). The received theory on ICT adoption by SMEs is that it enables SMEs to enter into global competition by securing local elements of competitive advantage (product and service differentiation) and leveraging on better access to information and specialised resources, flexibility and rapid adoption of innovations (Whittaker et al., 2003). Even though such assertions may be plausible there is still a need to provide practical advice to SMEs.

The factors that motivate SMEs to work co-operatively can be generally related to the need to generate economies of scale. Such economies of scale relate to reduced transactions costs, access to infrastructure, improved knowledge sharing and reduced risk (Czamaniski, 1974; Mytelka & Pellegrin, 2001, 2001; Porter, 1998a; Visser, 1996). Successful examples of such co-operations are often referred to as “clusters”.

Generally, there are two streams of issues surrounding the topic of SME clusters. One pertains to the lack of understanding of the process of cluster formation. The focus of most literature on clusters has primarily addressed the effects of clustering on the national economy (Baptista and Swann, 1998; Porter, 1998a, 2000b; Rosenfeld, 2002a; Rosenfeld, 2002b; Malmberg & Power, 2003; Stewart & Luger, 2003) or on the benefit of industry clusters (OECD, 1996, 2000a; Forsman & Solitander, 2003; Lake, 2004; Sohn, 2004; O'Malley & Cast, 2005). In summary, this attention to ‘big picture’ issues overshadows the process of how SMEs adopt and develop clusters.

This leads to the second issue which pertains to the vagueness of what constitutes a SME cluster. Much academic research in SMEs clusters focuses on vertically integrated



clusters that are distinguished by heterogeneous firms providing complementary inputs into a single production process (Hansen, 1992; OECD, 1996; Jonsson, 2002; Ketels, 2003; Spilling & Steinsli, 2003; Ingley, 2004). This is most clearly seen in the work of Porter (1998a) who emphasises the issue of geographical proximity as an explanatory factor underpinning success in clustering.

However the thesis of geographic proximity appears to have some limitations. For example, McCann and Arita (2006) warn that regional groupings of companies in the semi conductor industry did not naturally lead to co-operation. It appears that if one carelessly applies a regional approach to organise SMEs into clusters, important detail may be overlooked.

This is particularly apparent if one compares vertically integrated value chains and horizontally integrated value chains. While the former is naturally disposed to regional groupings it does not follow to apply this framework to the latter where such companies are in direct competition. The reality of many SMEs is that they face competition from large national companies in regional markets. As a consequence such SMEs need to generate comparable economies of scale across geographically dispersed members in order to effectively compete. The application of cluster theory based on geographic proximity is inappropriate for these SMEs.

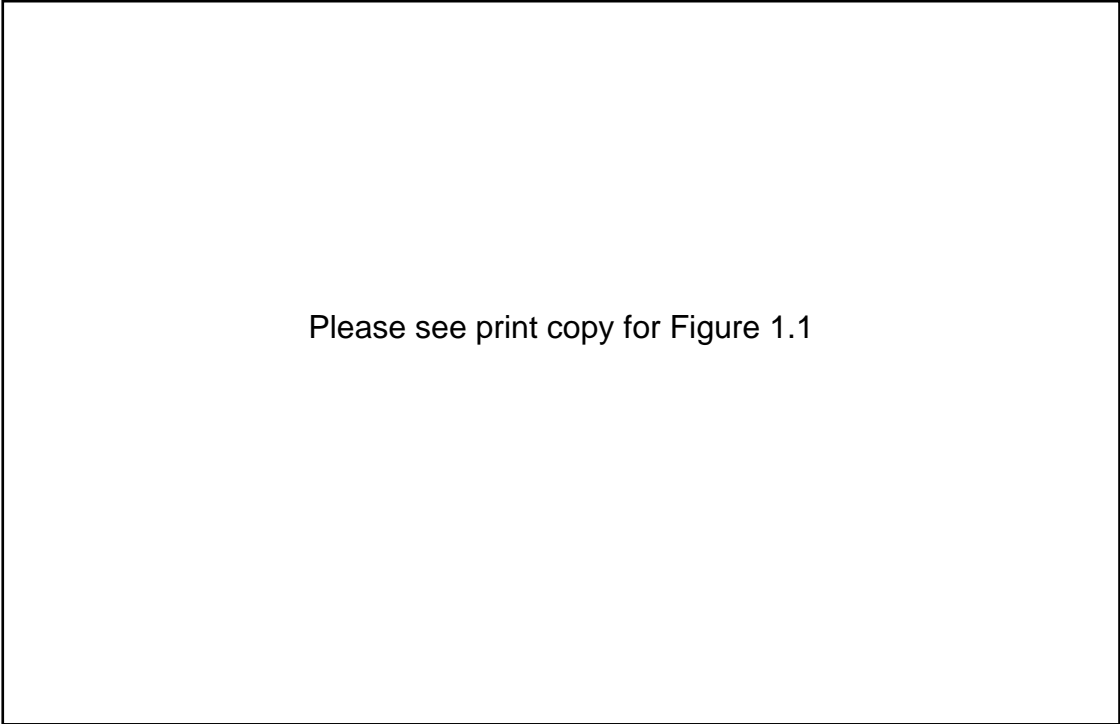
The response of this thesis is to draw on a related area of SME research that looks at innovation. If one views the clustering process in terms of knowledge and the diffusion of knowledge, innovation diffusion processes come into play. Innovation diffusion theory may open up avenues to analyse the area of cluster formation better.

### *1.2.1 The Role of Innovation Diffusion for SMEs – Australia's Case*

SME innovation diffusion research indicates that many of the factors leading to alliances have been associated with innovation. As evidenced in Figure 1.3, the innovation diffusion process traditionally involves huge financial resources, and is quite risky for SMEs (Baldwin & Scott, 1987).

SMEs generally do not have the resources to fully conduct research even if they are good at perceiving ideas. In fact, this view was first maintained by Schumpeter (1966) where he stated that even though small firms were the sources of most innovations, large firms with some degree of monopoly power were more likely to be the sources of innovation. It is understandable why larger companies rather than smaller ones better support innovation diffusion processes with their strong cash flows (Caputo et al., 2002). In this context cluster formation can be seen as a cheap alternative to expensive product innovation.

SME innovation diffusion research is constrained by insufficient knowledge of innovative activity in that sector. Government attention is focused on capital intensive innovation. Innovation diffusion and SMEs are often associated because of their ability to develop new product and services (Mueller, 1988). Towards the end of the 1990's, Williams (1999) observed that SMEs constituted 54% of the inventions leading to overall innovation in Australia. A study by McAdam (2000) supported this claim and suggests that innovation ultimately leads to domestic growth and international competitiveness.



Please see print copy for Figure 1.1

**Figure 1.1 : Barriers to Innovation (firms in percentages)(Caputo et al., 2002)**

There is a need to give greater recognition to cheaper forms of innovative activity in relation to business processes. It is clear from the above arguments that SMEs need to generate economies of scale such as forming alliances with both associate and rival firms through clusters if they are to achieve competitive advantage. More recently, it has been demonstrated that SMEs overcome the difficulties of limited resources by joining knowledge clusters and localised knowledge networks. In current years, innovation networks for SMEs have become increasingly important in political and economical agendas in industrialised countries. In this context, it is important to understand the process of adoption or diffusion of innovation concept within SMEs (Mohannak, 2007; Lohrkea et al., 2006). “Clustering” itself is a relatively new notion for SMEs. The idea of adopting the notion can be considered as an innovation. The processes involved in the adoption of the notion from consideration to implementation can be considered as diffusion of that innovation.

The advantage of an innovative diffusion milieu in this approach to understand clustering is that it emphasises the importance of successful collective learning processes (Mitra, 2000) and the benefits obtained by SMEs in the cluster (Ratti et al., 1997). It also allows for an understanding of the processes that led to cluster adoption and the kinds of advantages and disadvantages yielded before and after adoption. To date, the use of innovation diffusion theory as a framework to understand cluster adoption by SMEs is relatively new. It is anticipated that this approach will address the need for additional understanding of clustering (Keeble & Nachum, 2001).

### 1.3 Statement of the Problem

The primary purpose of this study is to use innovation diffusion theory as a framework to understand the formation of horizontally integrated clusters. It does this by exploring the innovation diffusion process of an Australian SMEs case study. Bringing together these two areas of research presents a formidable challenge only some of which this research project intends to address.

The novelty of this study lies in the assumption that the cluster idea is an innovation per se. In particular, we test this notion by drawing on Rogers' innovation diffusion theory (2003) to investigate if SMEs adopt the cluster idea as an innovation. In order to examine the process of cluster formation in SMEs, four research questions have been developed and addressed within a single case study.

- Research Issue 1: does the pattern of cluster growth over time follow Rogers' innovation diffusion pattern? This question relates to Rogers' finding that the diffusion of innovation in a society will follow an S-shaped adoption pattern among the target population.

- Research Issue 2: in examining how SMEs came to join the cluster is it possible to isolate opinion leadership as a cause? This question emerged from Rogers' identification of opinion leadership as a critically important factor in the diffusion of an innovation.
- Research Issue 3: what are the benefits (pre-adoption and post-adoption) that SMEs seek in a homogeneous SME cluster? What are the current impediments to the adoption of clusters by SMEs? This question recognises the special nature of the cluster under study being of a horizontally integrated nature. The specific factor that motivate members to initially join and the factors that sustain them are revealed.
- Research Issue 4: does geographical proximity matter in homogeneous clusters? If so, to what extent? This question responds to a dominant area of discourse in the clustering literature where Porter claims (1998) that geographic proximity is the key to understanding the clustering notion. This enables conclusions to be made about the role that ICTs play within this case study.

#### 1.4 Aims, Significance and Expected Contribution of the Study

The main aim of this study is to understand the process of SME-cluster formation by using Rogers' S-shaped innovation diffusion model. This introduces a different research focus in cluster formation, which has relied on geographic proximity as a dominant explanatory factor. More specific objectives of the research are as follows:

- to understand challenges and complexities related to SME clusters as being related to innovation and learning;
- to suggest ways SMEs can sustain competitive advantage through SME clustering; and

- to define a theoretically supported strategy for ICT implementation for SMEs when forming clusters.

### 1.5 Working Definition of SMEs for the Study

SMEs can be defined from a qualitative and a quantitative perspective. From a qualitative perspective, the Wiltshire Inquiry (1974) in Australia provided one of the earliest definitions of a SME. The Wiltshire Inquiry was commissioned by the Federal Government of Australia to examine management problems faced by SMEs. It defined a SME as one “....in which one or two persons are required to make all of the critical management decisions: finance, accounting, personnel, purchasing, processing or servicing, marketing, selling, without the aid of internal specialists, and with specific knowledge in only one or two functional areas” (Wiltshire Inquiry, 1974).

A quantitative perspective, on the other hand, describes SMEs by nature of their size or quantity. For instance, the Australian Bureau of Statistics (ABS) accepts the definition of SMEs in Australia to include employment of 20 people in the non-manufacturing industries and up to 100 people in the manufacturing industry (ABS, 2002b). There is no clear-cut line as to what constitutes a small or a medium sized enterprise. Moreover, in the definition provided by the ABS, little is known about the characteristics of the firms. Existing literature on SMEs usually focus more on “small businesses” rather than medium-sized ones (Bromson, 1995).

For the purpose of this research the top three category of the European Commission’s classification of SMEs (Peacock, 2004) shall be adopted in defining SMEs. See Table 1.1.

Please see print copy for Table 1.1

**Table 1.1: European Commission's Classification of SMEs (Peacock, 2004)**

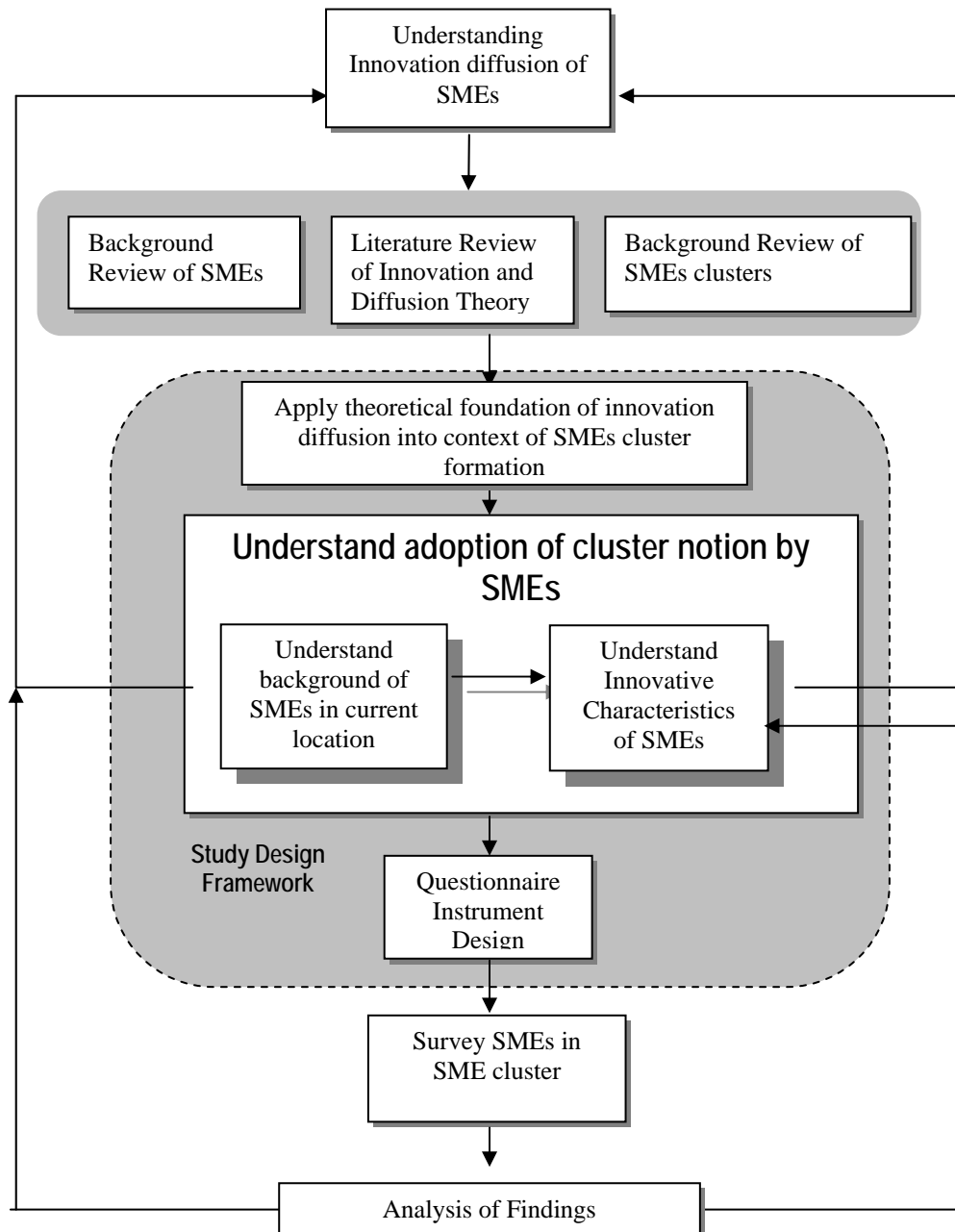
The European Commission's classification offer finer gradations in size, and this is potentially useful in better defining responses to SMEs problems. A qualitative definition serves similar purpose which is to enable targeted interventions. This include an extensive list of features such as small management team, lack of environmental control, lack of promotable staff, limited market share and so on (Reynolds et al., 2000). In doing so, another significant characteristic that distinguishes SME from larger enterprises emerge – that small firms are not simply small-scale versions of large companies (Barnett & Mackness, 1983). This is particularly relevant to making ICT interventions for SMEs. The environment encapsulating the problems and benefits of ICTs for larger firms may not be necessarily applicable to SMEs (Riemenschneider & Mykytyn, 2000).

## 1.6 Working definition of Cluster for the Study

As the definition of cluster involves a greater discussion owing to the diversity of theoretical views and perspectives, its working definition and the process of arriving at the definition is detailed in section 2.3 in the next chapter. Without much elaboration at this point, it is sufficient that clusters be regarded as a popular model of “inter-firm networking”.

## 1.7 Research Framework for the Study

The research framework depicted in Figure 1.4 outlines the step-by-step procedures undertaken for the study. A detailed explanation of the model of the research methodology undertaken and justification of its utilisation is presented in Chapter 3.



**Figure 1.2: A schematic flowchart depicting the research framework for the study**



## 1.8 Limitations

The limitations of case study research lie in its restricted scope. In this research the phenomena under study is limited to horizontally integrated (homogeneous) clusters. This means that contrasts drawn with vertically integrated (heterogeneous) clusters will be largely theoretical which in turn maps out useful directions for further research. Only SMEs within the Australian context will be explored meaning that conclusions will be most relevant to SMEs in Australia. The single case study undertaken further restricts the generalisability of the results even to an Australian context.

## 1.9 The Study

In using innovation diffusion theory to better understand the process of cluster formation the study is empirically based. Chapter 2 begins by presenting a review of the literature on SMEs, clustering and innovation diffusion theory. After defining process innovation as more appropriate for SMEs, Rogers' model of innovation and diffusion will be reviewed. Rogers' principles play an important role in developing the research methodology.

Chapter 3 provides an overview of the design of the study. After discussing the topic of research philosophy, the chapter goes on to explain case study methodology as the most appropriate response to the research questions. The chapter concludes with an overview of the design of the data collection methods and the procedures that will be used to analyse qualitative and quantitative data.

In Chapter 4, the findings from the surveys distributed to the target group SMEs are reported. Basic statistical analysis is performed on numerical data while qualitative data is compared to the literature.

Once the findings of the research have been described, analyses of all the research findings are reported in Chapter 5. The critical findings of the research indicate strong associations with Rogers' theory of innovation diffusion. This translates into a set of recommendations that have been mapped against the objectives of this study.

Chapter 6 concludes the thesis by discussing the implications for cluster formation among SMEs. The value of innovation diffusion research indicates greater attention should be given to information and knowledge development when planning for cluster formation. Finally, the drawbacks of the study are presented along with directions for future research.

## Chapter 2

### **2. Perspectives on Cluster Formation and Innovation in SMEs**

#### 2.1 Introduction

This chapter highlights the need for an understanding of the social processes that contribute to the formation of clusters in SMEs. Innovation diffusion theory is identified as a viable framework to understand such processes. The means by which innovations are diffused to society, the factors that motivate adoption of innovations along with the underlying information processes provide an alternative perspective on cluster formation. This in turn provides a way of meaningfully developing strategies for facilitating cluster formation through the implementation of ICTs.

The chapter begins with a review of literature on clusters. It moves on to justify the use of innovation diffusion theory as a response to cluster formation in both a practical sense and theoretical sense. Rogers' theory of innovation diffusion is explained highlighting specific principles that will be ultimately used to guide the development of the research instrument.

#### 2.2 SME Clusters in Australia

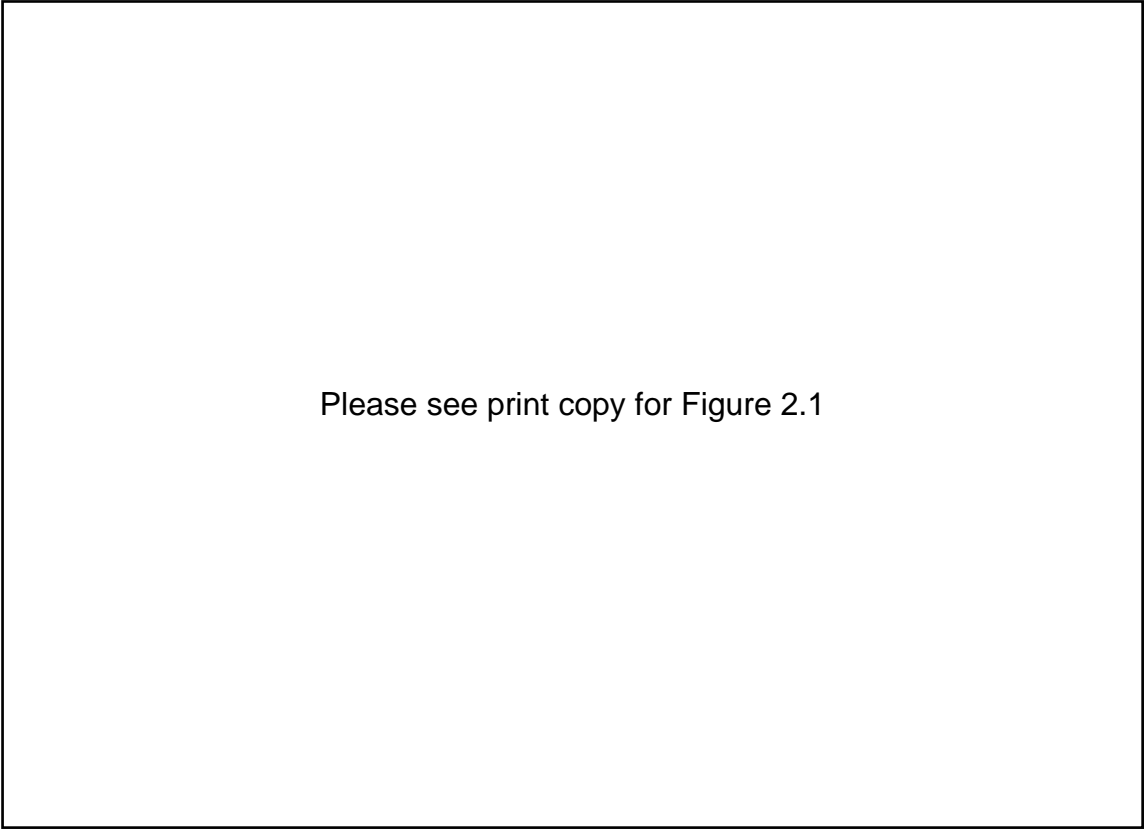
A great deal of literature about clusters in Australia identifies key factors in the development of clusters, with a particular emphasis on their role in regional development (Johnston, 2003). In regions where economic activity is low, clustering is a way of boosting innovation and investment for firms thus allowing firms to gain synergies and leverage economic advantages through access to knowledge embedded in

clusters (Roberts & Enright, 2004). Clusters have become recognised as a potentially effective method for enhancing competitive advantage (Mohannak, 2007; Lohrkea et al., 2006), and governments around the world have sought to develop methods to identify actual and potential clusters and to promote their formation and operation (Johnston, 2003). Examples of clusters in Australia include areas in aluminium and ferro-management (Tasmania), water management, defence and advanced electronics, multimedia (South Australia), thoroughbred racehorse breeding (NSW), defence (ACT) Oil and defence cluster are the cornerstones of the Australian Marine Complex (Western Australia). Other clusters include Australia Tropical Foods (Queensland), surfing (Victoria) and marine services, mineral processing, and NT Food Group (Northern Territory) (MacGregor & Hodgkinson, 2007, p. 17).

There are two general approaches to cluster development in Australia (Johnston, 2003). The first approach is the industry approach, which considers cluster formation and development as a process based on industry-specific value chains. Usually, this kind of cluster is named as a natural cluster or a deduced (top down) cluster (Johnston, 2003). Such clusters are often large, with a long history of a product in the industry, or are multi-regional, internationally focused and driven by powerful externalities such as affiliations, alliances and industry associations. The Australian wine, finance and tourism industries are examples of this type of cluster.

The second approach is where clusters are facilitated or induced (Johnston, 2003). These are mostly regional and consist of small industry groups or local business networks forming a micro cluster of a new regional industry. This approach involves strong public policy support and initiatives to stimulate the development of localized industry innovation and collaboration to develop a cluster.

An example of the second approach can be seen in the way the Australian government has implemented clustering initiatives differently from state to state (Braun et al., 2005a). There are recent reports on few successful Australian clusters in the agricultural sector (Insights, 2002) and also from the tourism industry. The example shown in Figure 2.1 is about a vertically integrated cluster whereby the hotel, restaurants, local transportation, government agencies and other connected industries altogether comprise the tourism cluster.



Please see print copy for Figure 2.1

**Figure 2.1: Cluster Development, Cairns (Australia) Tourism (Porter, 2000a)**

Even though there are successful stories about various cluster formations, Australian clusters have issues of deficient focus and lack critical mass (Brown, 2000). In New South Wales (NSW), a cluster development and cross-industry collaboration study showed that among the clusters, firms had low trust and much initial uncertainty about collaboration (Braun, 2003; Braun et al., 2005b).

There is a need for approaches that are able to account for socio-technical processes. The industry approach focuses on the natural development of cluster and second approach focuses on clusters that are formed by other forces such as regionally targeted public policy. Both do not determine a role for communication nor do they distinguish between vertically integrated (heterogeneous) clusters and horizontally integrated (homogeneous) clusters.

### 2.3 Definition and Historical Background of Clusters

Clustering has been of considerable interest over the last decade. The phenomenon of cluster itself is not something new and has been around wherever there is geographic concentration or firms who exchange know how and collectively innovate (Lake, 2004). The cluster notion was initially pioneered by Alfred Marshall (1920) who developed the idea of ‘industrial districts’ after observing how firms in a small geographic area performed superiorly.

Despite a long history of research it is hard to pin down a single definition of clusters (Murphy & Wu, 1997; Gordon & McCann, 2000). In summary, there are three views based on the significance of geographic proximity in clusters formation and effectiveness. Firstly, proximity of firms is generally and frequently the first sign that something interesting is happening and proximity can even be useful as an operational variable (Visser, 1996). According to Porter (2000b, p15) a cluster is “a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities”. The process of clustering involves intense interchange among industries in the cluster. Porter (2000b) observed that this works best where the industries involved are geographically concentrated. Although geographical proximity remains a key characteristic in most cluster definitions (Doeringer & Terkla, 1995), other perspectives do not echo the same view.

Other researchers such as Rosenfeld (1997) argued that geographic proximity does not matter much in defining a cluster. Such authors choose to concentrate on the positive externalities that are created through the availability of skilled labour, of certain kinds of infrastructure, of exchanging innovation-generation and co-learning. For example Czamaniski (1974) and Visser (1996) insisted that the cluster term was used in industry sectors related through formal production linkages regardless of geographic proximity. Collective efficiencies are achieved by way of reduced transaction costs (Mitra, 2000; Mytelka & Pellegrin, 2001).

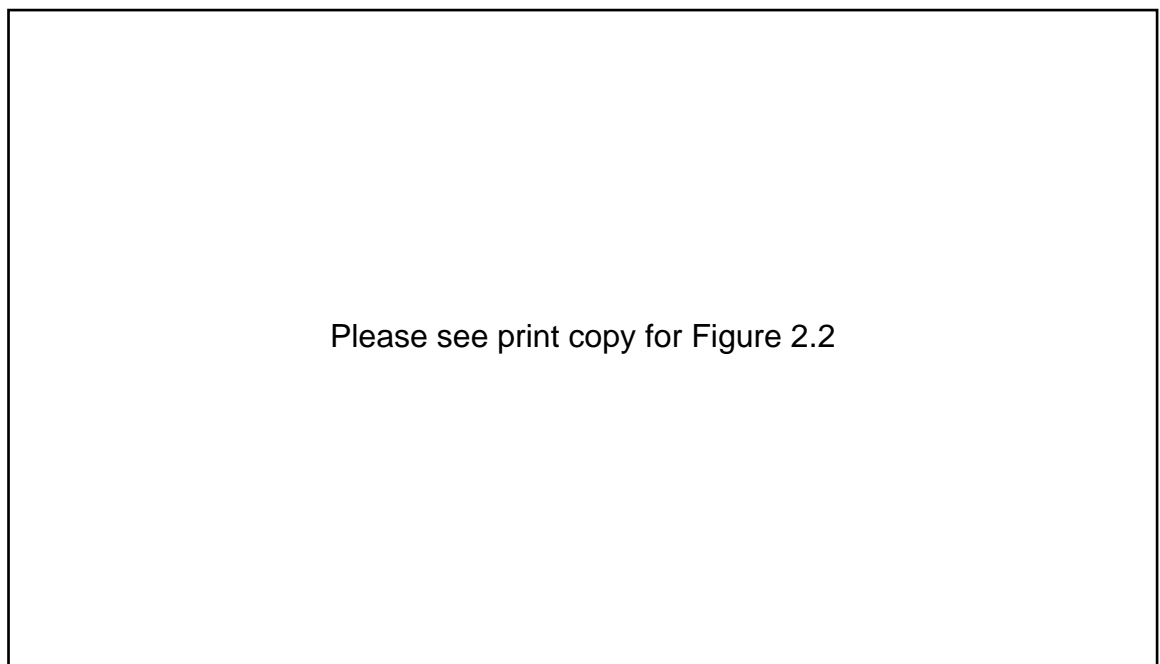
Such relationships between users and producers can reduce the costs in terms of information and communication. Contrary to the economist perspective, sociologists suggest that clusters bear characteristics of social network topologies (Wasserman & Faust, 1994; Scott, 2000). If the economy is seen as a complicated network held together by economic transactions, clusters can be seen as those areas of a network where connections are very much intense and economic transactions are overlaid by other types of relationships. John and Michelle (2003, p 1) defines clusters “as one of the popular models of interconnected-firm networking”. Geographical and direct proximity is only one of possible relationships, such as shared educational characteristic, division of labour and so on (Visser, 1996).

The third position is one that recognises geography as an important element only so far as it supports the effectiveness of the network interactions. For example Sverrisson (1997) argued that geographical proximity is flexible and it depends on the nature of the firms within the cluster. This highlights the need for researchers to take account of the special nature of activities taking place.

## 2.4 Heterogeneous and Homogeneous Cluster

One aspect that suffers by adopting geographical proximity as a foundation in defining clusters is when attention is given to horizontally integrated (homogeneous) clusters. There are generally two types of clusters that are found in the literature; the first describes heterogeneous companies which provide complementary inputs in the production of a good or service. The second describes homogeneous firms that provide similar services to multiple production processes. Porter (1998c) advises that vertical linkages can be identified by looking firstly upstream and downstream in the production processes. Horizontal chains of industries are identified based on the use of similar specialized inputs or technologies or with other supply-side linkages. This is best explained through the use of a relevant example.

Figure 2.2 shows diagrams of the Italian leather footwear and fashion cluster which is example of a heterogeneous cluster.

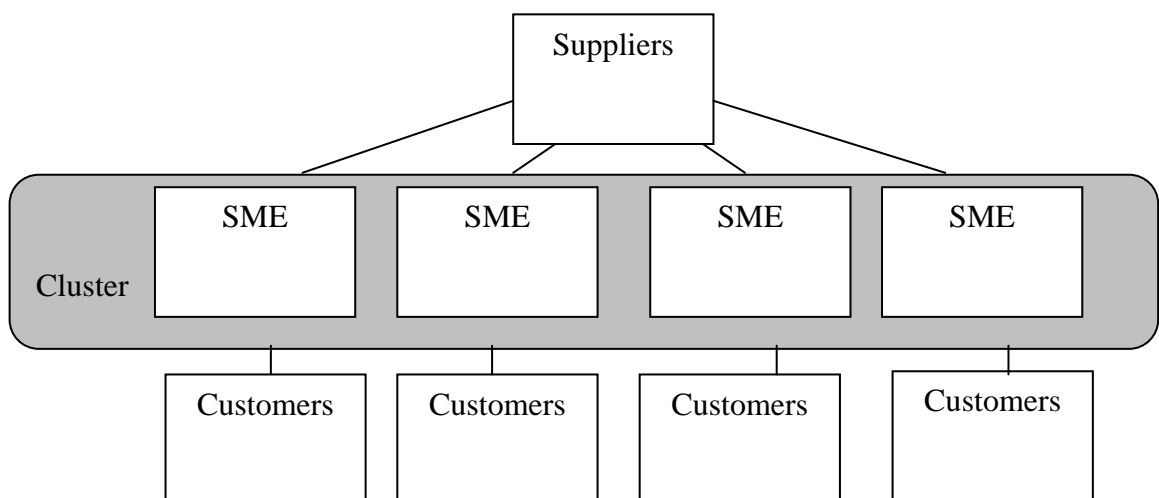


**Figure 2.2: The Italian Footwear and Fashion Cluster (Porter, 2000a)**



Several chains of related industries involved in the Italian leather footwear and fashion cluster can be observed. This include different types of leather goods (complementary products, common inputs, similar technologies), different types of footwear (overlapping channels, similar inputs, and technologies), and different types of fashion goods (complementary products). These industries also employ common marketing media and compete with similar images in similar customer segments. The extraordinary strength of the Italian cluster can be attributed, at least in part, to the multiple cross-firm linkages and synergies that Italian firms enjoy.

Homogeneous clusters, on the other hand, do not seem to enjoy the same level of scrutiny. For example, McCann and Arita's (2006) study of the semiconductor industry clusters reveal that the motivation for forming an alliance among such SMEs is similar to heterogeneous clusters such as the desire to achieve greater economies of scale. However, the different contexts in which these economies are to be achieved relate to common upstream channel (suppliers) and downstream targets (customers). In view of the common customer base, it seems such SMEs can be in direct competition if working in the same local market. Therefore, the notion that such SMEs be geographically proximate is logically inconsistent.



**Figure 2.3: Horizontally Integrated Cluster**

The emphasis on vertically integrated clusters in the literature indicates a need for greater attention to homogeneous cluster. This is particularly true if homogeneous clusters span state level boundaries because it is difficult for more than one firm to operate and co-operate in the one region. It follows that regionally based initiatives are not going to address the needs of such homogeneous clusters.

In the context of this study, these specific issues of geographically dispersed horizontally integrated clusters are given central attention. The choice of case study in this research is in line with the definition of homogeneous clusters - the shops (firms) have similar products and target the same customer base. Importantly, the shops are located in different regions thereby reducing the value of cluster theory based on geographical proximity.

## 2.5 Benefits of Clusters

When defining benefits of clusters, the literature does not distinguish between heterogeneous or homogeneous alliances. In order to compare heterogeneous alliance with heterogeneous alliance it is necessary to establish a benchmark as recorded in the literature for comparison purposes in the research instrument.

Generally, clusters maximise opportunities for SMEs by assisting them to overcome barriers that they may not have been able to overcome by themselves. Traditional barriers of SMEs include lack of finance, high risk, lack of motivation, lack of information and limited management capability. The OECD report (2000) also noted that clustering is the most prompt way for SMEs to achieve economies of scale while maintaining their flexibility and capacity to respond quickly to changing demand.

SMEs within a cluster can share the costs of training, marketing and research with other SMEs and support organisations (Waits, 2000). They can access technology by carrying out R&D with other firms and universities or by labour mobility or by participating in information sharing forums. Export opportunities are maximized by better access to market research, participating in export consortia and attending world trade fairs. Not only SMEs can reduce costs by bargaining with suppliers and service providers as part of the cluster but also clustering fosters innovation (MacGregor & Hodgkinson, 2007), Enright and Robers (2001) summarize a number of studies that connect innovation with innovation and argue that clusters provide a supportive framework for innovation in terms of the collection of workers, researchers, managers, information, suppliers, customers, and finance. Clusters are associated with informal, unplanned, face-to-face oral communication that is conducive to the innovation process. Porter (1998 a) argued that firms in a cluster can experiment at lower costs and can delay large commitments until they are more confident that the innovation will work. Baptista (1996) suggests that a localized pattern of development facilitates a collective learning process and increase the speed of diffusion of new innovation by helping to cope with the uncertainty related to business cycles and unemployment.

### *2.5.1 Knowledge Sharing Perspective*

Some researchers like to emphasise the potential of clusters to promote communication. Some firms form networks to generate a powerful learning and knowledge sharing system (Martinez-Fernandez, 2001). Firms which are close to each other are more likely to develop an effective knowledge sharing relationship. Firms endowed with knowledge-related capabilities (for example, skilled staff and ICTs) have more capacity for innovation and in turn have theoretically higher competitive advantage.

Clustering thus provides SMEs with knowledge benefits. Keeble and Wilkinson (2000) suggest that the central driver for clustering is for SMEs to gain access to localised explicit and tacit knowledge networks. Some examples are:

- information spill overs (effective knowledge transfer);
- flexibility and rapid change reaction due to extreme specialisation;
- easier imitation and faster innovation adoption ; and
- gaining better and easy access to special resources, information and tacit knowledge (Green et al., 2001).

Both formal and informal networks promote benefits of information sharing (Tayler & McRae-Williams, 2005). High levels of networking and trust create efficient knowledge sharing to form strong ties (Granovetter, 1973) and dependable relationships (Nonaka & Takeuchi, 1994). A strong tie increases trust and trust in turn enhances the environment for members to exchange information, knowledge, new ideas (innovation) and existing ideas (know-how). This fosters a higher level of localised collective learning, competitive advantage and innovation (Capello, 1999; Keeble & Wilkinson, 2000). Interestingly Granovetter (1973) identifies the weak ties of mutual acquaintances as productive sources of new ideas. Clearly, this discussion provides support for the link proposed between cluster formation and innovation.

## 2.6 Innovation

The following sections investigate the concept of innovation diffusion as a theoretical perspective on cluster formation. After providing a general discussion about Australian innovation initiatives for SMEs, the thesis moves on to detail Rogers' (2003) theory of innovation as a framework for the research instrument.

SMEs play a key role in the development of the emerging knowledge based economy by contributing to the national gross domestic product (Ceglie & Dini, 1999; Gray, 2006).

While SMEs are usually a source of new products and inventions, its potential to innovate is usually limited by deficiencies in budget, capital, and staffing skills (Mueller, 1988; Riemenschneider & Mykytyn, 2000; Allocca & Kessler, 2006). Competitive advantage in SMEs is dictated by its ability to invent, innovate and diffuse products and services that provide differentiation within the industry (Freel, 2000). However, SMEs face threats from larger companies which usually have more capacity to research and develop new product and services.

Links between clustering and innovation have been established in the literature. Braun et al. (2005a) claims that clustering leads to better innovation among SMEs. Enright and Roberts (2001) document how the state of Victoria, Australia used the industrial based clusters policy to bring in significant national & foreign companies. However, the use of innovation diffusion theory in understanding cluster development appears as a unique research initiative.

This thesis therefore argues for the significance and usefulness of innovation diffusion theory as the underlying influence of cluster formation and development (Keeble & Wilkinson, 2000). The key reason for that is innovative ability is the vital element for firms to prosper in the long-term. Apart from other long-term benefits, innovation is even more crucial than cost efficiency for long-term gains (Nelson, 1993; Nonaka, 1994; Grant, 1996).

### *2.6.1 The Root of Innovation – Creativity, Discovery, and Invention*

Innovation is defined as an idea, practice or product that is perceived as new by potential adopters even if it had existed earlier elsewhere (Rogers, 1995, p. 264). This definition is limited in the sense that an innovation can be as simple as coming up with a new idea, but not actually putting the idea into practice. Williams (1999), on the other

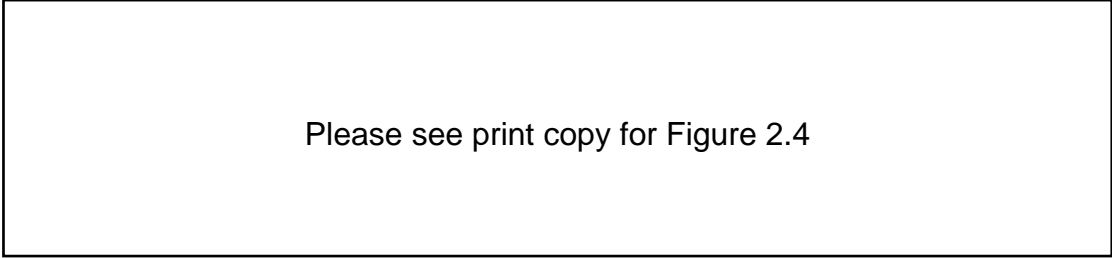
hand, describes innovation as the art of commercially applying the new and better idea. More specifically, it is the process by which entrepreneurs are catalysts for change by converting opportunities into marketable realities. In the latter definition, emphasis is placed on the creation of new wealth, rather than new knowledge, and eventual successful implementation of ideas. It is important to realise that the core element of innovation is creativity, which stems from invention and discovery.

The process of innovation is closely linked with creativity, discovery and invention. Creativity is essentially the source of all inventions, and ultimately all innovations. Considered as a way of thinking and as a driver for change, Williams (1999) views creativity as something that is novel (ie. bearing a unique value), practical (ie. usable, solving or fulfilling an existing problem or need) and understandable (ie. able to be replicated or used by others).

Discovery means the learning of the existence of something that was thought not to exist at all. More often than not, discoveries are accidental, fortunate and stumbled upon rather than intended. Such kinds of discoveries are usually not what was being sought after, but are valuable anyway. Invention, on the other hand, is an activity that is set out to develop something new that will do something new or better (Williams, 1999). Synonyms of the term ‘inventive’ are original, creative, ingenious, imaginative, resourceful and so on. The main difference between discovery and invention is the existence of the thing being discovered or invented. Hence, while discovery implies finding something that actually existed before it was found, invention means creating something that never existed before.

However, this difference does not indicate that discovery and invention are mutually exclusive. The relationship is that of a cause-and-effect because the process of discovery may lead to the process of invention, and similarly, the process of inventing

something may lead to certain insights that lead to the discovery of something. Hence, the process of innovation encompasses the elements of discovery and invention, both of which stem from the roots of creativity. This is conceptualised in Figure 2.4.



Please see print copy for Figure 2.4

**Figure 2.4: Creativity, Invention, Discovery and Innovation (Williams, 1999)**

### *2.6.2 Types of Innovation*

In the innovation literature, there are two broad types of innovation that are either market-driven or technically driven (Williams, 1999). Firstly, innovation with a market emphasis comprises of the following.

- Product innovation: the invention or creation of new products. Product innovation refers to the development, production, and dissemination of new consumer and capital goods and services (eg ATM machine, Mp3 Player).
- Service innovation: the invention or creation of new services. Services can either be classified as personal (eg. Haircuts, dental work, and massages) or business (eg. Accounting, tax, immigration or legal advice).

Service innovations are different from product innovations in the sense that services are more intangible in nature. Therefore, the measure of service innovations is relatively more subjective and difficult as compared to product innovations. While product innovations are more focussed on developing or manufacturing a new product that is offered to the public in general, service innovations are more personal in nature because the consumer is actively involved in using the service when it is being performed

(Williams, 1999). Services are hence, quite highly labour intensive because of the need of human skills and expertise to deliver the service even though machines and tools may be deployed.

From the above descriptions, service innovation rather than product innovation appears as most applicable to SMEs when one considers the lack of resources that SMEs possess. As detailed in Caputo's (2002) findings on barriers to innovation, the most significant barriers relate to cost and risk and absence of skill workers. The option of experimenting with new forms of service as opposed to capital intensive product development appears as more appealing.

In situations where providing services to customers are not the focus of innovation a related term called "process innovation" becomes useful. According to (Davenport 1993), a process is a structured, measured set of activities designed to produce a specified output for a particular customer or market. Hence, the work activities are sequentially divided into stages bearing a time frame, a beginning and an end, and clear input and output criteria. Typical examples of processes in firms are product development, customer order acquisition, post-sales service and the like. Process innovation is therefore the introduction of something new into the structured methodology for doing work with a view to achieving dramatic and productive results. These results often bring about radical change(s).

In terms of change, it is important to distinguish between process innovation and process improvement. Davenport (1993) states that while process innovation usually means performing work activity in a radically new way, process improvement seeks a lower level of change. As an example, assume that a firm (Firm A) simply analyses its customer order-fulfilment process and eliminates non-value adding steps. This leads to the elimination of redundant job activities, down sizing of the firm, faster deliveries and



improved customer satisfaction. Assume that another firm (Firm B) also analyses its customer order-fulfilment process. However, instead of just eliminating non-value adding steps, it installs online order entry portals/terminals for customers, eliminates its direct sales staff, and authorises its frontline staff to handle finance and shipping orders. The degree of change in the business structure and in the way work is being carried out at the operational level explains why Firm A is making process improvements whereas firm B is practising process innovation. The other important elements to consider in the difference between process innovation and process improvements are the initial state before the change took place, the frequency of change, duration needed for change to occur, the management participation approach, scope of change, risks and so forth.

In the context of SMEs, Davenport's (1993) distinction of a process improvement over process innovation is useful for suggesting the idea that clustering may be a form of process innovation.

## 2.7 Diffusion of Innovation

As detailed in the Section 2.6, SMEs must be able to innovate, diffuse and commercialise its creations and inventions in order to be successful in the competitive arena. An innovation remains incomplete unless and until the ideas are implemented, or put in use successfully. In other words, ideas need to be diffused if they are to become innovations. Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system (Rogers, 1995, p. 5).

Theories of innovation identify communication as an important part of the innovation-diffusion process. Communication in the diffusion process is about the conveyance of new ideas (Rogers, 1995, p. 6). The communication channels could be in the form of mass media channels or interpersonal channels. While mass media channels are good

for broadcasting the awareness of a certain innovation, interpersonal channels are ideal for influencing the attitudes and beliefs of others towards the innovation.

The norms of the social system also play a crucial role in innovation diffusion. How well the innovation can be diffused depends quite heavily on the heterophilous<sup>1</sup> and homophilous<sup>2</sup> nature of the individuals in the social system (Rogers, 1995, p. 17). The more homophilous individuals are, and the more open-minded the mental model of the system is, the more effective the communication becomes. This allows for a smooth diffusion of innovation. The success of the innovation diffusion process also relies on the capability of the innovation diffusion advocates to influence the beliefs of others. These individuals are usually the opinion leaders, project champions, change agents, and aides who have a good understanding of the norms of the social system, individual behaviours and patterns, and the system structure (Roberts, 1987).

The characteristics of innovations perceived by an individual explain why innovations are either adopted or rejected. Rogers (1995, p. 15) conceptualises them as follows.

- *Relative Advantage*: the degree to which an innovation is perceived as better than the idea it supersedes.
- *Compatibility*: the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters.
- *Complexity*: the degree to which an innovation is perceived as difficult to understand and use.

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<sup>1</sup> Heterophily is the degree to which two or more individuals who interact are different in certain attributes, such as beliefs, education, social status, and so forth.

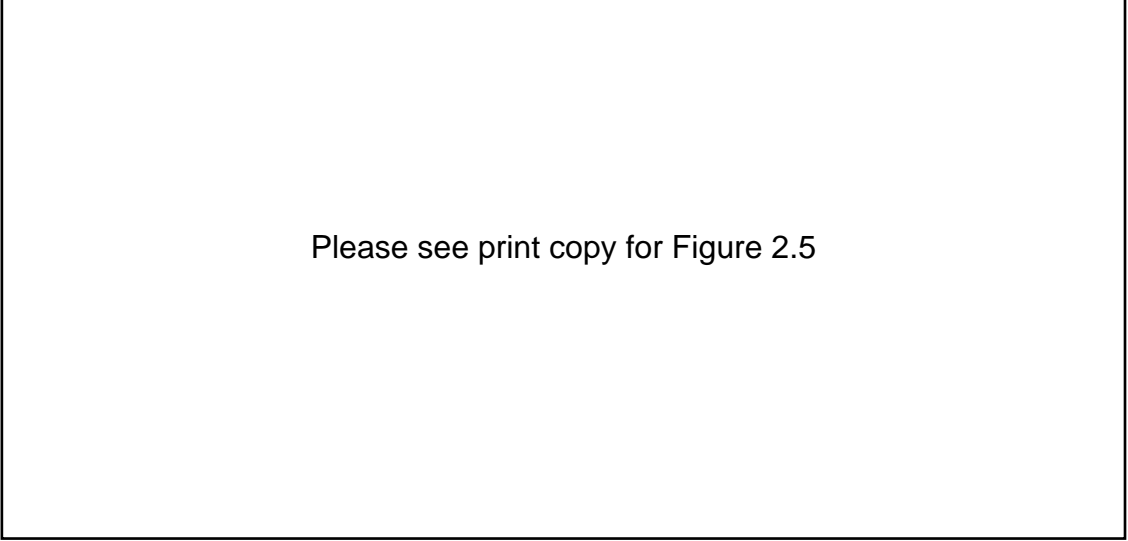
<sup>2</sup> Homophily refers to the degree to which two or more individuals who interact are similar in certain attributes.

- *Trialability*: the degree to which an innovation may be experimented with on a limited basis.
- *Observability*: the degree to which the results of an innovation are visible to others.

Other common characteristics could be learning-capability, communicability, profitability, social acceptance, and divisibility. The characteristics of innovation listed above are not exhaustive, but are certainly the most common ones that are inherent in all innovation diffusion frameworks.

#### *2.7.1 Rogers' S-shaped Model*

For most members of a social system, the innovation-decision depends heavily on the other members of the social system. Rogers (1995, p. 257) argues that empirically, the successful spread of an innovation follows an S-shaped curve (see Figure 2.5). He also argued that usually after about 10-25% of system members adopt an innovation, relatively rapid adoption by the remaining members occurs and then a period in which the 'holdouts' finally adopt. Rogers (1995) assesses the factors affecting the adoption of an innovation with the goal of elucidating how the earlier adopters of an innovation greatly affect the innovation-decisions of later adopters.

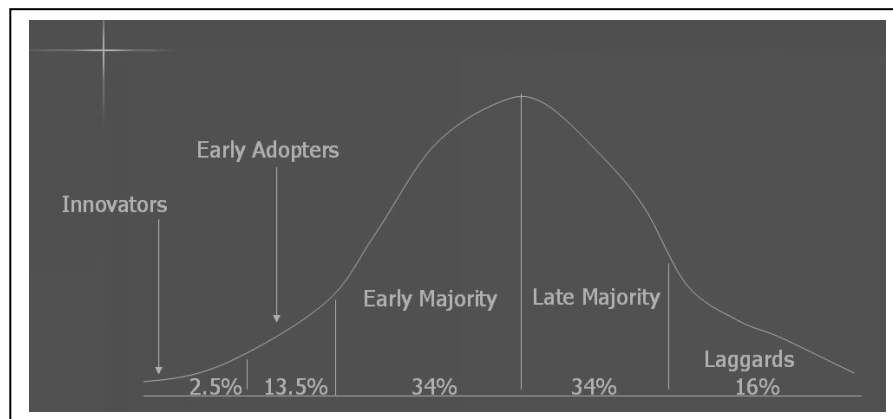


Please see print copy for Figure 2.5

**Figure 2.5: The Rate of Adoption for Innovation (Rogers, 1995, p. 106)**

The innovation-decision is made through a cost-benefit analysis where the major obstacle is uncertainty. People will only adopt an innovation if they believe that the innovation may yield some relative advantage to the idea it supersedes (Rogers, 1995, p. 208). The theory of diffusion of innovation claims that people usually postpone their decision-making when there is uncertainty or risk. However each individual's innovation decision can be made on personal characteristics and this variety actually makes diffusion possible. For a successful innovation, the adopter distributions follow a bell-shaped curve, the derivative of the S-shaped diffusion curve over time (Figure 2.6).

Diffusion scholars split this bell-shaped curve to characterise five categories of system member innovativeness, where innovativeness is defined as the degree to which an individual is relatively earlier in adopting new ideas than other members of a system. These groups are: innovators, early adopters, early majority, late majority, and laggards. The personal characteristics and interaction of these groups illuminates the aforementioned domino effect.



**Figure 2.6: Innovation Adopter Groups**

## 2.8 Opinion Leadership

In order to understand what spurs diffusion of innovation, Rogers (1995, p. 27) argued that there are individual roles in diffusion patterns in a social system. Scholars studying innovation diffusion constantly discovered that interpersonal contacts within and between social system were the most important influence on behaviour of adopters. Lazarsfeld et al. (1994) first developed the definition of the opinion leader in the study of political behaviour. The term ‘opinion leader’ has been used in many other studies namely: fashion leaders, gatekeepers, influencers, information leaders, key communicators, sparkplugs, style setters and tastemakers. All of these refer to the opinion leadership concept. This study uses the term ‘opinion leader’ to refer to those individuals who play a key role in diffusing innovations (Weimann et al., 2007).

In a social system, most members receive new information from other members within the system. However, most receive information with uncertain conditions of low reliability (Rogers, 1995, p. 215). Therefore, the role of these people is limited in the innovation diffusion process. Conversely, there are other individuals who are considered more reliable and able to persuade people to adopt the innovation by providing recommendations. These people are called opinion leaders.

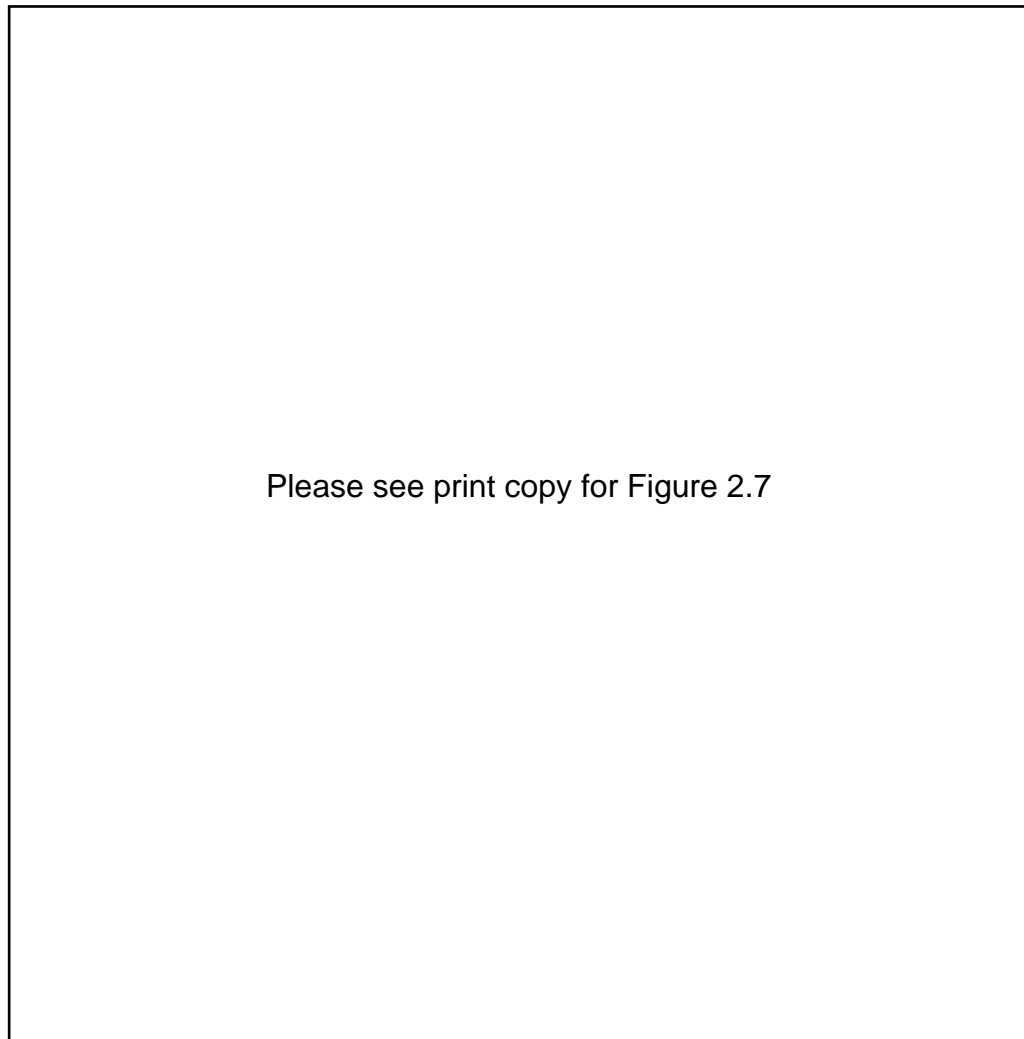
Rogers (1995, p. 281) defines opinion leadership as “the degree to which an individual is able to informally influence other individuals’ attitudes or overt behaviour in a desired way with relative frequency.” Therefore opinion leaders can be informal leaders rather than formal leaders of the social system in the innovation diffusion process. He also suggested that there are usually four characteristics of opinion leaders in a social system. Firstly, most opinion leaders are open to all forms of external communication. Secondly, opinion leaders are more cosmopolite<sup>3</sup>. Third, opinion leaders have higher social position than followers. Fourth, opinion leaders are more innovative than other followers. Opinion leaders can influence followers or other members in the system. They can promote ideas positively or even negatively.

### *2.8.1 Innovation Diffusion and Opinion Leadership*

Innovation diffusion and how information influences members of social systems lies at the heart of opinion leadership. Opinion leadership is not something new. Weimann (1991, pp. 267-279) argued that “opinion leadership was originally conceptualized as a combination of personal and social factors”. People generally rely on close ties of well-known contacts for personal and difficult problems. These individuals they rely on are opinion leaders for them. Thus, there are opinion leaders and opinion receivers (followers). For example, Figure 2.7 shows opinion leadership patterns in innovation diffusion.

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<sup>3</sup> The term cosmopolite here refers to the “citizenship” of the person within the social system. It also reflects the diplomatic nature and camaraderie of the opinion leader in the innovation diffusion process.



**Figure 2.7: Opinion Leadership Patterns in the Diffusion of Modern Math among School Superintendents (Rogers, 1971)**

Figure 2.7 shows that innovation diffusion through opinion leaders is more effective and efficient in terms of time, cost and distribution of the innovation. The implication is that opinion leaders, rather than innovators are the champions for the process of innovation diffusion. This is particularly true, where for example, although mass communication, media and advertising are on the rise, 80% of buying decisions are influenced by someone else's direct recommendation (Marsha & Teri, 1988).

## 2.9 Role of ICT in Innovation Diffusion

Information and communication technology (ICT) is closely linked with innovation. ICTs have revolutionised the way in which organisations work and share information

and knowledge. According to Sproull & Kiesler (1991), ICTs have brought about changes in the past decades in terms of task efficiency and more importantly, communication structure. Indeed, ICT enhances information sharing by lowering temporal and spatial barriers between individuals, and improves access to information about innovation (Hendriks & Vriens, 1999). This has major implications for the diffusion of innovation on the different groups of innovators. For SMEs, the literature reveals, these implications relate to effective operation and prosperity of modern organisation (Bensaou & Earl, 1999) and competitiveness of SMES (Morgan et al., 2006).

Previous studies of technology diffusion point to the role of mass media and interpersonal communication in adoption (Rogers, 1995, p. 46), with the growth of virtual teams and distributed groups, technology has spread on an informal basis rather than through formal channels that an organisation establishes (Mark et al., 2001). ICT capabilities such as the internet overcoming constraints of temporal distance, physical distance and social distance (McGrath & Hollingshead, 1994; Ruggles, 1997). Such transformations provided by ICTs bear significant implications on the structure of communication between individuals and organisations and therefore makes the role of ICTs quite crucial in the diffusion of innovations.

However, the role of ICTs to assist innovation within SMEs is not well understood. Social network characteristics which might influence the diffusion of innovations include centrality, density and reciprocity (Rice, 1994; Valente, 1995). These are again, easily affected by ICT as it allows for the development and sustenance of new and old information ties. The extent to which ICTs influence innovation diffusion in SMEs clusters remains a question that is currently open and an issue that is addressed in this thesis.



### 2.10 State of Innovativeness of SMEs

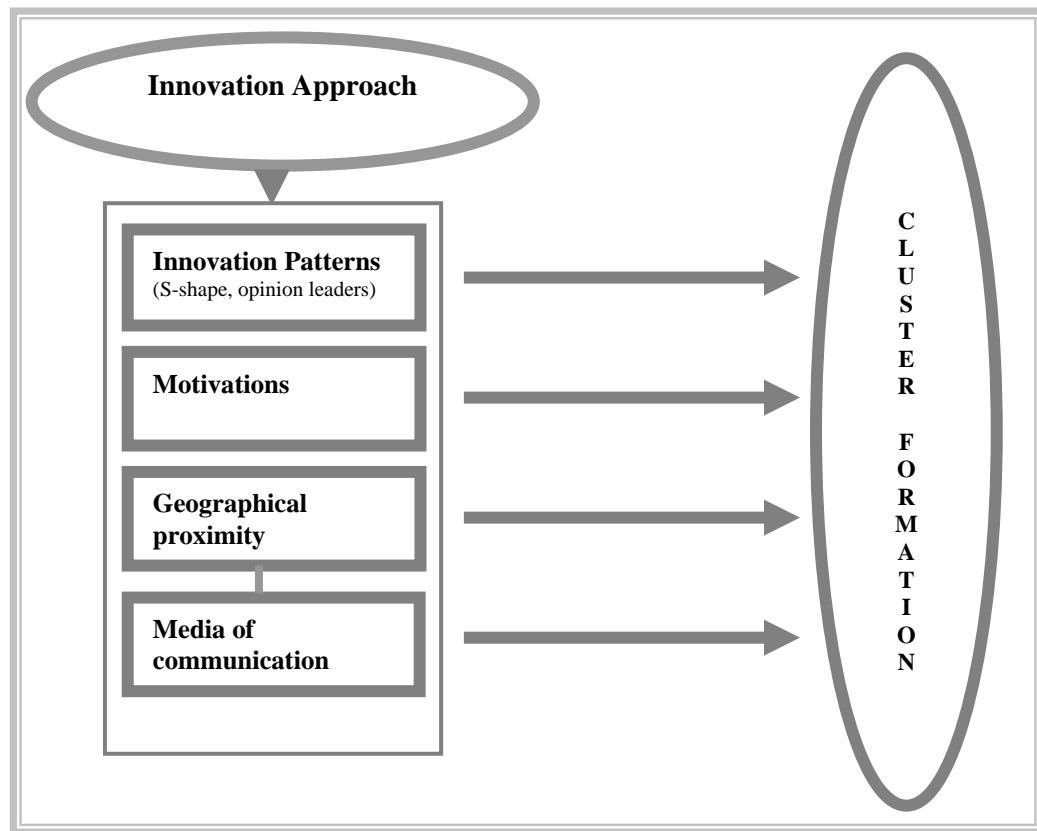
Despite government initiatives, studies show that SME still fail to realise the significance and benefits of innovation. For example, MacGregor and Vrazalic (2005) show that the barriers to E-commerce adoption can be grouped according to two distinct factors: the difficulty of implementing E-commerce and the unsuitability of E-commerce to the business. They also demonstrate that the relative importance of these two factors is affected by membership/non-membership of a small business cluster.

Other research demonstrates that when SMEs are part of clusters, they leverage on benefits from the cluster to further innovation (Verbeek, 1999; Benneworth et al., 2001). However, what is clear from these literature findings is that the process of how clusters form and the socio-technical processes that SMEs undergo that leads to this formation remains unclear.

Therefore, what remains clear is that benefits accrue to those SMEs who join part of a cluster (such as the example of the e-commerce adoption case in MacGregorand Vrazalic's (2005) study) but studies highlighting the process of cluster formation are relatively few. The focus of the cluster formation process should hence be on what attributes (both at the technological and social level) attracts SMEs to the membership and formation.

### 2.11 Towards an Innovation Diffusion Approach to Cluster Development

This thesis proposes that the cluster adoption process is an innovative activity. The cluster under study is a horizontally integrated cluster as defined previously. The make up of this cluster is largely homogeneous. Figure 2.8 below illustrates the framework of this research.



**Figure 2.8: An Innovation-diffusion Model for Understanding Clustering**

Earlier sections defined innovation is defined as an idea, practice or product that is perceived as new by the potential adopters even if it had existed earlier elsewhere (Rogers, 2003, p. 11) and the art of applying the new idea for better outcome (Williams, 1999). In light of this definition, this thesis argues that the processes leading to clustering can be viewed as catalysts for change by converting opportunities into marketable realities, and therefore a service innovation.

This leads to the first two research questions. The first question seeks to determine whether the pattern of growth in membership of the target clusters follow Rogers' (2003) S-curve diffusion.

**Research Issue 1: does the pattern of cluster growth over time follow Rogers' innovation diffusion pattern?**

The second research question is related in that it seeks to determine whether opinion leaders, another feature of Rogers' innovation theory, can be associated in the growth of cluster.

**Research Issue 2: in examining how SMEs came to join the cluster is it possible to isolate opinion leadership as a cause?**

The third research question seeks to examine motivation for joining the cluster and remaining in the cluster. The purpose of the question is to make an assessment whether these motivations can be matched to the distinction made between vertically integrated (heterogeneous) clusters and horizontally integrated (homogeneous) clusters in the literature.

**Research Issue 3: what are the benefits (pre-adoption and post-adoption) that SMEs seek in a homogeneous SME cluster? What are the current impediments to the adoption of SME cluster?**

The final research question addresses issue of geographic proximity and communication patterns among cluster members.

**Research Issue 4: does geographical proximity matter in homogeneous clusters? If so, to what extent?**

## 2.12 Conclusion

This chapter has reviewed literature on the topic of innovation, diffusion of innovation, the role of ICT in innovation diffusion, and its applicability as a framework to understand the nature of cluster formation. The chapter has also examined the definition of SMEs cluster, the role and issues of SME clusters in Australia and the benefit of being in clusters. It explored the approaches to cluster formation within the Australian context. A critique of the current approaches is that none of the approaches currently highlights the significance of socio-technical processes that occur during the process of cluster formation. Furthermore, the literature indicates that there is value in bringing it together with research on diffusion of innovation and cluster development elements. This is in response to the needs to distinguish between vertically integrated clusters and horizontally integrated clusters. Recent research shows that the internet and other ICT media play an influential role in communication structure because it lowers geographical, spatial and time barriers. The analysis provides greater direction in relation to implementing ICTs in SMEs. The next chapter discusses the methodology and methods used for operationalising the theoretical model proposed.

## Chapter 3

### **3. Case Study Methodology for Understanding the Innovation Diffusion process of SMEs in SME Cluster**

#### 3.1 Introduction

The previous chapter brought together two area of SME research and posed the question of whether cluster development can be understood in terms of innovation diffusion. This was in response to the case of alliances between horizontally integrated (homogeneous) SMEs. The use of geographic proximity as a dominant explanatory factor is logically inconsistent in such cases. In bringing these two areas together this chapter proceeds to outline a rationale that supports the use of a case study methodology to investigate this further. It also details the development of the survey that is used in the case study.

To that end, the chapter begins by locating the thesis within a philosophical context. It then moves on to provide a step by step justification of case study methodology using research guidance provided by Yin (1984). It concludes with an explanation and justification of questions used in the survey.

#### 3.2 Philosophical Context of the Research

The development of a research design leads one to consider the choice of philosophical context in which the research takes place. Consideration of such questions is important because this in turn makes explicit the potential and limitations of such choices (Creswell, 1998). Simplistically, research can be considered as a long and patient process of acquiring information in order to utilise that information towards achieving a

certain goal. In order to give more structure to the research process, it must also be a systematic process.

The positivist view of research is defined by Kerlinger (1986) who states ‘research is a systematic, controlled, empirical and critical investigation of natural phenomena guided by theory and hypotheses about the presumed relations among such phenomena’. While this approach duly emphasises the need to connect theory with research hypothesis it depends on the strict application of empirical methods in the research process. This may also imply that philosophical inquiries are not considered as research.

Critical Interpretative approaches represent another important area of research. The critical interpretive approach does not (implicitly or explicitly) exclude non-empirical techniques as part of the research process. Waltz & Bausell (1981) provides a definition of such research by maintaining that “research is a systematic, formal, rigorous, and precise process employed to gain solutions to problems and/or to discover and interpret new facts and relationships” (Waltz & Bausell, 1981). It is hence more subjective and supports both the use of quantitative and qualitative. The former usually involves the use of numerical analysis such as statistical analysis to deduce the result. The latter usually does not involve numbers but involves the exploration of events, identification of concepts and explanation of causal links between the concepts in a philosophical stance.

It is important to note that qualitative paradigms do not naturally enjoy greater insight into research phenomena than quantitative paradigms or vice versa. Rather, the choice of either paradigm should depend on how well it suits the task at hand – that is, how well suited it is for researching into and answering the research question (Galliers, 1985; Mumford, 1991).

In many cases, a superior approach to conducting research involves an integrated paradigm where the strengths of qualitative and the quantitative paradigms are utilised in tandem. This represents one example of triangulation where it is argued that the use of mixed methods on the same research problem will enable more accurate conclusions to be drawn from a variety of data (Mathison, 1988). Conceptually triangulation endeavours to view a single spot from two or more vantage points to get a richer data set (Waltz & Bausell, 1981). Ideally, this research favours the triangulation perspective as it draws strength from both qualitative and quantitative paradigms in order to understand the dynamics of the social and technological processes involved in the adoption of cluster by SMEs.

### 3.3 Justification of Research Methodology by Research Question

The choice between a positivist and critical interpretative approach is guided by the philosophical context of the study and the research questions. The case study methodology adopted for this research is largely informed by the philosophy that the truth is constructed by the interaction of the researcher with the subjects involved; it is interpreted subjectively via the researcher's experience (Crotty, 1998). This is partly reflected in the research questions which point to modes of communication, and perceived notions of expected benefits and actual benefits obtained by SMEs. Hence a critical interpretative mode of research is identified as most appropriate.

According to Yin (1994), there are three conditions that determine the usage of a research methodology. These conditions also make up the research strategy and are:

- firstly, the type of research questions posed;
- secondly, the extent of control over behavioural events; and

- thirdly, the degree of focus on contemporary as opposed to historical events.

This provides a detailed process to guide specific aspects of a critical interpretative framework.

Yin (1994) advises if the research focuses on a “what” question, then the form of research question is indicative of an exploratory type of research. “How” or “why” questions are usually explanatory in nature. An analysis of the research questions indicates that the study is partly exploratory but mainly explanatory. The study is exploratory because it attempts to filter out a clearer understanding of how geographical proximity affects the research subjects. The key question being asked here is a “what” question – that is, “What are the key underlying processes that explains the process of cluster formation in SMEs?” One of the research issues asks, “To what extent does geographical proximity matter in homogeneous clusters?”

While part of the study is an exploratory one, the majority of the research is that of an explanatory nature. It is explanatory because the aim of the study is to understand whether innovation theory accurately describes the processes leading to cluster formation and growth. by SMEs in Australia. Explanatory studies are normally initiated by “how” and “why” questions (Yin, 1994). Hence, the “how” part of the question translates more specifically into basic high level questions such as “How does the pattern of cluster growth compare with Rogers’ innovation diffusion pattern” and in examining how SMEs came to join the cluster, we ask “How do opinion leaders affect the process of cluster formation as an innovation diffusion process”; and the “why” part translates more specifically into “Why do SMEs decide to adopt the notion of SMEs cluster as an innovation?” That is, does the pre-adoption and post-adoption benefits that SMEs seek in a homogeneous SME cluster shape the adoption of clusters?



In relation to the extent of control over behavioural events that can be exercised it is clear that the researcher have very little control over events. Experiments are usually conducted when there is total or some degree of control over the subjects that are being studied. Hence, experiments are not suitable for this study.

The degree of focus on contemporary as opposed to historical events required by the research questions is split. Survey method is usually more suited to studying contemporary events as opposed to historical events. This is because survey methods allow for a more direct observation and systematic survey of the research subjects; in this case, the representatives of the SMEs in the SME cluster. This is useful for understanding modes of communication and the influence of geography on the research subjects. However, a good portion of the survey is directed at gathering secondary data. This includes the nomination of dates the SME joined the cluster as well as the motivations to participate in this alliance.

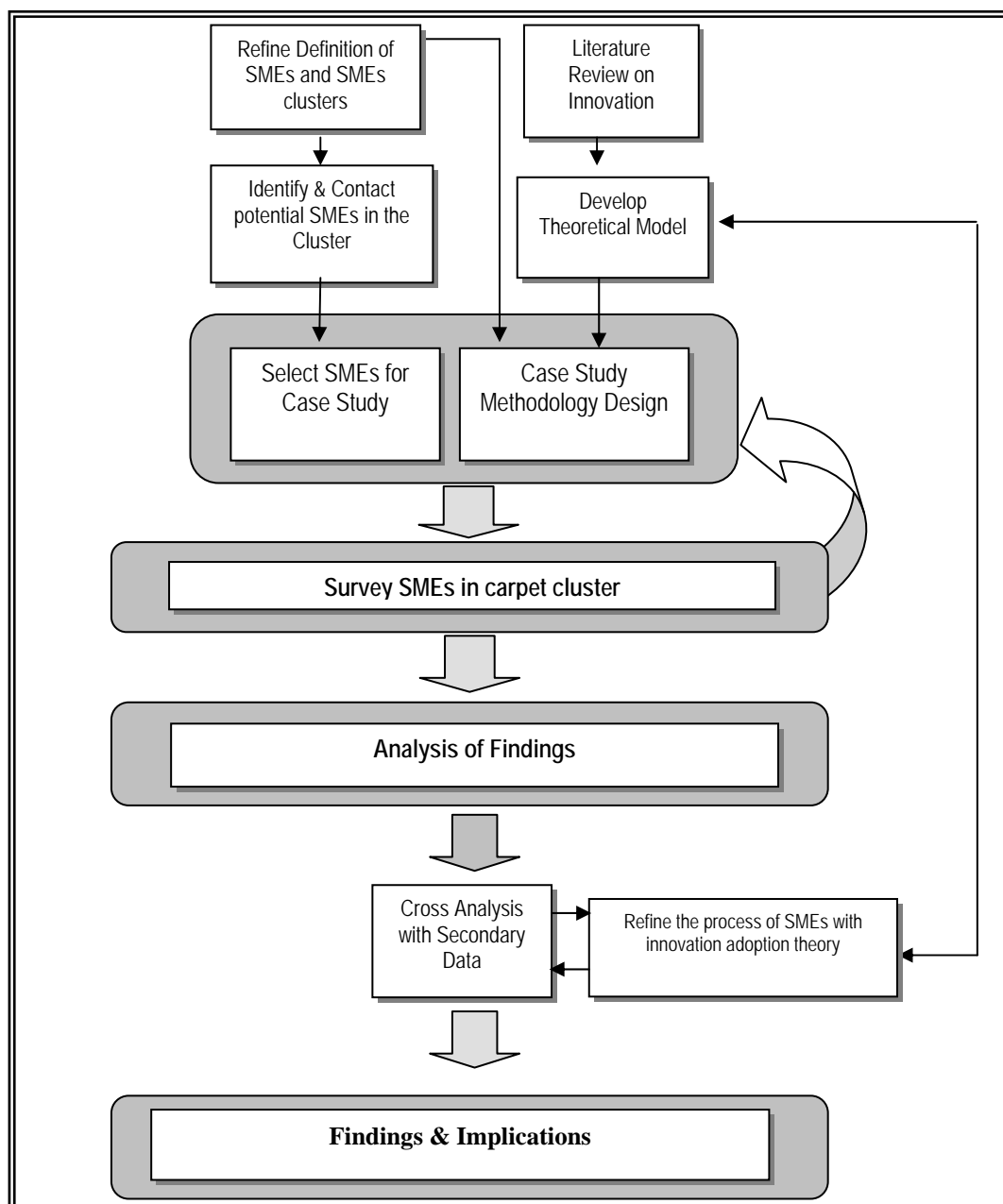
Table 3.1 summarises the three criteria discussed above and also compares the survey method strategy with other types of research strategies that are suited to relevant situations.

Please see print copy for Table 3.1

**Table 3.1: Relevant Research Questions for Different Research Strategies (Yin, 1994)**

### 3.4 Case study Framework

The research framework for the study is illustrated in Figure 3.1. It provides a "birds-eye view" of the research path, and depicts how theory influences the research design of this study. The initial stage involves a review of the theoretical background of the literature – working definitions of SMEs and SME clusters, followed by innovation diffusion theory. At the same time, a suitable SME cluster for the study was identified – namely, a homogeneous cluster as defined in the literature review.



**Figure 3.1: Research Methodology Framework for Understanding Innovation Diffusion of SMEs in the SMEs Cluster**

### 3.5 Selection of SMEs

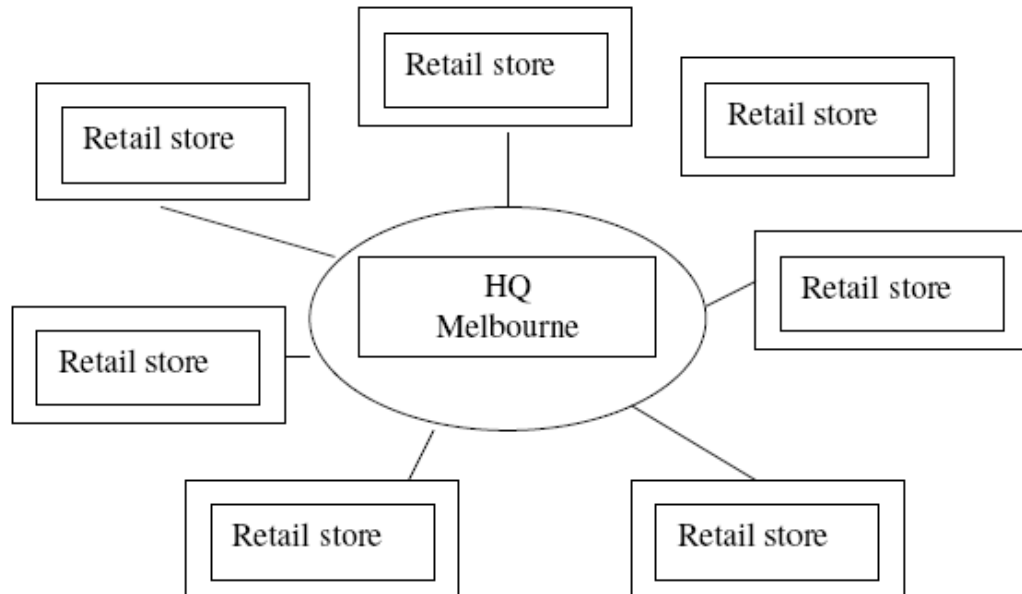
The choice of SME cluster was guided by the need to demonstrate sufficient character traits (homogeneity) of the horizontally integrated clusters determined in Section 2.4 of the literature review. Section 2.3 reviewed various definitions of clusters where certain characteristics such as geographical proximity and inter-firm networks in clusters were considered critical. The key benefits derived from clustering were primarily collective efficiencies, cost reduction in materials and transactions, and sharing of knowledge.

In light of the above, the buying group of SMEs in this study is considered a cluster in accordance with the cluster definition proposed by Whittaker et al. (2003) because it fosters a model of “inter-firm networking”. Geographical proximity, although only a possible relationship, bears significance only to the extent of supporting the effectiveness of network interactions (Visser, 1996). The buying group of SMEs in this study is horizontally-integrated to the extent that it shares the same business goals, accesses the same materials and targets the same customer base. Although they are a dispersed group, they are bound by both a formal and an informal network, as shall be evidenced in Chapter 4. The SMEs buying group will be notionally called, “A plus Carpet Group” for privacy and confidentiality purposes.

“A plus Carpet Group” has developed and matured over the years and is still growing. It consists of 113 individual stores located Australia wide, with each store’s annual turnover being approximately \$1 million Australian dollars. “A plus Carpet Group” has been in business for over 14 years, since early 1993. Since then, it has been recruiting SMEs to join the cluster. Each store (SME) is managed independently of each other. However there is an executive committee that oversees the major decisions of the buying group. This committee is headed by the founder, who is the current director of the organisation. Sub-committees also exist within its respective function areas -

marketing, finance, technology and products groups, such as *nylon*, *wools*, *tiles*, *vinyl*.

Figure 3.2 and Figure 3.3 depicts the structure of the group (cluster).



**Figure 3.2: Current “A plus Carpet Cluster” structure**

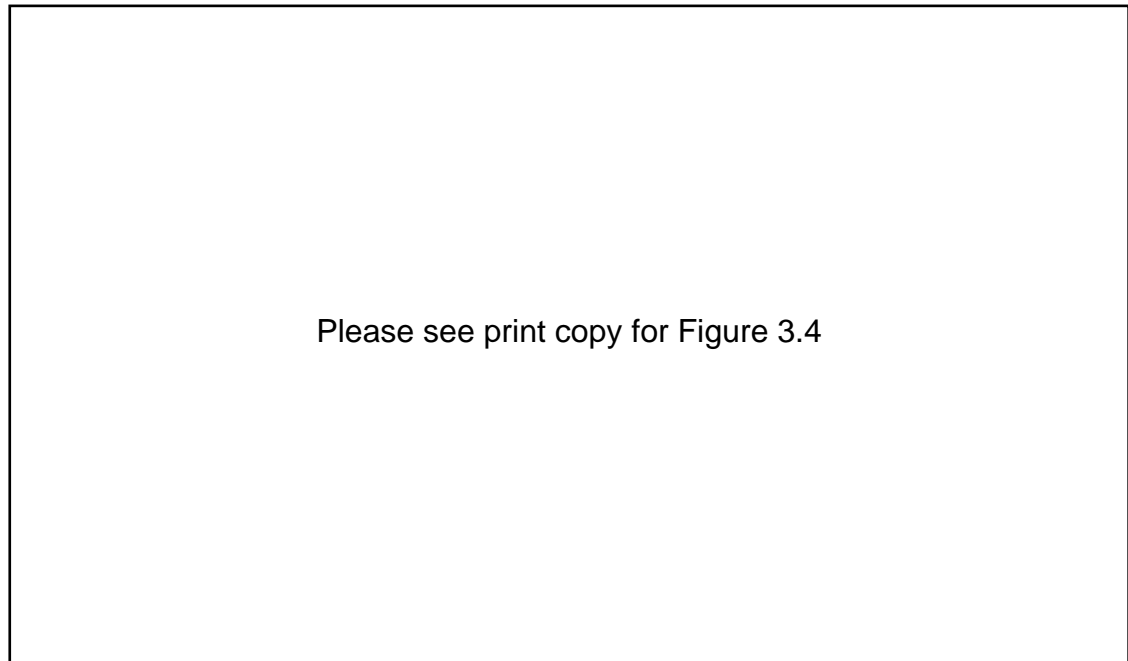
The basic philosophy for the buying group is that as more stores join, buying power increases. The cluster is now one of the largest buying groups in Australia. There are regular company meetings every 3-4 month and a grand meeting is held bi-annually, where at least one representative attends from each SME.



**Figure 3.3: Geographical Structure Chart of “A plus Carpet Group”**

### 3.6 Implementation of the Research Design

A timetable was established for carrying out the distribution of surveys and data gathering. The following diagram graph details the four phases of survey testing, distribution and data collection in this study:



**Figure 3.4: Stages in this Research (Adapted from McPhail (1999))**

Phase 1: Preliminary Literature review

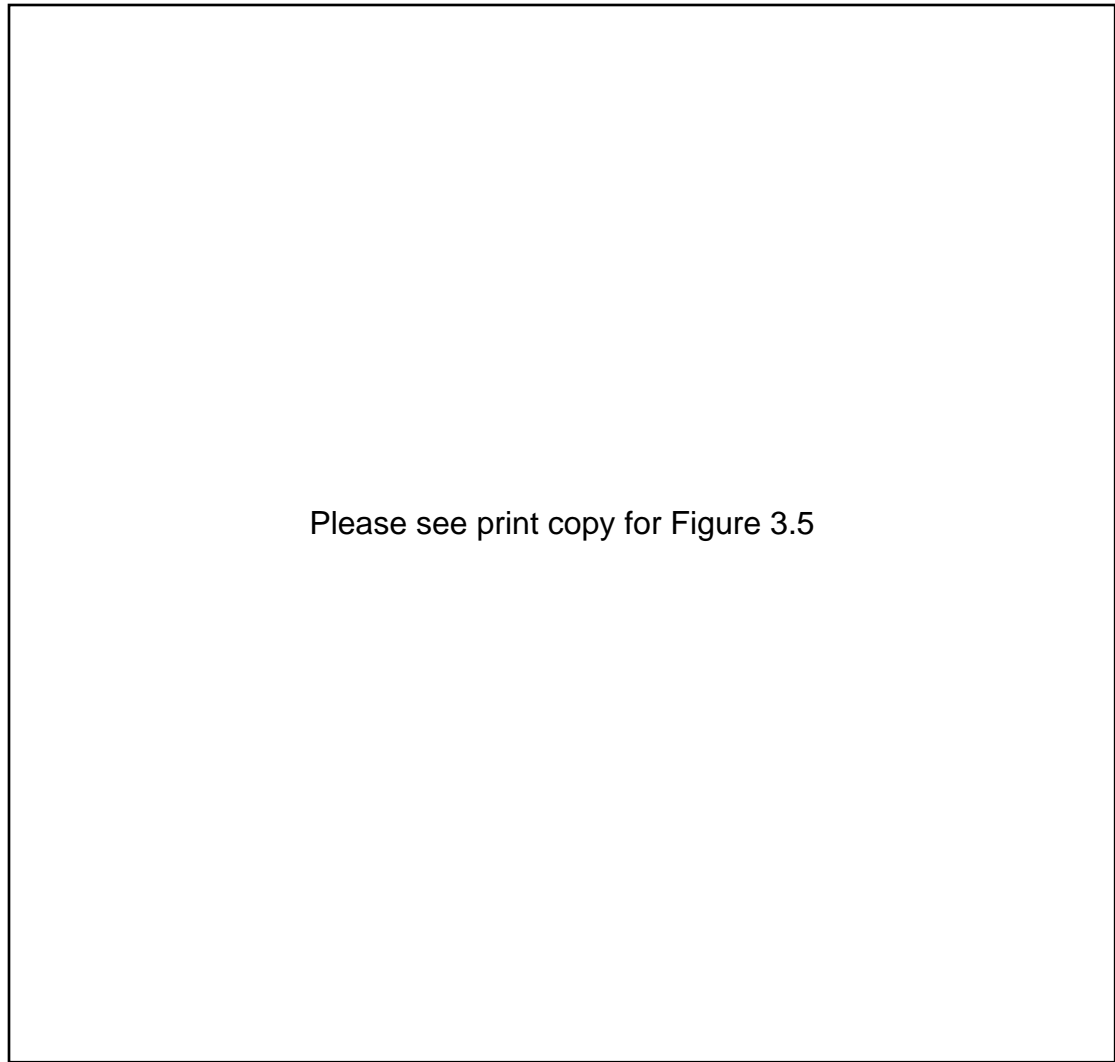
Phase 2: Pilot Survey

Phase 3: Reconstructing survey protocol and refine literature review

Phase 4: Main data collection through survey method and expansion of theory

#### *3.6.1 Design of Questionnaire*

The questionnaire design was based on the following process of questionnaire design proposed by Malhotra (1996), Luck and Rubin (1992), Churchill (1995), Bagozzi (1994). In effect, it follows a five step process.

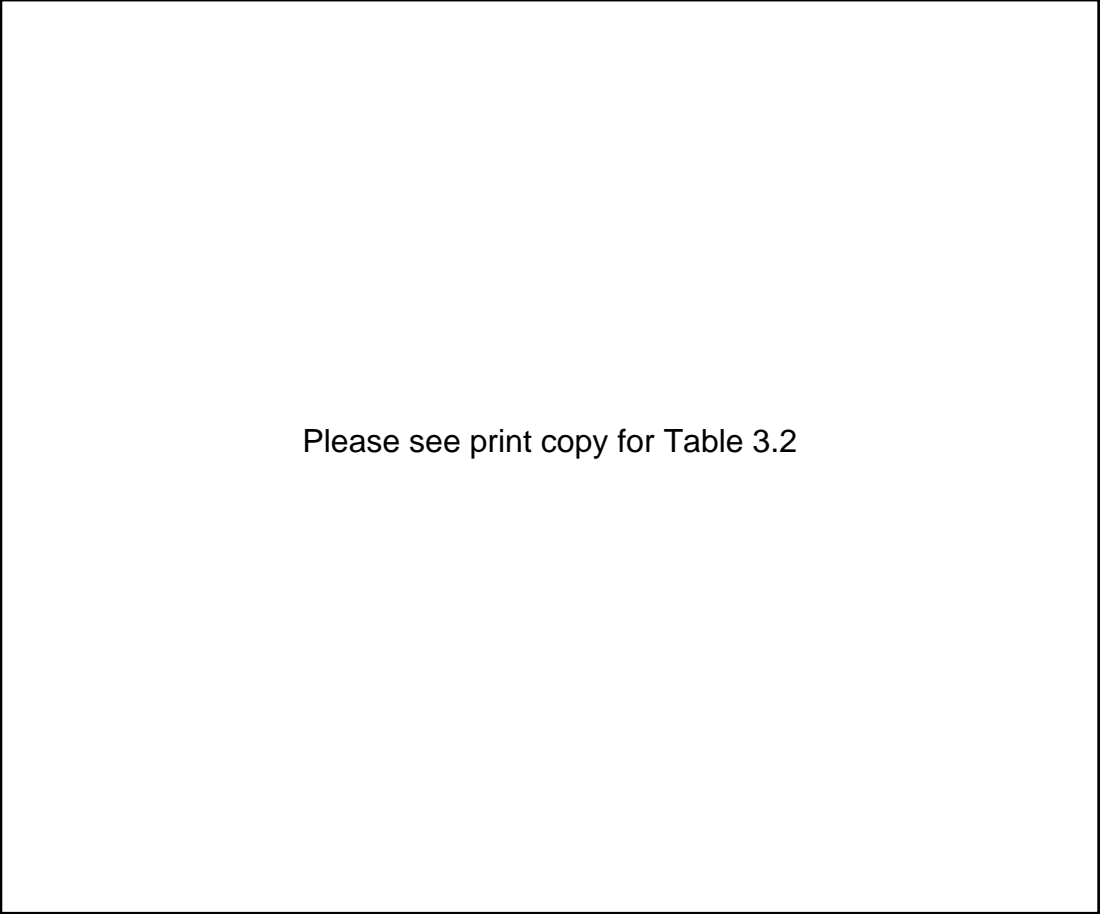


**Figure 3.5: Questionnaire Design Process (Malhotra 1996, Luck and Rubin 1992, Churchill 1995, Bagozzi 1994)**

As the first step, it was considered what kind of information would be required and from whom it could best be obtained. The second step was deciding the most appropriate mode of survey administration (postal mail, personal administration, telephone or internet) and the desired length of the questionnaire. The third step involved developing the draft survey with the appropriate question wording and content, suitable response format for survey and functional, without compromising the attractiveness of the structure and layout of the instrument.

Three kinds of question-response formats were chosen - scaled-response, close-ended response and the open-ended response format for reasons and benefits listed in Table

3.2. In particular, open ended response format was chosen for particular questions (see questions 4, 5, 6 and 7, located in Appendix 1) to allow respondents to express themselves freely as opposed to restricting responses by set of predefined close-ended answers. The open ended format was also used for question 1F and 2E in the survey. Close ended questions were used in the survey to limit answers (eg. questions 3) as dictated by the research design. Unlike open-ended formats and to a certain extent, the close-ended formats, scaled responses (Likert scale) were used so that answers could be quantified and summed up to create a score for a particular question item (see questions 1, 2 and 8 in survey in the Appendix).



Please see print copy for Table 3.2

**Table 3.2: Benefits and Limitations of Response Format Choices (Frazer & Lawley, 2000)**

As discussed above, questions in the instrument were determined from prior theory identified in the literature review and further refined from the findings from the pilot

study. Table 3.3 below shows the links and relevance between the research issues and the survey questions.

Theme	Research issues	Survey questions 1 to 8
Understanding Cluster notion as an Innovation	<b>Research Issue 1:</b> Does the pattern of cluster growth over time follow Rogers' innovation diffusion pattern?	Question 4 and Secondary data
Understanding how the innovation of SME cluster adoption is diffused	<b>Research Issue 2:</b> In examining how SMEs came to join the cluster is it possible to isolate opinion leadership as a cause?	Questions 3 and 7
Understanding barriers and benefits of SMEs carpet industry cluster adoption in Australia	<b>Research Issue3:</b> What are the benefits (pre-adoption and post-adoption) that SMEs seek in a homogeneous SME cluster? What are the current impediments to the adoption of SME cluster?	Questions 1, 2, 5 and 6
Understanding definition of SME Cluster in the Australian context (Geographic proximity)	<b>Research Issue4:</b> Does geographical proximity matter in homogeneous clusters? If so, to what extent?	Questions 8 and 2
Understanding channels of innovation diffusion through physical and non-physical media	How often in an average work week do SMEs members communicate with other members within the cluster using ICT and non-ICT media?	

**Table 3.3: Summary of the Research Issues and Related Survey Questions**

The questionnaire consists of eight main questions categorised into four research themes.

Table 3.4 below provides a summary of the types of the questions.

Questions	Question type	Theme	Category
<b>Question 1</b>	7 point Likert scale (range: very important to not important at all)	Reasons for joining cluster (before joining)	<b>Research Issue 3</b>
<b>Question 2</b>	7 point Likert scale (range: very satisfied to not satisfied at all)	Satisfaction after joining the cluster (after joining)	
<b>Question 5</b>	Open ended	Expected benefit in future	
<b>Question 6</b>	Open ended	Current Disadvantages	
<b>Question 3</b>	Nominal list (from A to E)	Channels of Innovation Diffusion	<b>Research Issue 2</b>



<b>Question 7</b>	Open ended	Opinion leader willingness	
<b>Question 4</b>	Open ended	Date of Joining Cluster	<b>Research Issue 1</b>
<b>Question 8</b>	5 point frequency scale (daily to never)	Contact frequency within the cluster through ICT and non-ICT media	<b>Research Issue 4</b>

**Table 3.4: Questions and Issues used in the Study**

### *3.6.2 Questionnaire Administration*

Moving on to step 4 (Figure 3.5) the questions was tested and revised. After an agreement on this research was made between the co-founder of the cluster and the author on behalf of the university, a pilot test was carried out online with 5 SMEs initially. An initial letter was sent to all SMEs managers/owners informing them about the research purpose and significance. The addresses of the SMEs were obtained from the cluster website with permission from the cluster co-founder. The questionnaire was posted online at <http://203.219.115.150/survey/uow/v3/authoring/> - the University of Wollongong's web survey service. In the letter, the SMEs were provided with a unique token number (login ID) in order to access the online survey. The token ensured one time access to the online survey and prevented duplication of response from the same SME. It also allowed tracking of non-respondents.

The pilot survey allowed for refinement and revision of the survey questionnaire, as detailed in step 5 (Figure 3.5). The table below highlights the changes before and after the pilot.

	Before Pilot	After Pilot	Justification
Semantic changes			
<b>Question 1 A</b>	Better and easy access to information and specialised resources	Better and easy access to manufacturer's data	Suggested by respondents because the idea of information and specialised resources was too vague for them.
<b>Question 1 B</b>	Reduction of cost in resources	Reduction in cost of materials	Suggested by respondents because 'materials' denotes 'raw materials' which was more specific than the term 'resources'
<b>Question 1 C</b>	Flexibility to adopt new ideas (products and services)	Access to latest "word of mouth" tips and new ideas	Suggested by respondents to facilitate easier understanding.
<b>Question 1 D</b>		Guaranteed access to product lines	Suggested by respondents
<b>Question 1 E</b>		Recommendation from an acquaintance	Suggested by respondents
<b>Question 3 D, E</b>	How did you hear about... D. People (Friend, acquaintance, colleague, ICR)	How did you hear about... D. An acquaintance from the buying group E. An acquaintance from outside the buying group	This was done in order to segregate internal and external referrers of SMEs to the cluster group whereas the original question did not allow this.
Scale changes			
<b>Question 1 &amp; 2</b>	Ranking intervals	7 Likert scales	This was decided because ranking intervals did not allow knowledge of the <i>extent</i> to which each reason (question 1) and benefit (question 2) was important whereas a Likert scale allows for both comparison and delineating extent of importance.

Table 3.5: Summary of Key Changes in Survey after Pilot Study

After three weeks, administration of the actual survey commenced. As in the pilot, SMEs (excluding those piloted) were notified about the research project a week in advance through post and email. SMEs had the choice to either fill out the survey online or through post, in the case of which reply-paid envelopes were provided to encourage response rates. After a week following the actual survey administration, two follow-ups through emails, telephone calls and postal reminders were made in the third week and the fifth week. There were 37 responses obtained out of 113 requests, achieving a response rate of 32%.

### 3.7 Secondary Data

Secondary sources of data used in this study involved obtaining SME information from the buying group website as well as through company records. The company records contain information such as company name, address, state, date of joining the cluster and email address for the company (SME).

### 3.8 Conclusion

The case study methodology - its justification design and data collection strategy- and the development of the survey instrument have been discussed in this chapter. The criteria and process of selection of SMEs and the role of theory in the design of the methodology component of the study are also discussed. Chapter 4 provides comprehensive reports of the findings resulting from the research design.

## Chapter 4

### 4. Research Findings

#### 4.1 Introduction

This chapter reports on the data collected from 113 SMEs which belong to the target study group – ‘A-plus Carpet Group’. The questionnaire survey developed and discussed in Chapter 3 was used to collect primary data. In addition, secondary data was made available detailing historical information about the group’s membership over a 13 year period. Appropriate statistical packages such as SPSS version 14 and JMP were used to analyse survey data. A description of the findings is categorised by key research issue/themes.

#### 4.2 Brief History of Case Study

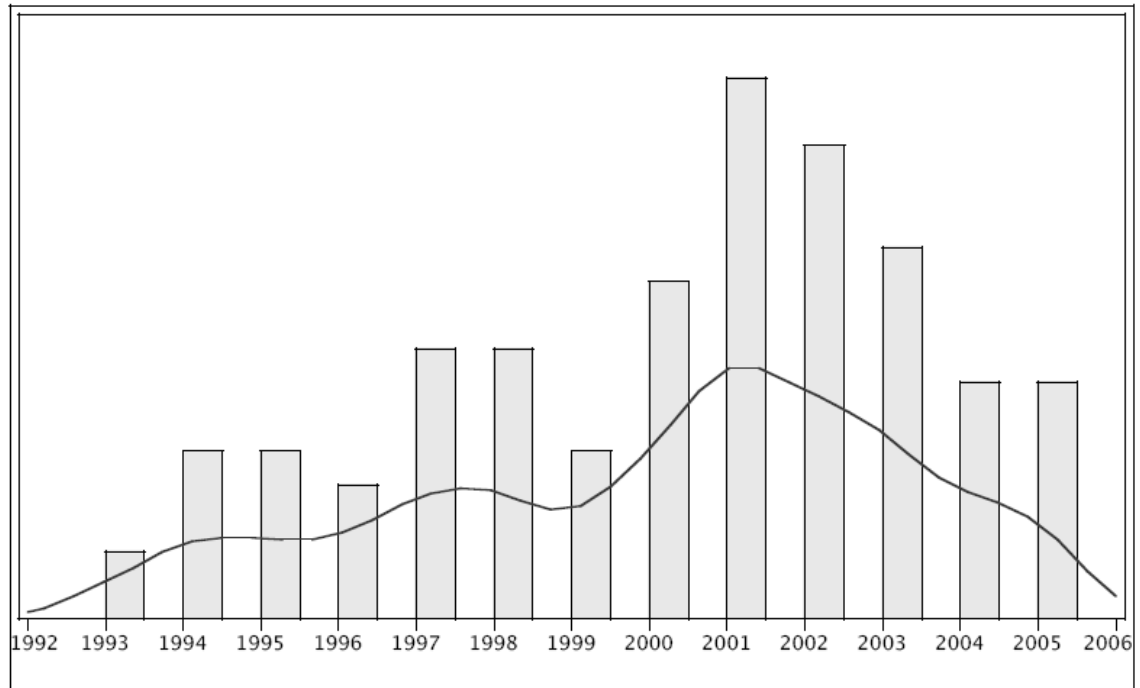
A brief history of the “A plus Carpet Group” reveals that it was initiated in 1993. It was first founded in Melbourne, Australia and over a 13 year period, has expanded to other states in Australia. The primary purpose of the group is to generate sufficient size to gain access to both to restricted carpet lines and group pricing. To the extent that the nature of SMEs within the group is homogeneous, they deliver similar service to many locations around Australia. As explained earlier, such an alliance is best viewed in terms of a horizontally integrated value chain. This is distinct from the more common SME groupings described in the literature that are part of a vertically integrated value chain and accordingly are heterogeneous (that is providing complementary inputs into a common value chain).

### 4.3 Innovation Adoption Pattern

#### **Research Issue 1: does the pattern of cluster growth over time follow Rogers' innovation diffusion pattern?**

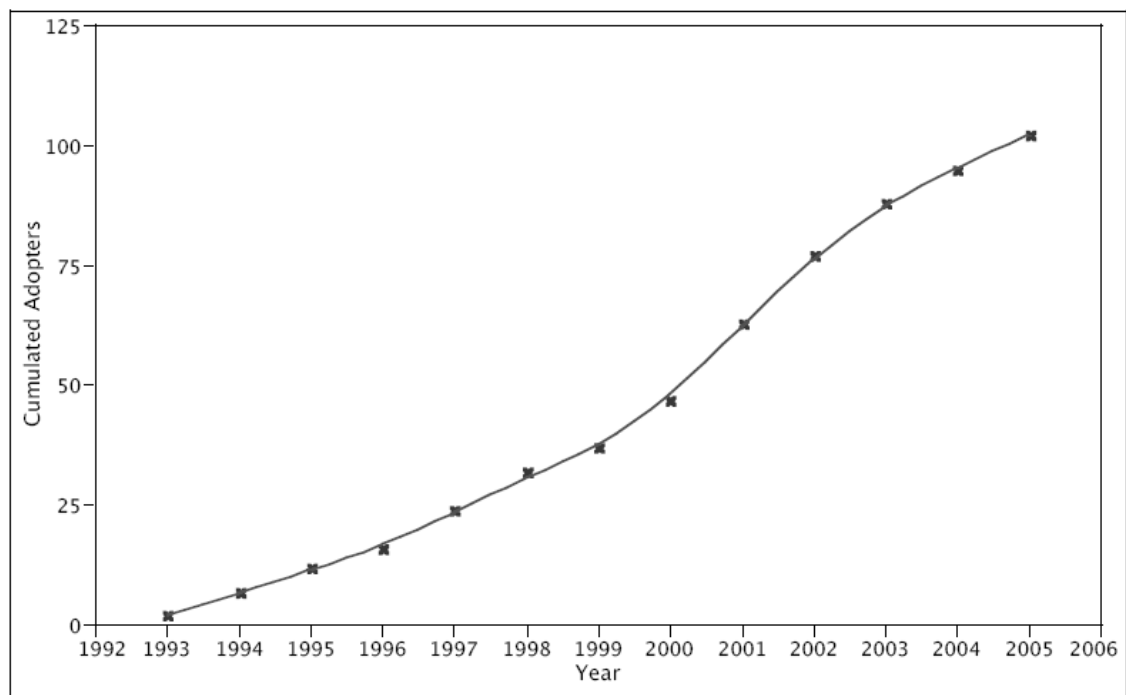
The first aspect of the research is reflected in the first research question that explores whether patterns of growth among the buying group follows Rogers' (2003) S-curve of diffusion. According to Rogers, successful innovation diffusion follows a standard pattern of diffusion as described in Section 2.7.1

Secondary data detailing information of individual company name, address, states, date of joining the cluster and email address was provided for analysis. This data is graphed against time of adoption. Figure 4.1 shows the distribution of annual number of adopters between 1993 and 2005, with a smoothed distribution fit to these data using JMP's nonparametric density option. This clearly shows the distribution tailing off rapidly after year 2001. Growth appears to have reached a maximum in 2001 after which a decline in new members is noted.



**Figure 4.1: The Distribution of Annual Number of Adopters**

After applying a smoothing spline (nonparametric smoothing) to the accumulated number of membership the pattern of the ‘S’ shape is clear (See Figure 4.2).



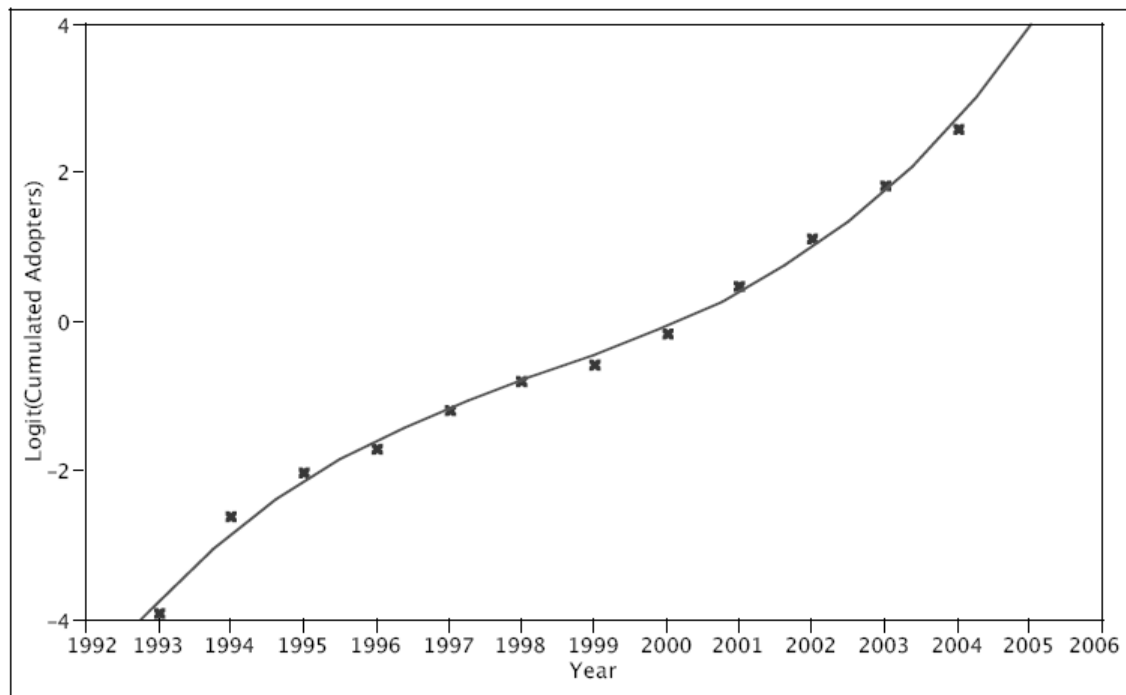
**Figure 4.2: Accumulated Number of Adopters**

Details of Fit:  $\lambda=0.457486$  (smoothing parameter),  $R\text{-Square} = 0.999555$

We also investigated the fit of a ‘parametric’ S-shaped curve to the data. The model which was used is a logistic one, defined by

$$\text{Logit}(\text{Cumulated Adopters}) = \log(\text{Cumulated Adopters}/(102 - \text{Cumulated Adopters}))$$

The following plot shows that this logit variable behaves like a cubic polynomial in time (year).



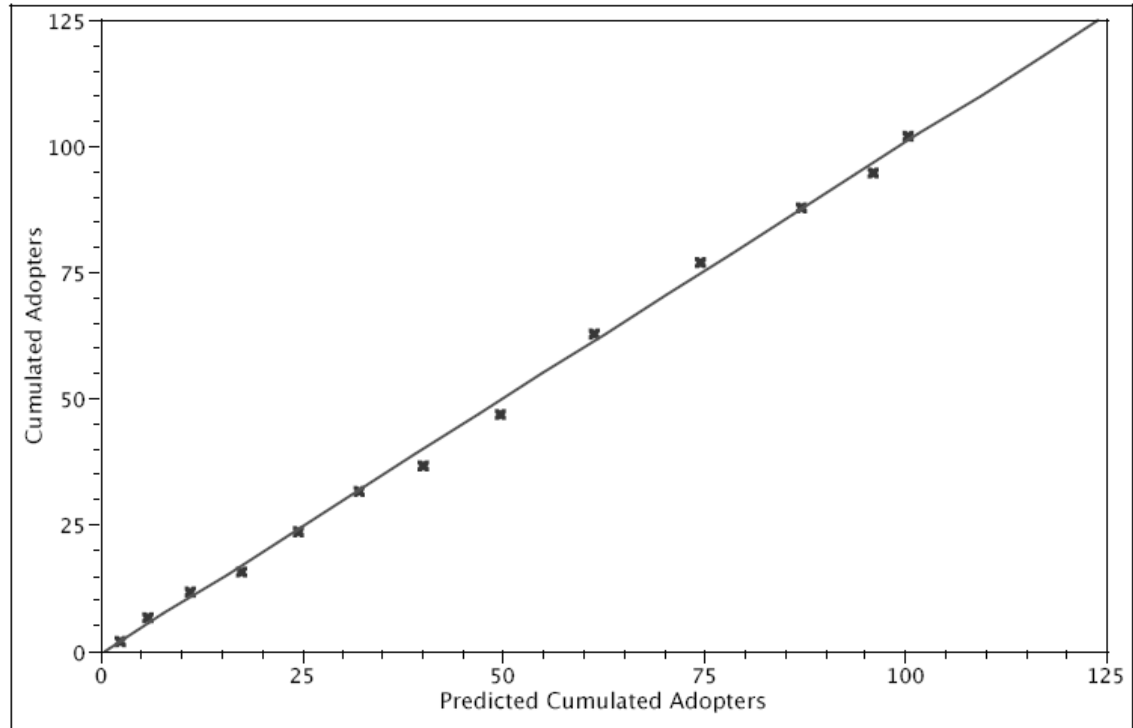
**Figure 4.3: The Fit of a ‘Parametric’ S-shaped Curve**

*Details of Polynomial Fit of Degree=3*

$$\begin{aligned} \text{Logit}(\text{Cumulated Adopters}) = & -717.5019 + 0.3587117 \text{ Year} + 0.0154376 (\text{Year}-1999)^2 \\ & + 0.0078876 (\text{Year}-1999)^3 \end{aligned}$$

$$RSquare = 0.995524$$

The following plot compares the actual value of cumulated adopters with the predicted cumulated adopters obtained from the preceding cubic logistic model.



**Figure 4.4: The Actual Value of Cumulated Adopters with the predicted Cumulated Adopters**

The straight line fit to these values shown above indicates no significant deviation from a line with zero intercept and unit slope.

*Linear Fit:*

$$\text{Cumulated Adopters} = -0.481638 + 1.0129982 \text{ Predicted Cumulated Adopters}$$

RSquare	0.997716
Root Mean Square Error	1.754555

**Table 4.1: Summary of Fit**

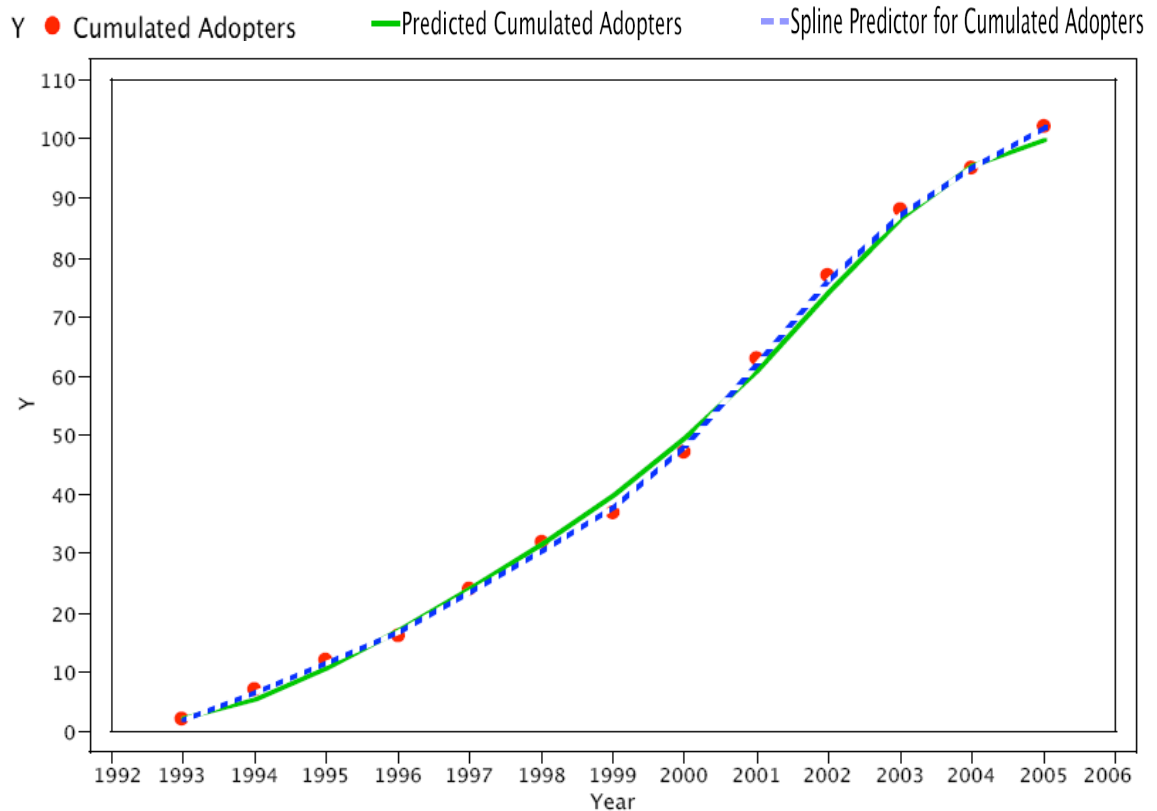
Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	-0.481638	0.832139	-0.58	0.5744
Predicted Cumulated Adopters	1.0129982	0.014614	69.32	<.0001

**Table 4.2: Parameter Estimates**

Finally, the overlay plot below compare the fits to the Cumulated Adopters data (dots) generated by both the non-parametric spline model used earlier (broken line – spline



predictor for cumulated adopters) and the parametric cubic logistic model (solid line-predicted cumulated adopters). There is very little to choose between them.



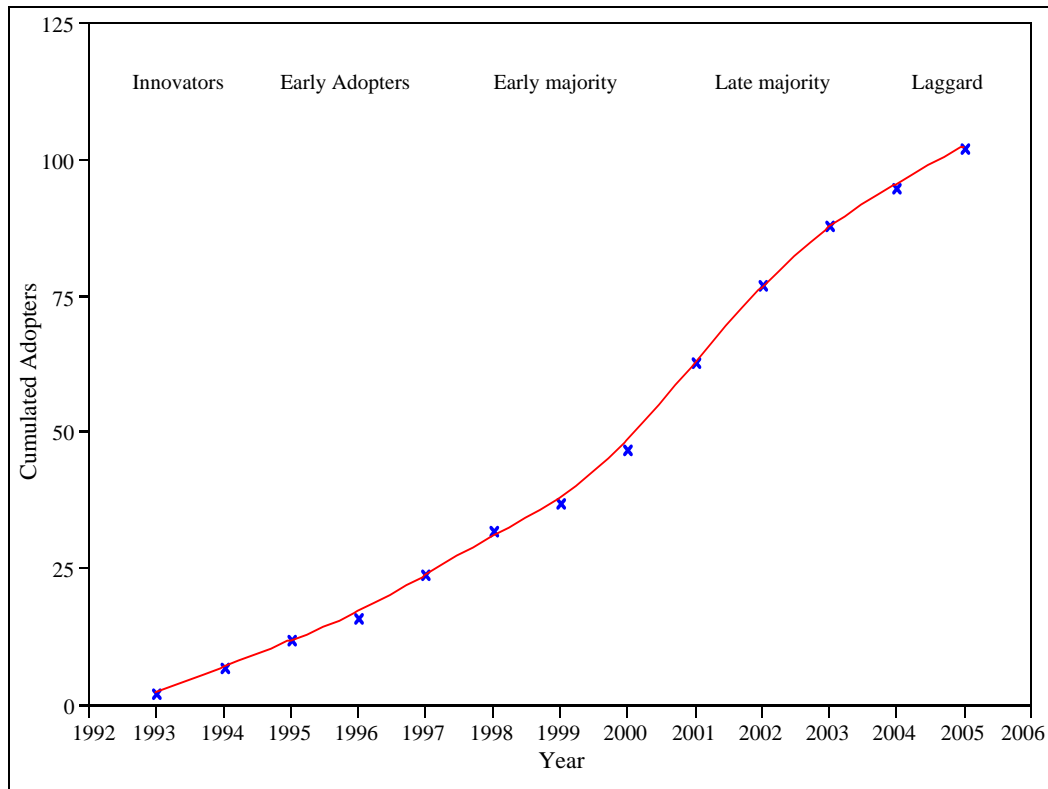
**Figure 4.5: The Overlay Plot**

The graphs show a clear S-shaped curve as the pattern of innovation amongst SMEs from 1993 to 2006, which is quite consistent with Rogers' (2003) ideas in his theory of innovation diffusion and adoption.

Rogers' (2003) discussion about innovators, early adopters, late adopters and laggards (see Section 2.7) can be applied to the research data. Table 4.3 and Figure 4.6 below indicate such groupings in relation to the growth of A plus Carpet Group over time. This issue is not investigated further but is noted as a possible area of further research that explores the dynamics of a cluster over time.

Carpet Cluster innovation Adopters Group	%	Years
Innovators	2.5	1993
Early Adopters	13.5	1995
Early majority	35	1999
Late Majority	35	2002
Laggard	16	2005

**Table 4.3: Percentage of Adopters over Years by Innovating Groups**



**Figure 4.6: Curve showing Adoption Pattern over Years**

#### 4.4 Research Issue 2: Cluster Adoption Process and Opinion Leaders

**Research Issue 2: in examining how SMEs came to join the cluster is it possible to isolate opinion leadership as a cause?**

This issue draws on another aspect of Rogers's (1971) research that identified opinion leaders as an important component in successful diffusion of an innovation. For this issue, *Question 3* and *Question 7* in the survey were used to understand the adoption pattern of SMEs based on opinion leadership theory. *Question 3* examines the process of how SMEs joined the cluster. This question asks the respondents about the channel(s)

they used in the adoption process. *Question 7* asks about their willingness to be potential opinion leaders to promote further membership of the group.

#### *4.4.1 Question Three: Channels of Innovation Diffusion*

The item sets A to E list the possible channels for SMEs to obtain useful information that leads to innovation adoption. This question asks about channels that are most useful for SMEs to adopt the cluster notion.

**Question 3. How did you hear about “A Plus Carpet Group”?**

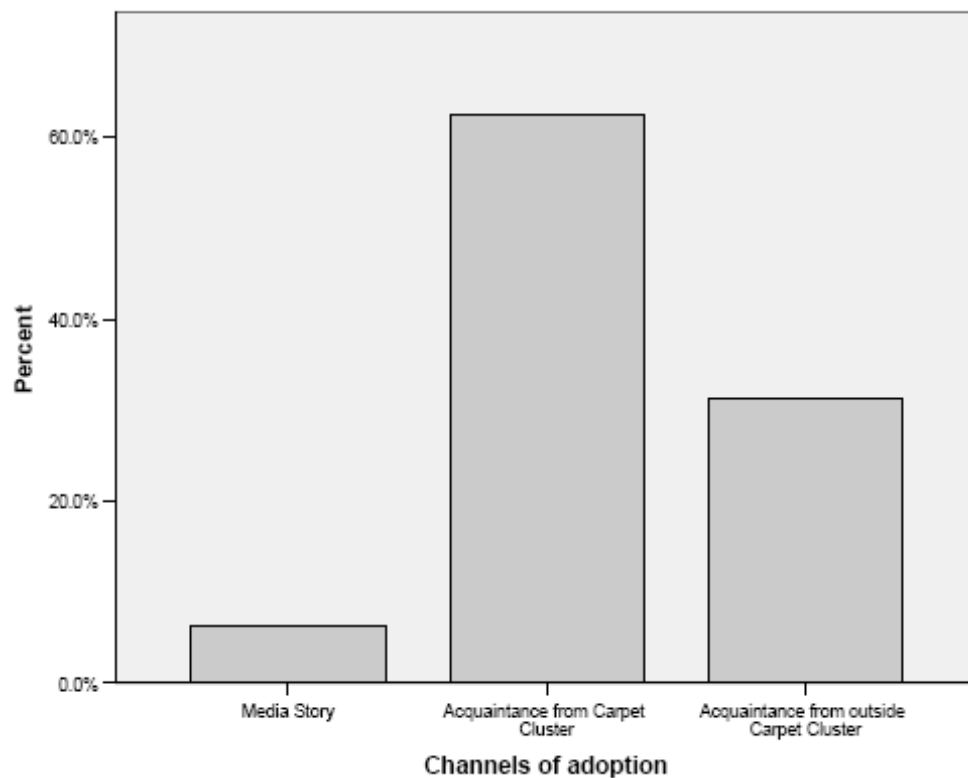
- A. Advertisement
- B. Media Story
- C. Internet Search
- D. An acquaintance from the buying group
- E. An acquaintance from outside the buying group

ANSWER: \_\_\_\_\_

**Figure 4.7: Question Three**

#### *Analysis of Question Three*

The results indicate that there were none who adopted the cluster adoption notion through advertisements or internet search. In fact 97.29% of the respondents joined the cluster through an acquaintance, out of which 70.27% of people joined the cluster through an acquaintance from within the cluster and 27.02% people joined through an acquaintance from outside the cluster. Only 2.7% people joined the cluster through media stories.



**Figure 4.8: Channels through which SMEs adopted Cluster**

*Question (3-a)* examined the specific name of the person who introduced the cluster notion.

**Question 3-a. If you heard about ‘A Plus Carpet Group’ from a person please enter his/her name.**

**(The details you provide will be coded to protect the privacy and anonymity of yourself and the people you identify)**

First name

Last name

Shop Area

**Figure 4.9: Question Three - A**

The results show that 32% of the people surveyed joined the cluster through the same key person. Furthermore, the history of involvement in the cluster stretches back to its formation so the key person can be regarded as an ‘opinion leader’. It is also important to note at this point that the key person is also the founder of the cluster and a co-

ordinator of the group. The remaining 68% of the respondents indicated other people's name and other SMEs as being responsible for leading them to the cluster.

#### *4.4.2 Question Seven: Willingness to be Opinion Leaders*

*Question 7* asks about the willingness of members to be opinion leaders for potential SME members. Respondents were also asked to provide justifications for their answers.

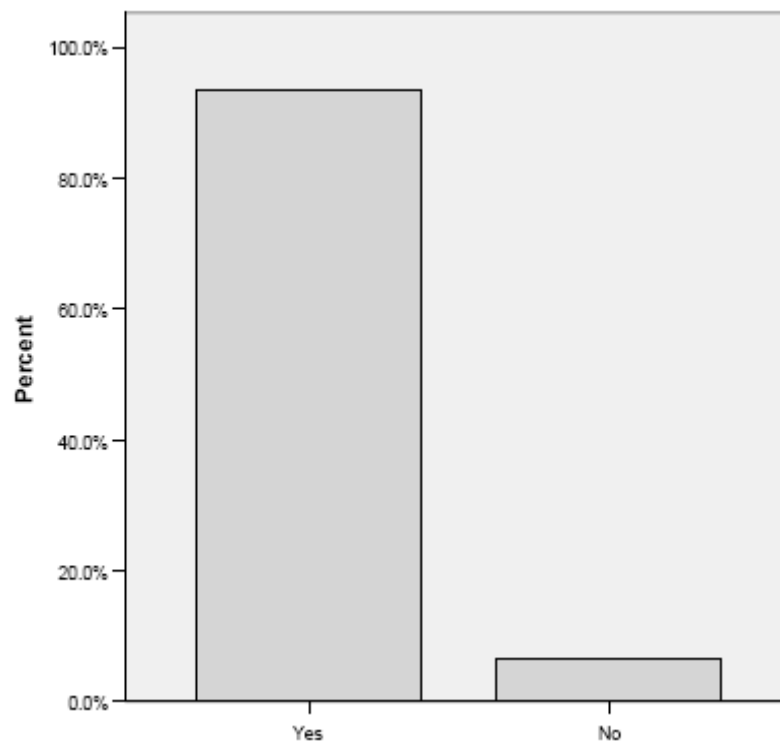
Question 7. Would you recommend 'A Plus Carpet Group' to businesses which are currently not a member of this buying group? Please also indicate why or why not?

**Figure 4.10: Question Seven**

In accordance with literature on innovation diffusion theory, people who are truly satisfied with the adoption are willing to become opinion leaders in order to diffuse the innovation to other people (Rogers, 1995, p. 293). Therefore, by asking *Question 7*, we can find out the extent to which they are truly satisfied or dissatisfied. The justification also allows for respondents to provide a richer account of their current satisfaction levels with being in the cluster.

#### *Analysis of Question 7*

As depicted in the bar chart below, 91.89 % of the people were positive about introducing the cluster notion to potential SMEs.



**Figure 4.11: Willingness to be an Opinion Leader**

Out of the 91.89% who were positive about introducing the cluster notion to others, 56.75% of them also provided justifications for their answers. The justifications fall into five categories as outlined in Table 4.4.

Reasons	Percentage of the answers
Better buying power	18.91%
Better network support (sharing knowledge, problem solving)	18.91%
Better access to suppliers, products	8.1%
Because of the benefits they are getting from the cluster	5.4%
As long as it can be managed	5.4%

**Table 4.4: Justification for joining Cluster**

The most important factor for SMEs to recommend other SMEs to join the cluster was ‘to gain buying power’. This *was* the main reason also for the founders to form the cluster originally. Furthermore, and also interestingly, current members of the cluster now feel that they have the benefit of support and knowledge sharing from the buying

group network. This was originally not an explicit goal driving the formation of the buying group. However, this now remains one of the key benefits and hence, respondents were willing to refer the cluster to other potential SMEs with a view to obtaining more network externalities. Members were aware of the fact that being in the cluster could help them to form a larger organisation in order to gain buying power and access to new products.

Some respondents exhibited a degree of disquiet about the group and implications for competition. Even though in a minority, 8.1% of the members surveyed mentioned that they were “not willing” to introduce the cluster to other SMEs. The reasons were narrowed down to one – they were not happy to have more than one shop in the same region. They believed that the cluster has reached saturation point in terms of SME population and it may become unmanageable.

#### 4.5 Research Issue 3: Pre and Post Benefits of Cluster Adoption and Impediments to Adoption

**Research Issue3: what are the benefits (pre-adoption and post-adoption) that SMEs seek in a homogeneous SME cluster? What are the current impediments to the adoption of SME cluster?**

Research issue three attempts to move beyond the explicit rationales of developing a buying group to aspects that may only become apparent while operating in such a group. Questions numbered one, two, five and six were used to elicit answers to research issue three. *Question one* examined the reasons why SMEs originally joined the cluster. *Question two* asked the extent to which SMEs were satisfied with benefits obtained from joining the cluster. The results from this question allow us to compare the actual

benefits for these SMEs as opposed to the potential benefits that inspired their initial involvement.

*Question five* examined current expectation about future benefits to flow from the involvement in the buying group whereas *Question six* asked about the disadvantage(s) of being in the cluster. These two questions allow one to examine if there are any unique benefits specifically for homogeneous clusters.

#### *4.5.1 Question One: Reasons for joining Cluster*

*Question one* examines the extent of justifications or reasons for which firms initially joined the cluster. It explores whether there are any differences in terms of benefits or reasons for being attracted to the buying group. The given examples of the benefits ‘A to D’ are based on the literature. For instance, the benefits detailed in the survey questionnaire have been postulated by firms which have joined or become part of a heterogeneous cluster (OECD, 1996; Baptista & Swann, 1998; Porter, 2000b; Waits, 2000). The Likert scale attitude statements suggested below was adapted from Rogers’ (1971) work on opinion leadership.



Question 1. We are interested to know the reasons why your firm initially joined 'A Plus Carpet Group'. Please indicate the importance of each factor in making the decision to 'A Plus Carpet Group'.

A. Better and easy access to manufacturer's data

-----|-----|-----|-----|-----|-----|-----|

Very important   Important   somewhat important   not sure   somewhat not important   not important   not important at all

B. Reduction in cost of materials

-----|-----|-----|-----|-----|-----|-----|

Very important   Important   somewhat important   not sure   somewhat not important   not important   not important at all

C. Access to latest "word of mouth" tips and new ideas

-----|-----|-----|-----|-----|-----|-----|

Very important   Important   somewhat important   not sure   somewhat not important   not important   not important at all

D. Guaranteed access to product lines

-----|-----|-----|-----|-----|-----|-----|

Very important   Important   somewhat important   not sure   somewhat not important   not important   not important at all

E. Recommendation from an acquaintance

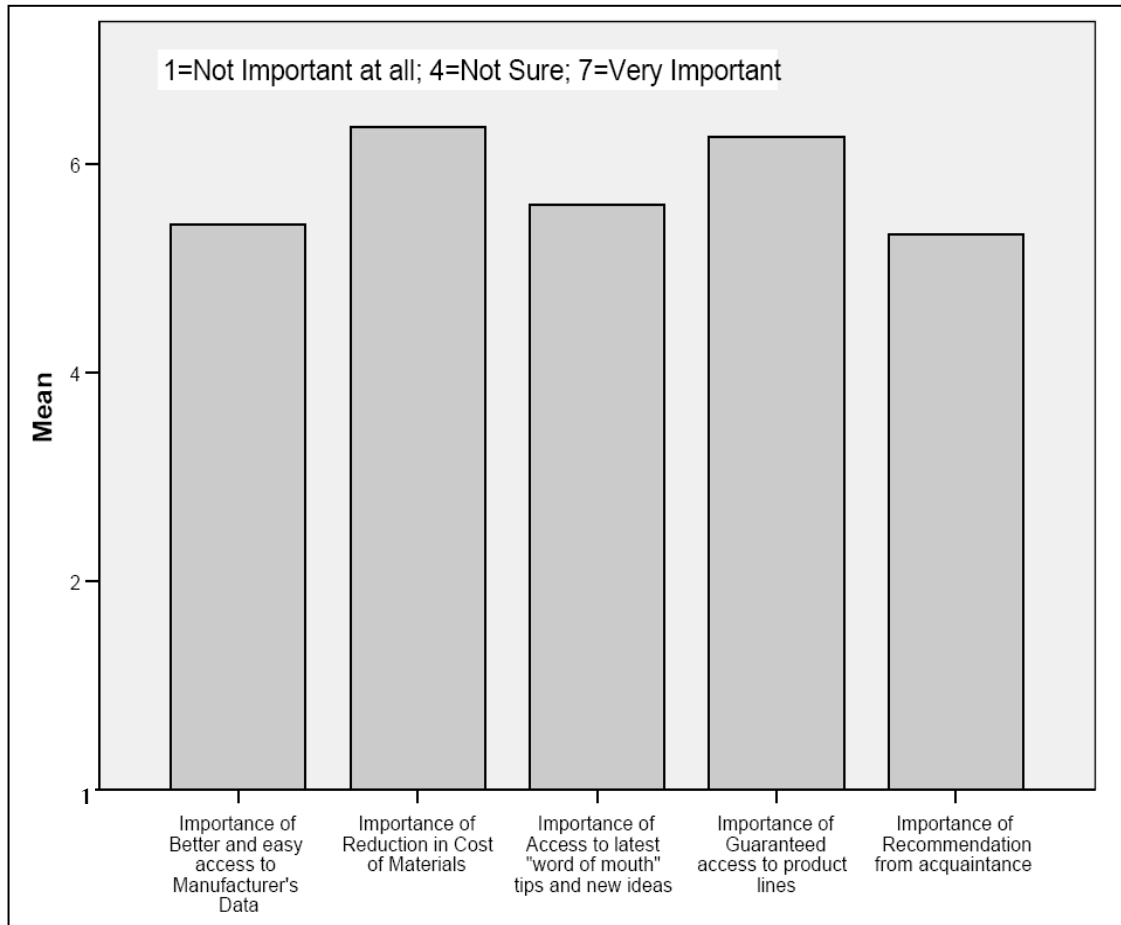
-----|-----|-----|-----|-----|-----|-----|

Very important   Important   somewhat important   not sure   somewhat not important   not important   not important at all

Figure 4.12: Question One

#### 4.5.1.1 Analysis of Question One

Answers from the attitude statements in *Question 1* were coded as numbers, 7 being very important and 1 being not at all important. The number was summed up to obtain a composite score and an average was obtained. The results of question one pertaining to the 'importance of perceived benefits prior to joining are shown in Figure 4.13.



**Figure 4.13: (Mean) Importance of Perceived Benefits prior to joining Cluster**

As shown in Figure 4.13, the most important reason for SMEs to join the cluster was “reduction in cost of materials” and “guaranteed access to product lines”. SMEs were not very interested in gaining better access to manufacturer’s data (suppliers) or access to new ideas. For other benefits, only a minority of respondents (13%) answered. Their comments are summarised in Table 4.5.

Better buying power/sales advantage/information and skill share.	Better negotiation with suppliers
Stronger stand as a larger presence.	Access to suppliers
Access to products via the group after being a company in administration	Low cost. More network
Better purchasing power	Network with peers

**Table 4.5: Summary of other Perceived Benefits**

Most of the benefits elicited as “other benefits/reasons” were very similar to the attitude statements A-D such as buying power (attitude statement B) and access to suppliers (attitude statement A). However the desire to “network with peers” is not covered by attitude statements A-D. This alludes to the perception that network connections foster skills and sharing of information leading to higher levels of satisfaction.

#### 4.5.2 Question Two: Satisfaction with Expectations after joining the Cluster

*Question 2* asked respondents to indicate the satisfaction of each factor for their company's operations/success currently.

Question 2. We are interested to know whether your firm benefited from the following advantages after joining “A Plus Carpet Group”. Please indicate the satisfaction of each factor for your company's operations/success currently.

A. Better and easy access to manufacturer's data.

Very satisfied    satisfied    somewhat satisfied    not sure    somewhat not satisfied    not satisfied    strongly dissatisfied

B. Reduction in cost of materials

Very satisfied    satisfied    somewhat satisfied    not sure    somewhat not satisfied    not satisfied    strongly dissatisfied

C. Access to latest "word of mouth" tips and new ideas.

Very satisfied    satisfied    somewhat satisfied    not sure    somewhat not satisfied    not satisfied    strongly dissatisfied

D. Guaranteed access to product lines

Very satisfied    satisfied    somewhat satisfied    not sure    somewhat not satisfied    not satisfied    strongly dissatisfied

E. Other\*

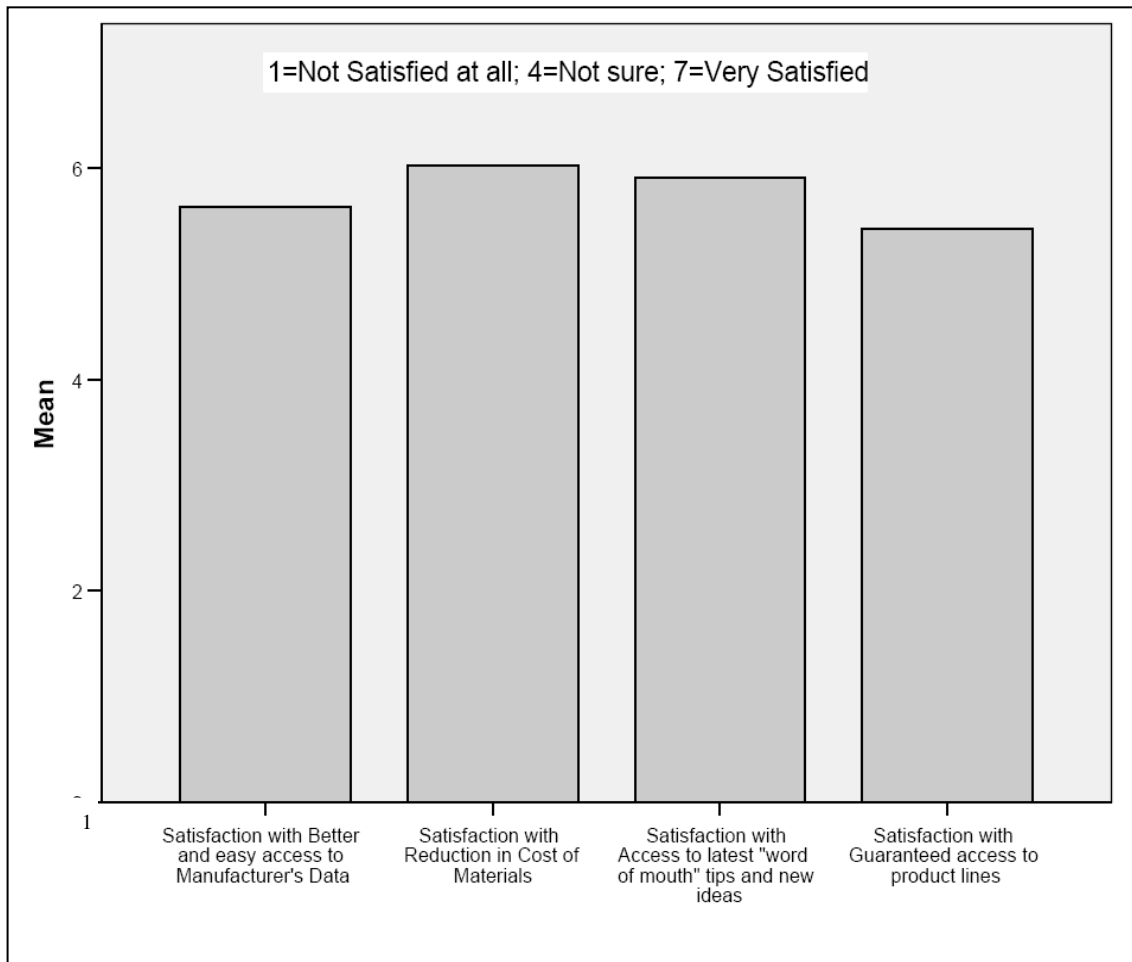
\*If you selected other please indicate the “other” factor(s) and the satisfaction of each factor(s)

**Figure 4.14: Question Two**

In order to measure satisfaction in terms of expected benefits before they joined the cluster, attitude statements were adopted from *Question one* with the exception of attitude statement E (recommendation from an acquaintance) as it was not relevant as a post-adoption item.

#### 4.5.2.1 Analysis of Question Two

Answers from the attitude statements in *Question one* were coded as numbers, “1” being not satisfied and “7” being very satisfied. The number was summed up to obtain a composite score and an average was obtained. The result is shown below.



**Figure 4.15: Satisfaction Levels of Actual Benefits received from being in Cluster**

The bar chart in Figure 4.15 shows that most members (on average) were satisfied with the benefits they obtained by joining and being part of the cluster. Most respondents indicated that they were especially satisfied because of ‘Reduction in cost of materials’ as a benefit from joining the cluster. Respondents (on average) rated ‘access to ‘know how’ and new ideas’ as the second most satisfactory benefit obtained from being in the cluster. Other benefits that members listed included “...being quite happy to have a unique product in their product line which allowed (them) competitive advantage”.

### 4.5.3 Question Five: Expected Benefits

*Question five* examined expectations of future benefits from members of the buying group. Therefore, this allows us to reveal the benefits that SMEs are not currently enjoying within the cluster but hope to in the future.

Question 5. Looking to the future, are there any other benefits/advantages you want to achieve through your membership of 'A Plus Carpet Group'?

**Figure 4.16: Question Five**

Some of the answers to this open-ended question were (in order of significance):

- 1. More buying power (18.9%)**
- 2. Nationally recognised brand name (21.6%)**
- 3. Gaining exclusive products (16.21%)**
- 4. No more store in the same region (13.51%)**

Other future advantages that members expected were network effects with increasing growth. This included knowledge and skills development as well as improved status as a distributor of products.

26% of SMEs who responded left the answer blank. Among the remaining 74% people who answered, an interesting finding was that similar firms within close geographical proximity seemed unwanted within the same cluster because it interfered with competition (see benefit 4). This provides an alternative angle to Porter's (1998b) argument that geographical proximity is essential for clusters to be sustainable. Clearly homogeneous SMEs do not benefit from close proximity. It seems that although geographical proximity is important, it is important to define clear boundaries at the firm level within the cluster for competitive sustenance. Chapter 5 discusses this in further detail.

#### 4.5.4 Question Six: Current Disadvantages

*Question six* examined disadvantages members currently experienced by being part of the cluster. This also translates to asking members of SMEs about the kind of insecurities SMEs faced about or within the cluster.

Question 6. Are there any disadvantages to your firm by being a part of ‘A Plus Carpet Group’? Is so, can you please briefly describe the nature of these disadvantages?

**Figure 4.17: Question Six**

81% answered “None”. 8.1% of the SMEs reported that it was disadvantageous for them to spend on travelling costs for the meetings. 2.7 % of the SMEs expressed their anxiety if the founder of the cluster should leave the cluster. These SMEs believed that the founder was the main asset of the cluster. 5.4% claimed that they did not obtain any benefit and felt disadvantaged in terms of transacting with goods, operations in the billing system and selection of suppliers. The remaining 2.7% of the SMEs pointed out that they were disadvantaged because of close geographical proximity between the firms. Overall, these results do not exhibit major disadvantages for the SMEs in the buying group.

#### 4.6 Research Issue 4: Geographical Proximity

##### **Research Issue 4: does geographical proximity matter in homogeneous clusters?**

In order to understand this issue, answers to *Question eight* and *Question two* were compared to discover the correlation between members’ satisfaction from the cluster and frequency of communication amongst firms within the cluster.

In *Question eight*, the frequency of communication through four channels was asked. Attitude statement A relates to physical communication channel (face-to-face), attitude statement B, C and D asks about using non-physical communication channels (email,

telephone and post) and attitude statement B and C pertain to ICT communication channels (email, telephone).

Question 8. We are interested in the frequency of communication between you and ‘A Plus Carpet Group’ members for work related information or advice.

- a. Over the past six months, how **many times** during the average **workweek** did you personally communicate with ‘A Plus Carpet Group’ members on a **face-to-face** basis?

-----|-----|-----|-----|  
Daily Weekly Monthly Quarterly Never

- b. Over the past six months, how **many times** during the average **workweek** did you personally communicate directly with ‘A Plus Carpet Group’ Member **by e-mail**, or telephone?

-----|-----|-----|-----|  
Daily Weekly Monthly Quarterly Never

- c. Over the past six months, how **many times** during the average **workweek** did you personally communicate directly with ‘A Plus Carpet Group’ Member by **telephone**?

-----|-----|-----|-----|  
Daily Weekly Monthly Quarterly Never

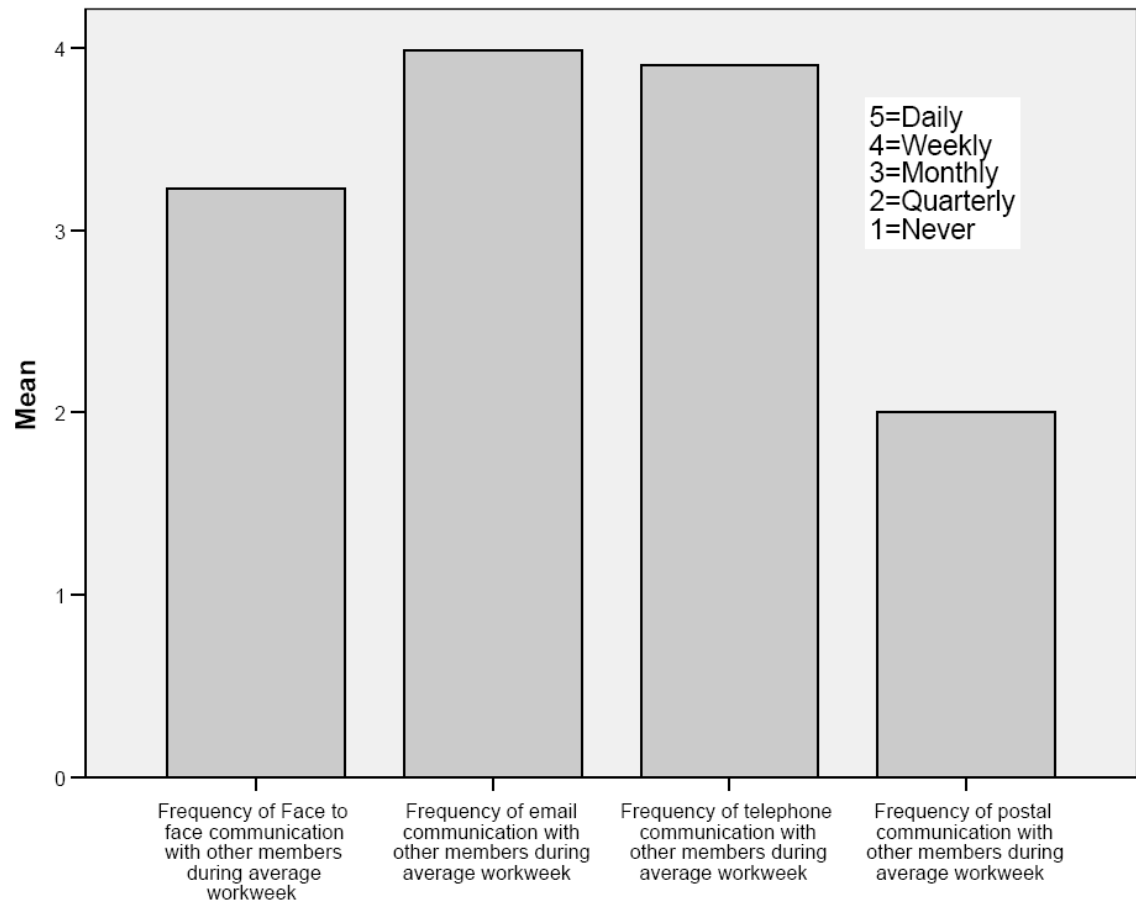
- d. Over the past six months, how **many times** during the average **workweek** did you personally communicate directly with ‘A Plus Carpet Group’ Member by **Post mail**?

-----|-----|-----|-----|  
Daily Weekly Monthly Quarterly Never

Figure 4.18: Question Eight

#### 4.6.1 Analysis of Question 8: Frequency of Contact

Members contacted each other most frequently by email and telephone on a weekly basis (see Figure 4.19). Although all the members in this cluster have information and communication technologies (ICT) such as computers, internet, fax, and email, the channels less often used were face-to-face and post.



**Figure 4.19: Frequency of Communication by ICT and non ICT Media**

It was useful to observe if there were any correlations between the satisfaction levels and frequency of communication using ICT, face-to-face (physical) and through postal (non-physical) communication. Table 4.6 exhibits the correlation matrix.



		<u>Satisfaction</u> with benefits obtained from cluster (mean)	Frequency of <u>ICT</u> enabled communicati on (Mean)	Frequency of <u>postal</u> communic ation with other members during average workweek	Frequency of <u>face-to-face</u> communication with other members during average workweek
<u>Satisfaction</u> with benefits obtained from cluster (mean)	Pearson Correlation	1	.406(*)	-.146	.309
	Sig. (2- tailed)		.019	.416	.080
	N	37	37	37	37
Frequency of <u>ICT enabled</u> communication (Mean)	Pearson Correlation	.406(*)	1	.125	.363(*)
	Sig. (2- tailed)	.019		.490	.038
	N	37	37	37	37
Frequency of <u>postal</u> communication with other members during average workweek	Pearson Correlation	-.146	.125	1	.334
	Sig. (2- tailed)	.416	.490		.057
	N	37	37	37	37
Frequency of <u>physical</u> (face- to-face) communication with other members during average workweek	Pearson Correlation	.309	.363(*)	.334	1
	Sig. (2- tailed)	.080	.038	.057	
	N	37	37	37	37

\* Correlation is significant at the 0.05 level (2-tailed).

**Table 4.6: Correlations between satisfaction (mean), frequency of ICT communication (mean), postal and face-to-face communication**

The correlation coefficient between satisfaction of benefits and frequency mean of face-to-face communication indicates no significant correlation. It explains that even if the number of face-to-face contact increases, there is no significant effect on the satisfaction levels of SME members. Therefore, one can induce that the role of close geographical proximity (for which face-to-face communication is required) is not a significant requirement for high levels of satisfaction. However, there is significant correlation between satisfaction from benefits and mean frequency of ICT contact ( $R=0.406$ ,  $p=0.05$ ). This indicates that although members in SMEs may be geographically distant from each other, as the frequency of ICT usage for communication with other member

increases, levels of satisfaction with the benefits from clusters also increases. This allows us to infer that ICT usage increases knowledge sharing and exchanges of interesting ideas which is conducive to level of satisfaction. This is alluded to in post adoption benefits identified by respondents (Section 4.5).

Interestingly, when the correlation between frequency of communication through non physical media (ie. ICT and post) and frequency of communication through physical media (face-to-face) was examined, there appears to be a very significant correlation ( $R=0.479$ ,  $p=0.01$ ) between them (see Table 4.7). This is highly indicative of the fact that as members interact with each other frequently face-to-face, the usage of ICT media for communication also increases and vice versa.

In relation to developing a better understanding of geographic proximity the analysis suggests that geographic proximity has some effect but not in the sense that SMEs need to be located in the same region. An interesting mix of face-to-face communication supported by ICTs indicates a virtual proximity that is initially developed in face-to-face meetings such as seminars then is strengthened by ongoing contacts. All of these factors may be facilitated by ICTs as different forms of communication emerge suggesting greater attention needs to be given to qualifying the issue of geographic proximity when dealing with alliances between homogeneous SMEs. This is discussed further in Chapter 5.

		Frequency of contact through non-physical media	Frequency of Face-to-face communication with other members during average workweek
Frequency of contact through <b>non-physical media</b>	Pearson Correlation	1	.479(**)
	Sig. (2-tailed)		.006
	N	37	37
Frequency of <b>Physical</b> (Face-to-face) communication with other members during average workweek	Pearson Correlation	.479(**)	1
	Sig. (2-tailed)	.006	
	N	37	37

\*\* Correlation is significant at the 0.01 level (2-tailed).

**Table 4.7: Correlations - Frequency of Non-Physical Contact vs. Physical Contact**

## 4.7 Conclusion

This chapter reported on the results of the survey distributed to case study members. The responses are addressed using the research issues raised in Chapter 2. The findings provide early confirmation of an innovation like diffusion patterns in the adoption of the cluster idea among the ‘A-plus Carpet Group’. The chapter also reveals a networked quality to the way members develop new knowledge through information sharing. The homogeneity of the group clearly leads to issues about competition in proximate markets as predicted by the literature review. Finally, the communication modes exhibited by the group provides an interesting perspective on geographic proximity and its role in supporting network formation and sharing of information. A detailed discussion of the implications of these findings is reported in Chapter 5.

## Chapter 5

### 5. Discussion of Findings

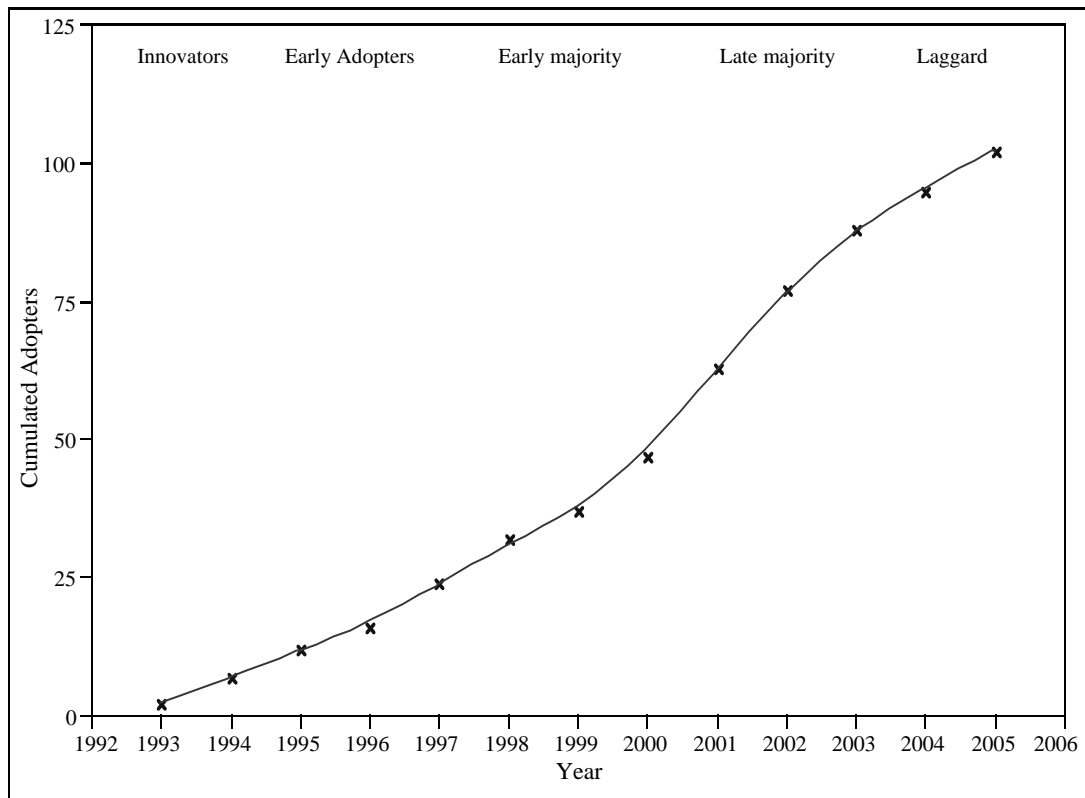
#### 5.1 Introduction

This chapter considers each research issue findings that were reported in Chapter 4 and analyses the findings in relation to the literature as detailed in Chapter 2. In effect, it is aimed at addressing the question of eliciting relevant implications from the results to other research in this area. This will enable judgement to be made about the value of innovation diffusion theory when considering cluster development in SMEs in Australia.

#### 5.2 Research Issue 1 & 2: Innovation Adoption Pattern and Opinion Leadership

Rogers (1995, p. 354) argued that most adopters of an innovation were largely influenced by other members of the social system. Based on many observations and experimentation, successful innovation diffusion and adoption follows an S-shaped curve. Normally after 10-25% of the members of the social system adopt an innovation, the adoption rate rapidly rises with potential adopters. Fundamentally, Rogers (1995, p. 264) postulates that early adopters play crucial role in attracting late adopters.

The survey results show two clear patterns of attributes of innovation adoption. First of all, depicted in the graph in Figure 5.1, 16% of the innovation adopters are innovators and early adopters. The diffusion of innovation then rises rapidly and peaks. The rapid increase in the number of SMEs in adopting the cluster notion indicates that they have been influenced by other people about the innovation and therefore decided to join the cluster as well.

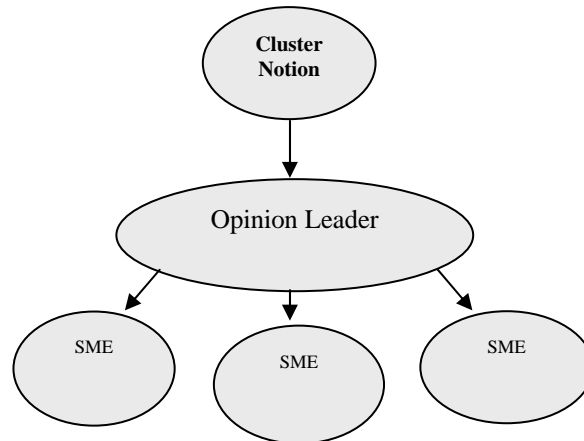


**Figure 5.1: The pattern of S-shaped curve**

Secondly, the social processes underpinning the adoption pattern can be understood from the perspective of 'opinion leadership'. The survey instrument shows that 97.29% of SMEs joined the carpet cluster through acquaintances, 70.27% joined through recommendation of cluster members and 27.02% of SMEs joined the cluster through one key person (the founder). This supports Williams' (1999) identification of the 'entrepreneur' as an important actor in innovation where ideas are extended into a commercial reality. This result shows that the most effective channel for the diffusion of innovation (buying group notion) was the opinion leader. Other common channels for diffusion were advertisement, media story, internet search but these channels did not play a significant role.

As Rogers (1995) argued, opinion leaders are individuals who play a key role in diffusing innovations. Our results find consistency with this argument in that there are opinion leaders who spur the progress of innovation diffusion. The innovation first

reaches the opinion leaders, who in turn pass on what they read or hear to SMEs personnel. Figure 5.2 depicts innovation diffusion by an opinion leader.



**Figure 5.2: The opinion leader as a channel**

The primary factor that motivated respondents to become opinion leaders was the potential for increased buying power. 91.89% of the respondents reported they were happy to pass information about the cluster to potential SMEs. The reason for this was that members (SMEs) strongly favoured the idea that more members would bring more purchasing power, and better network support. They also reported that they were very satisfied with the benefits they received from the cluster. This adds further weight to the claim that cluster formation among horizontally integrated (homogeneous) SMEs can be understood in terms of the diffusion of innovations.

In terms of taking a ‘next step’ with Rogers’ diffusion of innovation theory to understand cluster development, his findings about decision processes is promising. Rogers (1995, p. 20) argued that the innovation–decision process usually follows five steps.

Please see print copy for Figure 5.3

**Figure 5.3: 5-step process (Rogers, 1995, p. 20)**

Likewise, the result of our survey suggests that SMEs followed the same innovation diffusion process in the adoption of the carpet cluster notion. One could speculate that firstly, SMEs were made aware of the cluster notion and its functions from an information source such as an opinion leader or acquaintance. Secondly, SMEs responded to the innovation by contemplating the feasibility of the innovation and whether to pursue it or not. Thirdly, SMEs contacted the head office of the carpet cluster, which led them to make a decision to adopt the innovation. Fourthly, SMEs finally implemented the notion; applied to its business process and decided to allow for changes (eg. structure) in the firm. Finally, SMEs affirmed their decision by appreciating the benefits or disadvantages obtained from being part of the cluster.

As discussed in Chapter 2, in Australia, two distinct approaches have emerged with regards to the development of clusters (Roberts & Enright, 2004). One is the “natural development” of cluster which accounts for value chain attributes of specific industries. The other approach is the “facilitated or induced” approach to cluster formation based on regional public policy initiatives. However, both these approaches do not explicitly account for an understanding of the SME cluster formation process as a network of social influence, norms and processes. In contrast, the innovation diffusion perspective provides an alternative approach to understanding the social processes that are embedded within the process of cluster formation.

### 5.3 Research Issue 3 & 4: Pre and Post Benefits to Cluster Adoption, Impediments to Adoption and Geographical Proximity

The research confirms that a significant difference exists in operations between vertically integrated (heterogeneous) clusters and horizontally integrated (homogeneous) clusters. Most of the firms in vertical clusters such as the Italian Footwear and Fashion example described in Section 2.4, form a cluster to benefit from the advantages of co-informing, co-learning, co-marketing, and co-building (Waits, 2000). However, our results indicate that SMEs were more focused on co-purchasing prior to joining the cluster. They expected benefits in terms of reduction in cost of products and obtaining guaranteed product lines. For the majority of SMEs in this case, the owner is also the manager of the firm attesting to the small size of these SMEs (a micro business using the European Commission's classification as detailed in Table 1.1). Therefore, the most important benefit they expected was gaining buying power and unique products.

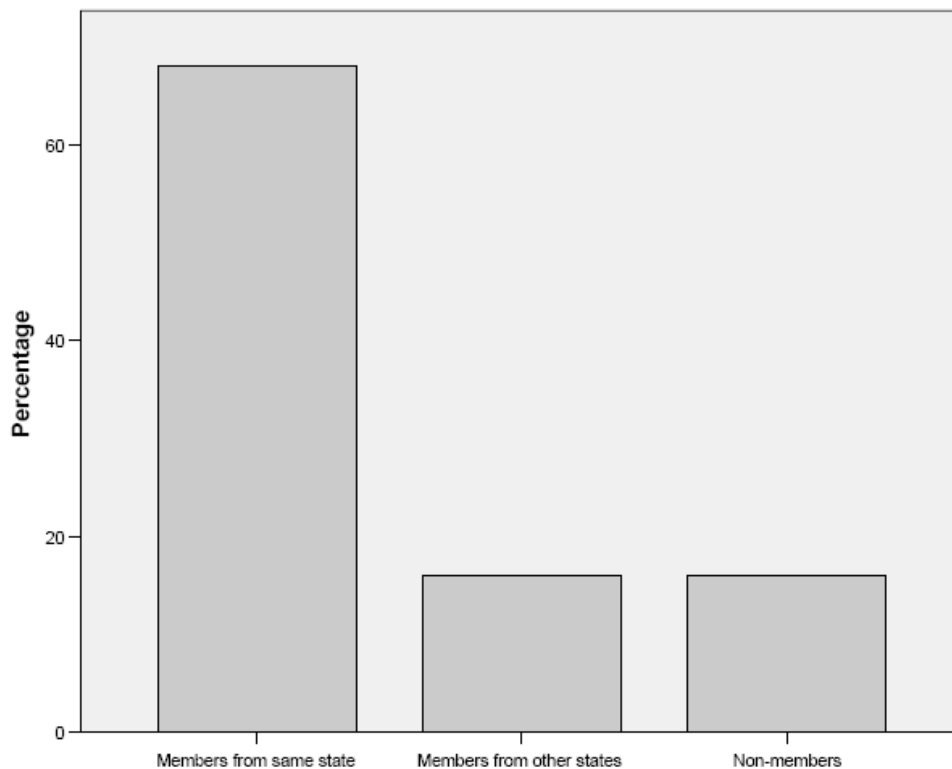
Post adoption benefits experienced by the case study participant indicated a growing awareness of benefits enjoyed by vertically integrated clusters. When asked about the benefits they experienced after joining the cluster (*Question two*), our results show that SMEs were satisfied with access to 'know how' and new ideas. This is an interesting finding because these benefits were not expected when SMEs joined the buying group. It can be seen that this kind of behaviour is a reflection of organisational learning (Mitra, 2000). Therefore, the study reveals that a commonality exists between the literature on vertically integrated clusters and horizontally integrated grouping of the case study.

Another contrast between vertically integrated and horizontally integrated grouping is the issue of geographic proximity. The analysis in Chapter 2 questioned this emphasis when advising SMEs how to gain competitive advantage. In this case study, SMEs are



found to target the same customer base and consequently, most firms are not geographically close within regions. Members of clusters are scattered across states in Australia. This stands to reason as it is almost impossible for firms to simultaneously stay in close geographical proximity to compete and support each other co-operatively. This explains why some respondents wished for ‘no more stores in the same region’. In this case of homogeneous clusters it is necessary to qualify the influence of geographical proximity. This can be done by looking to fundamental social processes relating to communication.

Further analysis of opinion leaders revealed an interesting insight when considering the locations of these leaders. In Figure 5.4, 84% of SMEs joined the cluster through a member, out of which 68% were influenced by members located *in the same state*. This contrasts with a figure of 16% who were influenced to join from members outside their states. Interestingly, all the SMEs within the latter category reported the name of one key person through whom they joined the cluster, the founder of the buying group. The remaining 16% of SMEs (third column in Figure 5.4) shows that they joined the cluster through an acquaintance who was not a member of the cluster. While it appears that regional proximity is not conducive to success in clustering, state-wide grouping appears to be associated with positive growth of the buying group.



**Figure 5.4: Channels of Adoption**

Communication patterns between buying group members further revealed the need to qualify geographical proximity as an explanatory factor. *Question eight* and *Question two* was structured to highlight correlations between communication frequency (which includes face-to-face and ICT media) and satisfaction of SMEs within the cluster. All firms in the carpet cluster have personal computers with email facility. Initially it was expected that ICT use and satisfaction of members would be positively related. While this was the case the result of the survey reveals interesting attributes.

Reference to Section 4.6.1 indicates a significant correlation at 0.406 between the frequency of ICT enabled communication and satisfaction of members. However, when we observe in detail the correlation between face-to-face communication (between SMEs during an average workweek for the past six months) and satisfaction of members (offered by being in the cluster), we found no significant correlation at all (Figure 5.5). Interestingly, Table 4.6 shows face-to-face (physical) contact has high

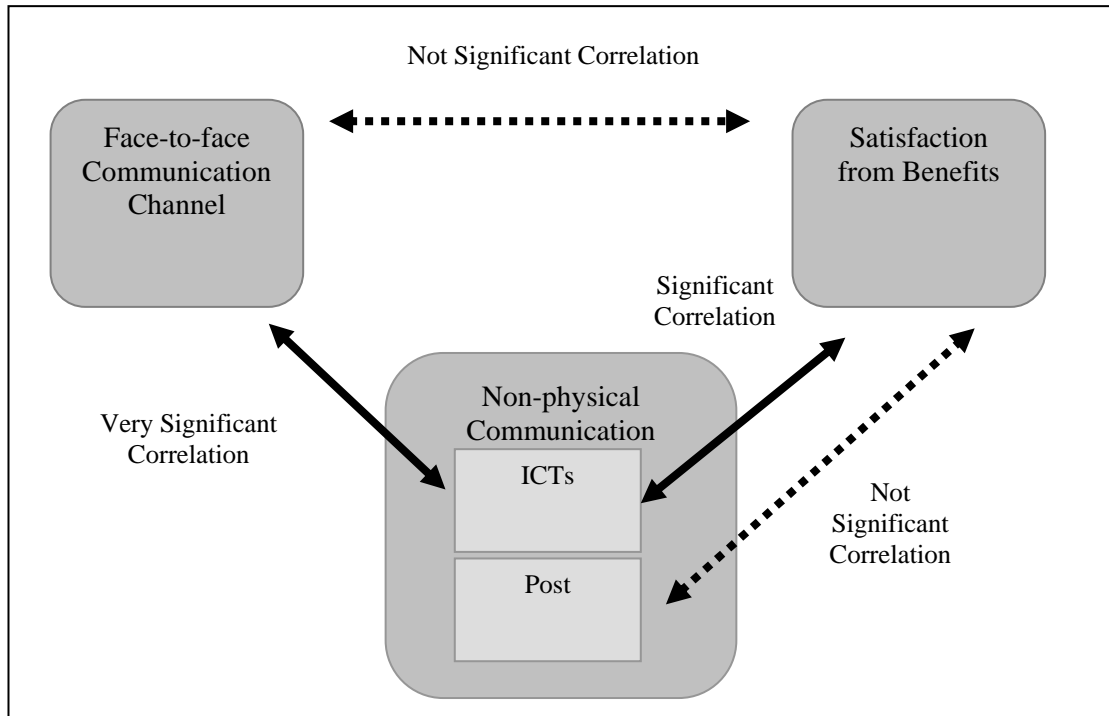
significant correlation with non-physical contact ( $R=0.479$ ,  $p=0.01$ ) even though most members still communicate with other members through post (but did not reveal high correlation with satisfaction). This is summarised in Figure 5.5.

Therefore, three explanations of the data can be advanced. Firstly, we can induce that members who were good at communication were equally adept at face-to-face and ICT enable communication. These members appeared to experience satisfaction with the cluster. Secondly, the weak correlation between face-to-face communication only and satisfaction appears to be related to the nature of geographic proximity where such members are in competition with each other. Thirdly the data hints at an interesting interplay between the use of face-to-face meetings such as annual conferences and ICT use. It is interesting to note that the increase in the usage of ICT also offers members the opportunity for further exchange and collaboration at a face-to-face level. Therefore, the increase of ICT usage tends to increase the level of face-to-face communication and vice versa.

This provides direction in relation to ICT use within horizontally integrated alliances. In summary, there seems to be an interesting relationship between different modes of communication and the levels of satisfaction of SME members within the cluster. One can therefore infer that the usage of ICT, rather than face-to-face, for communication *after joining the cluster* is crucial to the levels of satisfaction of members within the cluster, because it fosters knowledge sharing and the exchange of ideas, irrespective of geographical boundaries and time constraints.

The reason Porter (2000b) emphasized the importance of geographical proximity was to increase the frequency of contact between the firms and reduce the cost of sharing the information within the cluster. However, this case study demonstrates that frequency of the physical contact alone did not have much association with satisfaction of members

because this probably indicates co-located businesses that had little incentive to co-operate. The satisfaction of members significantly correlated stronger with non-physical communication contact instead.



**Figure 5.5: Correlation between Frequency of Communication and satisfaction**

In light of these arguments, the importance of geographical proximity for cluster formation cannot be ignored. Results concerning research issue 1 (pattern of adoption) and research issue 2 (opinion leaders) show that most SMEs adopted the cluster notion because of opinion leaders who were located in the same state. Post adoption results indicate that close geographical proximity to other competing SMEs within the same cluster actually hindered cluster operation. The effects of proximity appears to be relative where on the one hand regional proximity appears to have a negative effect on member's satisfaction while state-wide proximity positively influences cluster growth as revealed by the analysis of opinion leader location. Understanding and qualifying the

effects of geographical proximity is hence important for defining clusters as it has major implications on competition and cluster formation.

#### 5.4 Conclusion

This chapter amalgamates the findings from Chapter 4 in order to provide a coherent discussion of the results in conjunction with the theoretical model proposed in Chapter 2. The findings are strongly supportive of the use of innovation diffusion theory to understand process of cluster development. The case study indicates that the pattern of SMEs joining the cluster from 1993 until 2006 took on an S-shaped curve, which is highly indicative of a successful innovation. Next, the case study reports that a key person (founder of the cluster) played the role of ‘opinion leader’ in terms of generating membership or in the language of innovation theory and diffusion.

Important insights are gained in relation to differences and similarities between vertically integrated clusters and horizontally integrated clusters. Pre-adoption motivation for joining the case study cluster relates to increased supply side efficiencies - an area not normally associated with vertical integrated clusters. Post-adoption benefits indicate convergence between vertical and horizontal clusters where information sharing and knowledge development emerges as important.

However, geographic proximity cannot be dismissed when considering horizontally integrated clusters. It is important to look beyond the physical definitions to communication factors. Satisfaction with the cluster was considerably associated with the frequency of communication between SMEs in the clusters through ICT media such as email and telephone. Interestingly, the analysis showed no significant correlations between the mean frequency of face-to-face communication and satisfaction levels. This is indicative of the fact that close geographical proximity (in the case of face-to-face

communication) is not associated with high levels of satisfaction *after SMEs adopted the cluster notion* (the innovation).

Therefore, the issue of geographical proximity needs to be considered carefully as our findings suggest that there is a tension between competition and co-operation and this dictates the boundaries of geographical proximity. The manner in which ICTs can support this tension to create better learning opportunities for SMEs is crucial.

## Chapter 6

### 6. Conclusion

#### 6.1 Introduction

This study contributes knowledge about SME development by addressing two significant areas of research, cluster formation and innovation diffusion. In summarising the main findings, this chapter provides support for the use of innovation diffusion theory to understand cluster development. In turn this contributes to a better understanding of the role of geographic proximity and the use of ICTs to facilitate cluster development in horizontally integrated SMEs. The chapter concludes by recapping limitations of this research and specifying areas of further research.

#### 6.2 Summary of Research

The study set out to investigate the concept of clusters in order to better understand the challenges of horizontally integrated clusters. This study raised four research issues. The first and second issues were based on innovation diffusion theory in order to understand its value and relation to cluster development in SMEs. The third research issue focused on the defining differences between heterogeneous and homogeneous clusters. The fourth research issue raised the importance of whether geographical proximity played an important role in the operational satisfaction of the SMEs that were within the cluster.

We utilised a case study methodology in order to obtain a rich understanding of the cluster adoption process by a group of SMEs. In particular, the study sought to

understand “how” SMEs diffuse the carpet cluster information as an innovation that led others to adopt the innovation. It also asked the SMEs within the cluster about “what” benefits and disadvantages they expected prior to joining the cluster and actual benefits and disadvantages they received after they joined the cluster. The case study methodology also allowed for asking “why” SMEs joined the cluster and also allowed for a deeper understanding about the social processes that led to cluster adoption.

The context for our study was a carpet buying group of 113 SMEs located across Australia. The cluster had developed over 13 years and the homogeneity of the SMEs in terms of business nature, goals and customer base provided excellent justifications for its choice as a case study. Access to secondary data about the SMEs such as dates of joining the cluster and other details such as firm names and email addresses were made available to the author of this thesis.

In order to collect primary data about the innovation diffusion process, a survey questionnaire was developed and initially piloted to a small sample of SME representatives from the cluster through an online survey. Cosmetic errors in the questionnaire items were identified and eventually rectified. The questionnaire was sent to all 113 firms within the cluster through post and online media. An initial letter was sent to them informing them about the research. The actual survey was administered a week after, followed by two follow-ups through emails, telephone calls and postal reminders in the third week and the fifth week. 37 responses were obtained in the end achieving a response rate of 32%.

A clear pattern of innovation diffusion emerged when analysing the results in Chapter 4. Discussion in Chapter 5 led to a finding that innovation diffusion theory was a useful approach in understanding cluster development. This was based on the S-shaped adoption pattern over time. Also the existence of opinion leaders in the innovation



adoption process clearly demonstrated the influence of key social actors in exposing the innovation to potential adopters. It highlighted their influence on decision making capabilities of the adopters. These findings are consistent with Rogers' (2003) theory on innovation diffusion.

Although current approaches such as the “industry facilitated approach” and regional public policy initiatives are useful and necessary, there is a need to better understand the social processes that are crucial to the exchange of ideas and new information between SMEs. This limitation is intensified particularly in the case of understanding how horizontal value chains made up of homogeneous SMEs work together. The innovation diffusion perspective as offered by this thesis provides a closer and richer perspective for understanding the formation of homogeneous clusters.

An interesting finding that emerged from the research is that even though homogeneous clusters were focused on delivering short-term benefits, as the cluster matured, it displayed attributes that are common to heterogeneous groupings. Over time, SMEs within the cluster valued the need to obtain more network benefits such as knowledge-sharing. This is not unlike heterogeneous clusters that focus on co-benefits that are achieved on an on-going and long term basis.

The literature review in Chapter 2 draws attention to multiple definitions of clusters with respect to geographical proximity. That is, should clusters be geographically close for them to be considered a cluster? If not, what are the boundaries? In order to clarify such ambiguity, research issue four asks, “Does geographical proximity matter in homogeneous clusters?” The findings indicate that while geographical proximity does matter, it depends on the nature and characteristics of the SMEs. For instance, our findings indicate that most SMEs joined the cluster by influence of other SMEs within the same state and which were already part of the cluster. Therefore, it can be induced

that ties between the SMEs in the same states are stronger (that is, more frequent in communication) than SMEs not from the same states. Therefore, geographical proximity plays an important role in leading SMEs to adopt the cluster notion. However, our findings also indicate that in homogeneous clusters, SMEs would rather not be too closely located to other, *after adoption on the cluster*. The close distance impedes co-operation and hinders SMEs from obtaining competitive advantage through differentiation of pricing, service and product.

Furthermore, findings in Chapter 4 also indicate that SMEs which communicate at a face-to-face level do not achieve higher levels of satisfaction, as opposed to the frequency of using ICT as a communication medium. This indicates further that close geographical proximity of SMEs is not conducive to satisfaction levels. Geographical proximity therefore matters and its boundaries and the stages of innovation diffusion play a crucial role in determining competitiveness.

It was interesting to note that the respondents who met face-to-face more frequently with each other were also the ones who used ICT to communicate more frequently with each other. This finding bears implication for the development of the cluster into an e-business model.

This provides a significant endorsement of an innovation diffusion approach to understanding cluster development in SMEs. The ambiguity surrounding geographical proximity leaves the way open for alternative methods to understanding cluster development. The explanatory value of an innovation diffusion perspective, particularly the emphasis given to communication processes in social networks, opens the way for further application of related research methodologies to cluster development in Australian SMEs. Along with the two dominant areas by Government, industry specific clusters and regional approaches, an innovations diffusion approach potentially answers

the need for more effective methodologies in dealing with cluster formation in geographically dispersed SMEs.

### 6.3 Limitations of Current Study and Directions for Future Research

Directions for future research that emerge from this study are in part a reflection of limitations of the research methodology employed. One of the limitations of this study relates to the choice of data collection method. Critics of the case study method believe that the study of a small number of cases offer no grounds for establishing reliability or generality of findings (Giddens, 1984). This weakness has been acknowledged and addressed through discussion and analysis in Chapter 5. To that end future research directions would include a larger sample of SME organisations with emphasis on distinguishing between vertical and horizontal value chains.

In its favour the research design did establish coverage of 113 SMEs which is preferable to ethnographic case study research which is more limited in the number of SMEs it can cover. However ethnographic research would provide interesting insights into information sharing and knowledge development at a micro scale. Investigation into the role of opinion leadership within clusters would respond well to ethnographic research approach. This would be interesting to confirm at a more detailed level.

Other avenues for research include developing a comparison study between SMEs cluster from other nations and Australian ones. So far, the research demonstrates how SMEs adopt ideas from peers and acquaintances for innovation diffusion and adoption. It is also possible to conduct a longitudinal study to observe the dynamics of the cluster over time such as studying its communication behaviours between SMEs in the cluster and their ICT usage for innovation diffusion.

## 6.4 Conclusion

In conclusion, this study shows that SMEs clustering can be understood in terms of the diffusion of innovations for SMEs to improve competitive advantage. It also contributes to the understanding of the innovation diffusion process within the context of homogeneous SMEs cluster. The study also fostered an understanding of how SMEs cluster operate in contrast to established vertically integrated clusters. It depicts a clearer definition of the use of geographic proximity when forming clusters.

Finally, the Australian government currently provides extensive support to industrial clusters (eg. tourism industry clusters) at the state level. Clusters such as the homogeneous carpet cluster in this case, receive lesser attention at the state governmental level because of its homogeneous nature and dispersion across states within the country. The government and macro-level policy makers should consider supporting and appreciating the significance of homogeneous clusters

in terms of its contribution to the economy's gross domestic product and national income. This calls for greater attention to the use of ICTs by SMEs and the government's role in regulating the provision of telecommunications services to this important sector of the economy.

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## Appendix 1- Survey Questionnaire

University of Wollongong



**FAX To : 02) 4221 4338 Person to:** [REDACTED]

### Survey of A Plus Carpet Group

*We are interested to know how “A Plus Carpet Group” has grown over time. We would like to know how you became a member, when you joined and what kind of benefits you gained. All information given by you will remain completely confidential and used for this research only. No identified information will be published.*

**Instruction:** Please complete all the questions.

- 1. We are interested to know the reasons why your firm initially joined ‘A Plus Carpet Group’. Please indicate the importance of each factor in making the decision to ‘A Plus Carpet Group’**

**Please Circle**

**A. Better and easy access to manufacturer's data**

-----|-----|-----|-----|-----|-----|-----|  
 Very important   Important   somewhat important   not sure   somewhat not important   not important   not important at all

**B. Reduction in cost of materials**

-----|-----|-----|-----|-----|-----|-----|  
 Very important   Important   somewhat important   not sure   somewhat not important   not important   not important at all

**C. Access to latest "word of mouth" tips and new ideas**

-----|-----|-----|-----|-----|-----|-----|  
 Very important   Important   somewhat important   not sure   somewhat not important   not important   not important at all

**D. Guaranteed access to product lines**

-----|-----|-----|-----|-----|-----|-----|  
 Very important   Important   somewhat important   not sure   somewhat not important   not important   not important at all

**E. Recommendation from an acquaintance**

-----|-----|-----|-----|-----|-----|-----|  
 Very important   Important   somewhat important   not sure   somewhat not important   not important   not important at all

**F. Other\***

\*If you selected other please indicate what other means and its benefits.

-----|-----|-----|-----|-----|-----|-----|  
 Very important   Important   somewhat important   not sure   somewhat not important   not important   not important at all



- 2. We are interested to know whether your firm benefited from the following advantages after joining “A Plus Carpet Group”. Please indicate the satisfaction of each factor for your company's operations/success currently.**

**Please Circle**

**A. Better and easy access to manufacturer's data.**

-----|-----|-----|-----|-----|  
 Very satisfied    satisfied    somewhat satisfied    not sure    somewhat not satisfied    not satisfied    strongly dissatisfied

**B. Reduction in cost of materials**

-----|-----|-----|-----|-----|  
 Very satisfied    satisfied    somewhat satisfied    not sure    somewhat not satisfied    not satisfied    strongly dissatisfied

**C. Access to latest "word of mouth" tips and new ideas.**

-----|-----|-----|-----|-----|  
 Very satisfied    satisfied    somewhat satisfied    not sure    somewhat not satisfied    not satisfied    strongly dissatisfied

**D. Guaranteed access to product lines**

-----|-----|-----|-----|-----|  
 Very satisfied    satisfied    somewhat satisfied    not sure    somewhat not satisfied    not satisfied    strongly dissatisfied

**E. Other\***

\*If you selected other please indicate the “other” factor(s) and it’s importance

-----|-----|-----|-----|-----|  
 Very satisfied    satisfied    somewhat satisfied    not sure    somewhat not satisfied    not satisfied    strongly dissatisfied

- 3. How did you hear about “A Plus Carpet Group”?**

- A. Advertisement
- B. Media Story
- C. Internet Search
- D. An acquaintance from the buying group
- E. An acquaintance from outside the buying group

ANSWER: \_\_\_\_\_

- a. If you heard about ‘A Plus Carpet Group’ from a person please enter his/her name.**  
 (The details you provide will be coded to protect the privacy and anonymity of yourself and the people you identify)

First name \_\_\_\_\_

Last name \_\_\_\_\_

Shop Area \_\_\_\_\_

4. When did you join ‘A Plus Carpet Group’?  
Please provide the month and year only.

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5. Looking to the future, are there any other benefits/advantages you want to achieve through your membership of ‘A Plus Carpet Group’?

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6. Are there any disadvantages to your firm by being a part of ‘A Plus Carpet Group’? Is so, can you please briefly describe the nature of these disadvantages

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7. Would you recommend ‘A Plus Carpet Group’ to businesses which are currently not a member of this buying group? Please also indicate why or why not?

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8. We are interested in the frequency of communication between you and ‘A Plus Carpet Group’ members for work related information or advice.

- a. Over the past six months, how many times during the average workweek did you personally communicate with ‘A Plus Carpet Group’ members on a face-to-face basis?

|-----|-----|-----|-----|  
 Daily      Weekly      Monthly      Quarterly      Never

- b. Over the past six months, how many times during the average workweek did you personally communicate directly with ‘A Plus Carpet Group’ Member by e-mail, or telephone?

|-----|-----|-----|-----|  
 Daily      Weekly      Monthly      Quarterly      Never

- c. Over the past six months, how many times during the average workweek did you personally communicate directly with ‘A Plus Carpet Group’ Member by telephone?

|-----|-----|-----|-----|  
 Daily      Weekly      Monthly      Quarterly      Never

- d. Over the past six months, how many times during the average workweek did you personally communicate directly with ‘A Plus Carpet Group’ Member by Post mail?

|-----|-----|-----|-----|

If you have any other comments such as ideas or important issues relating to your firm and the buying group which you feel this survey may have missed out, please write them in the text box below.

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Should we require clarifications of your comments are you comfortable with follow-up contact via email? If so please provide your details.

**Firm name and the location: (please include Suburb, State)**

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**Name of the participant**

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**Email address**

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Thank very much for your participation



## Appendix 2- Survey Recruitment Letter

University of Wollongong



15<sup>th</sup> August 2006  
Independent Floors  
Australia

Dear Manager

I am currently a Masters by research student at the School of Information Technology and Computer Science, University of Wollongong. My supervisor, William Tibben and co-supervisor, Valerie Baker, and I are currently researching the topic of Small to Medium Sized Enterprise (SME) buying group and the process of how SMEs join SME-clusters. We believe that your buying group (an SME cluster) is unique because it has developed over the past twenty years almost instinctively and have been providing numerous benefits to the SMEs that are part of it.

For that reason we are seeking your participation in a limited study to better understand the development of your buying group. The study will benefit your organisation by providing insight into the formation of the buying group and the benefits members receive.

We would like to kindly ask your to participate a online survey. The survey would take lesser than 10 minutes to complete and the data obtained will be used only for purpose of this study. We assure you that your privacy, anonymity and confidentiality will be preserved. When presenting the data or the results, we will be using hypothetical names to represent your organisation and the participants of the survey.

Please go to URL: <http://survey.uow.edu.au/>

This is token which will allow you to access : [REDACTED]

I hope that you will kindly welcome my involvement into this research topic. If there are any questions or information you should require, please do not hesitate to contact me at [REDACTED]. I look forward to your participation.

Thanking you,

Kind regards,  
Claire (Ye ryung), Kim