

**HOW DOES THE INTERNET RELATE TO THE
INTERNATIONALISATION OF UK MANUFACTURING SMES?
– A NETWORK APPROACH**

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ABSTRACT

A number of researchers suggest that the development of Internet technologies, especially the World Wide Web, provides new opportunities for Small and Medium-sized Enterprises (SMEs), because the Internet has the ability to assist SMEs to extend their activities into customer base in international markets. Although there is extensive research focusing on business-to-consumer marketing, no significant studies have looked at business-to-business marketing, especially the manufacturing SMEs sector. This thesis examines how the Internet relates to manufacturing SMEs and reviews how manufacturing SMEs internationalise. In particular, this thesis concerns how industrial networks/relationships impact on the use of the Internet for manufacturing SMEs and their international operations.

This thesis reviews relevant areas of literature in industrial network perspectives, internationalisation, capabilities and the Internet. A conceptual framework derived from the literature review is also presented. The conceptual development provides a framework for the subsequent research strategies. The empirical data consists of ten in-depth case studies from different types of manufacturing SMEs and industries within the UK. A cross-case analysis was then carried out which leads to the finalised framework.

One of the key contributions of this thesis is the development of the SCIM (SME Capability for the Internationalisation of Manufacturing) framework. The framework provides an overview of an industrial network in relation to the manufacturing SMEs' capability development, and factors such as the Internet and industrial environment that need to be considered for their international business decisions. The findings reveal key components that have direct impact upon manufacturing SMEs when engaging in network business activities. Moreover, the findings elaborate the influence of the Internet for manufacturing SMEs for their international business operations and internationalisation strategies. Finally, the implications for practice and directions for future research are highlighted.

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CHAPTER ONE: INTRODUCTION

1.1 Introduction

This thesis concerns the exploration of how manufacturing Small and Medium-sized Enterprises (SMEs) in the UK perceive the use of the Internet in relation to their internationalisation process and operation. The study addresses the key Internet tools used and examines business marketing and purchasing in an interactive network approach.

This chapter discusses the background of the study with the research aim and objectives, followed by a brief overview of the structure of this thesis.

1.2 Background of Study

Since the commercialisation of the Internet in the 80's, it has extensively expanded in terms of technology and availability to the public. In the 90's, the Internet revolutionised the computing world and communication styles (Leiner *et al.* 2000). Different forms of Internet applications and activities such as electronic mail (e-mail), World Wide Web (WWW), electronic commerce (e-commerce), online chat rooms, online video conference and online voice conversation etc. are widely used by individuals and businesses. Most importantly, the nature of the Internet means there is no time restriction and it can be accessed from any corners of the globe as long as users have hardware (computers, mobile phones with Wireless Application Protocol (WAP) function, Personal Digital Assistants (PDA) etc.) with access to the Internet. The relatively low cost of the Internet is another issue why companies are interested in adopting it for their own use (Hamill and Gregory 1997; Poon and Swatman 1999; Avlonitis and Karayanni 2000; Daniel *et al.* 2002; Berthon *et al.* 2003).

Apart from the development of the Internet, the last twenty years have seen dramatic changes in technological, economic and social conditions, changes which researchers argue have encouraged firms to follow the trend of internationalisation which needed re-investigation (Oviatt and McDougall 1997; Chetty and Campbell-Hunt 2003). In

addition, Pleitner (2002) and Ruzzier *et al.* (2006) highlight that Small and Medium-sized Enterprises (SMEs) in high-tech industry and manufacturing sectors face increasing competition from overseas' competitors due to the lower cost of Internet development, as well as the global trend of continuous financial deregulation and economic liberalisation.

In terms of internationalisation strategy, there is an emerging trend in focusing on inter-organisational exchange and industrial marketing research, also known as "network" approach (Johanson and Mattsson 1994; Möller 1994). The network view of internationalisation differs from the views based on microeconomics and consumer marketing research (typically North-American marketing theory). As suggested by Tikkanen (1998), the network approach expands the economics-oriented view of industrial markets by looking at other non-economic bonds between firms.

Furthermore, a number of researchers and studies have highlighted the importance of industrial relationships as devices to influence industrial business networking (Naudé and Turnbull 1998; Gadde and Håkansson 2001; Ford *et al.* 2003). Thus, it is important for this study to investigate how different types of relationships have an effect on a manufacturing SME's internationalisation decision. The network view therefore offers an opportunity for a raw insight into the exploitation of the Internet in manufacturing SMEs' internationalisation.

To date, much of the investigation of the Internet has focused on the Business-to-Consumer (B2C) level in discussion of e-commerce, whereas the Business-to-Business (B2B) level has had less intensive and extensive discussion, in particular regarding manufacturing SMEs. Thus, this study explores the view of internationalisation from a manufacturing SME's perspective.

According to Olsztynski (2005), industrial buyers now turn to the Internet nearly twice as often as the offline information search. However in general, industrial sellers are still catching up with Internet technology, e.g. making their website appeal to potential buyers. Furthermore, the expectations between buyers and sellers differ: while 70% of buyers anticipate that detailed product information can be found on the website, only 53% of sellers actually provide it (*ibid.*). Moreover, 74% of users expect

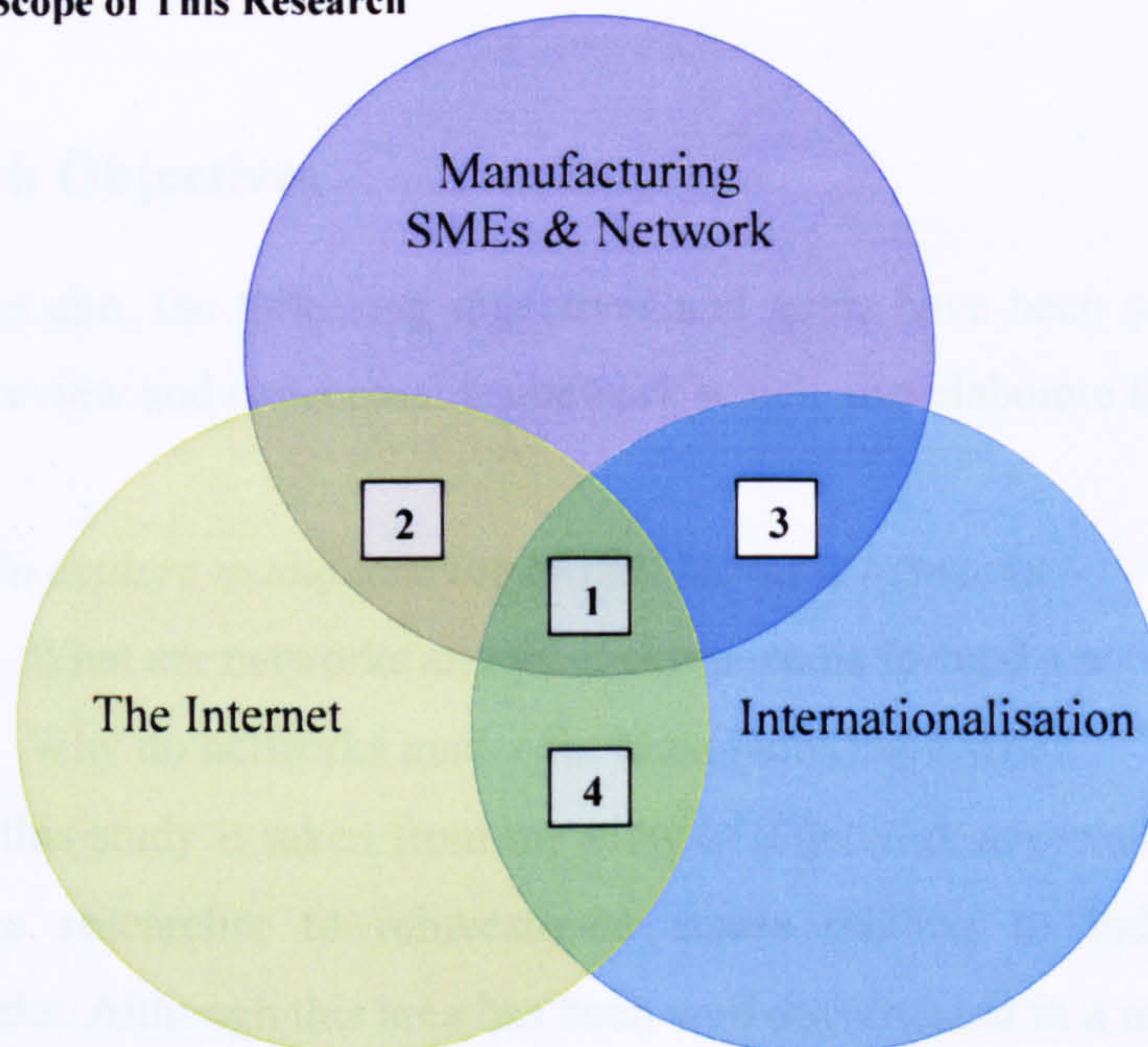
to find product prices online, while only 23% of company websites offer them (*ibid.*). This indicates the variance between the demand for usage and actual Internet development in the B2B environment, as well as the need to investigate the reason for such passive Internet development.

Nevertheless, there have been a limited number of academic studies addressing the direct impact of the Internet in the internationalisation process for manufacturing SMEs from a network approach. Therefore, this research aims to develop a specific framework for this domain and add to the existing knowledge.

1.3 Concept of the Thesis

The concept of this thesis is surrounded by three elements, they are: manufacturing SMEs and its network, internationalisation and the Internet. This can be further illustrated as the following figure 1.1.

Figure 1.1 The Scope of This Research



The key contribution and the core of this research is in the overlapping area 1 of Figure 1.1, between the elements of manufacturing SMEs and its network, the Internet and internationalisation. Yet, this research also expects to find other issues

overlapping in areas 2, 3 and 4, but the findings in these areas are best treated as supporting topics that can assist the researcher to focus on the key objectives and relevant goals.

1.4 Research Aim

From the previous section, it is possible to summarise central aim of the research:

*“How Does the Internet relate to the Internationalisation of UK manufacturing SMEs?
– A Network Approach”*

How do manufacturing SMEs use different Internet methods to assist their internationalisation or international operations? Additionally, how different business interactions within a manufacturing SME’s industrial network have an effect on a company’s internationalisation decision? In the next section, relevant research objectives are set and explained.

1.5 Research Objectives

To achieve the aim, the following objectives and goals have been set, derived from the literature review and conceptual framework which also elaborate this research.

Objective 1: To explore manufacturing SMEs’ business networks

- What are networks and what components formed a network?
- Why do networks matter for manufacturing SMEs?

Since this study is taken from the view of a network approach, it is necessary for the researcher to reinvestigate issues relating to industrial business networks. Although this area has been well documented in a number of studies, it is important to explore it in the context of this research in UK manufacturing SMEs. This will also provide indications of a manufacturing SME’s positioning and roles within their network, which may in turn influence their decision about the use of Internet and internationalisation approaches. This

also leads to the discussion of internationalisation through networks and other associate sub-topics, such as business relationships and capabilities.

Objective 2: To examine different views of the internationalisation process from manufacturing SMEs' perspective

- What is internationalisation?
- How do they internationalise?

This objective is to review different internationalisation theories and seek to understand how manufacturing SMEs internationalise. This objective also explores the reasons for different internationalisation approaches and investigates the importance of internationalisation to manufacturing SMEs.

Objective 3: To discover current Internet activities of manufacturing SMEs

- What is the Internet?
- How do different Internet methods contribute to a manufacturing SME's internationalisation in business networks?

This objective is to explore how different Internet methods were used by different types of company, namely B2B and B2C SMEs. In addition, this objective intended to find out on what basis manufacturing SMEs decided to use certain Internet technologies to assist their business operations. Achieving this goal will contribute to existing knowledge in terms of the key criteria that manufacturing SMEs use to assess the usefulness of the Internet.

Objective 4: To identify manufacturing SMEs' internationalisation process for the adoption of Internet.

- What drives an internationalisation decision?
- What are the approaches that they use?

It is necessary to understand manufacturing SMEs' intention to explore international markets when using the Internet. The findings will provide the researcher with understanding of the key decisions that concern manufacturing SMEs in internationalising. Furthermore, to categorise what sort of approaches manufacturing SMEs used to achieve their existence in international markets.

Objective 5: To develop a framework to reflect how manufacturing SMEs adopted the Internet for their internationalisation process.

- What factors/elements that contribute the model/framework?
- How do these factors/elements map to the network?

This, the final objective, is where the researcher intends to draw a conclusion for this thesis and to develop a framework that can be used for future research in relevant research areas, and to provide a clear framework for business considerations.

1.6 Justification for the Thesis

This research is aimed at the level of B2B industrial sectors and focuses on manufacturing SMEs within the UK. This research also includes how manufacturing SMEs perceive the use of the Internet and other effects brought along with it, which possibly influence manufacturing SMEs' internationalisation approaches or decisions.

Although this research is focused on manufacturing SMEs within the UK, the researcher expects that the outcome of this thesis may be applicable to other geographical regions, i.e. the European Union. This is because the definitions of manufacturing SMEs in different regions or countries share similar categorisations. Another important factor which supports the wider application of this thesis is that the companies chosen for this research are a collective sample from different manufacturing sectors. Thus, this would fill the gap in existing knowledge where most of the existing studies are focused on the non-manufacturing SMEs, e.g. retailers.

1.7 Structure of the Thesis

There are seven chapters included within this thesis; the order is set out as follows:

Chapter Two utilises the literature review to topics related to this research, which includes different existing definitions, theories and frameworks. Some key areas are

investigated, such as the definition of SME, internationalisation theories, the notion of “capabilities”, and the use of the Internet in B2B setting.

Chapter Three is the development of a conceptual framework, which derives from the literature review to form a platform for the primary research to follow. This chapter also includes the explanation of different components that assembled the proposed conceptual framework.

Chapter Four discusses the research philosophy and methodology. A multiple-case study approach was adopted and the research process is discussed, from the development of interview questions, data collection methods and the procedure for data analysis. At the end of this chapter, discussions on research validities and credibility are included.

Chapter Five presents the data collected from the ten case companies, in which is also included a pilot case study. Each case study is presented in the same structure format. The overall structure is also in line with the research objectives set in Chapter 1.5, with a number of tables and figures adapted for clear illustrations.

Chapter Six is a cross-case analysis. This categorises and summarises the key findings from the intra-case analyses in Chapter Five. The discussion is based on groupings of the case companies and seeks a pattern that can validate the research. Moreover, this chapter focuses on the modification of the original conceptual framework, with further elaboration and in-depth explanation.

Chapter Seven summarises the conclusions of this research, including the contribution to knowledge, with reflections on the proposed research questions set out in Chapter 1.3. Chapter Seven also includes some managerial implications and further research suggestions.

1.8 Conclusion

This chapter considered the development of the Internet and network issues in the general business environment. It is evident that there is limited research specifically focusing on the use of the Internet in the manufacturing SMEs' environment. Thus, this thesis identifies a potentially significant gap between the manufacturing SMEs and their behaviour in using different Internet techniques for their international operations/internationalisation.

Pursuing that aim, the chapter also indicated relevant objectives, with explanations, that are needed to in order to achieve that research aim. In the next chapter, the literature regarding the key issues is explored.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The purpose of this literature review is to identify and critically examine existing knowledge of the research topic of “How does the Internet relate to the internationalisation of UK manufacturing SMEs? – A network approach”. Within this chapter, five different areas of literature are explored: SMEs; Internationalisation; Industrial networks; Capability; and the Internet. This is followed by a summary in order to draft a conceptual framework in chapter three.

The literature review begins with the first research theme: SMEs. Within this section, different definitions of SMEs are discussed and established for the purpose of this research. The second part of the literature review explores the notion of industrial networks. The literature also explores some related areas such as the network perspective (approach), business relationships and the basic structure of the industrial network model (Håkansson and Johanson 1992).

The third part of the literature review critically examines existing internationalisation studies, focusing particularly on the business-to-business background. To begin with, it first explores and analyses the Uppsala internationalisation model (Johanson and Wiedersheim-Paul 1975), followed by some additional studies and theories built on the basis of the Uppsala model, such as the mechanism of internationalisation (Johanson and Vahlne 1977) and the network model (Johanson and Mattsson 1988).

In order to understand how companies interact and react with their counterparts and networks, it is crucial to understand a firm’s capabilities (Ford 2002b; Hertz 2006; Johnsen and Ford 2006). This section will critically review different aspects/dimensions of a company’s capabilities, due to the complexities and tendency to stabilise the network.

The Internet is the last key theme of the research. The key foci of the literature review are aimed at the use of the Internet in terms of business strategies with direct/indirect

and short/long term benefits for the SMEs (Berthon *et al.* 2003; Karayanni and Baltas 2003; Lichtenthal and Eliaz 2003; Day and Bens 2005).

2.2 Small Medium-sized Enterprises (SMEs)

2.2.1 Definition of SME

SMEs account for 99% of all business in the EU (Eurochambers 2001) and the term 'SME' consequently covers a wide range of business types, from the self-employed through to multinational public limited companies.

Yet there is no unique definition of an SME due to various degrees of economic development in each country. For instance, there are two versions of definition of SMEs within UK's institutions. The Department of Trade and Industry (DTI) defines them by the number of employees (see Table 2.1); while the Companies Act of 1985 section 248 states that a company has to satisfy at least two criteria from Table 2.2.

Table 2.1 DTI Definitions of SMEs

	Number of Employees
Micro	0-9
Small	10-49
Medium	50-249
Large	250+

Source: DTI (2003)

Table 2.2 Companies Act

	Small	Medium
Turnover	Max £2.8 million	Max £11.2 million
Balance Sheet	Max £1.4 million	Max £5.6 million
Employees	Max 50	Max 250

Source: DTI (2003)

The European Commission (EC) classified SMEs as shown in Table 2.3. The EC definition is much more specific and restricted in terms of employees and finance; therefore, the research samples for this study are based on the EC definition. And

using the definition suggested by the EC, the outcomes of this research is also likely to contribute to studies related to the European manufacturing SMEs.

Table 2.3 EC Definitions of SMEs

	Micro	Small	Medium
Employees	Up to 9	10-49	50-249
Independence	N/A	Maximum of 25% of companies that may be owned by one or jointly owned by several. Otherwise, DO NOT include to qualify the definition of SMEs.	
PLUS at least one of the criteria must be satisfied			
Maximum Turnover	N/A	€7 million	€40million
Maximum Balance Sheet Total	N/A	€5 million	€27 million

Source: EC (1996)

2.2.2 Industrial SMEs

Industrial SMEs are defined as manufacturing SMEs in this research, in particular the manufacturing SMEs in the UK. A SMEs observatory report by the European Commission (2002) listed and categorised several industries and companies' size dominance. In the report, most of the industries have sub categories, and noticeably most of the sizes of these firms are similar to others in their industrial network. It is likely, however, that this will be a very interesting subject as the discussion over the industrial SMEs continues, and there will be some consideration on both industrial SMEs and LSEs (Large-sized Enterprises) in the industrial network perspectives. For the research purpose, it is appropriate to use the EC definition of SMEs as it is a much more comprehensive definition.

2.3 Network Perspective

A "network" is defined by Håkansson and Ford (2002, p.133) as a "structure where a number of nodes are related to each other by specific threads". They explain that the business market can be viewed as a network where all the actors, activities and resources are linked directly or indirectly in between. More specifically, the "nodes"

in the network are not just between individual and isolated; instead, it is a much integrated level of business units, relationships, technological, resources.

A number of Swedish researchers originally introduced the network approach of industrial systems (Mattsson 1984, 1988; Håkansson 1987; Håkansson and Snehota 1989; Forsgren 1995). Johanson and Mattsson (1988 cited Ford 2002a, p.200) describe the network of relationships between the firms as an “industrial system” which is “composed of firms engaged in production, distribution and use of goods and services.” It is firms that are dependent upon each other within the network and it is therefore the coordination between firms’ activities resulting in different organisational performance in the levels of individuals, firms or the network. Johanson and Mattsson (1988 cited Ford 2002a) also indicate that the foundation of the coordination is that firms are free to choose ‘counterparts’ and thus ‘market forces’ are at play. Without doubt, firms need to gain external resources in order to achieve the firms’ goals and often exchange relationships to enable this to be done. These relationships however “take time and effort to establish and develop, processes which constrain the firms’ possibilities to change counterparts” (*ibid*, p.200). Individual firms have their own direct relationships with their customers, suppliers, distributors or even with their competitors. On the other hand, a firm in a network position often has indirect relationships involved, such as with its customers, suppliers, distributors, competitors, and so on. Therefore, the need for adjustments on every aspect of the firm’s relationships can influence the firm itself and other network actors. This context is clearly relevant to internationalisation and the Internet.

It is argued by Johanson and Mattsson (1988 cited Ford 2002a) that the networks are both stable and changing. Firms are often activated within the framework of established relationships (Easton 1992a; Chetty and Campbell-Hunt 2003; Hadley and Wilson 2003). However, on some occasions those firms need to establish new relationships. Perhaps they have to disrupt old relationships due to reasons such as gaining competitive advantages or business diversification, etc (Andersen 1997; Hadley and Wilson 2003). Nevertheless, the exchange relationships were still taking place within the earlier established relationships and it is likely that new types of relationship were slowly formed. As Johanson and Mattsson (1988 cited Ford 2002a) noted, there are aspects of those relationships, which they describe as “bonds”. These

established relationships are bonded in issues like product and process adjustments, logistics, knowledge of the networks, personal relationships, special credit agreements and contracts. The bonds can be claimed as technical bonds, planning bonds, knowledge bonds, social bonds, economic bonds and legal bonds (Johanson and Mattsson 1988; Ford 2002a).

2.3.1 Industrial Networks

Easton (1992a) views firms' access to resources from other firms in different industries, and not only through their suppliers and customers. Thus, firms can only survive by relying on each other. Furthermore, Easton (1992a, p.4) suggests that the terms of industrial networks are as follows:

“Industrial networks, by definition, comprise many such relationships and so any account of them not only has to sacrifice some of the descriptive richness of the interaction approach but also has to concentrate on those aspects which have particular implications for network operation.”

Easton (1992a) recommends that four different aspects of a network need to be investigated. The first aspect is to understand networks as relationships; moreover, he categorises five elements within this particular aspect. Easton (1992a) suggests that intra-firm relationships as the first element, within which firms have to prepare to interact with their workforces and expect cooperation in the firms' common goals or objectives. Secondly, the consideration of a firm's ability to exploit network access; these relationships imply a measure of control over another organisation or environment. For instance, the current interactions between the firms are affected by existing relationships development (Low 1996; Fujimoto 2003).

Thirdly, the relationships bond between existing firms; in other words, firms within a network are bonded together and often it is very difficult to dissolve those bonds at will. Therefore, structures or patterns of these relationships are likely to affect a network's performance. This is evident from the Hertz's (1998) study, as a firm within a network is likely to encounter domino effects in an integrated and complex

industrial network. Alajoutsijärvi *et al.* (1999) also address that the 'domino effect' happens when there is a change in a dyadic business relationship, which initiates a chain effect within a network. The fourth element is "investment", which is identified by Johanson and Mattsson (1986 cited Easton 1992a, p.11), as firms' commitment to the relationships of joint investment or resources for the future. Finally, a firm and its partners within a network are always expecting fair percentages of their benefits and shares; additionally, firms within the network are likely to encounter some types of tension and it is often that firms will have conflict or cooperation between them; and it is called atmosphere.

The next aspect is to view networks as structures, as the firms in an industrial network are connected and bonded to each other, thus, the firms are not independent. According to Easton (1992a, p.16), he describes that an industrial system is "interdependent rather than independent then networks will have structure", and he also mentioned that "The greater the interdependence the clearer the structure of the network becomes ... Structure in this context is based upon firms as the elements of structure." Therefore, in terms of industrial networks research, it is important to identify the network structure of the firms.

Networks as 'position' is another aspect and it is very similar to the previous aspect, except it is analysed through a different angle. Mattsson (1984 cited Easton 1992a, p.19) suggests that between firms, there will be either direct or indirect relationships not only solely at the level of buyer and supplier. However, it is to identify the firm's role and position in relation to other firms in the industrial network; as firms have different roles and positions in different levels of network perspective which could benefit the firm itself or perhaps create opportunities for the others. As a consequence, further exploration of the types of business relationship from a network perspective is necessary (Möller and Halinen 1999; Wincent 2005).

The final aspect is networks as 'process', mainly focusing on how networks are processes. The processes are often considered at each level of networks, these levels are as likely from one organisation to another organisation, such as a company's internal decision making process or the personal level. Other than that, the workforce would also have an effect on other company's network activities and decisions (Ritter

1999; Wilkinson 2002). Furthermore, Easton (1992a) expressed that there are two dialectical processes in networks, which are competition and cooperation. Competition and cooperation between firms within a network at different levels can be perceived as the network 'process', which have significant roles. Thus, this also indicates the need to further investigate a firm's capability within its industrial network, which will be discussed in Chapter 2.5.

2.3.2 Resource-based Approach to Internationalisation

The network approach can be seen as an evolution of the stage process of internationalisation, such as the U-model and I-model (Madsen and Servais 1997; Johanson and Vahlne 2003). It is also argued that a firm within a network, regardless of its history, size or industrial sector, can utilise its internationalisation approach by considering its resources in relation to the extensiveness of the network (McDougall and Oviatt 2000; Zahra and George 2002; Fernandez and Nieto 2006; Ruzzier *et al.* 2006). In other words, "the network of a firm is capable of providing the context for international activities" (Ruzzier *et al.* 2006, p.486). This also indicates that the development of network perspective and the resource-based view are inseparable from each other.

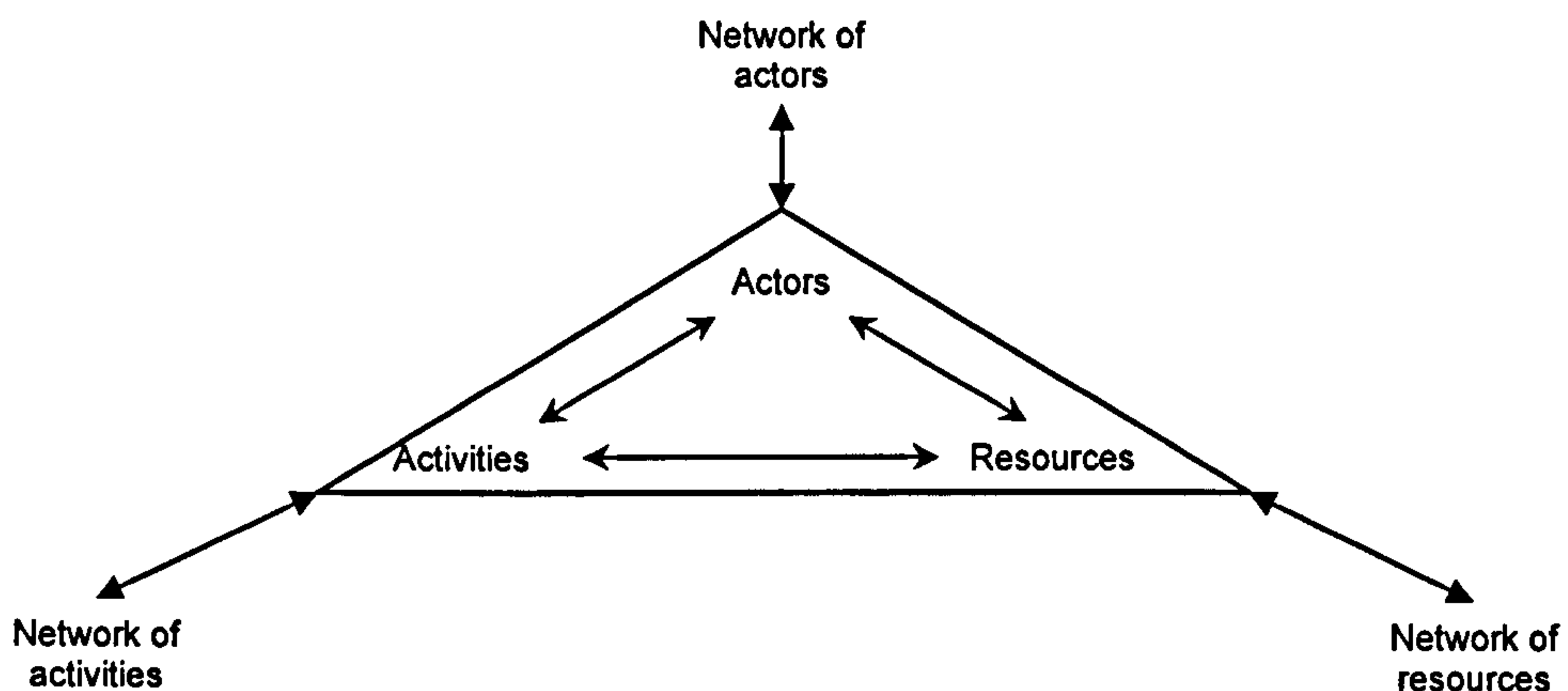
The discussion of resource-based theory can be traced back to Johanson and Vahlne's (1977) model of The Basic Mechanism of Internationalisation (See Figure 2.1). As suggested by Andersen and Suat Kheam (1998), Johanson and Vahlne's (1977) model rests on the resource-based theory. This is because the model emphasises the experiential knowledge through personal experiences; in other words, activities created from the company's internal assets, such as their skills and knowledge (Johanson and Vahlne 1977, 1990; Porter 1991; Andersen and Suat Kheam 1998). Furthermore, when using the resource-based approach, the firm should focus on its resources and capabilities in relation to external opportunities (Grant 1991). Some common sets of resources for resource-based theory include: managerial resources, entrepreneurial resources, technological resources, customer services, management know-how, industry-specific know-how, human capital or financial ability (McDougall *et al.* 1994; Westhead *et al.* 2001; Dhanaraj and Beamish 2003).

Moreover, this indicates that the resource-based approach to internationalisation can be extended to the discussion of capabilities. This is because the resource-based approach views that a firm should comprise different resources and capabilities that enable the firm to survive within the network (Roth, 1995; Ahokangas, 1998; Burgel 2001 and Luo, 2000). According to Dana and Wright (2004), a SME within a network is likely to gradually develop its capabilities and core competences, as well as its skills and knowledge eventually. An extensive discussion on a firm's capabilities is discussed in Chapter 2.5.

2.3.3 Basic Structure of Industrial Network Model

The basic structure of the industrial networks model was developed by Håkansson and Johanson (1992). The purpose of the model is to “make possible an integrated analysis of stability and development in industry” as well as to understand “the roles of actors and sets of actors in industrial development process” in relation to the industrial stability and development (*ibid*, p. 28). There are three key variables and these variables are related to each other and form a structure which is the shape of a triangle. (Figure 2.1)

Figure 2.1 Basic Structure of Industrial Networks



Source: Håkansson and Johanson (1992)

According to Håkansson and Johanson (1992), the first variable is “actors”. Actors have control over both activities and resources, for instance, actors could be an individual, managements, part of firms or groups of firms (Johanson and Mattsson

1992; Håkansson and Snehota 1995). Actors perform and control activities, these activities are at different levels and in different forms, such as management decision making and relationships with other individuals. Thus, these activities are likely to lead to some degree of control or access to the resources that are needed or affected to levels of individual or firms (Cook and Emerson 1978; Johanson and Mattsson 1992). Håkansson and Johanson (1992, p.29) also mentioned that “the existence of actors at several levels means that it is usually unclear which actors control which resources”, that is, different actors have different views on the activities and decisions over certain resources. Furthermore, since “actors are goal oriented” (*ibid*, p.30) and actors will have certain levels of direct or indirect influence for the controls over the network; thus, the network control is “reached through control over resources and/or activities” (*ibid*, p.30). This indicates that actors could have influence over resources and/or activities in order to gain a certain degree of control within a network (Miles and Snow 1986, 1995; Achrol 1991; Håkansson and Snehota 1995).

The second key variable of this model is “activities”, as “An activity occurs when one or several actors combine, develop, exchange, or create resources by utilising other resources” (Håkansson and Johanson 1992, p.30). Moreover, they identified two types of activities as transformation activities and transfer activities. Transformation activities are described as resources directly controlled by one actor; on the other hand, transfer activities are described as the transfer of direct control over a resource from one actor to another. That is, for a complete activity cycle, it is always expected to have both transformation activities and transfer activities. In the industrial networks, it is usual to have various degrees of activities in relation to actors and resources (Anderson *et al.* 1994; Easton and Håkansson 1996; Ford *et al.* 2003), therefore, on most occasions, firms will have different levels of controls over resources and firms will need to seek optimal configurations for their operation within.

The last variable is “resources”, it is described that resources are “heterogeneous” (Håkansson and Johanson 1992, p.31) and are formed into different layers of complicated but connected relationships. In the previous discussions that actors have certain degrees and controls over the resources, it is therefore possible that the use of resources cannot be fully specified. Another important issue is the knowledge and experience of resources; because resources can be found and formed in numbers of

dimensions, thus, the knowledge and experience of actors and activities become a key to finding and acquiring any essential resources. In other words, actors and their performed activities would influence the firm's decisions over the resources (Lambert and Cooper 2000; Ford *et al.* 2003).

Nevertheless, the model is tightly constructed by these three variables and it is largely dependent on its functional interdependence. Moreover, the degrees of control by the actors are largely dependent on its power and knowledge; and often affect the stability and development of the network. Therefore, while having changes within the network, it is likely to be accepted by the majority of other actors in order to maintain the network's stability (Ford *et al.* 1986; Ford 2002a).

2.3.4 Network VS. Business Relationship

Ford *et al.* (1986) suggested that a firm's interaction is based on its control of resources and activities. These resources and activities will affect other participators within the network. In order to interact with other actors, it is essential for firms to adjust their responses to activities or resources; and the forces behind are known as 'capability'. Although firms across the network may have intensive interaction with each other, a firm itself internally would have different sets of interrelated interactions, which humans develop and employ different capabilities.

Ford *et al.* (1986 cited Ford 2002a, p.79) described that "within companies a number of inter-related activities are performed". There are, therefore, they suggested, four aspects of interaction in order to analyse a firm's interaction. The first aspect is *capability*, where it is a question of what the firm is capable of doing for its counterpart. It is a question and a process of understanding its abilities of functional expertise, financial resources, physical resources, and technological resources; also its relationship or connection to the network.

The second aspect is the *mutuality*; it is a simple question of "How do you see me?" and the concept of mutuality was defined as "mutuality rests on the importance of collective goals or common interests between more than one company" (*ibid*, p.82).

Johnsen and Ford (2001, p.9) explained that “Mutuality is a critical characteristic which implies that there is a measure of equality between the parties to a relationship”. In other words, a contribution by a firm to give up its goal and share the positive outcomes with others; and it is often that the firm will benefit from the outcomes of a network. For example, in the technology industry, firms will share their technologies with each other within the network; therefore, it enhances the suppliers’ capability and benefits any other actors in the same framework. Moreover, mutuality is described as “the mirror of the trust” (*ibid*, p.83) which exists between firms. Often, firms adopt different methods to demonstrate their commitment to the counterpart by use of its various capabilities. In a long-term relationship, it is crucial that firms and counterparts have a positive mutuality between them; and vice versa. It is dangerous once any parties feel loss of mutuality and it is likely to take a long while for the mutuality to be re-established.

The third aspect of interaction is called *particularity*; it can be described as a ‘lock tightening’ between the firm and a ‘particular’ partner. In a network, there is a relationship where company A considers company B as one of the most important partners; it is a question that on what level company A is prepared to make it appear to its particular partner that it can make a better offer than another counterpart. Companies are often having selective counterparts that are particularly important, in terms of supplies, financial, physical and technological resources (Anderson *et al.* 1994). Particularity is sometimes used as a strategic tactic in order to inter lock and engage with a most needed partner.

The last aspect is called *inconsistency*; not only the company, but individuals or subgroups are involved in the company’s interactions. Therefore, Ford *et al.* (1986, p.84) introduced a term called “interpersonal inconsistency”. They suggest that “each person involved in interaction between companies will have his or her own expectations of his or her counterpart”. Within a firm, individuals make decisions on what is perceived and expected, and those individuals have certain role-plays inter-firm. Thus, individuals within a firm have the ability to influence the whole network. Furthermore, Ford *et al.*, (1986) introduced another term called “intertemporal inconsistency”, as firms have different stages of goal which means that different

situations require different strategies, thus, the interaction relationships may change at various times accordingly.

2.3.5 Business Relationship in International Market

So far, the review of literature on internationalisation process and networking theories has indicated the importance of relationship maintenance. Firms are in cooperative associations with their counterparts, sharing knowledge, resources and expertise to improve their competitiveness. This type of cooperative association within a network is also known as 'learning networks' (McGovern 2006). With the fast growing technologies and market movement, firms are always having more than one decision to make and it is likely these decisions will affect other parties in the network; and it is down to the relationship between each party to involve and keep its interdependence which is a firm's capability (Ford *et al.* 1986; Chandler and Hikino 1990; Grant 2002).

According to Varamäki and Vesalainen (2003), in order to survive in a competitive market, SMEs' networks would form relationships similar to alliances, joint ventures or partnerships and would not necessarily have any direct interaction with each other. This also confirms the view of Hertz (2001); she concludes that there is an increasing trend of integration from relationships, supply chain networks and industrial networks. In addition, Hertz (2001) suggests that due to the high integration of a network, it is much more difficult to form or break alliances; as a consequence, acquisitions and mergers become more common.

Hutchinson *et al.* (2006) suggest that the relationships within a network could be either on a formal or informal basis. SMEs in comparison with larger firms have less controls and powers within the market/network where the size of an organisation could possibly have an impact on the overall network relationship (Koh and Venkatraman 1991; Alvarez and Barney 2001). However, Wincent (2005) proposes that the relationships of working jointly can be seen as 'network logic' where a firm may create a sub-group for the purpose of strategic integration, thus, membership firms can join their resources and expertise to overcome the natural disadvantages of

SMEs being small with limited resources and inadequate market power. In addition, Wincent's (2005) research shows that SMEs reveal the issue of trust as the most important element of selecting a partner and forming a network. Yet, the existence of larger firms cannot be ignored as they are the most important network actors for holding the SME network together (Varamäki and Vesalainen, 2003).

Apart from the importance of trust, Möller and Halinen (1999) identify four types of relationships and network views based on different management attitude. First, network vision - this is to perceive the industry as a network. Secondly, net management - this is to perceive a firm in the network, within a certain industry. Thirdly, portfolio management - this is to review a network from relationship portfolios. Finally, relationship management - this is to review relationship via a series of relationship exchanges. The categorisation demonstrates how complex a network or relationship can be, according to Johnsen and Ford (2002, 2006) a firm's ability to develop their capability at the right time is important for a firm's survival. In fact, a firm's network competence is highly associated with a firm's capabilities (Ritter 1999; Ritter *et al.* 2002; Wilkinson and Young 2002; Ritter and Gemünden 2004). Indeed, capabilities can be found in various aspects, such as technological capability (Håkansson and Snehota 1995), dynamic capability (Teece *et al.* 1997), skills and knowledge capability (Teece 1998), asymmetrical and symmetrical relationship capabilities (Johnsen and Ford 2002, 2006), etc.

2.3.6 Summary of the Network Perspective

It is suggested that in order to understand the industrial networks, various aspects need to be investigated. Aspects like relationships, organisational structures, network position and processes are all bonded together within the networks perspective. One of the key issues is a network's stability; unlike business-to-consumer markets, industrial networks have closer relationships. Due to the majority of companies being SMEs within the industrial network, it is often that these SMEs have either direct or indirect relationships with their counterparts and it is crucial that these SMEs maintain stable relationships and avoid being isolated from other network actors.

Because of the networking environment, firms are often encountered acting both roles as partners and competitors. Again, it all depends on the perceived company and how it cooperates with other firms, with maintaining the stability of a network in mind (Easton 1992a; Håkansson and Johanson 1992; Ford *et al.* 1986; Johnsen and Ford 2002, 2006). While discussions over the concept of networks for the business strategy are still continuing, some scholars are starting to discuss the terms of a firm's capabilities (Ford *et al.* 1986; Håkansson and Snehota 1989, 1995; Foss 1999; Johnsen and Ford 2001, 2002, 2006; Knudsen and Madsen 2002; Andersson 2003; Möller and Törrönen 2003). From the basic structure of the industrial networks model (Figure 2.3), it can be described that both actors and activities affect the resources; and it all depends on a firm's capability.

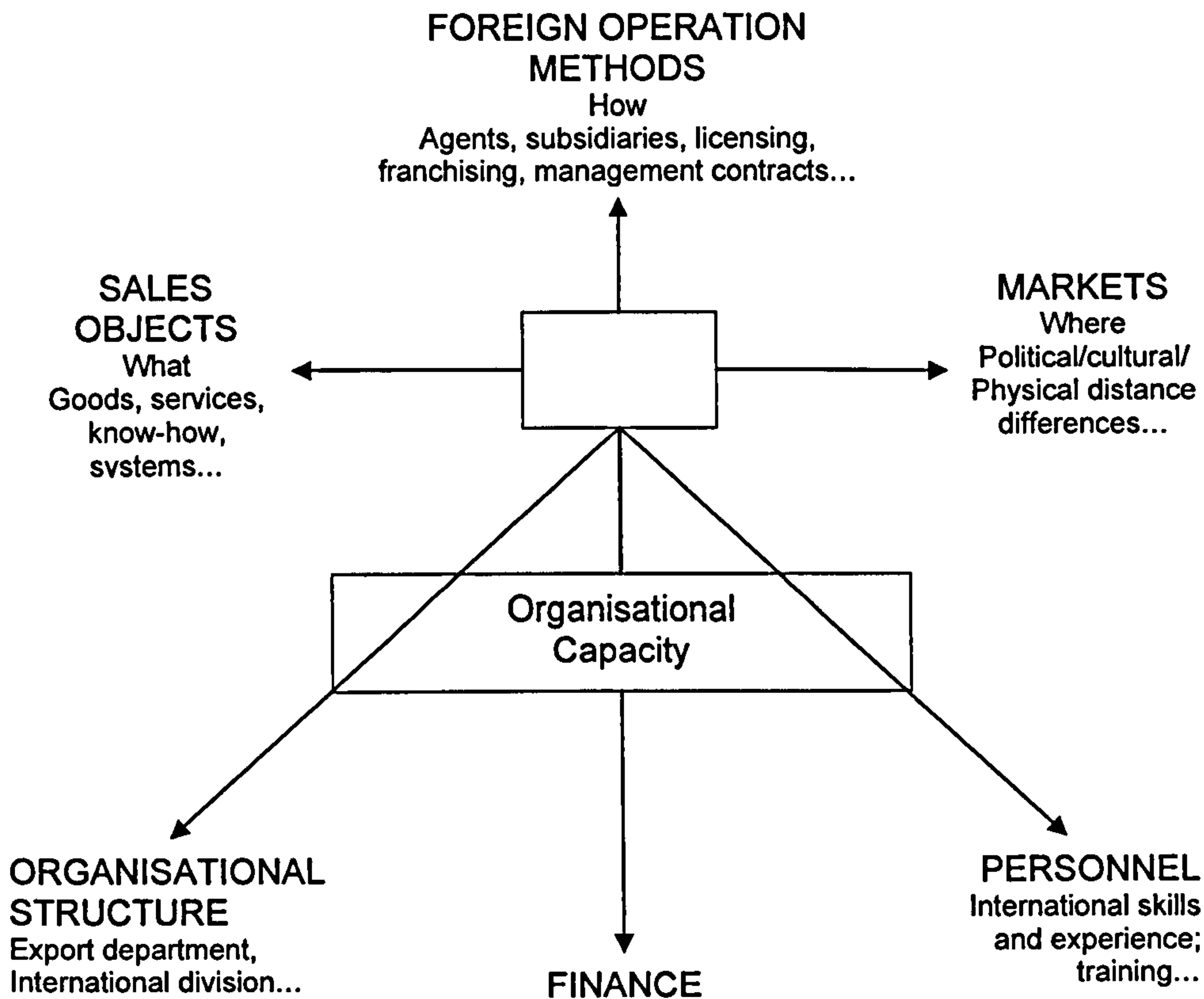
Complexities of network exist in every aspect of business activity whether through direct or indirect relationships and it always involves actors at different levels, from individual to business level. It is why the "interaction approach" has been studied over time (Håkansson 1982; Turnbull and Valla 1986), as companies "interact, react, re-react etc" (Ford *et al.* 1986 cited Ford 2002a, p.79). Although the interactions may be direct or indirect, conscious or unconscious, frequent or infrequent, scholars are arguing over two aspects, internally and externally. Thus, each aspect of relationships has to be treated carefully and individually in order to provide a much better picture for the firm or its existing parts of the network, where the biggest challenge for SMEs is their flexibility to adopt a different market environment (Volberda 1998; McGovern 2006; Raymond and Croteau 2006).

2.4 Definition of Internationalisation

There is no clear definition for the term of internationalisation. According to Johanson and Wiedersheim-Paul (1975) and Welch and Luostarinen (1988), the term internationalisation can only roughly be described as a firm's outward operations in foreign markets. Even until recently, the definition of internationalisation was still unclear, where Ruzzier *et al.* (2006, p.477) expressed the term of internationalisation as "a synonym for the geographical expansion of economic activities over a national country's border". Nevertheless, Welch and Luostarinen (1988) indicate some

possible operations that relate to a firm's internationalisation, which include: sales, market, foreign operation methods, organisational structure, personnel and finance. A clear illustration of the dimensions of internationalisation by Welch and Luostarinen (1998) can be seen as the following figure 2.2.

Figure 2.2 Dimensions of Internationalisation



Source: Adapted from Welch and Luostarinen (1988)

Therefore, it can be said that the investigation of internationalisation should not only focus on the chosen foreign operation methods, sales and the market, but the need to further explore relevant areas in organisational structure, personnel skills and experience as well as the capacity of a firm, such as its finance. However, it is imperative that the exploration of different internationalisation processes and theories needs to be completed before the discussion on organisational capacity.

2.4.1 Internationalisation Theories

Reference to Ruzzier *et al.* (2006), the development of internationalisation theories can be traced back to the work of Cyert and March (1963, 1992). In Cyert and March's (1963) study, they proposed a behavioural theory where a company would have different decision making patterns that affect their decisions over issues of different business practices, which also include their internationalisation decisions and approaches. In the later study by Ahokangas (1998), he suggested that most of the internationalisation theories were taken from the perspective of market development and they have mainly concentrated on the interests of large companies, such as diversification strategies for large multinational enterprises (MNEs). The most well known representation of the market perspective internationalisation theory; Dunning's (1988) Eclectic Paradigm of International Production, focuses on the internationalisation development of the MNE and the context of research strategy based on the economist's view (Ruzzier *et al.* 2006). Thus, it is the researcher's intention to ignore the discussion of Dunning's work as it is not applicable to this study, as SMEs tend to ignore dimensions in international economics involvement and business diversification.

The other type of internationalisation theory is developed from a firm's perspective, which includes the Uppsala Internationalisation Model (Johanson and Wiedersheim-Paul 1975) and Innovation-related Model (Johanson and Vahlne 1977). Although the development of a firm's perspective internationalisation theories were initially focused on the MNEs, these types of stage approach have been reviewed and discussed extensively in the field of SMEs. In fact, there are a number of studies that suggest that different stage models (Uppsala Model and Innovation-related Model) provide a useful framework when establishing the linkage between the internationalisation frameworks to SMEs (Leonidou and Katsikeas 1996; Burgel *et al.* 2001; Collinson and Houlden 2005; Fernández and Nieto 2006). Thus, the researcher intends to review the stage approaches and to seek the applicability of the theories in relation to SMEs.

2.4.2 The Uppsala Internationalisation Model

Studies of internationalisation have been around for more than four decades, but they were initially focused mainly on the MNEs in the United States of America (Kundu and Katz, 2003). As SMEs are in their growing phase, intense competition often causes a local market to reach its full capacity, thus, increasing numbers of companies are seeking their opportunities overseas. In terms of 'international', Johanson and Wiedersheim-Paul (1975) argued that the true meaning of the international firm is the firm relating to overseas activities or the actual process by which the firm carries out activities. Moreover, Johanson and Wiedersheim-Paul (1975) developed a well known model, named "The Uppsala Internationalisation Model", also known as the U-model. The model suggested that internationalisation of a firm gradually increases its international involvement as a process. According to Johanson and Vahlne (1990), market knowledge is acquired through experience and the driving force in the internationalisation process is often those business opportunities created from experiential market knowledge. From another perspective, it can be said that experiential market knowledge is gained through existing knowledge.

The stage theory of internationalisation is based on the assumption of firms following a learning curve and acquiring market knowledge from experience (Johanson and Mattsson 1988; Clark *et al.* 1997; Ford 2002b). In other words, firms feel uncertainty on the decision of internationalisation due to lack of market knowledge. The U-model is a learning-based model and the key contribution of the model is to describe sequential development in the form of market operation. The learning curve in conjunction with firms' business activities generated the Uppsala internationalisation Model. Four basic stages have been described as follows:

The first stage is called *no regular export activities*. It is most likely to happen to a newly setup firm with little capital. Nevertheless, firms have no intention or ability to expand their export activities. Companies in this stage are considered as local or national companies. It is likely to expect a firm in this stage to still be in its learning stage and trying to acquire local market knowledge.

The second stage is called *export via independent representatives (agents)*. The term 'agents' referred to the foreign business contact, firms in this stage still lack foreign market knowledge. It is agents, who have been used in connection with foreign activities and there are no physical activities in the international markets. Firms in this stage are relying a good deal on their foreign counterparts.

The third stage is called *sales subsidiary*; where a company has established foreign sales affiliates. Since their establishment, firms are expected to have better foreign market knowledge; therefore, there are limited agents involved. In other words, firms themselves have greater responsibility.

The final stage is *production/manufacturing*. This is the stage where there are no agents involved; firms have the ability and enough local knowledge in order to produce and sell. Thus, firms have their output/production unit and sales office in foreign countries.

Pedersen (1999) pointed out that the U-model is too static and ignored the facts of cultural distance in relation to the foreign markets. Additionally, it is argued by a number of researchers that the firm does not necessarily follow the traditional pattern of internationalisation, for instance, companies perceived themselves as international new ventures or born global firms (McDougall 1994; Oviatt and McDougall 1995, 2005; Madsen and Servais 1997). Despite this sequence of stages, Johanson and Wiedersheim-Paul (1975) suggest that firms involved in the internationalisation process are not there because of their degree of involvement, but due to resource commitment. However, a firm with surplus financial resources could possibly overcome the issues of the amount of resources committed; thus, the firm does not follow the traditional stage approach of internationalisation (Johanson and Vahlne 1993). Another issue is that while firms move toward internationalisation, acquiring market knowledge and selecting agents often involves human nature, which highlights the importance of network perspective (see Chapter 2.3).

2.4.3 The Innovation-related Model and The Mechanism of Internationalisation

The innovation-related model is another stage model, also known as the I-model (Gankema *et al.* 2000; Ruzzier *et al.* 2006). This model best describes a firm which sees each of its subsequent internationalisation stages as innovations, such as the export development process (Gankema *et al.* 2000). According to Andersen (1993) the I-model is very similar to the U-model where it can be simplified into three stages. Stage one: pre-export; Stage two: initial-export and Stage three: advanced export. Furthermore, Collinson and Houlden (2005) advocate that the I-model was in fact providing an explanation of the importance of decision makers and other variables that influence the firm's internationalisation decision. In other words, the I-model emphasises the individual learning of a firm's decision maker (Andersson 2000).

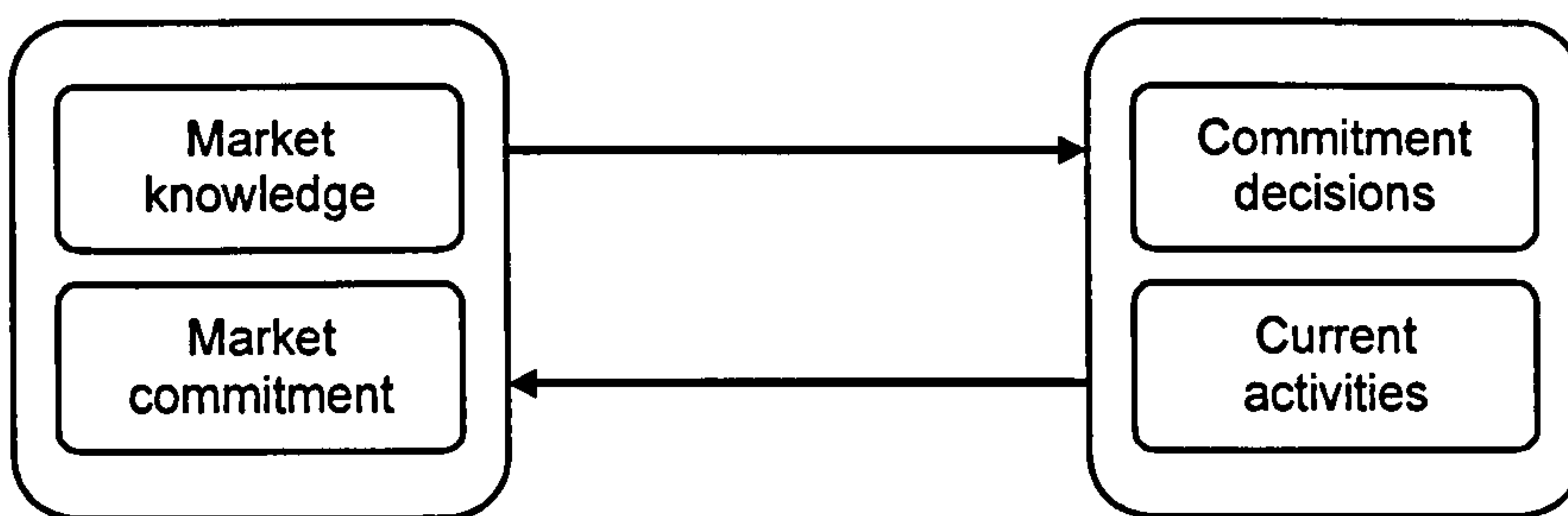
“International expansion is inhibited by the lack of knowledge about markets and such knowledge can mainly be acquired through experience from practical operations abroad.” (Forsgren and Johanson 1975, p.10)

Based on the understanding of the U- Model and I-model, Johanson and Vahlne (1977) developed the Basic Mechanism of Internationalisation (Figure 2.3). The model of the basic mechanism of internationalisation was generated from market knowledge and developed two different aspects interacting between the State and the Change aspects. The State aspect includes market knowledge and market commitment, and the Market aspect includes commitment decisions and current activities. Johanson and Vahlne (1977) described two factors in considering the market commitment. One is the amount of resources committed, and the other is the degree of commitment; these are often influenced by a company's foreign business activities (current activities). The market knowledge is based on existing experience and knowledge; there is also a direct influence on the commitment and decision making (commitment decisions).

In the Change aspects, Johanson and Vahlne (1977) noted that in order to achieve the business activities, the key element is the commitment decisions. Current activities are explained as the second stage of the change aspects; during the process the firm would gain additional commitments. Each stage is presented as one cycle of events, as well as the input for the next stage and indicates the direction of further

internationalisation; therefore, the Uppsala Internationalisation Model suggested that firms should follow a particular pattern. However, the pattern does not exist in real business practice. Firstly, larger firms are likely to have surplus resources; they are able to make huge internationalisation processes. For example, a larger firm may have sufficient financial resources to set up company-owned foreign subsidiaries initially instead of using agents. Secondly, in a stable market situation, market knowledge can be gained rather by experience. Finally, a firm may have a considerable amount of data and knowledge from its existing market, which they can apply to a specific market that has similar characteristics and situations (Johanson and Vahlne 1993).

Figure 2.3 The Basic Mechanism of Internationalisation – State and Change Aspects



Source: Johanson and Vahlne (1977)

Buckley and Chapman (1997) and Ahokangas (1998) criticised that neither the U-model, nor the I-model were never intended to be applied in every case and cannot be used to identify different dimensions of approach or the different internationalisation activities of a firm. Nevertheless, the basic mechanism of internationalisation is mainly based on market knowledge, there is an argument that history is mostly experienced at a personal level. If the personal link is broken down, there will be a great risk on the other level within the model, which pin points the importance of investigating the aspect of industrial relationship. Andersson (2000) addressed the key role as individual and has not yet fully explored the research on the internationalisation process.

2.4.4 The Internationalisation in Industrial Systems (The Network Model):

Another aspect to investigate is the internationalisation process from the network perspective as Johanson and Mattsson (1988) view markets as networks. They point

that “The industrial system is composed of firms engaged in production, distribution and use of goods and services. We describe this system as a network of relationships between the firms” (Johanson and Mattsson 1988, p.305). Furthermore, Johanson and Vahlne (1990, p.20) define that the network view of internationalisation should be seen as “the process of developing networks of business relationships in other countries through extension, penetration and integration.”

The network perspective of internationalisation is still influenced by different network relationships and has further influence on the firm’s decision making on its market entry mode (Coviello and Munro 1997). Coviello and McAuley (1999) also claim that internationalisation through networking is more multilateral than the stages approach. To ensure firms have their competitive advantages, firms have to be well established within their existing network. In other words, the basic assumption for the network model is that each company is dependent on resources controlled by others. Besides, the development of a firm’s network position is through the accumulation of time and resources, and then the firm will begin their internationalisation process by engaging and exchanging resources with foreign counterparts (Hollensen 2001; Ritter *et al.* 2002; Wilkinson and Young 2002; Sherer 2003). Nevertheless, according to Lehtinen and Penttinen (1999) there are two concepts can be applied to the Nordic school of thought on internationalisation, which is international orientation and international commitment.

Lehtinen and Penttinen (1999) propose that international orientation is referred to a firm’s attitude towards internationalisation, where Reid (1981) provides a list of different dimensions that can be used to investigate different aspects of a firm’s attitude, which includes: political, economical, cultural and market strategy. Conversely, international commitment can be reflected in a firm’s level of involvement and operation for international business (Madsen and Servais 1997).

Hollensen (2001) also suggests that the level of interaction between the firm and other network actors can be categorised as ‘direct’ or ‘indirect’ relationships. Additionally, these direct or indirect relationships are often associated primarily with technical issues, economic trends or even the legal issues. Nevertheless, personal influence is the key ingredient when building and maintaining the relationships. It is argued by

Contractor and Lorange (2002) that firms which internationalise through the network would result in a faster international development, particularly SMEs within high-tech industries which tend to take a more direct approach, thus establishing their foreign subsidiaries more rapidly. It is also known that existing contacts within a network assist companies to further their international operation through referrals, as prior experiences with existing contacts provide firms with some level of confidence or trust in the new contacts (Webster 1992; Fujimoto 2003). To explain this phenomenon for high-tech industries, Solberg (1997) and Hollensen (2001) assume that a firm within the high-tech industries is likely to have networks of industrial contacts due to the need to seek new technology; therefore, an aggressive internationalisation approach would assist the company to have stronger establishment within the network.

Due to various limitations of SMEs, such as the companies' size or financial resources, networking is extremely important from their perspective. In an empirical study by Gilmore *et al.* (2001), they point out that SMEs networking and communicating with competitors is commonly seen. Furthermore, Borch (1994) claims that alliances are fundamental as they have to overcome the problems of internationalisation.

Figure 2.4 The Network Model

		Degree of Internationalization of the market (the production net)	
		Low	High
Degree of Internationalization of the firm	Low	The Early Starter	The Late Starter
	High	The Lonely International	The International Among Others

Source: Johanson and Mattsson (1988)

Within the Network Model, four categories of the network perspective have been introduced (see Figure 2.4). The Early Starter, as known in internationalisation terms, begins in nearby markets by using agents. The firms reduce the risks in terms of the unfamiliar market by using local agents having better local market knowledge and well established contacts, whereas in terms of the production, firms can minimise the risk of over or under production. These companies also encourage internationalising

by the use of distributors or customers in the international market as the company has few international relationships (Chetty and Blankenburg Holm 2000; Chetty and Campbell-Hunt 2003).

The Lonely International stage is when a firm is highly internationalised but with limited knowledge of the market environment. Firms are likely to succeed as they have better market relationship knowledge from previous foreign markets; on the other hand, firms have better flexibility in the adjustment of resources. That is because the experiences gained from the previous foreign markets would evolve the firm's knowledge development (Barkema and Vermeulen 1998).

Next category is the Late Starter; firms in this category have more advantage over the Early Starter firm due to their high degree of internationalisation in existing markets. The international development includes indirect relationship with foreign industrial networks, such as foreign suppliers, customers or even competitors (Chetty and Blankenburg Holm 2000). Specialised firms with high customer adaptation can also influence the needs of their customers and are more likely to survive.

The International Among Others is the last category in the network model. This is a stage where firms are truly internationalised with a high degree of internationalisation and marketing activities. Johanson and Mattsson (1988) suggest that firms linked as a network have substantial amounts of influence both internally and externally. This is likely to increase a firm's externalisation, which means instead of focusing on manufacturing, the firm is concentrating on the acquisition or sub-contracting of other firms within the network.

However, there are some weaknesses in the Johanson and Mattsson's (1988) model. As suggested by Chetty and Blankenburg Holm (2000), the criteria used to differentiate each category within the model are not clear, for instance, the overlapping areas on the use of agents between the phases of The Early Starter and The Late Starter. Additionally, the model does not include the discussion of a firm's decision-making process or characteristics in taking up opportunities for international operations, such as a firm's decision for further integration or extension (Calof and Beamish 1995). Another important factor that is not addressed within Johanson and

Mattsson's (1988) model is the external uncontrollable variables that would affect a company's internationalisation decision, for instance, the consideration of domestic competition or government policies (Chetty and Blankenburg Holm 2000). Not only does the Network model not emphasise the process of how a firm moves from one position to another within the matrix, the explanation of the model lacks consideration of relationships formed through formal associations, i.e. trade associations or joint action groups (*ibid.*).

Indeed, several studies suggest it is indispensable to ignore the understanding of business networks when investigating the internationalisation of SMEs (Coviello and Munro 1997; Hertz 1998; Coviello and McAuley 1999; Autio *et al.* 2000; Chetty and Campbell-Hunt 2003). Yet, before the discussions on the industrial network, it is important to explore further what sort of level of collaboration is involved with a manufacturing SME. As suggested by Wang and Archer (2004), a company situated in a B2B environment requires different levels of interaction with other industrial firms, thus, these different levels of interaction are discussed next as it would affect a manufacturing SME's internationalisation decision, whether to use agents, distributors or foreign subsidiaries as such.

2.4.5 The Network Model for the SME Serving As Subcontractor

In the B2B environment, the network has been developed primarily on mutual trust and interests between each firm (Hollensen 2001). Since the individual firm is dependent on resources from other companies within the network, the network itself is likely to emerge via different levels of collaboration. Hence, Hollensen (2001) suggests three dimensions of how companies exchange their resources within the network: control, coordination and cooperation. Wang and Archer (2004) have further categorised a comparison of cooperation, coordination and collaboration based on Winer and Ray's (1994) definition (see Table 2.4).

'Control' can be described as a firm (normally a multinational corporation or large enterprise) having surplus resources and a leading role within the network or the industry, where they have power to determine the direction of other smaller firms

(SMEs) (Johanson and Mattsson 1988; Hollensen 2001). The second dimension ‘coordination’ is firms within the network working closely for a certain goal and providing a value-added supply chain; thus, the coordination between firms allows them to strengthen their competitive advantage over other network groups (Hollensen 2001). Finally, the ‘collaboration’ is a relationship development between firms within the network; traditionally, the leading firm would provide support and designs to their subcontractor in order to suit the firm’s manufacturing requirement. This type of relationship requires greater commitment from both parties, thus, greater level of trust is needed (Ganesan 1994). In short, the relationship development can be seen as a progressive development, from cooperation, then coordination and finally collaboration.

Table 2.4 A Comparison of Cooperation, Coordination and Collaboration

	Cooperation	Coordination	Collaboration
Mutuality of goals	Not clear; different goals can exist	Sharing of mutual goals	Sharing of mutual goals
Resource sharing	No	Yes	Yes
Commitment	Low	Moderate	High
Structure	Full independent autonomy	Independent autonomy; Modification to original structure	New structure organized
Agreement	Definitive agreements	Relational contracts	Relational contracts
Trust	Low	Moderate	High
Examples	Ad hoc purchasing within purchasing organizations; Preferred suppliers	Real time purchasing sessions; Joint projects	Purchasing consortia; Strategic alliances

Source: Wang and Archer (2004)

On the other hand, Korhonen (1999) not only mentioned that the relationships existing between a SME and its counterparts are selling, purchasing and cooperating, but they should be divided in terms of “inward”, “outward” and “cooperative”

operations. The suggested new terminologies introduced by Korhonen (1999) argue that an SME should view its internationalisation process in a holistic approach, rather than a plain relationship.

Karagozoglu and Lindell (1998) pointed out the biggest problem for SMEs is to find suitable partners abroad. Nevertheless, the majority of network theories are concentrated on traditional import and export, therefore, the lack of development of international marketing theories (Wind 1979).

2.4.6 Summary of Internationalisation Theories

The U-model has been developed to explain the sequential steps for the MNEs, however, this model has proved to be applicable to SMEs' research in the direction of increasingly foreign commitment (Johanson and Vahlne; 1977, 1990). The model is based on the assumption that firms follow a learning curve and acquire market knowledge from experience. The model also suggests that the learning process has two dimensions, one is 'cultural' and the other is 'commitment'.

In addition to the U-model, the basic mechanism of internationalisation focuses on the issue of learning processes. It argues that in order to have full market commitment, firms need to have sufficient market knowledge followed by their commitment decisions and current activities. Nonetheless, the mechanism of internationalisation does not apply to some cases. Buckley and Chapman (1997) suggest that larger firms may have surplus resources, in terms of finance and experiences, etc.; therefore, larger companies or firms with surplus financial resources have the ability and potential to make a huge step toward internationalisation.

The network model is a much advanced theory compared to the Uppsala model. Coviello and McAuley (1999) pointed out that internationalisation through networking is more multilateral than the stages approach. Due to the various limitations of SMEs, it is commonly seen that a company may have networking and communications with its competitors. The internationalisation through network

development can be found in different levels of cooperation, coordination or collaboration, either through formal or informal connections.

To summarise, both U-model and the basic mechanism of internationalisation indicate that firms are likely to progress their foreign business activities by collecting information and experiences step by step. The two models/theories above are slowly being phased out due to the appeal of the network model (perspective). The network perspective has taken one step further by viewing a firm's internationalisation in terms of learning and depending on other players within the network. Nevertheless, all internationalisation theories have indicated the importance of a company's ability to stabilise in the process of changing, in other words, it all depends on a firm's capabilities to cooperate during the changing. Thus, in order to understand how companies move towards internationalisation, it is necessary to explore what are industrial networks, business relationships and capabilities of firms.

2.5 Firm's Capability

Edith Penrose (1959) was the first to address the capabilities perspective of the firm. Penrose argued that "it is only possible to understand such crucial issues as diversification and the pursuit of corporate and business strategies in terms of underlying endowments of capabilities that make firms essentially heterogeneous and path-dependent entities" (Foss 1999, p.3). She also suggested that firms have "a tendency to accumulate surplus resources, whether physical, human or organizational". It was explained that firms' activities were largely dependent on the knowledge base, such as learning and experiencing. Furthermore, Penrose (1959) pointed out that knowledge-based activities are related to management and affect the firms' normal activities. It is clear that Penrose (1959) asserted that these learning activities become embodied in capabilities.

Chandler and Hikino (1990, p.24) are other theorists who emphasise that "obtaining favourable competitive positions is largely a matter of the leadership and organization required to exploit economies of scale and scope". The differences between Chandler and Hikino and Penrose that Chandler and Hikino focus on a larger scale, larger firm;

as Chandler and Hikino suggested a larger firm has superior innovative capabilities. Teece *et al.* (1990) conclude Chandler and Hikino's thought that "dynamic" firms' capabilities are concentrated on the economic issues, unlike the capabilities expressed by Penrose.

Lazonick (1991) made a much more detailed explanation; he argued that theories are always constructed on the basis of perfect competition where large firms are "marked" to accepted innovation capabilities. He also pointed out that a decentralised network is unlikely to accept and unable to coordinate innovations. During the early 90s, British economic decline and industry were decentralised and "made impossible the introduction of the largely complementary organizational and technical innovations that made American firms prosper" (Foss 1999, p.4).

2.5.1 Dimensions of Internal Capabilities

Leonard-Barton (1992) has identified four dimensions of *core* capabilities by looking at different dimensions around a firm. Leonard-Barton (1992, p.113) defines a core capability as "the knowledge set that distinguishes and provides a competitive advantage". In addition, Teece *et al.* (1990, p.28) defines core capabilities as "a set of differentiated skills, complementary assets, and routines that provide the basis for a firm's competitive capacities and sustainable advantage in a particular business". From the two definitions identified above, it can be seen that the development of capabilities is based on the knowledge-based view.

Dimension 1: Skills/Knowledge

According to Leonard-Barton (1992), skills and knowledge are embodied in people and usually the individuals' capabilities are relevant to new product development. It is a very specific capability that is required in specific companies, as different industries required different skills and knowledge. For example, in terms of skills, a software development company may require its employees to have advanced computer skills for writing software in different computer languages and perhaps it requires some graphic design speciality and so on.

Knowledge is usually associated with skills, and it is not only that employees need to have enough knowledge, but to master it and become an expert in their own field. It is also argued by a number of researchers that extended market knowledge embedded in people (not only the management) would allow the firms to gain the competitive advantage over the international expansion (Johanson and Mattsson 1988; Coviello *et al.* 1998; Merrilees *et al.* 1998; Coviello and McAuley 1999; Rundh 2001; Fillis 2001). In terms of company level, a company tends to accumulate knowledge and experiences over time. This knowledge and these experiences come from its employees. Moreover, both skills and knowledge are the ingredients that are not meant to be separate in this dimension.

Dimension 2: Technological/Technical System

Technology offers the same solution to firms around the world. It is a tool to increase competitive advantage. Because of the technologies, firms can now have mass production, cheaper labour and material costs, etc. In the earlier discussion by Ford *et al.* (1986), the mutuality of a firm can be seen as a company gives up its goal and shares positive outcomes; also sharing its technologies with other counterparts and sharing the benefits.

Dimension 3: Managerial System

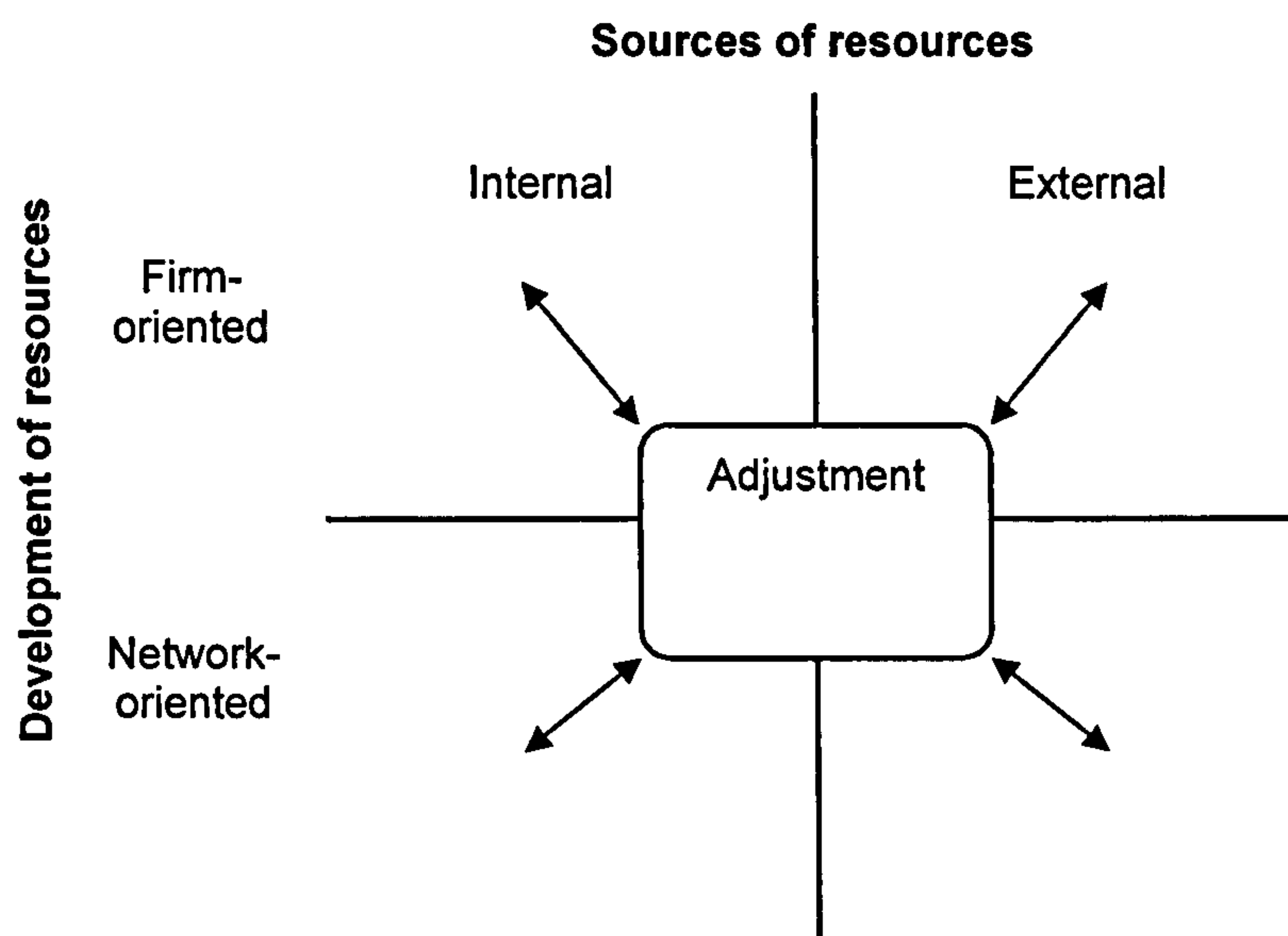
Management is the centre of decision making in a firm and the managerial systems capabilities that “incorporate unusual blends of skills, and/or foster beneficial behaviors not observed in competitive firms” (Leonard-Barton 1992, p.118). The understanding of a firm’s abilities and capabilities is a key function of management, the managerial system is a system to understand individuals within the company in order to have optimal performance. Research conducted by Chandler and Hanks (1994), Bell *et al.* (1998) and Hutchinson *et al.* (2006) also suggests that managerial competence at network relationships is essential aside from resource allocations in international markets.

Dimension 4: Values

According to Leonard-Barton (1992), the values dimension is infused through three dimensions above. It is the “value assigned within the company to the content and structure of knowledge, means of collecting knowledge and controlling knowledge”

(*ibid*, p.114). From a company's perspective, it is the value and the culture of the company which affect the company's behaviour and decisions over business activities. In addition to Leonard-Barton's (1992) core capabilities, Ruzzier *et al.* (2006) suggest that the model proposed by Ahokangas (1998) may have the best explanation on both resource-based and capabilities-based views. Ahokangas (1998) assumes that SMEs are dependent where the firms have the ability to adjust or to develop according to different levels of resources or environment. He argues that there can be four different perspectives of a firm from a simple two dimensional aspect: internal vs. external sources of resources and firm vs. network-oriented development of resources (see Figure 2.5). To some extent, Ruzzier *et al.* (2006) argue that from the modes of resources adjustment by Ahokangas (1998) emerge both network views and resource-based approaches.

Figure 2.5 Modes of Resource Adjustment



Source: Ahokangas (1998)

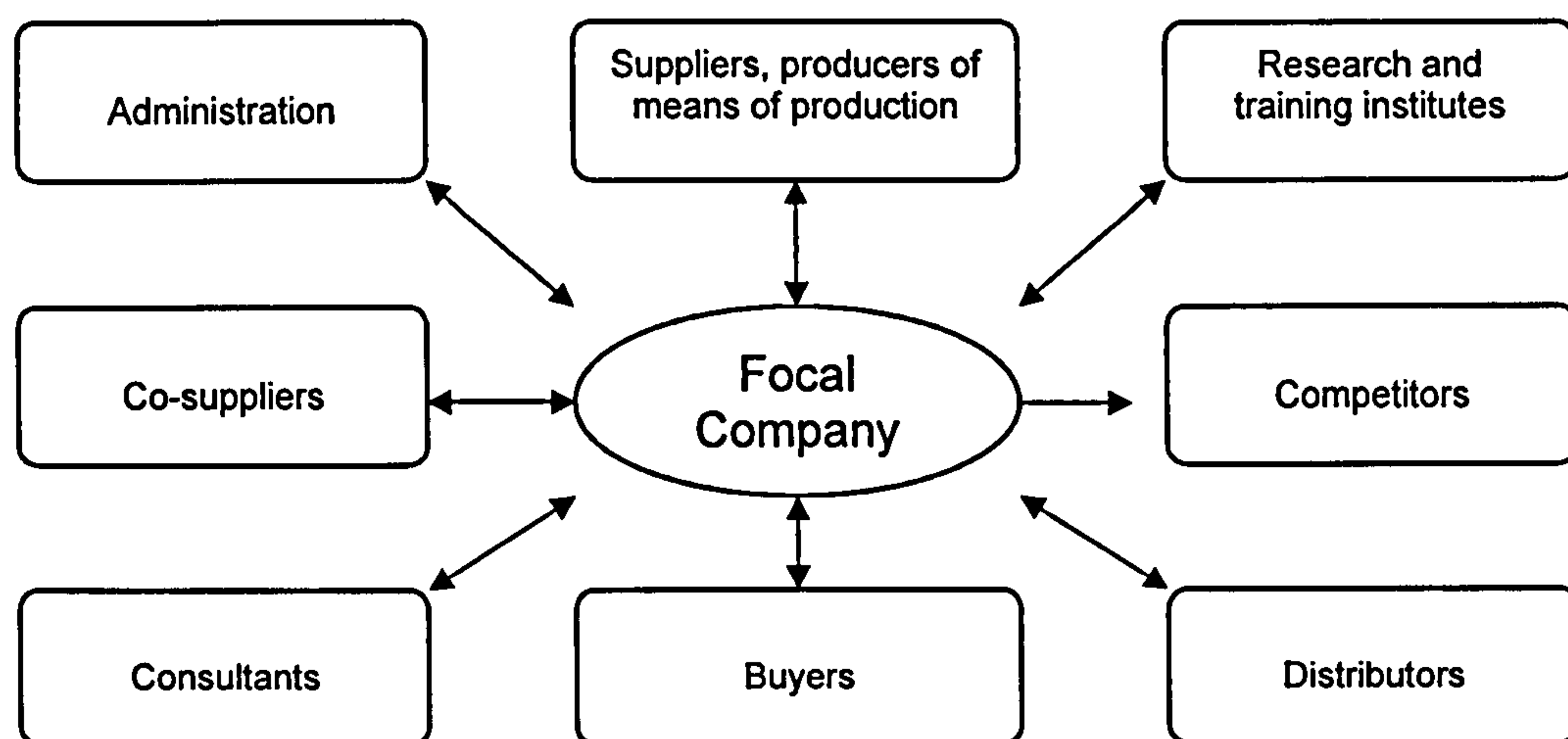
2.5.2 External Capabilities

Based on the assumption of Gemünden *et al.* (1996) and Ritter and Gemünden (2003)'s work of the network configuration, firms need to understand their network competence, in other words, external capabilities of the firm. They argued that for a

firm to be successful it must understand “what” the dimensions we need to be aware of in order to achieve stability within the network.

Similar to internal capabilities, external capability has some different dimensions that need to be considered. Gemünden *et al.* (1996) and Ritter and Gemünden (2003) noted that in discussion of the network, there is a need to investigate dimensions, such as administration, suppliers, co-suppliers, research and training, competitors, consultants, buyers and distributors (see Figure 2.6). Furthermore, the model of innovation partners and their contributions (Figure 2.6) also applies to the manufacturing SMEs where the supply chain is through collaboration and partnerships with other actors within the network (Soh and Robert 2005).

Figure 2.6 Innovation Partners and Their Contributions



Source: Gemünden *et al.* (1996)

Gemünden *et al.* (1996) suggest that companies have to be aware of the administration dimension in terms of political issues, laws, finance and relationships with other actors in the network. Companies also need to focus on the movement of suppliers and producers of the latest technologies, components and systems development. Another dimension is research and training, which have a direct impact on the company’s research and development. In the production, co-suppliers have certain degrees of importance, especially the product compatibility with main suppliers’ products.

Although companies need to monitor their competitors to gain competitive advantages, in some situations the company and its competitors may need to have either formal or informal agreement in the product standard. For example, product standards and joint research projects to ensure the product is following the industrial standard. Companies may require financial services or legal advice and relationship maintenance with these specialised consultants is essential. Buyers will have strong influences as well; they have demands on the new product requirement and after sale services for solving any relevant problems. Additionally, from another perspective buyers in industrial environments have the professional ability to judge product quality, price and important transaction terms (Holmlund and Knock 1995; Fujimoto 2003). Finally, companies' strategies or changes will affect demands on distributors, whether on the issue of delivery time, transportation or location etc.

2.5.3 Summary of Capability

Firms have a tendency to accumulate surplus resources. These resources may be formed from any part of the company, whether it is physical, human or organisational (Penrose 1959). The term "capabilities" is simply how a company uses its surplus resource to react in its environment. The complexities of networks exist in every aspect of business activities, both direct and indirect. To target this issue, Teece *et al.* (1990) addressed that a firm's capabilities have huge impact on how companies interact, react and re-react. This also linked to the interaction approach which has been studied over time (Ford *et al.* 1986).

Leonard-Barton (1992) identified four key dimensions of core capabilities; nevertheless, these different aspects of capabilities affect how a company behaves internally, but also affects the attitudes towards its counterparts and networks. That is, different dimensions and changes to a firm's capabilities will have a huge impact in terms of the network stability.

External capabilities, or so called network competence, have strong influences in different aspects of a firm's relationships within the network (Gemünden *et al.* 1996; Ritter and Gemünden 2003). Therefore, a company needs to consider both internal

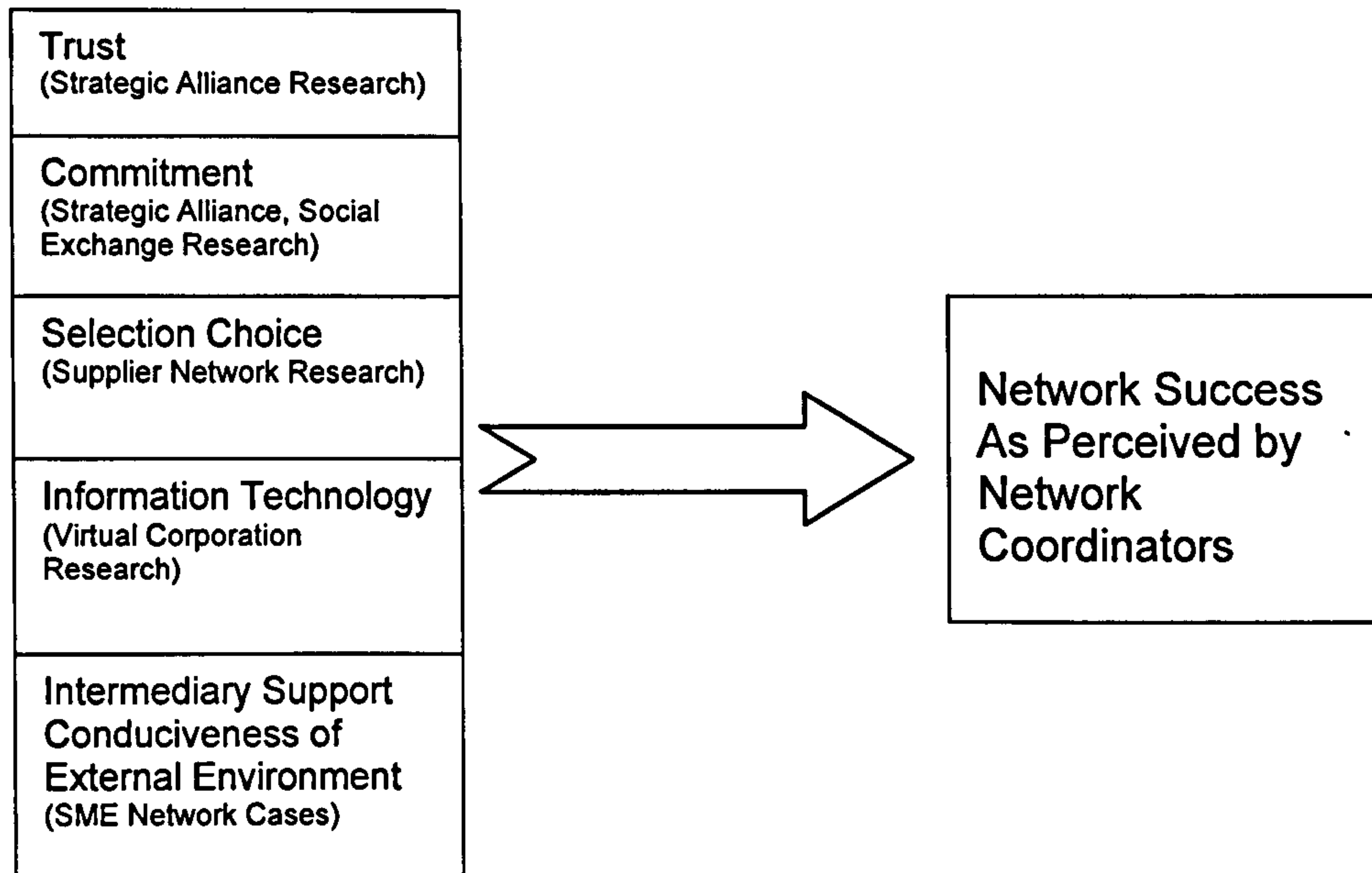
and external capabilities as they will affect ‘what can the company do?’ and ‘what can the company offer to the network?’ Thus, in the next section, the researcher’s intent is to explore further on issues related to industrial networks and capabilities.

2.6 Other Network and Capabilities-related Issues

The emerging discussion of SMEs, internationalisation and industrial networks cannot be ignored as there are other issues aside from the learning process of stage approach, industrial SMEs’ network structure and the capabilities. For instance, when a firm is involved in a manufacturing network, it is often for the firm to gain competitive advantage through different levels of coordination; additionally, the firm is expected to grow (include international expansion) among other small manufacturing firms (Selz 1992; Malecki and Tootle 1996; Suarez-Villa 1998; Sherer 2003). In other words, the manufacturing SMEs are developing their market and network strategies through their value chain integration and cooperation with other network partners (Fariselli *et al.* 1999).

Moreover, Sherer (2003) argues that the key driver to form the manufacturing network collaboration is the companies’ specific business objectives, nonetheless, the SMEs still maintain a significant degree of interdependence. Thus, under the influences of social network theory three major factors are derived: trust, commitment and selection (*ibid.*). Figure 2.7 below illustrates different factors that lead to perceived success of manufacturing SMEs and their network.

Figure 2.7 Factors Leading to Perceived Success of Manufacturing Networks



Source: Sherer (2003)

Although Sherer (2003) suggests that information technology (IT) is one of the factors leading to a successful manufacturing network, it is noted that many SMEs in the manufacturing networks are not using IT and do not perceive IT as one of the necessary elements. As a matter of fact, manufacturing SMEs pay more attention to industrial relationship development instead of exploring other possibilities for IT development, which includes the Internet (Nohria and Eccles 1992). This reflects on the empirical results of Gattiker's *et al.* (2007) research. Computer mediated interaction cannot replace traditional relationship development and trust building. It is also commonly known that SMEs tend to have short-term operational focuses, instead of long-term business strategic planning (Levy *et al.* 2002).

From another perspective, Bell *et al.* (2004) suggest that when analysing an SME's industrial network, it is advisable to review whether the SME belongs to a knowledge-intensive firm or traditional firm. According to Coviello and McAuley (1999, p.223), knowledge-intensive firms are firms which have "high added value of scientific knowledge embedded in both product and process". Knowledge-intensive firms are likely to position themselves in niche markets, thus, due to the limited size of the market these firms are expected to have more international connections during new

product development (NPD) process (Bell *et al.* 2004). In addition, Noori and Lee (2006) suggested that the development of the Internet would have a larger impact on knowledge-intensive firms as high-speed data networks can carry digitalised information such as product design blueprints to logistics and distribution level.

In contrast, traditional SMEs tended to focus on the domestic market and have reactive behaviour towards international activities (Liikanen 2000; Bell *et al.* 2004). Furthermore, Bell *et al.* (2004) note that the most significant factors in explaining different attitudes of different firms towards their development could be determined by the industrial sector and product characteristics. Table 2.5 below summarises different internationalisation strategies according to different type of SMEs.

Table 2.5 Internationalisation Strategies

	Knowledge-intensive Firms	Traditional Firms
Motivation	Proactive	Reactive
Patterns	Concurrent	Incremental
Pace	Rapid	Gradual
Method of Distribution/Entry	Flexible	Conventional
Subsequent Internationalisation	Structured	Ad hoc

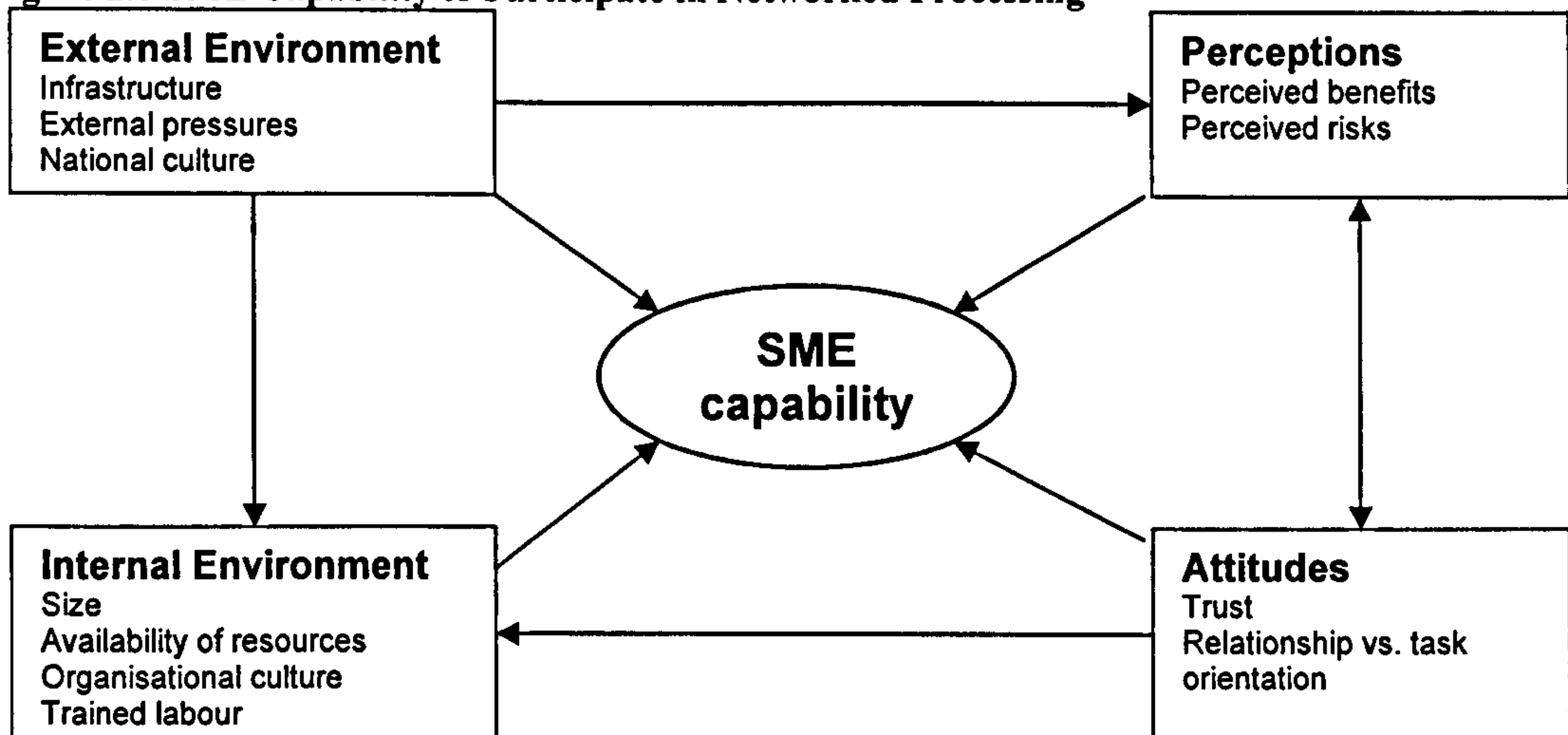
Source: adopted from Bell *et al.* (2004)

Hutchinson *et al.* (2006) also noted that during the internationalisation process of an SME, the decision-maker plays a significant role. To some extent, the decision-maker involves decisions that are associated with foreign market knowledge or the firm's commitment towards international markets (Reid 1981; Holmlund and Kock 1998; Andersson 2000). In other words, the decision-maker would not only influence the network relationships development, but also have certain powers over a firm's investment and development pattern (Carson *et al.* 1995; Coviello and Munro 1997).

Johnston and Wright (2004) also suggest that when evaluating a firm's capabilities, it is necessary to see how a firm can participate within a network with internal and external environments, as well as the perceived risks, benefits and attitudes issues, such as trust and relationship (see Figure 2.8). Indeed, the OECD (2001) noted that

the Internet does not necessarily promote more international trade. Other factors such as language, taxation, trading regulation, payment or delivery should be taken into account when evaluating a network process, as these factors would have an impact on Internet usage (OECD 2001).

Figure 2.8 SME Capability to Participate in Networked Processing



Source: adopted from Johnston and Wright (2004)

On the other hand, a number of researchers argue that to establish an effective communication channel within a network is essential, especially with the integration of electronic mediated exchange which would assist the firms to increase their coordination intensity (Malone and Rockart 1991; Fulk and DeSanctis 1995; Zaheer *et al.* 1998; Sherer 2003). Moreover, Sherer (2003) believes that a network with high coordination intensity would result in faster adoption of IT through joint activities. Thus, the researcher intended to draw the focus of the literature review to the Internet and other Internet-related discussions for SMEs.

2.6.1 Summary of Other Network and Capabilities-related Issues

The manufacturing network is somewhat different from other business networks, as the manufacturing network not only requires intensive coordination, cooperation or collaboration, but needs to consider issues such as trust, commitment and selection (Sherer 2003).

In terms of the communication within the manufacturing network, Gattiker *et al.* (2007) suggest that computer mediated interaction cannot replace traditional relationship development and trust building. Nevertheless, Sherer (2003) insists that IT development is crucial for successful network interactions. Furthermore, the use of technology for internationalisation may depend on the types of organisation, as knowledge-intensive firms have a much more proactive attitude in comparison to reactive traditional firms (Bell *et al.* 2004). This has triggered the researcher to further investigate the issues related to the Internet, which also correspond to one of the key focuses of this PhD research.

2.7 The Internet

Levitt (1983) considered the impact of technology as the contributing factor to a more homogeneous business environment, leading to increasing levels of competition and shorter product life cycles. As a result of information technology development, the effective distances shorten between people-to-people and there is faster communication. Poon and Swatman (1997) pointed out that SMEs' decisions over the use of the Internet are driven by the management's inspiration by the Internet technology and seeking to use it as an advantage for its communication.

There is no single definition of the Internet, Cambridge Dictionaries Online (2003) defines the term as 'the large system of connected computers around the world which allow people to share information and communicate with each other using email'. Another definition from The Federal Networking Council (FNC) in 1995 has a more general description of the Internet, describing it as "a global information system by connecting other computers or networks and is able to support different forms of communications, such as electronic mail (e-mail), electronic commerce (e-commerce), World Wide Web (WWW), online video conference and voice conference, etc". In other words, the Internet not only refers to websites, e-mail or online shopping, but as a collective term of online computer mediated communication methods which will be covered for this research.

Over time, the Internet has become one of the key issues in business strategies. Palumbo and Herbig (1998, p.255) suggest eight key issues in adapting marketing decisions to the Internet. These issues include international price, global branding, territory, channel conflict, international distribution, organisational structure, increase of competition and means of payment.

According to Palumbo and Herbig (1998), the Internet means global presence; therefore, products prices and details could be revealed at the other side of the globe. More precisely, a product price and specification may differ in a developed market to a developing market or less developed market. In terms of global branding, buyers may well be confused about product specifications if the company chooses to use different brands in various countries. Companies normally have their authorised distributors and sales forces in various regions or countries. An up-to-date distributors' list is needed, and therefore, to reduce channel conflict, especially with international distribution operations, it is important to design a logistical system. When a company is involved in Internet activities, it is likely to change the organisation structure, from creating a new department to assign different tasks as well as the co-ordination between various parts of the company. One of the benefits of the Internet is it reduces the cost of entry, and it diminishes the competitive advantage of economies of scales for the larger companies. However, it will face heavy competition in the existing market. Finally, due to international trade, the means of payments will change constantly; therefore, choosing appropriate methods is needed for the SMEs (*ibid.*).

Sharma *et al.* (2001) categorise the nature of the Internet as information, connectivity, community, transaction and share of cost reductions. These categories are very similar to Palumbo and Herbig's (1998) eight key issues in adopting marketing decisions to the Internet. In addition, Sharma *et al.* (2001) suggest that connectivity and community of the Internet can provide a 24/7 platform for communication and the sharing of news or experiences. Therefore, online transactions around the clock and reducing the risk of traditional order taking would be a key advantage for the firm. Finally, the last advantage is to share cost reduction as the Internet takes over part of the communication, which will allow the firm to cut its unnecessary cost. However, the use of Internet technology differs from B2B and B2C, as highlighted by Furlong

(2005). B2B's implementation of Internet technologies is driven by 'hyper-competition and important bottom-line imperatives'. This further indicates that a successful Internet implementation depends on the level of interaction offered to both one-to-many and one-to-one basis communication, as well as the competence to research, target and reach appropriate target audience (Wright *et al.* 2006).

According to Kundu and Katz (2003), newly setup firms with Internet access categorise themselves as 'born-international' or 'born-global'. In particular, these firms in developing countries could leverage the Internet to gain controls of regional or global exports, thus, these activities have become the initial stages of internationalisation.

From the definition of the Internet and previous discussions of industrial networks, it can be said that the Internet is a network of the network. In other words, the Internet is a form of communication network that exists within the complexity of industrial networks, thus, it is necessary to extend the discussion between the Internet and SMEs in the next section.

2.7.1 Internet and SMEs

As noted in the U.S. Industry and Trade Outlook® (NTIS, 2000), traditional wholesaler-distributors have not been replaced by e-commerce because of the complexity in replacing the highly valuable industry intermediaries. Furthermore, it listed three common forms of Web sites (i.e. Auction Sites, Catalogers of Catalogs and Distributor Web Sites) used by B2B e-commerce. Fein (2002) also mentioned that manufacturers' profits increase from the growth of electronic business (e-business) over traditional approaches. According to Smith (1999) B2B online markets are four times larger in terms of sales in comparison with B2C markets.

In fact, many firms were early entrants to B2B Internet marketing, where they committed to the use of the Internet to reduce costs across different aspects (Anandarajan *et al.* 1998; Chaston and Mangles 2003). Despite that, inbound and outbound benefits of the Internet usage have been strongly highlighted (include:

logistics and organisational operations). Aspelund and Moen (2001) noticed an important trend in SME's competitiveness through the electronic process technology as well as the communication technology. The electronic process technology makes production more efficient, the improvement of communication technology such as e-mail, Internet and video conference, etc. have significantly reduced the costs. Gattiker *et al.* (2000) state that the use of Internet raises important issues about the interaction between industrial clients and possible sellers. Furthermore, as suggested by Wright *et al.* (2006) SMEs can use the Internet in order to achieve cost reduction, inventory reduction, customer service improvement and customised production development.

SMEs are considered to lag behind large firms in terms of innovation and the use of technologies. According to Dutta and Evrard (1999), this trend is changing and modern SMEs can quickly adopt the new technologies, such as the use of the Internet. Nevertheless, there is no further research to verify their research, where this particular area would be further investigated within the scope of this study. The Internet is increasingly important to SMEs, and it is involved in all aspects of competitiveness. In a study by Lichtenthal and Eliaz (2003), they explore Internet integration in business marketing tactics and found that the Internet is having an impact on the firm's market size and structure, buying and selling behaviour, product, associated pricing practices and distribution systems.

However, when SMEs are enjoying the benefits of broadband Internet, there are two major concerns: performance level and security (Vidgen *et al.* 2004). The performance level refers to a firm's technological capacity and as the volume of Internet traffic increases, firms should raise their capacity to cope with any inward and outward information. Security is another concern where it relates to a firm's ability to control information access or privacy. These two concerns could have immediate effects for SMEs, which lack financial or technological resources (*ibid.*). From another perspective, industrial customers may decline to use the Internet for ordering, payment or other functions due to the seller-firm not demonstrating the capacity to achieve customers' expectations on the Internet development (Damanpour 2001; Eid and Trueman 2004).

2.7.2 Integration of the Internet

Lichtenthal and Eliaz's (2003) found that Internet integration has a huge impact on market size and structure. More and more businesses are aware and beginning to take advantage of the Internet and industrial marketing marketers are starting to consider the use of the Internet in the marketing mix. Due to the nature and characteristics of the Internet, large numbers of companies' information has become transparent, such as a company's financial performance and products' specifications etc., which are of benefit to buyers. Nonetheless, competitors can also seek the information they require to become competitive, which may cause companies to fail or to merge over time due to lack of competitive advantage. The phenomenon would not only affect the restructuring of the whole market size, but also companies' size on some occasions.

In terms of "Internet" market structure, the Internet has created the possibility of bringing many buyers and sellers under one virtual roof (e.g. virtual shopping mall) (*ibid.* p.4). However, a website is often the first point of contact for anyone who searches on the Internet, therefore, the interactivity of the website interface plays a significant role for international B2B organisations (Karayanni and Baltas 2003). In other words, this is to say that the website design could have direct influences in terms of users' perceptions towards the firm. Blattberg and Deighton (1991) and Berthon *et al.* (1996) also highlight that the Internet is likely to change the way of how companies interact with the users (another company, buyer or potential customer), thus, the firm would change the way they initiate, develop or terminate customer relationships. On the contrary, Shani and Chalasani (1992) and Kara and Kaynak (1997) propose that the use of the Internet is to make a tie between the customer and the company through development, such as a detailed customer database where the firm can extend different techniques to explore relationship marketing. As Karayanni and Baltas (2003) conclude, it is necessary for the firm to review the importance of Internet marketing from the customers' perspective, thus increasing the marketing communication flow.

Another type of Internet market structure is where the company provides their own software platform to enable buyers to negotiate prices on a real time basis; in addition, for companies which have fewer budgets but require some level of integration, they

install middleware (normally provided by third parties). Dutta and Evrard (1999, p.241) note that the “use of modern technologies often cannot be combined with older methods of management”. In a later research conducted by Dutta and Biren (2001), they have confirmed that most of the companies move their existing business processes on to the Internet with little change to their business models. This indicates that new management and employees are needed in order to allow a firm’s participation and reorganisation. In other words, when a firm integrates the Internet into their business operation, extra resources, such as human or IT, are required.

Schwartz *et al.* (2000) noted that where firms have limited resources (small businesses in particular), Internet exchanges (web browser interface, middleware and own software on site) seem to be the only viable option in order to compete in the business. Further to their findings, smaller companies who use Internet exchanges to trade are likely to save costs in between 15% to 25% compared to traditional face-to-face negotiation. Moreover, Internet exchange can act as a filter by screening, pre-qualifying or assessing potential risky members. Still, a problem exists when some industries have smaller profit margins and the exchanges do not make a profit (Pachetti 2000).

According to Lichtenthal and Eliaz (2003, p.6), “buying online implies three levels of brand selection: item, Website, and service provider.” Indeed, assuming an industrial firm is looking for a new component; once the item is found the company will assess the potential usage of that particular Website and who provides it. This is because different firms will have different degrees of development for the Internet exchange software accordingly to their capabilities. With the variety of the software development, a buyer would have different levels of received information (products, company, general), purchase procedure, discounting, transaction, delivery etc. For the smaller company, they are likely to have fewer resources in terms of developing software and only provide relevant product or company information online, e.g. the webpage; thus, the buyer would still need to use telephone, facsimile or face-to-face contact (Damanpour 2001). This indicates that the use of traditional telecommunication and face-to-face contact cannot be ignored, as it can be perceived as the development pattern for Internet.

Information provided on the Internet can also have an impact on competitors' NPD strategy and imitation issue; that is, product information exposed from Internet to public, not only to the buyer but competitors also. Competitors can use the Internet to their own advantage by collecting other ideas and design, in some cases, the competitor can be an anonymous buyer for closer inspection (Lichtenthal and Eliaz 2003). Because of the over exposure of the product, it will become vulnerable in terms of competitive advantage.

Transparent information on the Internet has a huge impact on the product price, both buyer and seller can compare product prices online. However, but not surprisingly, price transparency has only limited effect on industrial companies. Booker (2000) views that industrial networks cannot ignore the importance of customer relationships and the impact of brand equity. In most cases, industrial firms will develop deep relationships with their counterparts, because product price cannot replace the importance of product "quality, order cycle time, augmented services, geographic proximity or desirability, etc." (Lichtenthal and Eliaz 2003, p.8). In other words, trust and commitment between both parties are far more important than finding a supplier with a cheaper product price.

The Internet is also a tool for both buying and selling companies. Companies can search opportunities for further improvement and cost reduction. Internet can provide managers with fast and accurate information from several operating areas, such as transportation, inventory, purchasing, customer service, production scheduling, order processing, and vendor operations (*ibid.*, p.7). It is believed that using the Internet can constantly track and identify buyer's buying behaviour with preferred distribution channel choices. To fulfil the integration with the information received, one of the popular exchanges is being used. This particular exchange is called 'logistics exchange', also known as LXs. The purpose of LXs is to provide companies (especially small and new companies) at the stage where they are involved in international distribution; LXs' advantage is to provide a platform containing distributors' information for companies which encounter new logistics challenges. LX is a vital resource for those companies which have insufficient channel information and capabilities, in particular, e-companies. Whereas traditional companies have

better skill at managing and operating supply chains, due to years of investment and experience.

Poon and Swatman (1999) identify the benefits of the Internet (Figure 2.9) from their studies and the findings suggest that SMEs do not gain particularly significant benefits by adopting the Internet in the short term. SMEs are not convinced the sales by online transaction; therefore, companies believe that those goods that are difficult to purchase over the Internet are better sold with face-to-face interaction. In contrast, Lichtenthal and Eliaz (2003) argue that B2B firms cannot survive without having any Internet presence. As Honeycatt *et al.* (1998) indicate, initial development of the Internet is perceived as a medium that is endowed with opportunities to reduce costs of information seeking and to provide customer support. However, it is suggested that discussions of the Internet should be broadened in terms of its effectiveness of transactions, web's added value and increasing customer involvement (Sharma 2002; Berthon *et al.* 2003; Krepapa *et al.* 2003).

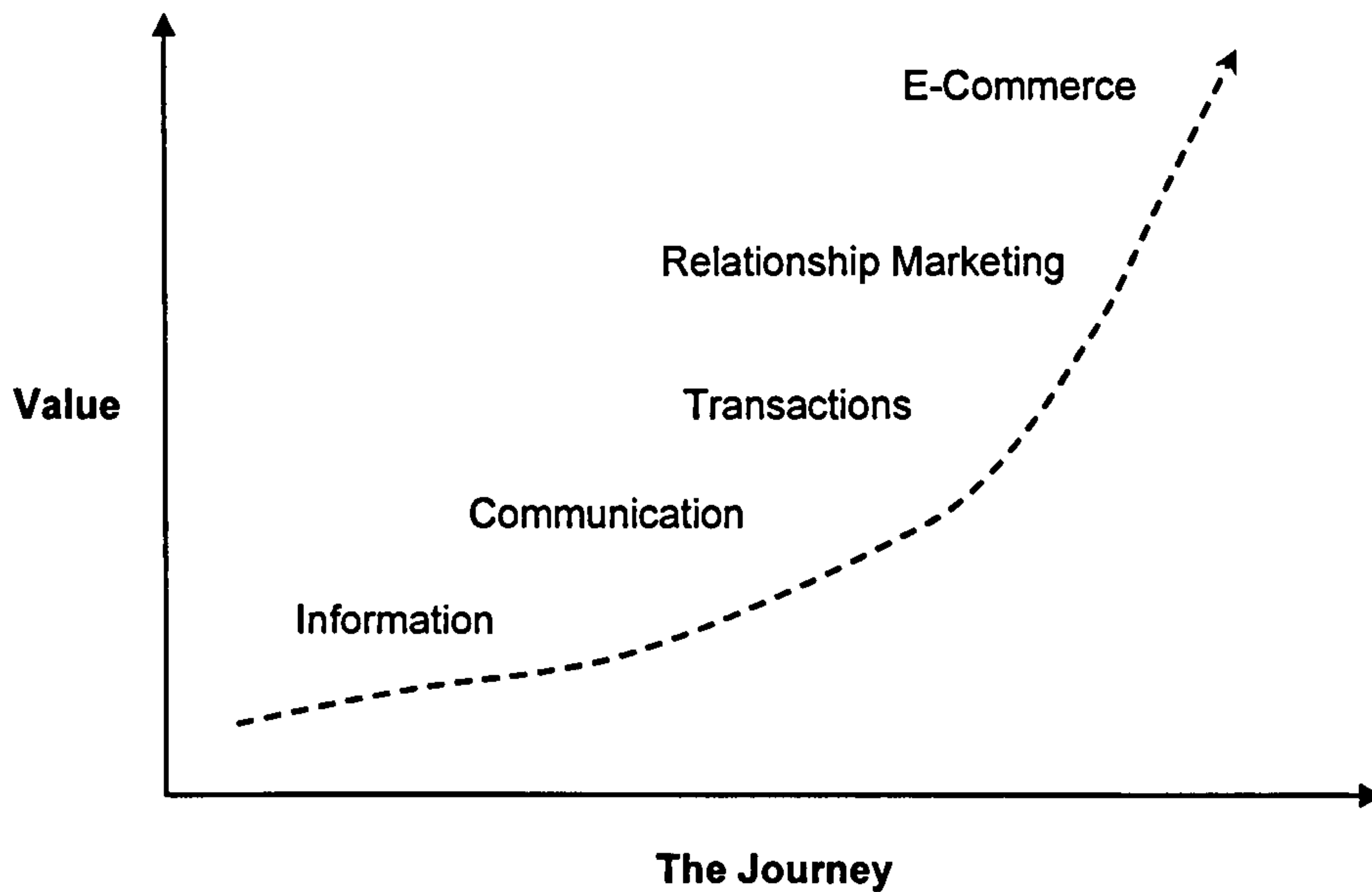
Figure 2.9 A Framework of Benefit in the Context of Small Business Internet Commerce

Direct benefits	Examples: - Save in communication costs - Generate short term revenues	Examples: - Secure returning customers - Long term business partnership
	Examples: - Potential business opportunities - Advertising and marketing	Examples: - Ongoing business transformation - New business initiatives
Indirect benefits	Short term	Long term

Source: Poon and Swatman (1999)

Since there is a lack of standard Internet infrastructure across the network, there is a compatibility issue between firms' IT level (Hauguel and Jackson 2001). As a result, current Internet usage in industrial marketing can be seen as only focusing on areas between selling and advertising, or both (Krepapa *et al.* 2003). It is also suggested by Sharma (2002) that the value of the Internet can be seen as a development over a period of time and can be shown in a diagram format (Figure 2.10).

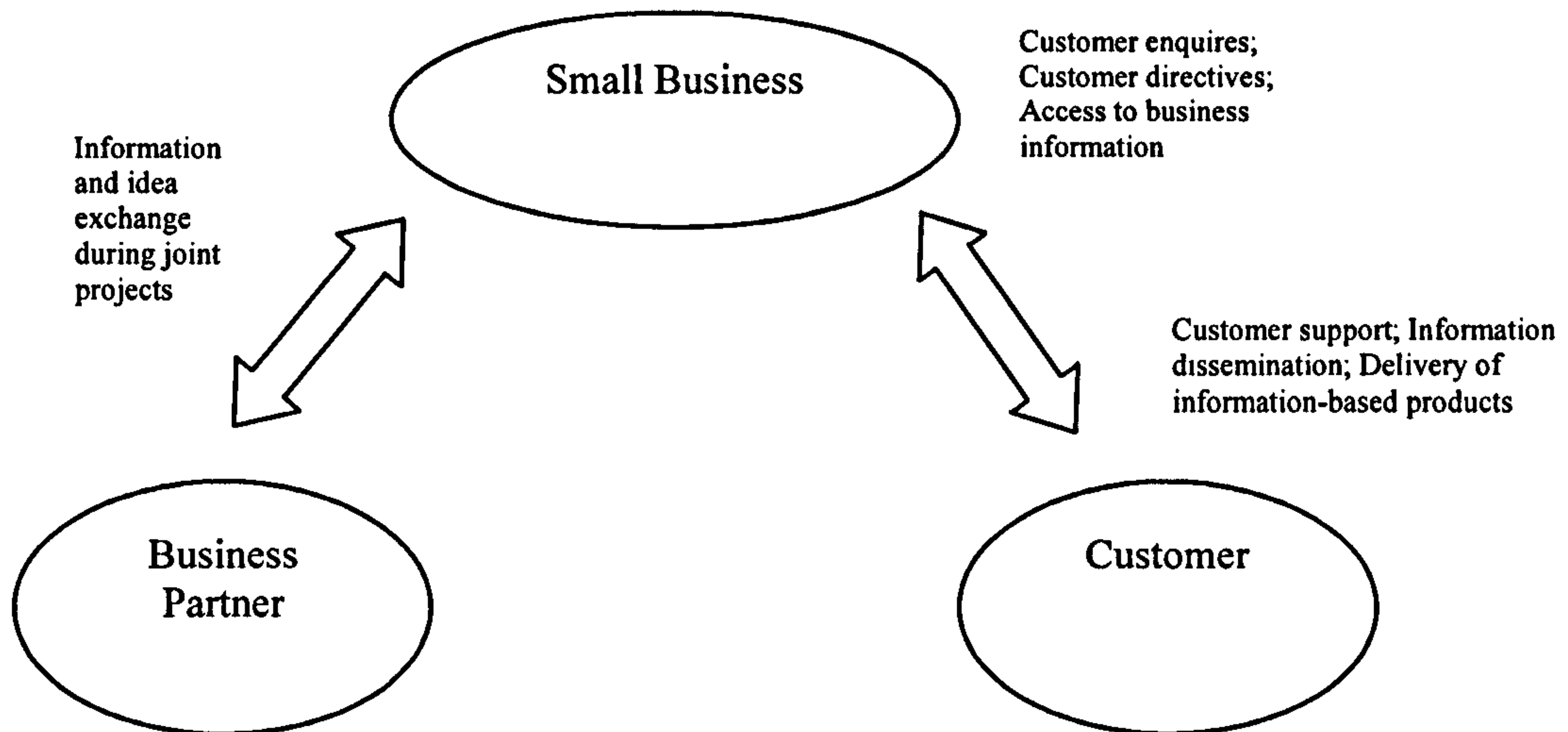
Figure 2.10 Evolution of Internet Presence



Source: Sharma (2002)

Moreover, Poon and Swatman (1999, p.12) suggest that “firms considered the most useful function of the Internet is as a medium for business communication using electronic mail (e-mail)”. That is because firms believe the Internet is a 24/7 platform which overcomes the problems of time and geographic limitations, most importantly its ability to carry electronic documents. Many companies are convinced by the cost saving of e-mail and are getting used to it to contact customers (see Figure 2.11). According to Poon and Swatman (1999) and Kehoe and Boughton’s (2001) research, one of the biggest issues for the SMEs is the lack of systems integration, such as the firm’s internal systems not being integrated with Internet applications. Furthermore, Smith *et al.* (2003) suggest that the e-mail business format would lose its limited advantages, along with simple, non-interactive web pages. For example, customers place their orders by email, but due to a lack of integration between systems or applications the firm that received the order still has to process it manually; which is one of the common problems of SMEs and often cost them extra time and resources.

Figure 2.11 E-mail Usages Between a Small Business, its Customer and Business Partner



Source: Poon and Swatman (1999)

Unfortunately, the benefit of cost saving is limited. This is due to legal and privacy concerns for confidential material, thus, firms have to use traditional paper-based communication methods to communicate. Day and Bens (2005) also highlight the possible opportunities for using Internet in B2B marketing, which includes: promise of efficiency; reducing customer search costs; personalised message to strengthen customer services and encourage customer feedback. This also signifies that when considering a manufacturing SME's operation, they not only have physical manufacturing operations but also service elements. However, the biggest challenge for SMEs using the Internet includes their competitors copying the offering, especially for SMEs competing in standardised product areas, such as CDs or DVDs, which only service and price can differentiate sellers (Swatman 2000). Another issue is the cost of keeping a website up-to-date, which can be excessive and costly, where it represents another big challenge for most of the SMEs (*ibid.*).

2.7.3 Web's Adding Value and Cutting Costs

The Internet's impact on transaction costs is immense and cannot be ignored. A recent study conducted by Berthon *et al.* (2003), explores different types of transaction costs and how the WWW affects the companies (see table 2.6). The study was based on two

types of transaction costs identified by Milgrom and Roberts (1992), which are coordination costs and motivation costs.

Coordination costs are the “costs associated with the coordination of producers and customers” (Berthon *et al.* 2003). In detail, coordination costs encompass four different types of costs: search costs, information costs, bargaining costs and decision costs. Firstly the search costs; the WWW can reduce time and effort in finding buyers and sellers by using search engines. Furthermore, most search engines have an advanced web search function which can be really specific in finding products, services and solutions. Secondly the information costs; WWW is an information platform and any individuals or firms can easily access the company’s or the product’s information at no cost. In addition, buyers can compare products with any available suppliers. Thirdly the bargaining costs; the web is slowly increasing the power of negotiation, for instance, on-line bidding systems. With on-line bidding systems firms can spend less time on traditional face-to-face negotiation and can automate bidding through a virtual agent. Finally the decision costs; apart from collecting information that is needed from one website to another, there are websites that allow buyers to compare products and prices under one roof, thus, buyers can compare and make decisions instantly.

Motivation costs are the “costs associated with achieving incentive symmetry” (*ibid.* p.554); in other words, costs to overcome imperfect information and commitment. Two types of motivation costs were identified as policing costs and enforcement costs. Policing costs on-line can allow buyers to check their orders and bills in real time, unlike traditional methods where buyers need to wait for written confirmation. In addition, chat lines or chat rooms on the website have the ability to alert potential buyers on issues of problem products and suppliers. Whereas traditional compliant procedures are time consuming and involve huge legal costs, on-line chat rooms can provide information and make suppliers aware of how they should improve their products in an inexpensive way.

Table 2.6 Types of transaction costs and how the World Wide Web affects them

Type of transaction costs	Example(s) of how the Web can reduce the transaction cost
Search costs	Reduce time and effort in finding products, services and solutions, and potential suppliers and buyers. For example, search engines and comparison sites allow buyers (suppliers) to find suppliers (buyers) of specified products and services such as “Linux operating systems” or “environmental auditing.”
Information costs	Buyers who wish to learn more about thermoplastics and what is available before purchasing previously would have had to read magazines and journals, talk to knowledgeable individuals and visit producers. They can now access company and product information easily and at no cost, obtain comparative product information and access suppliers on the Web.
Bargaining costs	Time normally taken by customer to negotiate can now be used for other purposes as intelligent agents transact and negotiate on the customer’s behalf. On-line bidding systems can achieve similar results. For example, GE in 1996 purchased \$1 billion from 1400 suppliers over the Internet and there is evidence of a substantial increase since. Significantly, the bidding process for the firm has been cut from 21 days to 10. In the advertising auction site, additionally, buyers can automate bidding through a virtual agent called “proxy man.”
Decision costs	The cost of deciding over Supplier A vs. Supplier B, or Product A vs. Product B. Proprietary and/or comparative websites provide information on suppliers, products and services. For example, travel websites allow business customers to compare hotels and meeting facilities on-line.
Policing costs	Previously, customers had to wait to receive statements and accounts, and then to check on paper for correctness. On-line ordering and billing allows buyers to check statements in real time. Chat lines frequently alert participants to good and bad buys, and potential product and supplier problems. For example, the flaw in Intel’s Pentium chip was communicated extensively over the Internet, while security problems with various Microsoft products have been reported widely on-line.
Enforcement costs	When a problem exists with a supplier, how does the buyer enforce contractual rights? In the real world this would require legal assistance. Publicizing the infringement of rights would be difficult and expensive. Chat lines, bulletin boards and on-line media offer an easy and inexpensive way of making suppliers listen.

Source: Berthon *et al.* (2003)

“New customers are frequently low users as they buy from many sources but if relationships work out well, they are likely to favour a single supplier and share of customer increases.” (Gummesson 2004, p.146)

In Eid and Trueman (2004) and Gummesson's (2004) findings, when a firm is using the Internet extensively for their international communication/marketing, trust has to be established initially. This indicates that the environment of trust in Internet-based marketing has a great influence on a buyer's decision over the method of communication, usage or even a successful transaction. In other words, the initial relationship development could determine a firm's attitude to the choices of Internet technology, communication strategy and finally its Internet development (Mayer *et al.* 1995; Ratnasingham 1998; Hoffman *et al.* 1999; Urban *et al.* 2000).

Apart from the understanding of traditional business communication approaches, it is important for firms to investigate the impact of Internet communication culture. For instance, Rosenbloom and Larsen (2003) argue that in high-context culture countries, the use of e-mail is limited and not perceived as an effective medium. Arguably, it is because high-text culture countries prefer to conduct face-to-face contacts to reduce the risks of misunderstanding (Hofstede 1991). Indeed, Carson *et al.* (1995) have mentioned the importance of personal contact networks (see Chapter 2.6). Nevertheless, Rosenbloom and Larsen (2003) suggest the use of e-mail can decrease communication gaps between different industrial actors from different culture contexts. However, as suggested by both Hofstede (1991) and Rosenbloom and Larsen (2003) different cultures may encode or decode the message differently, thus, it would be worth exploring how different Internet techniques cope with different cultures in international markets.

2.7.4 Summary

The impact of technology changes the business environment and leads to higher levels of competition. With the significant development of information technology over time, the Internet has become one of the key issues involved in business strategies. The Internet, which can be used in different ways, has changed traditional

communications. Firms can exchange information in a no-time boundary; not only to exchange information in a 24/7 platform but also to reduce the cost for communication.

The Internet creates a bridge for companies to global audiences, providing an easier first step toward internationalisation. Current literature suggests the Internet is used mainly as an information gateway, providing direct benefits for reducing communication costs; therefore, it is possible to generate short-term revenues. However, the Internet can also be used for advertising and marketing, which generate new potential business opportunities. Within the industrial networks, the Internet has potential benefits to the firm and to its counterparts by creating an information network and thus reducing communication costs.

Two types of virtual shopping methods are also identified which influence the market structure. Since B2B markets have larger demand in one transaction, as well as business customers who have different requirements (made-to-measure products, products quantities, discounts, delivery methods and delivery time) for each transaction, the company who sells will require their own software platform in order to support different buyers' different needs. Whereas the 'virtual shopping mall' mode is less suitable for B2B market, especially for smaller firms offer products with less choices or have limited resources and capabilities to develop particular software to be used for virtual shopping. In other words, the virtual shopping mall mode is a much better method for B2C market, where they have less demand individually and have few or no special requirement.

Nevertheless, the use of the Internet is restricted by the firm's capabilities. For instance, companies may or may not have the technological capability to cooperate with different forms of the Internet. It is often to seen that due to the different nature of the counterparts, the Internet may not be the primary choice of the communication; instead, traditional paperwork would be more appropriate.

2.8 Conclusion

The development of information technology is increasingly important, especially the technological breakthrough of the Internet. Private individuals and companies are aware of the impact and importance of the Internet; therefore, the Internet is not just a form of communication, it is one of the most efficient tools for money making. Literature reveals that the Internet has become one of the key issues involved in business strategies. Companies often adopt their marketing decisions to the Internet in order to establish their global presence, communication with their suppliers/customers, distribution, payments, competitive advantage and organisational structure. The issues that relate to the Internet are focused on the use of the Internet as an information highway and its connectivity. Moreover, the literature review suggests that more newly setup firms with Internet access categorise themselves as global companies, in particular, these firms in developing countries could leverage the Internet to gain controls of their foreign activities and thus, become the initial stages of internationalisation.

Although there are extensive studies on internationalisation, there are no direct studies in relation to manufacturing SMEs and the Internet. Nevertheless, current knowledge on internationalisation suggests that these firms are likely to follow the U-model (Stages Theory), as it is based on the assumption that firms follow a learning curve and acquire market knowledge from experience. Furthermore, the study carried out by Johanson and Vahlne (1977) on the mechanism of internationalisation believes that the key to a firm's internationalisation process is to understand market knowledge before exploring the process of the decision-making and market commitment of the firm. In addition, Andersson (2000) suggests that the dimension of individuals and key roles has not yet been fully explored. Finally, a more up-to-date study of the Network Model by Johanson and Mattsson (1988) argues that the network perspective of internationalisation is influenced by different network relationships; in comparison with the Uppsala Internationalisation Model, the Network Model is more multilateral than the stages approach.

In terms of understanding the internationalisation process, it is necessary to investigate how companies access resources from others, as firms can only survive by

relying on each other. Thus, review of networks as relationships is necessary, both internally and externally of a firm. Within the model of the basic structure of industrial networks, it is without doubt that there are links between actors, activities and resources. In order to interact with others within the industrial networks, it is essential for firms to adjust their operational methods for different activities or resources (Ford *et al.* 1986). Ford *et al.* (1986) suggests the capability is to focus on the scale of companies within a network on what are firms' capabilities and reactions towards to their counterparts. Unlike Leonard-Barton (1992), she describes capabilities as within a firm on what firms are capable of; that is, two different aspects or scales of capability theories are offered.

This chapter has highlighted the key themes associated with this research, which are the investigation of different internationalisation theories, the Internet and industrial SMEs (see Table 2.7). Furthermore, this chapter has found out other relevant discussions, such as a firm's capabilities, network perspective of internationalisation and the structure of manufacturing networks, which are highly associated with this research. This leads to the development in the next chapter of a conceptual framework that merges the different views and theories into a single framework.

Table 2.7 A Summary of Key Literature Findings in relation to the Conceptual Development

Themes to be studied	Citations
Industrial Network	<ul style="list-style-type: none"> - Network includes aspects such as: relationships, organisational structures, network position and process. - Depends on the level of cooperation, firms have different roles and activities to maintain the stability of a network (Easton 1992a; Håkansson and Johnson 1992; Ford <i>et al.</i> 1986, 2003; Johnsen and Ford 2006). - Discussion of capabilities emerged from the industrial network interactions (Ford <i>et al.</i> 1986, 2003; Håkansson and Snehota 1989, 1995; Foss 1999; Johnsen and Ford 2006; Knudsen and Madsen 2002; Andersson 2003; Möller and Törrönen 2003).
Internationalisation	<ul style="list-style-type: none"> - Indispensable to ignore the understanding of business networks when investigating the internationalisation of SMEs (Coviello and Munro 1997; Hertz 1998; Coviello and McAuley 1999; Autio <i>et al.</i> 2000; Chetty and Campbell-Hunt 2003). - Internationalisation through networking is more multilateral than stages approach (Coviello and McAuley 1999).
Capability	<ul style="list-style-type: none"> - A company's capabilities have huge impact on how companies interact, react and re-react (Teece <i>et al.</i> 1990). - Manufacturing network not only considers the intensity of coordination, cooperation or collaboration with other firms, but needs to consider issues such as trust, commitment and selection (Sherer 2003).
Internet	<ul style="list-style-type: none"> - The use of technology for internationalisation may depend on the types of organisation (Bell <i>et al.</i> 2004). - IT development is crucial for successful network interactions (Sherer 2003). - Trust in Internet-based marketing would determine a firm's attitude to the choices of Internet technology, communication and Internet development (Hoffman <i>et al.</i> 1999; Urban <i>et al.</i> 2000; Eid and Trueman 2004; Gummesson 2004)

CHAPTER THREE: CONCEPTUAL FRAMEWORK

3.1 Introduction

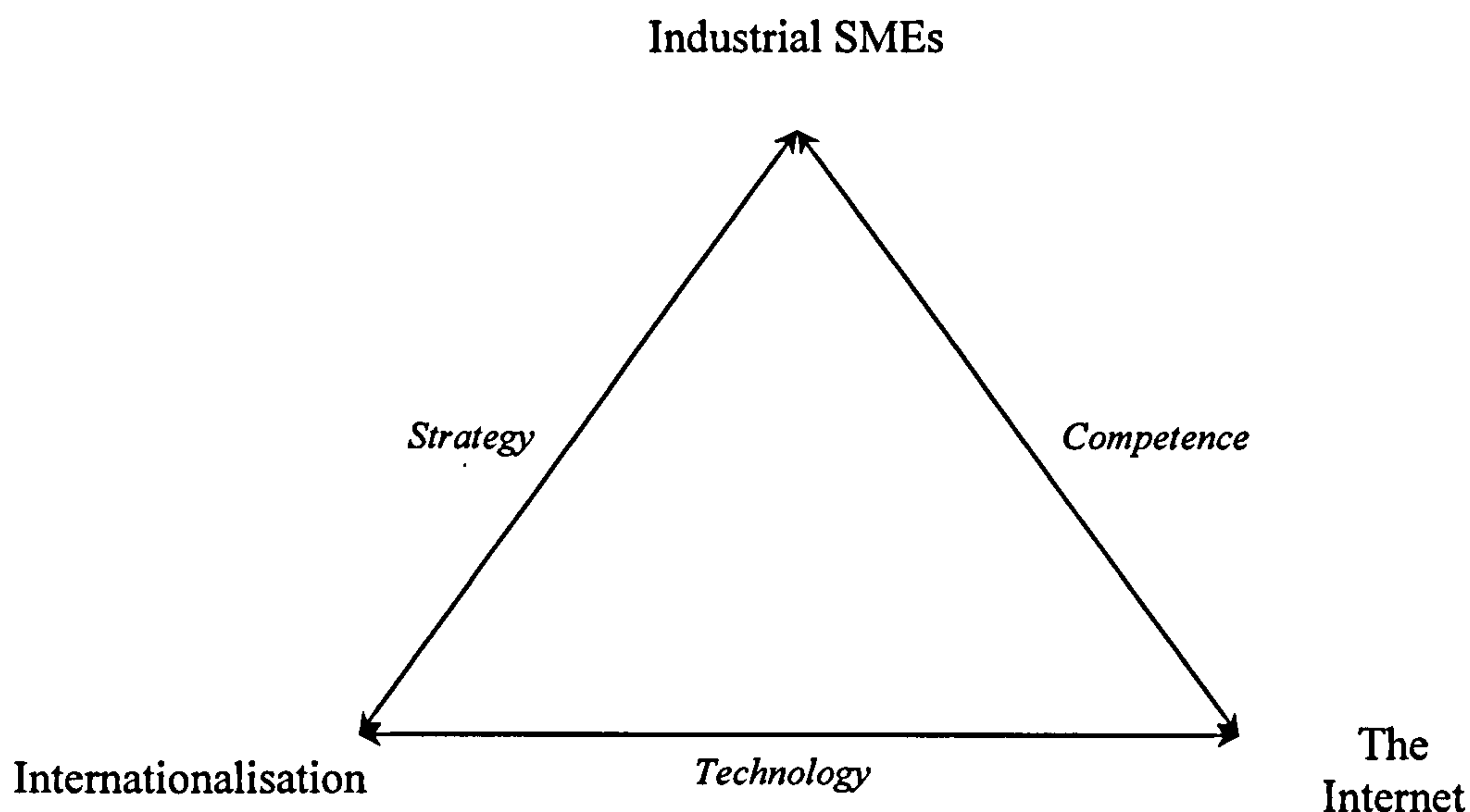
The discussions from previous chapters have highlighted some changes and factors that are likely to affect a manufacturing SME's decision to explore international markets and how a firm perceives the use of the Internet for its international operations and networking. In Chapter Two, the researcher also concluded that there was a need to explore a firm's capabilities and the need to understand different industrial network environments is required for the development of a conceptual framework. The conceptual framework in this chapter is aimed at providing an overview of how different variables and elements trigger a firm's decision regarding their internationalisation approach with consideration of the network relationships.

The conceptual framework building is divided into three stages. The first stage is a brief explanation of the main research themes and their relationships. Stage two is the conceptual framework building accompanied by the industrial network theory. The last stage considers the integration of a firm's capabilities with the previous stages in order to complete the conceptual framework.

3.2 Framework Development: Stage One

In considering the research topic of "How does the Internet relate to the internationalisation of UK manufacturing SMEs? – A network approach", there are three key themes: the Internet, internationalisation and manufacturing SMEs. Within these three key themes, the questions that need to be investigated are: what is the effect of the Internet in conjunction with the internationalisation process of manufacturing SMEs and what is the impact for manufacturing SMEs in adopting the Internet in its internationalisation process? These questions lead us to a bilateral conceptual connection between each theme. (See Figure 3.1)

Figure 3.1 Basic Structure of Key Themes: the Internet, Internationalisation and Industrial SMEs



Before the explanations of each relationship between different themes, the denotations of each theme need clarifying along with its connotations. The term “Industrial SMEs” in Figure 3.1 refers to SMEs that have manufacturing operations; it also represents the manufacturing SMEs as business organisations. Thus, it is important to note that the view between the industrial SMEs and other themes is from an organisational perspective. The second theme is “Internationalisation”, this refers to any activities that assist or support a firm to explore international markets regardless of the degree of internationalisation, i.e. using agents, distributors or foreign subsidiaries. The final them is “The Internet”, this is a collective term for any Internet activities that have been used by a manufacturing SME regardless of the level of Internet development or infrastructure. In between each theme, the categorisations of different relationships are described in italic font.

Firstly, the relationship between Industrial SMEs and Internationalisation is categorised as “*Strategy*”. This is because companies decide whether they want to expand their products, markets, resources and territories etc. to the international level. Under the scope of B2B environment, Winer and Ray (1994), Hollensen (2001) and Wang and Archer (2004) suggest that an industrial SME requires different degrees of interaction within their business network, which includes cooperation, coordination or collaboration. As different type of interaction would have the consequences of not

only affecting a firm's network position, but their degree of internationalisation from a network perspective (Ganesan 1994; Karagozoglu and Lindell 1998; Korhonen 1999; Ford 2002a; Håkansson and Ford 2002). Thus, this indicates that the decision on a manufacturing SME's internationalisation is not only based on their decision-making, but the possibility of strategic decisions where it is involved with other industrial network actors, activities or resources.

The link between Industrial SMEs and the Internet is categorised as "*Competence*". Competence is defined as a firm's ability to adopt and make use of the Internet. In reality, different types of manufacturing companies, despite their nature of business or size, their primary concern is whether they can quickly adopt and absorb a new technology for their use, such as the Internet, to be one of their advantages. From another perspective, "*Competence*" can also be defined as the Internet's compatibility towards a manufacturing SME's business operations since they use the Internet for their technological advances.

The third component is "*Technology*", linking the themes of the Internet and Internationalisation. The Internet is a global information system and capable of supporting different forms of communication, i.e. providing and receiving information, with other advantages such as no time zone restriction and ability to operate in a 24/7 environment. Companies see the Internet's accessibility, possible future IT integration, popularity and coverage are some advantages for them as it can assist the firms towards their international markets (Karayanni and Baltas 2003; Lichtenthal and Eliaz 2003; Day and Bens 2005). Nevertheless, technology availability of other companies such as a manufacturing SME's foreign partners can have a serious impact in terms of communication processes or styles, which is closely related to that manufacturing SME's decision over their operational strategy and competence.

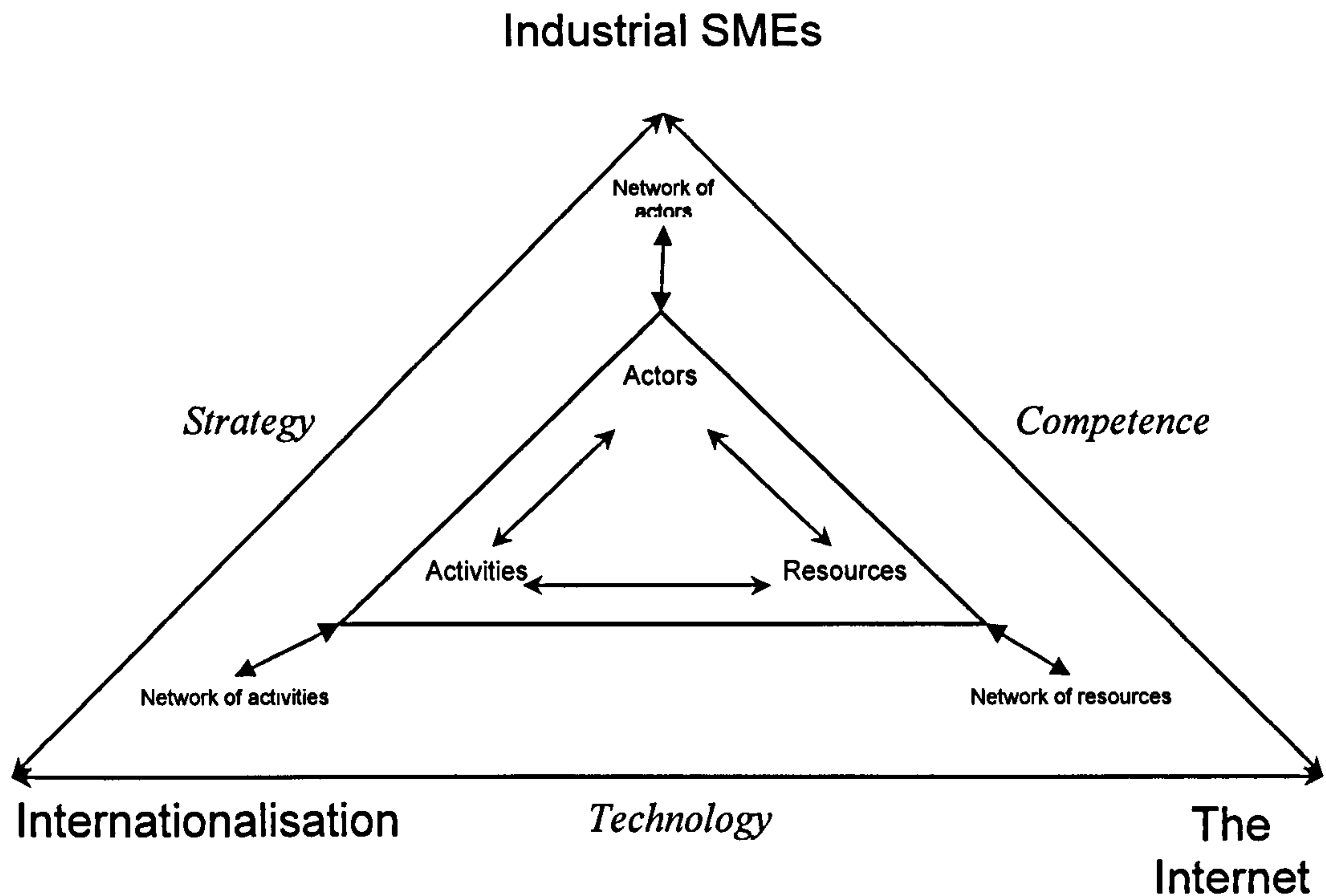
3.3 Framework Development: Stage Two

To uncover and understand what are the key factors that are likely to influence the use of the Internet for manufacturing SME's internationalisation process and approach, it is necessary to understand the relationships of an industrial network. It is evident from

Johnston and Wright's (2004) research that a firm's ability to interact within a network is partially dependent on a firm's external environment, which includes the network infrastructure or external pressures and influences. Then it would lead to other issues such as a firm's internal environment, perceptions and attitudes which contribute to a firm's capability. It was further suggested by Bell *et al.* (2004) that the most significant factors in explaining different attitudes of different firms towards their development (includes: internationalisation, Internet or other business decisions) could be determined by the industrial sector and product characteristics. Thus, the researcher adopts the 'Basic structure of industrial networks model' into the research theme (See Figure 2.1) created by Håkansson and Johanson (1992), as the conceptual framework is built on the ground from the network perspective. It is important to know how companies are affected by the relationships of other actors, activities and resources within the network before further investigation into a firm's capability.

The three key variables within the industrial network are: actors, activities and resources. Furthermore, these three elements cannot be separated. For example, firms ("Actors") need "Resources" in order to have "Activities" (no matter what combination between actors, resources and activities; they are automatically linked with each other with no argument). In addition, each element also has its own network extension; actors are linked with other actors, resources are linked with other resources and so on. Furthermore, these networks of actors, activities and resources have huge influence in terms of a company's strategies, technologies and ability to cooperate with technology (competence), etc. These considerations have a direct impact on how companies interact, react, re-react and their entrance into international markets (Håkansson, 1982; Turnbull and Valla, 1986; Ford, 2002a). Moreover, a manufacturing SME's interactions within a network would have a direct impact and lead to their flexibility to adopt different market environments as illustrated in Figure 3.2 (Volberda, 1998; McGovern, 2006; Raymond and Croteau, 2006).

Figure 3.2 Integration of Basic Structure of Key Themes and Industrial Networks



3.4 Framework Development: Stage Three

From the literature, both stage models and network-view perspectives indicate the need to understand a firm's capability within their network. Additionally, the discussions of a firm's capabilities have extended to both internal and external dimensions. Conversely, the commitment of internationalisation progress or Internet development required investigation from the needs of industrial network. Thus, it is a logical approach to position capability as the core element of a successful network (Johnston and Wright, 2004).

Apart from the four different capabilities suggested by the Leonard-Barton (1992), it is suggested by Ahokangas (1998) and Ruzzier *et al.* (2006) that it is necessary to understand a firm's capabilities from both internal and external dimensions. It can be argued that the different dimensions of a manufacturing SME's capability contribute to a network's stability. As different aspects of capability would also affect a manufacturing SME's business, such as commitment, operational selection choices, IT development and the confidence of working within their network (Sherer, 2003), this may lead to different levels of network interaction. Thus, a manufacturing SME's

capabilities can be positioned in the centre of the industrial network as it is them who provide and receive different activities and resources in order to gain their network position (See Figure 3.3).

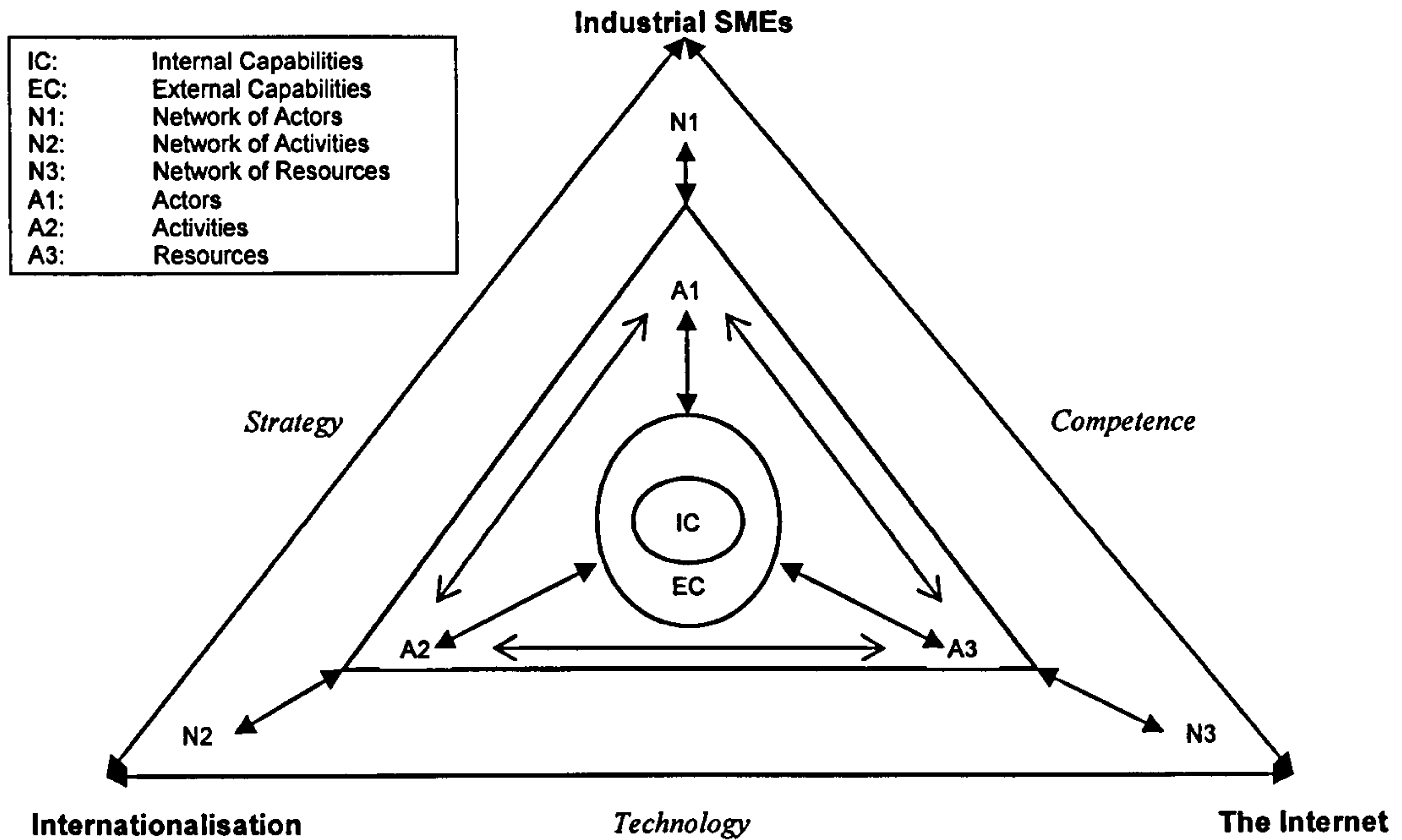
Internal capabilities are viewed as a set of differentiated skills, complementary assets and routines that provide the basis for a firm's competitive capacities (Teece *et al.*, 1990; Leonard-Barton 1992). A simpler term to describe internal capabilities is, 'what is the company capable of doing'? Furthermore, Leonard-Barton (1992) suggested that there is a need to consider this from four dimensions: skills/knowledge, technological/technical systems, managerial systems and value. Furthermore, Håkansson and Johanson (1992) noted that in an industrial network, actors (companies) have some certain degree of influence over associated activities and resources. This influence often depends on the company's capabilities, more specifically, what is the company capable of doing?

In terms of external capabilities, firms are never completely self-contained. Therefore, in order to have effective co-operation within the network, it often requires some knowledge of "neighbouring" capabilities (Richardson 1972). This is a learning curve for manufacturing SMEs to expand their knowledge and co-operative relations. Nevertheless, individual manufacturing SMEs may have extensive knowledge of their production, but it is essential for them to understand their network capabilities and to co-operate with others to gain competitive advantage. Thus, the researcher describes external capability as "what can a company offer to others?" In addition to external capabilities, firms are also responsible for any changes in their internal capabilities which may have other consequences to other network actors. Nonetheless, these effects will raise another question of "whether other companies have the capabilities to co-operate with the changes". As the findings of literature noted, industrial networks are chains of network which may cause chain-reaction, not only actors but activities and resources as well (Sherer 2003; Johnston and Wright 2004).

Both internal and external capabilities will have certain degrees of direct and indirect connection to and influence over their network. Hence, the researcher assumes that internal capabilities will be the first consideration and positioning in the centre (inner circle) as the fundamental element of a manufacturing SME, whereas external

capabilities having the same kind of effect but closer to the network level. Since the effects of external capabilities are closely related to the industrial network (actors, activities and resources), it would be appropriate to pin two circles to the centre of the network where internal and external capabilities require constant interactions and influences.

Figure 3.3 The Conceptual Framework



3.5 Conclusion

The key foci of this conceptual framework illustrated are the relationships on the manufacturing SMEs' capabilities and their industrial network interactions. This conceptual framework provides a foundation for the research design and reflects the proposed objectives (see Chapter 1.5).

The conceptual framework also provides a basis for deciding the research questions. For instance, the investigation of those relationships illustrated in Figure 3.3 determined the nature of the investigation as questions begin with what, why, when and how. This suggests the need to employ qualitative research methods in order to obtain rich information and detailed explanation.

In the next chapter, the researcher will highlight relevant research philosophy, methodology and detailed research design based on the conceptual framework, together with the relevant data analysis approaches.

CHAPTER FOUR: RESEARCH PHILOSOPHY AND METHODOLOGY

4.1 Introduction

The purpose of this chapter is to present and justify the research philosophy and methodology adopted for this research. The philosophical assumptions will be discussed in the first part of this chapter as it reflects on the researcher's view of the reality. This chapter then discusses an overview of the research approach, which also includes the justification of research design and unit of analysis. This chapter also details the data collection methods, including the research design and data collection procedure. At the end of this chapter, the research is related to some tests of research outcome quality that are associated with a qualitative study; they are confirmability, credibility, transferability and dependability.

4.2 Philosophical Assumptions

The views of ontological and epistemological commitments can relate to the assumptions of the reality and relevant claims of valid knowledge (Easton, 1998). It is known that different views of ontological and epistemological assumptions would affect the choices over the methodological approach, as well as the research strategy implemented.

4.2.1 Ontology

The view of ontological assumption can be simply interpreted as a person's view of the nature of reality (Collis and Hussey 2003). According to Bryman (2001), when considering questions related to social ontology researchers should also reflect on the nature of social entities. The researcher believes that when investigating a social phenomenon the meanings attached should consider the external facts that are outside the reach or influence. However, the researcher also believes that social phenomena and their meanings should not be regarded as definitive; this is because the researcher

considers that a social phenomenon is in a continuous state of construction and reconstruction. That is, the researcher not only needs to focus on the exploration of the research objects (manufacturing SMEs), but to review external factors (industrial networks or industrial environment etc.) that would have effect on the companies' decision making.

4.2.2 Epistemology

Referring to Collis and Hussey (2003), the epistemological assumption involves the examination of the relationship between the researcher and the object that is being researched. In short, epistemology is concerned with what the researcher perceives as a valid knowledge (*ibid.*). The epistemological assumption can be separated into either positivistic or interpretivist paradigms (Collis and Hussey 2003). According to Creswell (1994), the former approach was based on the view of reality as objective and singular. In addition, positivists view that a researcher can and should be independent from the entities (*ibid.*). Whereas, interpretivists suggest that the world we know is not entirely based on our existing knowledge. In other words, there is a need to understand whether a natural (human being) or an object (event) has their own way for different circumstances. This is because different human activities cause different events and chain-reactions. In the following two sections, the researcher investigates further on both positivistic and interpretivism paradigms; and concludes with a clear adopted philosophical assumption.

4.2.3 Positivistic Paradigm

Positivistic paradigm was historically based on the development of natural science, however, it is now mainly associated with sociology where surveys can generate quantifiable data to test theories or hypotheses (Bryman 1988; Collis and Hussey 2003). Positivists believe that reality is independent where a researcher should also be independent and excluded from that being researched (Burns 2000; Creswell 1994). As suggested by Collis and Hussey (2003), positivists perceive both social and natural worlds are being controlled by certain fixed laws in a sequence of cause and effect. As a consequence, research constructed and based on the positivistic paradigm would

impose some limitations on the research outcomes, such as ignored or missed relevant key findings.

4.2.4 Interpretivism Paradigm

Opposite to the positivists' view, interpretivists (also known as phenomenologists) assumed that social reality is within us (*ibid.*). Taylor and Bogdan (1998) addressed that interpretivists view that human behaviour influences how the society works, therefore, it is logical to interpret people's view of things. In other words, interpretivists think it is necessary to capture the process of human interpretation where qualitative research is a better method. Additionally, Saunders *et al.* (2003) highlighted the increasingly trend of adopting the interpretivism paradigm in business and management study. Both Remenyi *et al.* (1998) and Saunders *et al.* (2003) argued that, as an interpretivist, it is necessity to discover "the details of the situation to understand the reality or perhaps a reality working behind them" (Remenyi *et al.* 1998, p.35). It has clearly indicated that Interpretivism research philosophy requires a qualitative approach (Collis and Hussey 2003; Hussey and Hussey 1997), which refers back to 'how' and 'what' research questions. In other words, the view of the interpretivism paradigm assisted the researcher to gain the rich insights into social phenomena of how manufacturing SMEs perceive industrial networks and the contribution of the Internet. Table 4.1 highlights the features of the two main paradigms.

For the purpose of this research, the researcher has taken from a more interpretivism point of view. This is because the researcher believes a natural or an object are controlled and affected by human activities and decisions. That is to say, research taken from the interpretivism paradigm attempts to minimise the distance from someone or something that is being researched, thus, to understand the real reasons behind the phenomenon.

Table 4.1 Features of the Two Paradigms and the Requirements of This Study

Positivistic Paradigm	Interpretivism Paradigm	This Study
Tends to produce quantitative data	Tends to produce qualitative data	Need to understand the issues relate to industrial network relationships and a firm's capabilities. Therefore, qualitative data is needed.
Uses large samples	Uses small samples	Difficult to find a large number of manufacturing SMEs to participate interviews.
Concerned with hypothesis testing	Concerned with generating theories	This study has a conceptual framework that needs to be generalised.
Data is highly specific and precise	Data is rich and subjective	Rich data is needed to understand why and how industrial SMEs interact within their network, etc.
The location is artificial	The location is natural	Cannot predict the locations of participate SMEs.
Generalises from sample to population	Generalises from one setting to another	Look for a trend from the data collected.

Source: Adapted from Collis and Hussey (2003)

4.2.5 Adopted Philosophical Assumption

It is argued by Collis and Hussey (2003), that both positivistic and phenomenological (interpretivism) paradigms are the two extremes of the ontological assumption; and there are no right or wrong paradigms. Since the purpose of this study is to explore, understand and identify the contribution of the Internet to the internationalisation process for manufacturing SMEs, the researcher has chosen the view closer to the interpretivism paradigm as he believes that there is a need to explore each relationship illustrated in the conceptual framework in detail (Morgan and Smircich 1980). From a sociological consideration, the interpretivism paradigm not only considers the social action but also its causal explanation. That is, interpretative procedures compared with other social research methods offer a colourful richness and in-depth description (Bulmer 1990; Creswell 1994; Hussey and Hussey 1997; Morgan and Smircich 1980; Saunders *et al.* 2003).

“... qualitative approach stresses the subjective aspects of human activity by focusing on the meaning, rather than the measurement, of social phenomena.”

(Hussey and Hussey 1997, p.53)

Supported by Van Maanen (1983) and Easton (1998), the interpretivism paradigm would assist the researcher in discovering any relevant event or set of events within the study of business relationships and business networks. The researcher believes that the relationships within industrial networks cannot be fully measured where human-based decisions, such as management decisions and culture, inter-organisational culture, attitude towards other businesses or even the organisational value, would provide the support for this study by offering rich contexts. In addition, when investigating the topic of a firm's internationalisation process in relation to the Internet, it is impossible to conduct quantitative research methods as this project intends to discover the questions related to when, how, what and why.

4.3 Research Approach

The choice of appropriate research approach not only reflects the nature of the study but the research objectives. For the purpose of this research, the researcher not only tried to discover the questions related to why and how, but to seek to build a framework that can contribute to existing knowledge. The different research approaches are explained in next two sections.

4.3.1 Deductive Approach

There are two types of approach in general: deductive and inductive (Saunders *et al.* 2003). A deductive approach can be described as scientific research and usually depends on quantitative data; whereas, an inductive approach mainly uses qualitative data (Collis and Hussey 2003; Creswell 1994). However, a deductive approach is driven by the development of conceptual or theoretical structures and then tested in an empirical manner (Collis and Hussey 2003). In other words, the deductive method is to take a general theoretical framework then test it in particular setting (*ibid.*).

4.3.2 Inductive Approach

An inductive approach is the converse process of a deductive approach, whereby the inductive approach is to build theories from the observation of empirical reality (*ibid.*). According to Easterby-Smith *et al.* (2002), using an inductive approach can help researchers who are particularly interested in understanding why something is happening. Thus, the inductive approach is to apply the evidence gathered and understand how the evidence is interpreted from the research questions. Therefore, unlike a deductive approach, an inductive approach can build theory.

In the mainstream literature (such as the Industrial Marketing and Purchasing (IMP) Group) on the internationalisation process, relationship, network and capabilities, most studies employ an inductive approach with qualitative research methods. For example, IMP scholars believe the only way to understand the complexity of a firm's capabilities with how they interact in a network relationship is by involving and experiencing with the firm (e.g. Ford *et al.* 1986; Håkansson 1982, 1987; Håkansson and Ford 2000; Johanson and Mattsson 1986, 1988 etc.). In other words, an inductive approach can have a more flexible research structure in terms of data collection and understanding of the meanings humans attach to events. Qualitative research methods can close the gap between researchers and the research context, therefore, to reduce concerns related to generalisations (Easterby-Smith *et al.* 2002).

4.4 Methodological Assumptions

Different research approaches would have different selection criteria for the research methodology. According to Collis and Hussey (2003) and Hussey and Hussey (1997), different methodologies have their association to particular paradigms; either positivistic or interpretivism. It is also noted by Collis and Hussey (2003) that the chosen methodology can be reflected in the chosen research paradigm.

The case study methodology was chosen based on the researcher's arguments of the philosophical assumption and research design. Defined by Hussey and Hussey (1997), a case study is "an extensive examination of a single instance of a phenomenon of interest and is an example of a phenomenological methodology" (p.65). The research

topics related to this thesis are to investigate a contemporary phenomenon of a real-life context (networks, internationalisation process and SMEs' attitude towards the Internet), in which the emphasis is on an empirical enquiry (Yin 2003). In addition, case study methodology is arguably the most appropriate research strategy in terms of answering questions such as "what", "how" and "why".

Noted by Yin (2003), exploratory study research questions like "what" can be the type of question which is justifiable and rational; in addition, explanatory questions like "how" and "why" can be perfectly answered by case studies. He also suggested the use of case study(s) to show descriptive and exploratory functions. Furthermore, they can also demonstrate complex business and management activities. The research approach will reflect not only the research questions; perhaps also reflect recent changes in social sciences.

"The essence of a case study, the central tendency among all types of case study, is that it tries to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result." (Schramm 1971, emphasis added, cited Yin 2003, p.12)

A number of researchers such as Hamilton (1980) and Simons (1996) considered case study methodology as a paradigm rather than a method. This is because a case study normally has different assumptions regarding the social world and should understand every aspect and approach of the case or event. Schofield (1990) proposed that a series of methodological issues needed to be addressed about the purpose and nature of case study. These issues are generalisation, causal or narrative analysis, the nature of theory, authenticity and authority. Yin (1994, 2003) argued on the issue of generalisation, where case study methods can be logical, theoretical and analytical in terms of generating findings for cases. For instance, how did characters (both interviewees and interviewers) contribute to the cases? Nonetheless, it depends upon the perspective of the researchers and interviewees, thus, it created an issue of whether the findings of the cases can be applied to other similar cases.

Due to the different purposes of different research, there are concerns where researchers design the study differently. The most common problem was deciding

how many case(s) and the size of the case(s) to adopt in the research (Schofield 1990; Easton 1992b; Yin 1994, 2003; Hammersley and Gomm 2002; Saunders *et al.* 2003). The decision will affect the analysis. For example, if fewer cases were studied (one or two) the greater the depth. On the other hand, if a large number of cases were conducted, the less the depth.

Different case studies have different theoretical perspectives. Mainly, there are two different aspects of theoretical perspective in connection with a case study. One of them recommends that a theory has to be bounded and integrated with the case, in order to make sense (Yin 2003). Another aspect is arguing the task of theory and to explain what is going on within a case. Nevertheless, a case(s) study cannot be accomplished without either forms of theoretical perspective.

One of the advantages of the case study method is its ability to capture the character of a person and event. Due to a case study's unique design, researchers are not particularly concerned with the generalisation issue (Mitchell 1983; Yin 2003). Thus, the case finding may be authentic. Another argument is where case studies can produce in-depth analysis and then it can be represented as an authority in its own field (*ibid.*).

However, Bryman (1988), Easton (1992b), Hussey and Hussey (1997), Saunders *et al.* (2003) and Yin (2003) suggested that case study research has various benefits, especially applying to the proposed research questions. For example, case study research can not only explore certain phenomena, but understand them within a particular context. Case study research does not commence with a set of questions and often uses multiple methods (both qualitative and quantitative) for collecting data.

In order to fulfil the understanding of the research methodology, the researcher has figured the 'exploratory' nature of case studies as the strategy for this research project. Yin (2003) suggested that as an exploratory case study, the type of research questions would have to be justifiable and rational. Whereas, Hussey and Hussey (1997) emphasised that case studies are the method to use in areas where there are few theories or knowledge and can often be described as an exploratory research.

Furthermore, Yin (2003) added the goal of these types of research questions is to “develop pertinent hypotheses and propositions for further inquiry” (p.6).

4.4.1 Research Design: Multiple-Case Studies

In comparison with single case studies, multiple-case design has some distinct advantages and disadvantages. Despite the downside that employing multiple-case studies can be very time consuming, as well as requiring extensive resources (Yin 2003), the evidence produced from multiple cases is more persuasive and undeniable as this research design has an overall robust structure (Herriott and Firestone 1983). Additionally, multiple cases can be considered as conducting multiple experiments (Yin 2003).

Hersen and Barlow (1976) suggested that a replication process is crucial within the deployment of multiple-case studies. Since different cases would have different settings and conditions, the researcher proposed to use a standard set of semi-structured interview questions and the selection of interviewees based on their level of involvement, knowledge and experiences within the firms, to ensure that the data collected were valid (see Chapter 4.6.3 and 4.7.3). According to Yin (2003), the ideal number of cases for effective and persuasive results can be as low as six to ten case studies. Additionally, a further three to four cases can be used to verify the consistency of the findings. In other words, a total of ten cases should provide considerable support for the credibility and generalisation of the research project (*ibid.*). For the purpose of this research, the researcher has identified six cases initially (excluding the pilot case). Then, he identified three further cases (see Table 4.4, case 8 – 10) which consists of ten cases in total.

To summarise the methodological assumptions for the research, multiple-case studies offer a powerful opportunity. According to Yin (2003), multiple-case studies can increase the construct validity, as readers may argue that if using only one single case study, there will not be sufficient evidence to support any relevant theories.

4.4.2 Unit of Analysis

The unit of analysis for this research is based on individual case companies. However, to ensure the credibility of this research, the researcher has used two different units of analysis. This allowed the researcher to construct and validate the research findings at two different levels of analysis: intra-case analysis and cross-case analysis.

4.4.2.1 Intra-case Analysis

Within the intra-case analysis, the researcher took views from interviewees at different companies to identify the relationships between the manufacturing SMEs and their other industrial actors. In other words, the researcher attempted to understand how the relationships between the manufacturing SMEs and their industrial business actors formed, interacting with additional information related to their internationalisation process with the linkage to the discussion of other activities and resources. In the second stage of the intra-case analysis, the researcher used a similar approach to the first stage. However, the focuses of the analysis would be based on how manufacturing SMEs perceived their internal and external capabilities. Whereas, in the third stage of intra-case analysis, the researcher sought to examine different views and experiences on the firm's Internet usage, as well as incorporating their views on the overall impact of the Internet in relation to their internationalisation process and industrial network. Thus, with the information needed, the researcher was available to proceed to the cross-case analysis from a broader perspective, industries versus size of the companies versus the network relationships.

4.4.2.2 Cross-case Analysis

For the cross-case analysis, the researcher has experimented with different type of categorisations. These include: (1) company turnover; (2) number of employees; (3) geographic locations; and (5) the age of companies. The type of categorisations mentioned above were not considered as practicable and cannot track any pattern of how different manufacturing SMEs behave. As the result, the only helpful option for the categorisation was by using the level of technology, which suggested by Carroll *et al.* (2000).

In the cross-case analysis, the companies were grouped into three categories: high-technology, medium-technology and low-technology. The basis of this categorisation was to bring together companies with similar product types (e.g. precision equipment) and also industrial market sectors. This allowed the researcher to seek any particular patterns that appear from the research findings. In addition, the industrial classification is based upon using its ideas to differentiate different companies.

Table 4.2 Case Companies and the Classification of Sector by Level of Technology

Level of Technology	Company Name	Main Product/Market Sector
High-Tech	Bede	X-ray metrology: semiconductor industry
	TSSE	Metal Organic Chemical Vapour Deposition (MOCVD) reactors: semiconductor industry
	Accent	Process control system: silicon and semiconductor industry
Medium-Tech	Polaron	Switching and sensing solution: various industries
	Mobiletron	Automotive electronics: automobile industry
	Coborn	Precision machine: diamond and laser cutting industry
	Crystran	Infrared and ultraviolet optics: optical industry
Low-Tech	Verplas	Ventilation system: domestic ventilation industry
	Agar	Microscopy supplies: microscopy industry
	Purimachos	Fire cement: building industry

The researcher adopted the classification of sectors by level of technology which was originally defined by the OECD (1999) with further refinement by Carroll *et al.* (2000). The term 'high-tech' refers to classified industries that involve frequent R&D for their product, a high rate of technological innovation and produce technologically advanced products (e.g. companies in semiconductor industry). 'Low-tech' refers to classified industries that involve limited or no R&D for their product, slow rate of innovation and produce technologically limited products (e.g. building materials) (Carroll *et al.* 2000). For industries that only achieved aspects of high-tech categorisation, the researcher defined the term of 'medium-tech' industry. Table 4.2 above shows the system of classification used to study the ten study companies.

4.5 Data Collection Methods

Qualitative data is known for collecting “meaning” (Collis and Hussey 2003) as it relies on interpretative techniques, such as describing, decoding and translating the messages collected.

Yin (1994, 2003) suggests that case study evidence may be sought from several different sources: documents, archival records, interviews, direct observation, participant-observation and physical artefacts. Documents and archival records are claimed as secondary data, whereas other evidence is expected to be produced by primary data. With the qualitative research process in mind, the researcher proposed to build up the cases on the basis of interview findings together with secondary data and personal observations (Easton 1992b; Yin 1994, 2003).

4.5.1 Secondary Research

Secondary research data is existing information which is available and accessible to the public. Apart from the literature review and relevant information searches done previously, other forms of secondary data also need to be collected. (Collis and Hussey 2003; Saunders *et al.* 2003). There are different forms of secondary data that may be found such as books, newspapers, magazines, journals, company annual reports, archives, published (government) statistics, electronic databases and the Internet etc. The secondary data assisted the researcher to familiarise with the case company environment to enable design of the case study investigation. Another advantage of secondary sources for the researcher was that secondary information has saved the researcher’s time and financial resource in terms of finding the right case. The use of secondary data also filtered unnecessary contact with unsuitable firms and produced accurate companies’ information before the primary data collection.

4.5.2 Primary Research

Primary research data requires a totally different data collecting methods compared to secondary research data; the choices are between interviews, direct observations, participant observations and physical artefacts (see Figure 4.1).

Interviewing is one of the most important and essential sources of case study information (*ibid.*). The data generated from interviews can be surprising and promising due to interviewees' expertise in their field. There are some different types of interview process, such as structured interview, semi-structured interview and unstructured interview.

Figure 4.1 Sources of Evidence: Strengths and Weaknesses

Source of Evidence	Strengths	Weaknesses
Interviews	<ul style="list-style-type: none"> ◆ Targeted – focuses directly on case study topic ◆ Insightful – provides perceived causal inferences 	<ul style="list-style-type: none"> ◆ Bias due to poorly constructed questions ◆ Response bias ◆ Inaccuracies due to poor recall ◆ Reflexivity – interviewee gives what interviewer wants to hear
Direct Observations	<ul style="list-style-type: none"> ◆ Reality – covers events in real time ◆ Contextual – covers context of event 	<ul style="list-style-type: none"> ◆ Time-consuming ◆ Selectivity – unless broad coverage ◆ Reflexivity – event may proceed differently because it is being observed ◆ Cost – hours needed by human observers
Participant Observation	<ul style="list-style-type: none"> ◆ [same as above for direct observations] ◆ Insightful into interpersonal behavior and motives 	<ul style="list-style-type: none"> ◆ [same as above for direct observations] ◆ Bias due to investigator's manipulation of events
Physical Artifacts	<ul style="list-style-type: none"> ◆ Insightful into cultural features ◆ Insightful into technical operations 	<ul style="list-style-type: none"> ◆ Selectivity ◆ Availability

Source: Adapted from Yin (2003)

For the present research, the unstructured interview was not considered due to the range of different subjects and topics involved with this research, whereas the structured interview may restrict the view of interviewees and thus, lack of data richness (Hussey and Hussey 1997; Yin, 2003). Because of this, interviews were semi-structured and by using open-ended nature interviews could explore answers in more depth (Collis and Hussey 2003).

4.6 The Pilot Case Study

An initial study was carried out before the full programme of case studies. According to Yin (2003), a pilot case study assists researchers refine their future data collection plans, such as the interview questions. It is important to note that a pilot case study is treated in a formative manner. The aim of the pilot case study is focused mainly on the pre-testing validity of the research questions proposed. In addition, the pilot case is used to assist the researcher to clarify further substantive and methodological issues, such as the suitability of interview questions, etc (*ibid.*).

4.6.1 Pilot Case Study: Research Indicators

Before the data collection for the pilot case study, the researcher developed a set of research indicators (see Figure 4.2). These were derived from the conceptual framework (Figure 3.3) by giving a detailed definition and indication of whether the interviewees have provided enough data, thus it assisted the researcher to set up a boundary for the answer when a question was being answered (Appendix 1). Wengraf (2001) also noted that an 'empirical indicator' is a signifier of dimensions, an observation, a datum, which means there is 'evidence' for a particular theoretical concept. In addition, the Rose (1982) Model of the Research Process requires the design of indicators for concepts which will have influences on choices of sampling techniques of data collection. Thus, before working on the interview guide and interview questions, a set of research indicators have to be completed.

Wengraf (2001) notes that in a social science theory that theory-language is made up of a body of concepts (qualitative research) which are difficult to measure. Thus, it is

important for the researcher to follow a set of research indicators and to determine whether the data collected were satisfied. For example in the Figure 4.2, a concept was derived from a key theme appeared from the conceptual framework. Under each concept, property(s) were defined as the key elements contributed to that concept. However, in order to determine whether an interviewee has answered the question relates to the property(s), indicators were set. A set of research indicators not only assisted the researcher to decide whether the information is sufficient but to signify in what ways that the case companies achieved the concept and the property listed.

Figure 4.2 A Sample of Research Indicators

<p>Keys: 1: Concept - : Property ◆: Dimension (Indicator)</p> <p>Internal Capabilities:</p> <ol style="list-style-type: none"> 1. Skill and knowledge capability <ul style="list-style-type: none"> - Contribution of employees' skills and knowledge to internal structure of the company. <ul style="list-style-type: none"> ◆ Indicator: close engagement/relationship in firm's internal activities. - Integration of skill and knowledge with other elements of internal capabilities. <ul style="list-style-type: none"> ◆ Indicator: outcome of new product development, market development or technology development. 2. Technical system and technological capability <ul style="list-style-type: none"> - Technical/technological competence and integration between each departments. <ul style="list-style-type: none"> ◆ Indicator: technological development planning and forecasting. - Company's technological compatibility within. <ul style="list-style-type: none"> ◆ Indicator: adaptation and application of technical/technological programme within the company. 3. Managerial capability <ul style="list-style-type: none"> - Manager's ability in co-ordination with internal personnel/department. <ul style="list-style-type: none"> ◆ Indicator: relationship problem solving and planning. ◆ Indicator: managers' responsibility of internal programme development. 4. Values capability <ul style="list-style-type: none"> - Company's goals and beliefs. <ul style="list-style-type: none"> ◆ Indicator: understanding of staff's beliefs and attitudes. ◆ Indicator: understanding of company's goals/mission statement.
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4.6.2 Pilot Case Study: Interview Guideline and Protocol

One of the benefits of conducting a pilot case study is to offer the researcher a chance of re-conceptualising the key aims and in preparation for future fieldwork and analysis. Therefore, the pilot case study is to establish the researcher's understanding of the industrial environment and exploring relevant research questions for future cases. In other words, the early stages of pilot study is exploratory in nature and

primarily concerned with the conceptualisation of the theory question (note: a theory question is NOT an interview question) (Oppenheim 1992; Yin 2003). Because the goal of the pilot case study was to refine and test the conceptual framework, the interview was conducted on a general level. Some initial interview topics included:

- (1) Company background
- (2) Level and experience in international markets
- (3) Industrial network
- (4) Company's external and internal capabilities
- (5) Company's ability in using the Internet
- (6) The impact of the Internet toward to the company's internationalisation process
- (7) Additional information

The purpose of section (1) was to gain an overview of the company's history and nature of business. This information was helpful in terms of identifying the company's activities and to confirm whether the chosen company has met the requirement of research criteria. In developing the conceptual framework, one of the key issues was to find out in detail about the company's involvement in international markets. Therefore, the section (2) aimed to explore the company's activities in international markets and attempted to understand the company's experiences in international markets.

Section (3) investigated how a company positions itself within its business network. This led the researcher to explore whether actors, activities and resources in the business network have any influence over the company's internationalisation process. Furthermore, this section was designed to investigate and identify what these relationships are. Section (4) was about discovering the company's internal and external capabilities by clarifying the manufacturing SME's understanding of their own capabilities, both internally and externally. This section also tested capability theory and the conceptual framework on the implication to the industrial SMEs. Thus, the result was used to refine and reshape the conceptual framework. Most importantly, this section assisted the researcher to identify whether there are links between industrial network, external capabilities and internal capabilities.

Table 4.3 A Summary of the Interview Framework

Section	Theme	Purpose
1	Company Background	A filtering process to confirm and to update information on whether the case company is qualified for the research.
2	Level and experience in international markets	To understand a firm's existing and current internationalisation process; in addition, to overview the scale of their international business.
3	Industrial network	To identify different components within a firm's business network. Furthermore, to overview the nature of relationships formed with different actors, as well as how relationships developed.
4	Company's internal and external capabilities	To explore a firm's internal and external capabilities and the link between these two dimensions of capability.
5	Company's ability of using the Internet	To explore the firm's current Internet activities and development. Moreover, to understand what sort of electronic-based communication contributed to their network.
6	The impact of the Internet towards to the company's internationalisation process	This section is supplemented by section five, specifically by identifying the impact of the Internet on a firm's international business.
7	Additional information	This section is to provide an opportunity for the interviewee(s) where they can add additional information regarding this research. As well as some further comments for the future interview and interview questions.

A key theme of the conceptual framework was the Internet. Therefore, section five above was to discover how a firm uses the Internet and how often it uses it. In particular, what was the impact that the Internet brought to the company, both advantages and disadvantages. Section (6) extended the previous section, by focusing on the impact of the Internet in relation to the firm's international market. This section tried to look at the usefulness and effectiveness of the Internet, also to investigate any link between the Internet and business network relationships. Finally, section (7) was to provide an opportunity for the interviewees to express their point of view on the interview questions and the subjects. Therefore, further suggestions and comments can be used to refine interview questions. Table 4.3 above is a brief summary of the interview framework.

4.6.3 Pilot Case Study: Data Collection Procedures

The pilot case was initially chosen based on the conditions set by the working definition of a SME; these criteria included the number of employees and the company's annual turnover (see Chapter 2.2.1). In addition, the researcher purposely chose a company that had experience in international business activities. This is because a firm who had experience in international business activities in the pilot case allowed the researcher to test and verify the research questions that relate to the internationalisation process. An additional condition for the pilot case was that the company had to be in B2B based manufacturing industry and to operate in the UK.

In terms of selection of the interviewees, the researcher was promised access to interviews with the Managing Director and Sales Manager, because given the size of the company, the two interviewees arguably had the most sufficient knowledge of the firm. In addition, during the two visits to the pilot case company, the interviewed Managing Director also volunteered to act as the firm's Technical Director since he believed that he had a better knowledge of their product technology with better industrial contacts. Thus, it may be said that the information collected from the pilot case study was a compilation of three different set of views. As a result, the data collected was relevant, rich and dynamic.

Before each of the two formal interviews, a protocol was provided along with the interview questions. In addition, a note pad with writing instrument was provided for the interviewee as part of the interview questions required mapping and drawing an explanation on networking issues, such as relationship interactions and overview of the firm's industrial network map. The researcher also used a note pad during the interview and noted down some key issues and questions that were generated during the interview. Each interview lasted approximately one to one and half hours and was audio taped (with the interviewees' prior consent) for future reference, as well as for future transcription to be used for data analysis. Please see Appendix 2a for the questions used in the pilot interviews.

A copy of a Non-Disclosure Agreement was also offered to the pilot company; however, the company was satisfied with the level of information requested during

this research and agreed that the information could be published for the purpose of this study.

4.7 The Representative Case Studies

Following the pilot case study in January 2005, a series of nine case studies were then conducted until May 2006 (see Table 4.4 for detailed interview dates). Prior to the completion of the desired number of cases, the researcher had approached more than 40 companies from a variety of different manufacturing SMEs across the UK. Although only nine companies responded and agreed to be interviewed, these still represented a good variety of different manufacturing SMEs ranging from low-technology to high-technology industries. More importantly, these nine cases were located in different regions of the UK. This also reflects the difficulties of generating a large sample size that has been mentioned in Chapter 4.2.4.

Yin (2003) suggests the ideal number of cases for effective and persuasive results would be between the total nine to twelve cases (see Chapter 4.4.1). That is, to have six to ten cases with the additional three to four cases selected to check the consistency of the findings. Consequently, the researcher decided to use all ten cases, as that would provide considerable support for the credibility and generalisation of the research project (*ibid.*). Nine cases in total were chosen along with the previously conducted pilot case study, which makes up to a total of ten cases for a multiple-case study.

4.7.1 The Representative Case Studies: Research Indicators

The research indicators used in the pilot case study (see Chapter 4.6.1 and Appendix 1) were effective in assisting the researcher identify whether the information collected was sufficient, as well as consistent, for further analysis. Therefore, the same research indicators were used for the subsequent nine cases. This allowed the researcher to include the pilot case study as part of the multiple-case study and it could also improve the research generalisation for the research outcome (Kidder *et al.* 1986; Yin 2003).

4.7.2 The Representative Case Studies: Interview Guideline and Protocol

The same interview guideline was used for both pilot and the subsequent nine cases. This was because the interviewees could understand the research topic better and could collect their thoughts prior to the formal interviews, thus providing constructed comments that often achieved the expectations according to the research indicator. In addition, the researcher was aware that providing the same material throughout the data collection interviews would increase the transferability of the research (Kidder *et al.* 1986; Yin 2003).

4.7.3 The Representative Case Studies: Data Collection Procedures

The selection of cases was again based on the pre-defined criteria of SME (see Chapter 2.2.1) with further justification to fit in to the research criteria of manufacturing B2B companies within the UK. In addition, all cases were categorised within the manufacturing SMEs sector that is also listed within the section D of UK Standard Industrial Classification (UK SIC) 2003.

The sampling procedure for the nine cases followed a two-stage approach. The initial sampling process for the first six cases was based on 'snowball' sampling, also known as 'networking' sampling, which is often associated with social/organisational studies (Collis and Hussey, 2003). This particular technique as a type of non-probabilistic sampling is beneficial for B2B research because industry experts for the given sampling frame have better knowledge in terms of industry trends and market movements etc. (Saunders *et al.* 2003). The interviewees include people with direct experience of the events/issues that have strong links and consequences with the proposed research questions. In addition, referral contacts could be made through the previous interviews, as those interviewees were able to identify companies that would fit into my research criteria for the future cases (Craig and Douglas, 2000).

Another important reason for using this particular sampling technique was that unlike general consumer research, smaller companies may be difficult to approach, since they tend to have passive attitudes toward individual researchers (Ruzzier *et al.*, 2006). Thus, by introducing through another SME, this increased the researcher's chances of

securing interviews, especially interviewees who are in the top managerial positions. This particular sampling technique was also supported by a number of studies on the internationalisation activities of SMEs, such as McDougall *et al.* (1994), Boter and Holmquist (1996), McDougall and Oviatt (1996) and Westhead *et al.* (2001). This indicates that non-random case studies and small sample surveys would be effective for this type of enquiry.

The sampling process for the final three cases was based on a judgemental sampling technique. Judgemental sampling is a non-probabilistic approach. It is very similar to the snowball/networking sampling; however, this sampling technique relied on the researcher's decision prior to the field research and had no intention of seeking further contacts which may have arisen during the research (Craig and Douglas, 2000; Collis and Hussey, 2003). The researcher was aware that these additional cases would provide more data and it could be used in order to serve as the verification for this study.

From analysing the outcome of the pilot exercise, the researcher decided to add a further question to the section of the Internet usage for the future interviews (see Appendix 2b). All subsequent cases were provided with the same interview guideline as the pilot case (see Chapter 4.6.2). Each interview was based on open-ended questions with a note pad provided for questions related to industrial network relationships/maps. The researcher estimated that each interview should last about an hour from the previous research experience with the pilot case study. However, due to length and the speed of speech differing from one interviewee to another, the length of interviews ranged from about forty-five minutes up to one and half hours. A copy of a Non-Disclosure Agreement was also given as a standard research procedure. Fortunately, all nine companies agreed that the information supplied for this research was not sensitive and granted permission for the researcher to use their company names and data for publishing in his PhD thesis.

All interviews were tape recorded (with the interviewees' prior consent) and transcribed into text format for subsequent analysis. To ensure the accuracy of the transcripts, the researcher out-sourced professional transcribers, as this would reduce the incident of data error. Nevertheless, to ensure all transcripts were accurate, the

researcher personally repeatedly reviewed the audio tapes and the transcripts. The following Table 4.4 in the next two pages (comprised of part A and B) summarises the organisations participating in this research.

Table 4.4 Profiles of Ten Case Companies (Part A)

Case No.	1 (Pilot Case)	2	3	4	5
Company	Polaron Components	Mobiletron UK	Verplas	Coborn Engineering	Bede
Interviewee(s)	1. Managing Director/Technical Director 2. Sales Manager	1. Manager Director 2. Operations Director/Sales Director	1. Chairman 2. Managing Director	1. Managing Director	1. Regional Manager 2. Quality Engineer 3. Chief Operating Officer 4. Global Sales and Marketing Director
No. of Employees	55	15	70	50	140
Annual Turnover	£4m	£4m	£7.5m	£3.5m	£7m
Company Size	Medium	Small	Medium	Medium	Medium
UK Standard Industrial Classification 2003 (SIC (03))*	31.62 Manufacture Other Electrical Equipment 31.10 Manufacture Electric Motors, Generators etc.	50.30 Sale of Motor Vehicle Parts etc. 36.63 Other Manufacturing	93.05 Other Service Activities	29.40 Manufacture of Machine Tools	36.63 Other Manufacturing
Location	Hertfordshire, UK.	Lancashire, UK.	Dorset, UK.	Essex, UK.	Durham, UK.
Date of Interview(s)	9 th and 21 st January 2005	20 th May 2005	17 th June 2005	22 nd July 2005	9 th August 2005

* Information obtained from the Companies House, UK Government

Table 4.4 Profiles of Ten Case Companies (Part B)

Case No.	6	7	8	9	10
Company	Thomas Swan Scientific Equipments	Agar Scientific	Accent Optical Technologies	Crystran	Purimachos
Interviewee(s)	1. Managing Director	1. Manager Director	1. Director of Materials Physics and Global Customer Support	1. Marketing Manager (also as one of the company founders)	1. Technical Director
No. of Employees	75	23	230-240	19	20
Annual Turnover	£27m	£2.5m	£28m	£1.6m	£1.4m
Company Size	Medium	Small	Medium	Small	Small
UK Standard Industrial Classification 2003 (SIC (03))*	29.56 Manufacture Other Special Purpose Machine 33.30 Manufacture Industrial Process Control Equipment	74.87 Other Business Activities	33.20 Manufacture Instruments for Measuring etc.	36.63 Other Manufacturing	26.40 Manufacture of bricks, etc. in baked clay
Location	Cambridgeshire, UK.	Essex, UK.	North Yorkshire, UK.	Dorset, UK.	Gloucestershire, UK.
Date of Interview(s)	10 th August 2005	10 th August 2005	23 rd August 2005	6 th April 2006	3 rd May 2006

* Information obtained from the Companies House, UK Government

4.8 The Interviews

In total, thirteen interviews were conducted (including two from the pilot case study). After the pilot case study, the researcher noticed that due to the size of the SMEs and their attitudes towards the individual researcher, it was very difficult to obtain the ideal number of interviewees for each firm, i.e. three informants in different roles within the firm. Furthermore, when the company size is particularly small, it is possible for anyone who is at management level to be sufficient to handle all the relevant questions raised for this research. However, to ensure data richness and content quality, the researcher decided to approach company directors, i.e. Managing Director, Operations Director, etc. for the interviews. This was because company directors would normally have accumulated industrial experience and oversee the whole business.

Interview questions for both pilot case study and multiple-case study (see Appendix 2a and 2b) appeared in a similar way. As mentioned earlier, the only difference between the two sets of interview questions was that there was an additional question for the multiple-case study, based upon experience of the pilot case study. Nevertheless, the overall structure of both sets of interview questions were followed by the development of research indicators and interview guidelines (see Chapter 4.6.1 and 4.6.2).

In general, the interview procedures for the nine case companies followed the process of the pilot case study. Prior to the visit of the case companies, the researcher conducted secondary research through the case company's website and the UK Companies House to confirm that each case company was suitable. In addition, the secondary research allowed the researcher to have a glimpse of the company's business activities and the industry they were operating in.

4.9 Data Analysis: Strategy and Techniques Used

Data analysis for case study evidence consists of data examination, categorisation, tabulation or combining evidence to address the objectives of the study. Because

every single case study was different, the researcher did not pre-define priorities for what to analyse and why (Yin 2003). According to Collis and Hussey (2003), there are three main challenges that comply with qualitative data analysis, which is discussed in the next section.

4.9.1 Problems of Qualitative Analysis

Firstly, data reduction. Since there would be a large volume of qualitative data collected, it was important for the researcher to find a systematic approach to summarise the data. In other words, the data has to be reduced to a manageable proportion. As suggested by Miles and Huberman (1994) the data have to be filed, then sorted, key information found, unnecessary or irrelevant data discarded and most importantly, reorganise the data to the extent that they can be used for further analysis. Secondly, data structure. Data is often collected sequentially and may not be suitable groupings for subsequent analysis (Collis and Hussey 2003). However, since this research was conducted and based on a theoretical framework that provided the researcher with a data categorisation structure it can be fitted in (*ibid.*). Nevertheless, even with the theoretical framework in place, the researcher still may have the need to develop a new structure for analysis according to the different needs.

Finally, detextualising the data. The data to be collected is in the form of extended text and it may be necessary to convert the text into table, figure or diagram (*ibid.*). This particular technique is perceived as an effective approach when explaining the complexity of network relationships as well as other findings that can be presented in a constructive manner.

4.9.2 Intra-Case Analysis

Data interpretation is the core of qualitative research, as suggested by Flick (2002). There are two strategies when interpreting textual data. One way is to reveal, to discover or contextualise within the original interpretations. The other approach is by paraphrasing, categorising the original evidence to create a smaller but useful set of data.

For the purpose of this research, the researcher intended to use the former strategy to reveal and contextualise the original interpretations. This is because this particular strategy allowed the researcher to reveal the research data and seek explanations of any approach or decision making. According to Flick (2002), there are several methods that can be used for interpretation of this kind, including theoretical coding, thematic coding, qualitative content analysis and global analysis. The researcher decided to use the thematic coding/analysis, because thematic analysis exposes the causes and effects or the entire processes of a particular episode (Strauss 1987; Flick 2002). Thematic analysis would also assist the researcher to uncover the overall process of each incident (Strauss 1987; Flick 2002). The process of analysis is summarised in Table 4.5 below.

Table 4.5 An Overview of Thematic Analysis Framework

The Process	What is going to be found?	How can it be explained?
↓	Stage 1: Conditions	Why? What has led to the situation? Background? Course?
↓	Stage 2: Interaction among the actors	Who acted? What happened?
↓	Stage 3: Strategies and tactics	Which ways of handling situations, e.g. avoidance, adaptation?
↓	Stage 4: Consequences	What did change? Consequences, results?

Source: adapted from Flick (2002)

There is the possibility of multiple interpretations of any phenomenon, thus, influencing the coding reliability is therefore irrelevant. Therefore, the researcher used a template analysis along with the thematic analysis in order to strengthen the research credibility and validity (King 2004 cited Cassell and Symon 2004).

Template analysis can be used in conjunction with a wide range of epistemological positions (*ibid.*). King (2004 cited Cassell and Symon 2004, p.256) defines template analysis as “a varied but related group of techniques for thematically organizing and analysing textual data”. In other words, template analysis requires the researcher to produce a list of codes/template that correspond to the themes identified from the textual data, hence, the data can be represented systematically (Crabtree and Miller 1992; King 1994, 2004).

Initial Template

According to King (2004 cited Cassell and Symon 2004), an initial version of the template would require few pre-defined codes that can assist and guide the researcher during the initial analysis. In this instance, the researcher used themes that have been created in his conceptual framework as the initial version. The researcher used the final transcript (last interview) for revision and then used the revised template for the previous transcript (in reverse order) and so on. Once the final transcript had been revised with the improved template, the researcher revisited each transcript by using the standard formal/final template for complete data analysis. The major reason that the researcher worked his template and coding in reverse order was because he believed that newly conducted interviews would provide fresher memory on additional issues that can be highlighted along with the coding. An example of the coding for a section in a case company is illustrated in Table 4.6. It is also important to note that the codes were developed case by case as the unit of analysis is based on a single case.

Table 4.6 Example: Coding Structure (extract from Case 3)**Coding: Case 3 Verplas Ltd, Interview set No. 4****Company Background**

1. Company structure
2. Number of employees
3. Annual turnover
4. Product range/Diversification
5. Business approach
6. Company's attitude towards business
7. Investment

Industrial Environment

8. Nature of the industry and business (high/low technology)
9. Domestic market
10. Level of competition
11. Different product expectation and requirement for each market (product standardisation vs. adaptation)

Industrial Network

12. Type of customers
13. Suppliers/Number of suppliers
14. Current business development

Exchange of Resources

15. Company's activities
16. Communication method
17. Communication frequency
18. Number of materials needed for production
19. Procurement

Internationalisation

20. Reasons for international expansion
21. Internationalisation approach
22. Limitation of internationalisation approach
23. Export (product vs. services)
24. Level of export
25. Export destination(s)
26. Reasons for slow overseas market development

In addition, a short analysis and interpretation of each interview was conducted (see Table 4.7 for an example) with a short description of each case company's Internet and its usage (see Table 4.8 for an example). The tables produced through this analysis have assisted the researcher in building the intra-case study. The full structure and analysis process of the intra-case analysis can be found at the beginning of the next chapter. An example of a full length intra-case analysis (Case 5: Bede X-ray Metrology) can be found in Appendix 3.

Table 4.7 Example: Analysis and Interpretation of An Interview (extract from Case 8)

Theme	Topic	Director of Materials Physics and Global Customer Support
Industrial Network	Actors	<ul style="list-style-type: none"> ➤ Use of agents and sale representatives ➤ 100% owned foreign subsidiaries: Accent US, Accent Korea ➤ International and local suppliers ➤ Customers in semiconductor industry, universities ➤ For the UK market, an external sales representative is used
	Activities	<ul style="list-style-type: none"> ➤ Assisting suppliers for further product improvement ➤ Direct technical support to the customers ➤ Involvement with customers for testing and new product development, pre and post-sales ➤ R&D: some R&D activities with industrial actors, e.g. Thomas Swan ➤ Purchasing components and parts from suppliers
	Resources	<ul style="list-style-type: none"> ➤ Materials and parts supplied from suppliers ➤ Information exchange partly through Accent's online database, password protected ➤ Local agents/subsidiaries provide responsive technical support ➤ Provides design for Accent's suppliers to manufacture ➤ Main resources exchange are technical and engineering issues
External Capabilities	Skills and Knowledge	<ul style="list-style-type: none"> ➤ R&D activities with suppliers and customers, which contribute to the new product development ➤ R&D with other industrial actors for further joint-development, e.g. Thomas Swan. This is due to the products provided by Thomas Swan and Accent that would need collaboration, in other words, customers would need to purchase products from both Thomas Swan and Accent to continue the production process ➤ Skills and knowledge gained from the acquisition of Waterloo Scientific company

Table 4.8 Example: Analysis of Case Company's Internet-related Issues (extract from Case 5)

Subject	Regional Manager	Quality Engineer and Chief Operating Officer	Global Sales & Marketing Director
Aims of using the Internet	<ul style="list-style-type: none"> ➤ For more effective communication: important to have an effective communication infrastructure between the firm, employees and industrial actors 	<ul style="list-style-type: none"> ➤ n/a: no clear indication of the aims of using the Internet 	<ul style="list-style-type: none"> ➤ Increase levels of publicity ➤ Provide alternative communication methods for customers ➤ A trend, a standard where others were using the Internet
Functions of the Internet	<ul style="list-style-type: none"> ➤ Display company's information: products, innovations, reports, customer support, technical advice (knowledge base) ➤ E-mail as the main Internet communication method ➤ Basic market research ➤ Maintain communication with investors and other industrial actors ➤ Video conference priority for internal communication 	<ul style="list-style-type: none"> ➤ Time and money saved when using video conference for internal meeting, communicate with subsidiaries in particular ➤ Convenient and instant when sending files such as, video clips, photographs and technical drawings via e-mail ➤ Mainly for communication purpose 	<ul style="list-style-type: none"> ➤ A channel for others to seek the firm's information ➤ Alternative communication channel ➤ Product information on the website: advertising purpose ➤ Keep updated industrial information for investors via e-mail/newsletter ➤ Education for the customers: technology based

4.9.3 The Cross-Case Analysis

Cross-case analysis is a synthesis of at least two cases (Yin 2003). The cross-case analysis is particularly useful in the present study, as it can increase the external validation of this research (Eisenhardt 1989). This particular cross-case synthesis can also incorporate quantitative techniques if the number of cases is sufficient (*ibid.*). Most importantly, cross-case analysis allows the researcher to compare and integrate the findings from the intra-case analysis, for example, a cross-case comparison table that developed from the initial coding for each case. That is, a table with key findings/data categorised in different properties along with an indication of different dimensions accordingly (see Appendix 4).

Moreover, the cross-case comparison table allows the researcher to further simplify the data by grouping them into two dimensions, which include the companies according to their level of technology/industry and the types of similar Internet activities that the companies are involved in (see Appendix 5). Nevertheless, the cross-case comparison table primarily acts as a basic framework for the analysis. An in-depth explanation will be discussed along with the cross-case analysis where the researcher demonstrates how the information in the Appendix 5 was transformed into useful analysis framework. (Chapter Six for more detailed discussion)

4.10 Confirmability

Denzin and Lincoln (2000, 2005) summarised that for qualitative research, a researcher should evaluate its quality of research in terms of confirmability, credibility, transferability and dependability in response to the quantitative view of construct validity, internal validity, external validity and reliability.

Confirmability reviews the extent that the researcher's bias and values have affected the research (Denzin and Lincoln 2000). Some common problems of case study are whether the researcher has developed an appropriate research? It is known that sometimes researchers are subjective about some judgements, as well as having inappropriate research methods (Yin 2003). To ensure this research can address these issues, the researcher has used multiple sources of evidence and established a chain of evidence. This includes secondary research materials, to compare the information provided on the company's website against the interview findings. Another method to avoid the researcher's bias is to repeatedly revisit the research data (both audio tapes and transcripts) and to filter subjective opinions.

4.11 Credibility

The credibility refers here to the authenticity and truthfulness of the research findings (Denzin and Lincoln 2000, 2005). The researcher has used the exploratory interviews to reassure the credibility that allowed for further exploration on different concepts

that can be examined. Additionally, to show that this research is authentic, the researcher attended academic conferences, workshops and doctoral colloquiums that provided opportunities to gain feedback from other experts and researchers from similar fields. This also allowed the researcher to publish a conference paper that was based upon the pilot case study and welcome any comments that strengthened the development of this research (Tseng 2005). Other sources of information, such as industrial news and articles were also used to verify and update the findings. Moreover, the draft of the interview transcript report was reviewed by informants to ensure the quality of the research and increase the truthfulness of this study.

4.12 Transferability

The transferability involved the problem of whether the findings of a case study can also apply to other similar cases (Yin 1994, 2003; Denzin and Lincoln 2000). Criticisms of case studies are often to be found, because the majority of case studies are designed around particular companies, in particular if the research is based on a single case study (Collis and Hussey 2003).

However, the researcher has used the multiple-case study method, in which Yin (1994, 2003) recommends the use of replication logic to solve this problem. In brief, replication logic means identifying the findings from the first case, then attempting to replicate the findings by conducting further case investigation. If the outcomes are similar in terms of literal replication or theoretical replication over a number of cases one can therefore believe that the research project is valid. In other words, the researcher used a total of ten cases and sought any emerging patterns that occurred during the analysis in order to provide stronger support for the theory/conceptual framework (see Chapter Six).

4.13 Dependability

The dependability of this study can be described as whether different researchers could use the findings/outcomes to apply to different SMEs. In order to have similar

outcomes, two key tactics can be considered: the use of case study protocol and the development of a case study database. In terms of the case study protocol, the researcher has introduced the use of interview guidelines and research indicators (see Chapter 4.6 and 4.7) to act as a role in guiding the case study; thus, it is a standardised procedure for the inquiry. In terms of developing a case study database, the interview transcripts were also kept for future research.

4.14 Conclusion

This chapter has provided a detailed discussion of the overall research process, from the understanding of research philosophy, research approaches and the validation of this study. The next chapter presents the data from each case company before the overall discussion on the cross-case analysis. The next chapter also shows how the interview findings were converted into meaningful and useful sets of data that was discussed previously in Chapter 4.9.2.

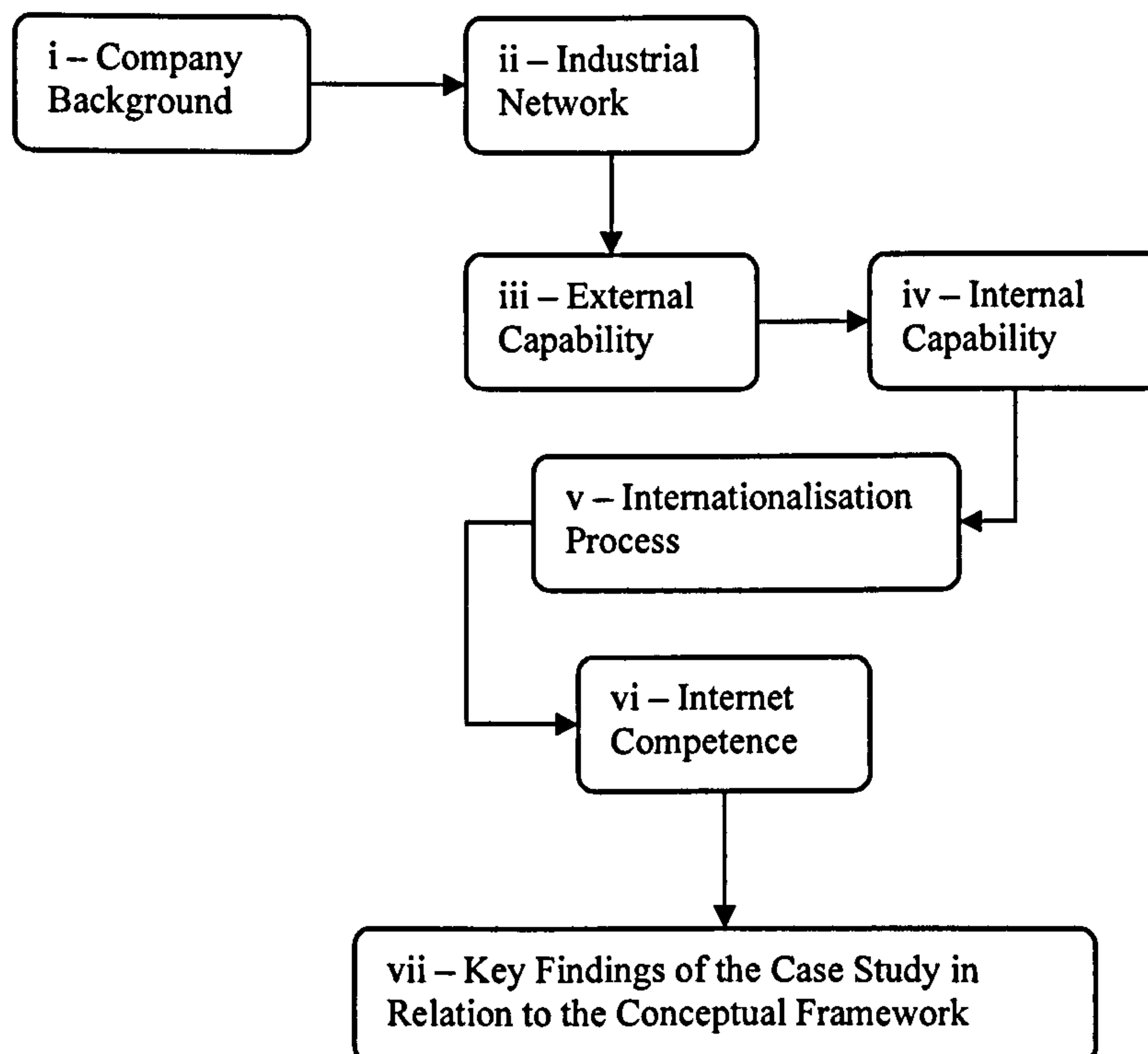
CHAPTER FIVE: INTRA-CASE ANALYSIS

5.1 Introduction

The purpose of this chapter is to present analysed data based on the interviews conducted. A total of ten cases are presented (thirteen interviews overall), each case study being presented in the same format for consistency. The data presented in the chapter have been analysed through a systemic approach, through the use of research indicators, coding and further interpretation (see Chapter 4.9.2).

In order to provide a logical order and to guide the reader in this chapter, a case analysis flowchart (see Figure 5.1) has been produced. This flowchart presents the overall structure of data, which also corresponds with the order of interview questions.

Figure 5.1 Intra-Case Analysis Flowchart



5.2 Pilot Case Study (Case One): Polaron Components Ltd.

5.2.1 Company Background: Polaron

Polaron Components Ltd. (PCL) is one of the leading manufacturers and designers of switches and sensors. The application of their products is widely used in different industries such as aerospace, military, sub-sea, measurement and control, medical and etc. Based in Hertfordshire, U.K. with 30 employees and turnover (figure based from year 2004) of just over £4million, the name of PCL can be traced back to 1929, with continuing acquisitions and reforming with other companies throughout the years. The current company was formed in 2003.

In the following sections, all key findings and data are presented in tables and figures before the conclusion is given. This particular structure is used as a standard format across all cases presented in this chapter.

Table 5.1 Interactions of PCL's Network

Actors	Distributors	Suppliers	Customers	Others
Activities	Distributors are acting as PCL's overseas representatives and the first point of contact. (PCL handles the UK market directly, not via distributors or agents)	Joint-development programmes, discussion forum, technical support.	Mainly to OEM. After-sales direct technical support, online video conference with customers (customised products).	MSIUSA as one of the main business partner. Constant technological issue review and information search. Outsourcing in China in order to reduce manufacturing cost.
Resources	Orders taking and a fixed delivering destination for PCL. Training programmes can be arranged if required.	Exchange of human resources, technical and technological issues, market information, etc. Realisation of resource sharing to reduce cost.	Customer's opinions are needed if modification required. Provide market trend and updates.	Share online forum with MSIUSA and exchange of technology update. Exchange of human resources/expertise if needed from competitors.
International Interaction	Uses of distributors provide a cheaper option for PCL for maintaining their international existence. Sustain relationship with military market.	Some materials needed are from overseas, therefore, constant relationship building and retaining is indispensable.	PCL does not interact with their customers directly in terms of sales (not in the UK). However, post-sales relationship is strong as PCL provides direct technical support.	Several means of communication channels (mainly Internet base) are available to communicate with other competitors, suppliers or customers. This is because PCL may need to consult or exchange technology for much more advanced level.

Figure 5.2 Illustration of PCL's Network

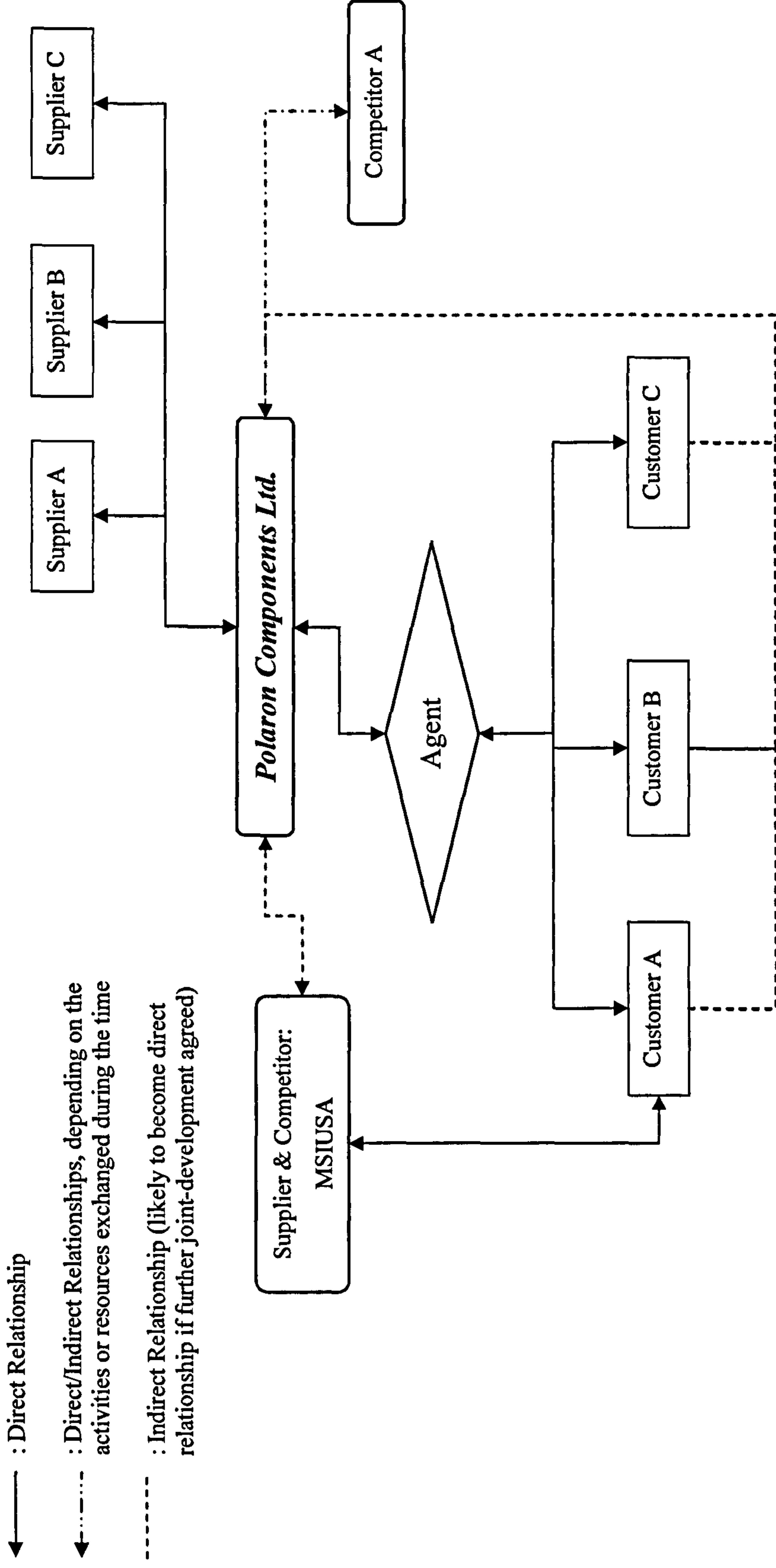


Table 5.2 PCL's Internal and External Capabilities

	External Capabilities with description	Internal Capabilities with description
Skills and Knowledge	Joint programmes which encourage the exchange of skills and knowledge between actors within the network.	Direct influences to the firm's design ability. Integration from external capabilities has left the internal skills and knowledge capability.
Technical Technological	Through the joint programmes that PCL has integrated their product standards with others. Further integration of their communication skills and methods also.	This capability is to be considered as the most important asset of the firm. Additional technology competences such as advanced communication methods have increased their productivity.
Managerial	Quality management system created due to frequent interaction with others industrial actors such as, bring external expertise.	"Flexibility approach" was adapted to avoid conflict in a team-working environment. Recognise the potential integration from other capabilities and formed effective production process flow.
Values	Strong value associated with the firm's activities and resources. Encouragement from the firm has given their employees opportunities to learn new skills and knowledge through joint programmes. In return, employees bring new culture, technology and skills to the firm.	Having beliefs that the firm's success is based on their employees' success. The firm is willing to take individual comment or culture into consideration. In return to create better products from their 'value-added' employees.

Table 5.3 PCL's Internationalisation Process

Intention	Markets	Industry	Involvement with
Increase market share and their market profile. To obtain specific technologies required.	Mainly in Europe, USA and some parts of Asia-Pacific region.	Military, Aerospace, Medical, etc.	Suppliers, and a supplier who also is a competitor (MSIUSA). Joint development with other OEMs. Distributors who also act as sales representatives.

Table 5.4 PCL's Internet Activities

Forms of Internet Activities	Description
Website	The website provides some basic information for the customers, including company history, product and application information, contact information for both PCL and their distributors. The website itself does not include the direct (external) links to their online forum.
Online Forum	Online forum is only provided for their customers or suppliers who are in business relationship with PCL. The forum is not listed/published on their website as this is a confidential database. The main function of the forum is to provide a platform for PCL to interact with its counterparts by exchanging ideas and frequently asked questions.
E-mail	It is part of PCL's policy where every employees need to have Internet access and is capable of using computers. This rule was created based on their need as each individual may encounter the need to be able to reply to queries directed at them, regardless of whether internally or from a third party.
Video Conference	PCL is very advanced in terms of using the online video conference facility. The firm uses video conference not only for regular meetings but as a tool for customers to monitor their orders. In other words, customers can speak to PCL live with video footage to discuss their need and monitor the production progress without visiting the company.
Others	Web broadcasting is another method that PCL uses to communicate with their counterparts. Apart from the online forum, PCL joined an e-mail database in the USA; via this channel, relevant industrial information will be sent to anyone who is a member.

Table 5.5 Forms of Internet and the User Groups

Internet Activities	User Groups
Website	Agents; Potential and existing customers
Online Forum	Suppliers; Existing customers; Other industrial users
E-mail	All
Video Conference	Suppliers; Customers
Web Broadcasting	All

Table 5.6 Key Findings of the Pilot Case Study in relation to the Conceptual Framework

Links	Descriptions
Industrial Network vs. Capabilities	The firm's skills and technological knowledge has triggered a number of interactions between PCL and their counterparts, such as joint-development and research. Since PCL argues that they are very concentrated at technological development, it has left the company to deal directly with fewer companies. As a result, PCL relies on their agents and distributors for most of sales and marketing activities.
Internal Capabilities vs. External Capabilities	Most of the internal and external capabilities are highly relevant to each other. For example, skills and knowledge gained through joint-development; offering customers to view or to discuss their order via video conferencing.
Industrial SMEs vs. Internationalisation	Although PCL is very advanced in terms of using the Internet, they still make <i>strategic decisions</i> such as to use agents and distributors to handle PCL's customers. However, for larger customers (or those considered as important customers), PCL takes a direct approach as they have the capacity to do so.
Internationalisation vs. The Internet	The Internet does not have direct influences on PCL's internationalisation decision, however, the Internet served as <i>communication technologies</i> which assist PCL's international operations.
The Internet vs. Industrial SMEs	PCL is keen to develop further usage for their Internet resources as they are trying to achieve the concept of a paperless business environment. PCL has demonstrated their Internet competence by conducting a number of different Internet activities.

5.2.2 Summary: Polaron

From the pilot case, it is inarguable that the firm's internal and external capabilities are the core element of successfully managing in their industrial network. This has supported the basic concept of the conceptual framework. These capabilities are linked to the firm's industrial networks and relationships via different types of activities or resources; and correspond with the industrial network theory by Johanson and Mattsson (1988).

In terms of the Internet and internationalisation, the findings indicate that the Internet was not the only factor which has influenced the company's internationalisation decision. Although Poon and Swatman (1997) and Palumbo and Herbig (1998) proposed that a company adopt the Internet in order to establish a global presence, the findings suggest that it was because of the firm's understanding of the need to expand their market share and profit; thus, the purpose of the Internet was to act as a tool for communication. However, the company's persistence in using distributors has limited to some degree the use of the Internet. For instance, international sales were handled through distributors where there was no need to increase spending on website functions such as online purchase.

PCL was likely to develop its technology competence for more Internet activities in some other aspects. Since the company was one of the main suppliers of its kind, their customers or suppliers were likely to follow PCL's trend in order to benefit from the firm's experiments, such as a paperless business environment. Therefore, it was not difficult to predict the firm would push its boundaries and ideas on how to use the Internet resources. Nevertheless, current Internet technology has benefited PCL in a lot of different ways, most significantly the reduced time and cost of travelling. From the other aspect PCL can achieve instant technical support by using online video conferencing which would promote PCL's reputation in terms of their quick response concerning customer support. This could have an indirect impact on some customers and suppliers within PCL's network where these customers or suppliers will invest more in their IT equipment; thus catching up on the demand and requirement from PCL.

The pilot case has indicated the increasing importance of the Internet, especially in dealing with day-to-day business communication. However, in this particular case, the level of Internet activities not only depends on the industrial requirement but also the efficiency of using distributors, thus, providing a much closer link with their customers internally. PCL also raises the argument that online meeting has become a trend and there will be less traditional face to face communication. Therefore, further investigation was needed and some minor modifications of the pilot interview questions were required. Nevertheless, the key findings of the pilot case study in relation to the conceptual framework can be summarised in Table 5.6.

5.3 Case Study Two: Mobiletron U.K. Ltd.

5.3.1 Company Background: Mobiletron

Based in Preston, Lancashire; Mobiletron U.K. Ltd. (Mobiletron) is one of the major automotive electronics suppliers in the UK as the company supplies 70% of its components for the market. The company has two product divisions; one is the 'electronics division' mainly dealing with automotive electronics control systems, such as ignition control modules for automotive and smaller engines. The other is the 'power tool division' which is a relatively small division compared to the automotive electronics.

The history of Mobiletron is relatively short, as it was established during 2000 and 2001 by More Group based in Taiwan. In year 2002, Mobiletron was fully functional with 15 employees with an annual turnover of around £4 million. Although the firm is 100% owned by its parent company in Taiwan, Mobiletron remains as an independently strategic business unit for the European and African markets.

Table 5.7 Interactions of Mobiletron's Network

Actors	Agents & Distributors	Suppliers	Customers	Others
Activities	Commission-based agents used for Mobiletron's sales in certain countries; agents also act as first point of contact for Mobiletron's clients overseas. Distributors purchase products from Mobiletron and distribute to 2 nd layer distributors. Some activities such as visiting each other to exchange ideas in product testing, stock control, etc.	Suppliers mainly provide parts for product ranges that are produced by Mobiletron UK. The parent company (More Group) is also the firm's supplier. Also, Regitar (the sister company) provides power tools shipment and parts for Mobiletron.	Distributors are parts of Mobiletron's customer base and they distribute the products to 2 nd layer distributors or garages. The other customers are large retailer-chains such as, B&Q, Argos. Some activities such as visiting each other to exchange ideas in product testing, stock control, etc. Some overseas customers where Mobiletron deals directly.	Joint-research programmes with research institutions and universities.
Resources	Agents – sales and marketing Distributors – sales and distribution. Provide after-sales services.	Mainly technical issues with suppliers. However, exchange of human resources, technological issues and share Internet resources with the parent company.	Sales and marketing, after-sales services such as technical supports and repairs.	Exchange on new product technology for further product development, software development and market research.
International Interaction	Agents as the point of contact, as well as to day-to-day communication with customers on behalf of Mobiletron.	The parent company is Mobiletron's main international supplier. Shipments delivery from the parent company to Mobiletron. Regitar (the sister company for power tools) provides shipments to Mobiletron.	Some direct customers where Mobiletron deals with them directly and provides sales and marketing, after-sales service, technical support and repairs.	n/a

Figure 5.3 Illustration of Mobiletron's Network

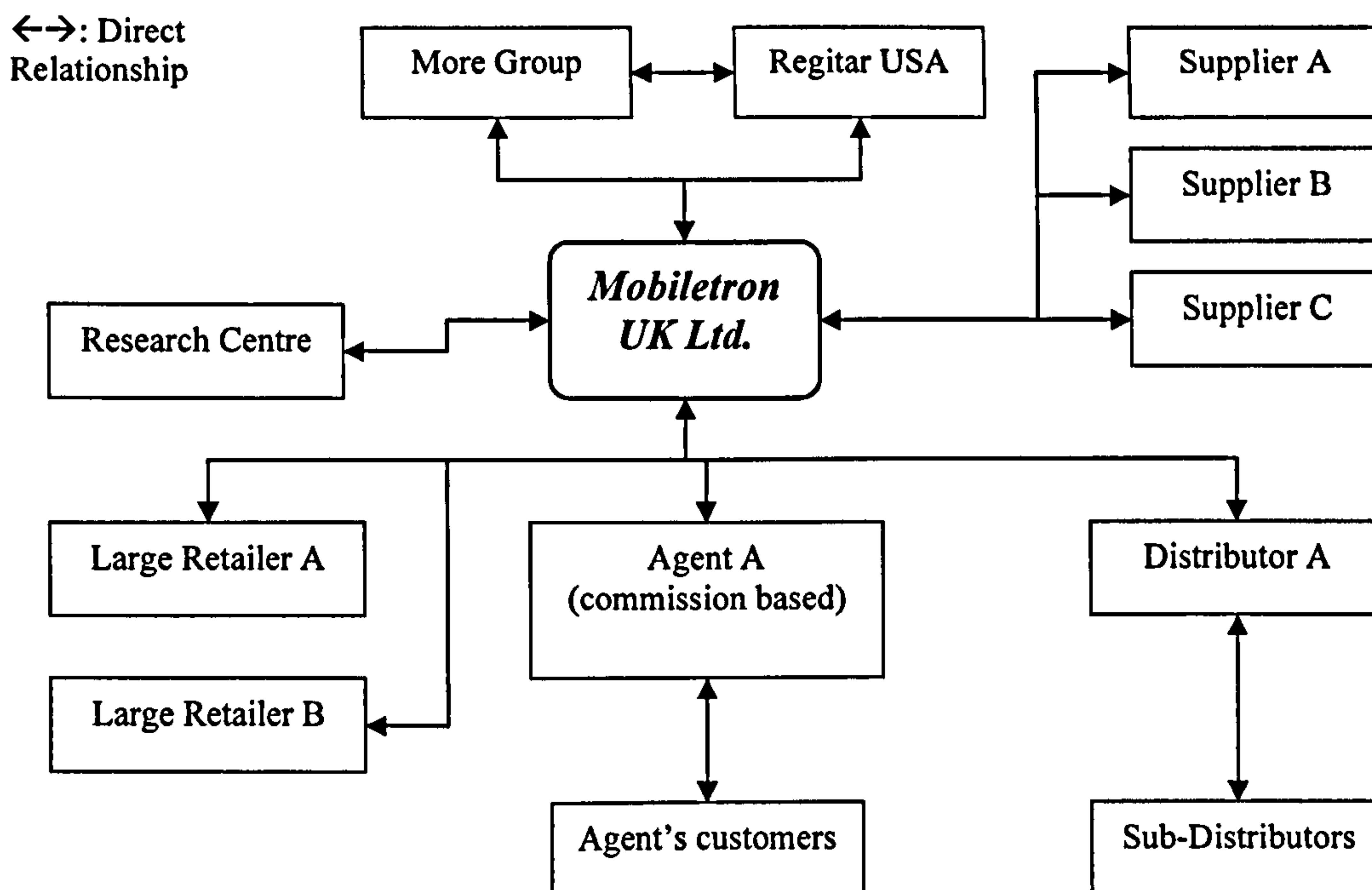


Table 5.8 Mobiletron's Internal and External Capabilities

	External Capabilities with description	Internal Capabilities with description
Skills and Knowledge	Learn from their customer to enable skills and knowledge in product testing and manufacturing procedure. Encourage their employees to learn new skills through external organisations (including training from their suppliers via the Internet).	Employees' knowledge of markets. Use of ERP system to transfer necessary training programme and knowledge internally from parent company.
Technical Technological	Exchange technological information with clients. Development of new standardised applications between the firm and its clients. Provide technical support.	Use in-house technicians to handle sensitive database and Internet.
Managerial	Purchase IT systems for its key clients to increase productivity. Adopt different production processes for different customers, e.g. semi-automatic process for small orders. Decision to use agents overseas and to reduce the firm's workload.	Positive management attitude, encourage employees to obtain new skills and knowledge externally. Understanding of good relationships maintenance.
Values	Face-to-face communication. In the process of educating its clients to use Internet-based technology. Assessment of the 'opportunity' cost. Maintain good relationships.	Maintain high product and service standards, key to long-term relationships success.

Table 5.9 Mobiletron's Internationalisation Process

Intention	Markets	Industry	Involvement with
Market saturation, forced to expand to European market	Most of the Europe includes Russia. Some African countries: South Africa, Algeria, Morocco and Tunisia.	Automotive electronics and Power tools	Parent company (supplier), local suppliers for local production in the UK. Distributors and Agents (some agents are commission based)

Table 5.10 Mobiletron's Internet Activities

Forms of Internet Activities	Description
Website	The website displays information such as company introduction, product information and contact details. Additionally, the website has functions like online catalogue and delivery tracking and pricing update via a set of usernames and passwords provided by Mobiletron. The online order function is still under construction, and is expected to go live shortly. Overall, the website is fully integrated with their ERP system.
E-mail	E-mail is treated as another format of facsimile and for day-to-day communication. Mobiletron is expecting by using e-mail could help the firm achieve real-time operation. However, the firm is in the planning stage for Internet usage management where there are risks when using e-mail, such as sensitive data being sent out. A strange incident is where e-mails sent to Eastern European countries are sometimes missing or disappearing according to their clients.
VoIP	Mobiletron considers VoIP is a revaluation technology where the firm uses the technology extensively internally.
Video conference	Mobiletron has a video conference facility where they would use it for meetings across different regions. The company uses the video conference facility to conduct training from the parent company or other suppliers. The system is set and ready to use if any of Mobiletron's clients want to communicate through online meetings.
Others	Mobiletron also conducts online satisfaction surveys and uses Internet to carry out some basic market research.

Table 5.11 Forms of Internet and the User Groups

Internet Activities	User Groups
Website (general information)	All
Website (restricted access)	Suppliers; Agents; Distributors; Existing customers
E-mail	All
VoIP	Internal; Other actors who have the VoIP capacity
Video Conference	Internal; Suppliers; Other actors who have the Video Conference capacity

Table 5.12 Key Findings of the Case Two in relation to the Conceptual Framework

Links	Descriptions
Industrial Network vs. Capabilities	Mobiletron has surplus resources provided by the parent company, which allows them to manage with agents or distributors, even large customers (DIY retailers) directly overseas.
Internal Capabilities vs. External Capabilities	Mobiletron argues that the amount of resources they have would have huge impacts in terms of their internal capabilities, which would have impacts on their external capabilities. Furthermore, the firm suggests their internal and external capabilities would have effects on their overall industrial relationships.
Industrial SMEs vs. Internationalisation	The firm have early focus to expand their market internationally, and they recognise the need to have surplus resources to achieve the goal. It can be argued that the firm's internationalisation decision is purely based on a <i>strategic decision</i> to acquire huge market share.
Internationalisation vs. The Internet	Apart from communication purposes, the Internet <i>technologies</i> allow Mobiletron to transfer their skills and knowledge required from their parent and sister companies. Advanced technologies have been incorporated within Mobiletron's website and allow their clients to track and monitor their stock level which speeds up the overall communication.
The Internet vs. Industrial SMEs	Mobiletron has demonstrated their Internet <i>competence</i> by adapting the Internet for international communication, training and enables their clients to interact with the firm through the use of Internet.

5.3.2 Summary: Mobiletron

The findings indicate that in order to manage the firm's industrial network successfully, establishing and maintaining good relationships are the most important elements. To facilitate good relationships, the case firmly believes that they would need to strengthen the skills and knowledge capability and the know-how concept. This would help the company to determine the level of service and support needed, where this is involved with management's responsibility and technological capability. However, the real influences on the level of service and support that the firm can afford depends on the amount of resources.

In this case, the firm's intention to expand to foreign markets was not because of any direct influence by Internet usage, it is due to the saturation of the UK market. During the expansion to overseas markets, Mobiletron increases its publicity by taking part in various industrial exhibitions and using exclusive agents and distributors to handle the overseas markets. The firm argued that local agents and distributors have better knowledge of local markets, and agents and distributors can handle massive communication between the sub-distributors and the users. Although Mobiletron expressed their view of preferring closer relationships with users, the existing market structure did not allow this, as most of the products would rely on services from another company or someone who has the installation capacity.

The case company was very advanced in terms of their Internet system which was integrated with their ERP system. Indeed, the firm incorporated their ERP along with the development of their website; for example, online order tracking for Mobiletron's clients via a set of usernames and passwords. Not surprisingly, the main purpose of the Internet was to improve communication efficiency for various business activities. However, the case company took a step further as they used VoIP and a video conference facility to receive the training required from overseas (parent company and suppliers). In return, the training enhances Mobiletron's know-how ability and strengthens their skills and knowledge as well as their technological capability.

Finally, Mobiletron considered that the most significant disadvantage of the Internet is when communicating with an organisation at a different IT level. This not only

increased the length of the communication channel but increased the costs. Therefore, Mobiletron consistently educated their clients to take the full advantage of the Internet. In some extreme cases, Mobiletron willingly purchased an IT system for their clients after the evaluation based on the Return on Investment (ROI). Yet, having regular visits and face-to-face communication with clients were the most important principles of Mobiletron's management. The key findings of this case study in relation to the conceptual framework can be summarised in Table 5.12.

5.4 Case Study Three: Verplas Ltd.

5.4.1 Company Background: Verplas

Established in 1986, Verwood, Dorset-based Verplas Ltd. was a manufacturer of ventilation accessories. The ventilation and ducting systems were mainly for some domestic applications, such as tumble dryers, cooker hoods and extractor fans. The company comprised two sites, Verplas and Verplas Extrusion, which were located next to each other. The company employed around 70 people with an annual turnover approaching £7.5 million.

Table 5.13 Interactions of Verplas's Network

Actors	Distributors	Suppliers	Customers
Activities	Distributors in this case are more like the customers, where distributors purchase goods from Verplas rather than Verplas pushing the products to distributors.	Supply raw materials and machinery.	Large retailer chain, e.g. B&Q, Homebase, etc. Other customers include domestic appliance OEMs.
Resources	Sales and marketing basis, after sale services.	Materials information, technological issues.	Joint-discussion for appliances' standards of ventilation system
International Interaction	After-sales service given to the distributors, however, the end-user would need to contact local distributors for the warranty.	Suppliers could be anywhere in the world. Currently, the main supply of PVC and wire is from the Asia-Pacific region.	Standard ventilation kits sold to larger retailer chains. Direct after-sales service provided to the OEMs.

Figure 5.4 Illustration of Verplas's Network

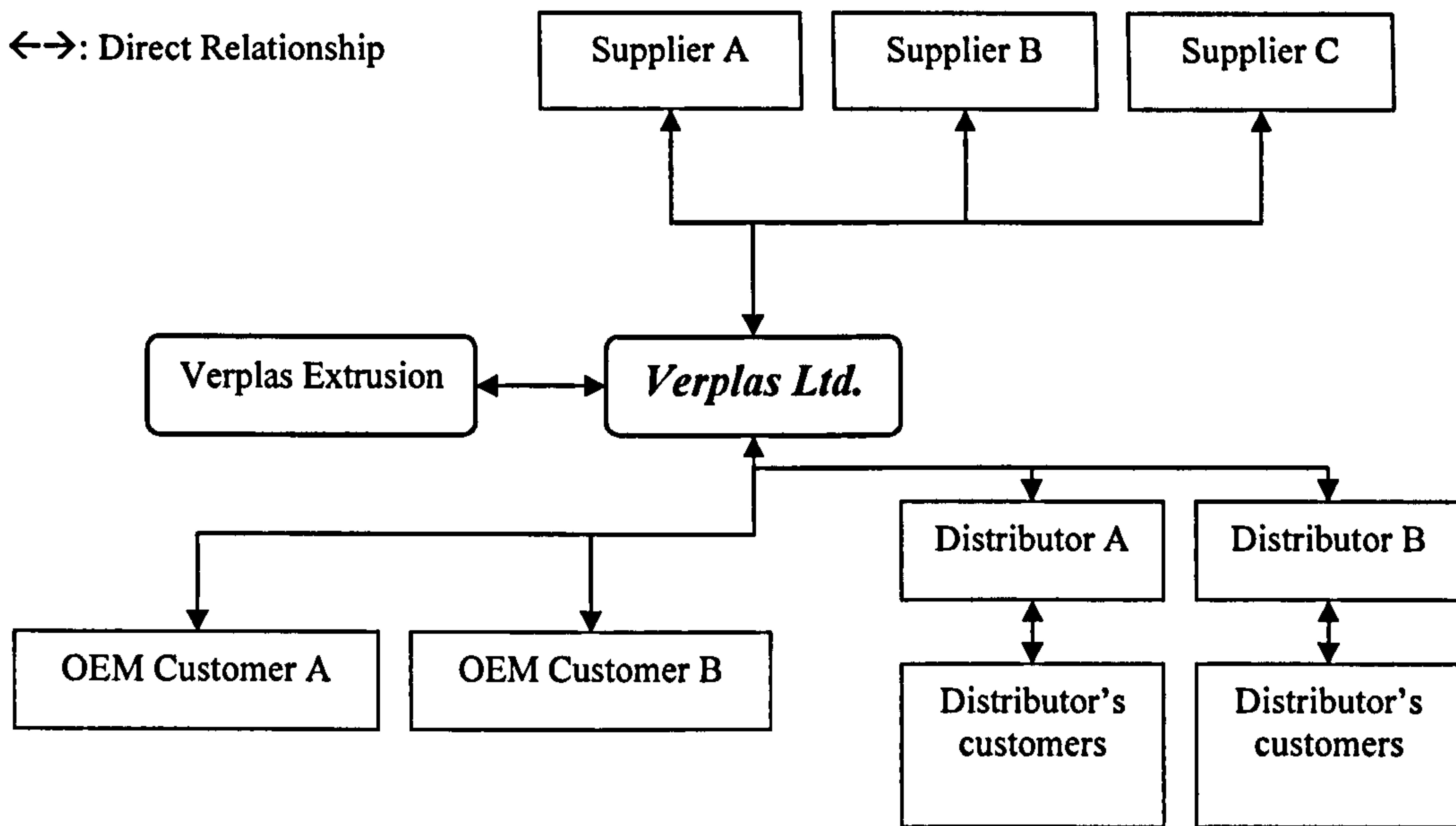


Table 5.14 Verplas's Internal and External Capabilities

	External Capabilities with description	Internal Capabilities with description
Skills and Knowledge	Awareness of market trends, such as product materials and design. Education for the sales team for expanding existing market.	Training provided for the employees; include shop floor workers and sales team. In return, offer better product quality, comprehensive product range.
Technical Technological	Through joint-development with domestic appliance OEMs which set up standards of ventilation kits.	Continuous investment for new machinery which is capable of manufacturing new products by using new materials sourced.
Managerial	Insist on the important value of face-to-face communication, maintaining good relationships; as well as reviewing suppliers' capacity at all times.	Up-to-date management system, appointment of new Managing Director. Retaining existing communication methods.
Values	Offer comprehensive product range and competitive product price. Face-to-face communication has provided opportunities for management to review other management system and compare to itself.	Constantly searching for new markets and new materials. Trust and relationships between the firm and other industrial actors.

Table 5.15 Verplas's Internationalisation Process

Intention	Markets	Industry	Involvement with
No strong intention to expand the business internationally; however some customers (distributors) would like Verplas's product to be shipped overseas.	Mainly in Europe, parts of Asia Pacific and South Africa.	Supplies for domestic appliances, white-goods industry	Suppliers, distributors (include large retailer chain) and OEMs.

Table 5.16 Verplas's Internet Activities

Forms of Internet Activities	Description
Website	The website is mainly for customers, includes basic information, e.g. company introduction, product information and contact details. The website is an advertising tool for the firm, to generate awareness and publicity. Additionally, the website offers catalogue download.
Newsletter	An integrated electronic newsletter function with the website, enables the firm to send out news for development or some other relevant details.
E-mail	To use for day-to-day communication with suppliers and customers. The e-mail is purposely for external communication not for internal uses.
Online Banking	Verplas uses online banking for managing their inbound and outbound payments
Others	Use Internet to purchase some smaller items which can be paid for by company's credit card. Verplas is also considering setting up a video conference facility in the near future which would offer another form of communication method.

Table 5.17 Forms of Internet and the User Groups

Internet activities	User Groups
Website	Existing customers (include OEMs and distributors); Potential customers
Electronic Newsletter (part of website)	Suppliers; Existing customers
E-mail	All
Online Banking	Supplier, Customers
Video Conferencing	Still under construction

Table 5.18 Key Findings of the Case Three in relation to the Conceptual Framework

Links	Descriptions
Industrial Network vs. Capabilities	Verplas argues that due to the nature of their business that their network is restricted to larger clients that include OEMs, large retailers and distributors. Since there are less B2B customers, Verplas is able to handle their business directly in most cases; thus, the firm has developed their capabilities mainly to deal with B2B customers only.
Internal Capabilities vs. External Capabilities	Verplas works closely with domestic appliances OEMs through joint-development for setting up application ventilation standards. In order to satisfy the requirement from the OEMs and large DIY retailers, Verplas has increased its production capacity by continuous investment. This indicates the firm is highly influenced by its external environment and has to strengthen its internal capabilities.
Industrial SMEs vs. Internationalisation	Verplas views the relationship between industrial SMEs and internationalisation as a <i>strategic decision</i> . Evidence such as appointing a new Managing Director and much aggression towards international markets.
Internationalisation vs. The Internet	The firm insists that some traditional communication methods such as face-to-face communication cannot be ignored. However, the use of Internet technologies has speeded up the communication process with their international clients in particular. Thus, it can be described that the Internet serves as a <i>technology</i> which assists the firm's international business.
The Internet vs. Industrial SMEs	The level of activities and resources exchanged between Verplas and its counterparts has determined the level of Internet technology that is required. The relationship can be described as the Internet <i>competence</i> for Verplas and its counterparts.

5.4.2 Summary: Verplas

The findings indicate that Verplas's decision over the Internet was because of the industrial trend as their customers were expecting faster communication. Also, the firm's attitude to Internet usage very much depended on the customers' requirement. The relationship between the Internet and Internationalisation was to speed up the communication process for the firm's international business activities. Nevertheless, the relationship between Verplas's internationalisation process and the industrial

SMEs was strategically based which assisted Verplas to expand their market share internationally.

However, the relationships between the Internet, Internationalisation and Industrial SMEs are determined by the firm's capabilities as well as the interaction within the network. As communication technologies advanced, Verplas were forced to provide different types of communication channel, such as e-mail usage. This is where Verplas realised that there is a potential to intensify communication with their customers. Although Verplas is not a leader in terms of Internet usage, it is aware of different forms of Internet-based technologies, for example, video conference.

Verplas was also aware of the importance between the firm and other industrial SMEs, as the findings suggested that their own capabilities were the most important elements for success within the network. Customers would approach and stay with the firm and this was due to the level of service provided, the comprehensive product range and competitive product price. Then, it was Verplas's responsibility for maintaining good relationships with their clients. As a result, Verplas strongly emphasised the importance of face-to-face communication, and it is unlikely to be replaced by the Internet. The key findings of this case study in relation to the conceptual framework can be summarised in Table 5.18.

5.5 Case Study Four: Coborn Engineering Co. Ltd.

5.5.1 Company Background: Coborn

Coborn Engineering Co. Ltd. (Coborn) was a specialist manufacturer of laser grinding and cutting equipment. The history of Coborn can be traced back to 1941 when they only manufactured grinding spinners; however, as Coborn expanded, they have concentrated on development of other machines for diamond processing tools such as lapping, laser cutting and blinding, etc. At that moment in time, diamond related products accounted for 75% of the total production, whereas it was 25% for the grinding spinners. The company employed 50 people with an annual turnover of £3.5 millions (the figure is based on 2004-2005). Coborn's products were mainly exports to the Gem Industry as well as the Optical Lens Industry for some particular applications.

Table 5.19 Interactions of Coborn's Network

Actors	Agents	Suppliers	Customers
Activities	As sales representative for Coborn, some agents have the capacity to carry out service modules.	500 suppliers, part of them have long-term relationships with Coborn as they would have joint-development for certain components. For raw materials suppliers have less close relationships.	Interaction includes pre-sales consultation, initial product setup before delivery. Post-sales activities includes free training programme offered by Coborn.
Resources	Free training programmes can be provided by Coborn if required.	Exchange of human resources, technical information, etc.	Some customers have a close relationship with Coborn for further joint-development.
International Interaction	Mainly in European and Asian markets.	Most suppliers are based overseas.	Mostly direct interactions, especially for after sales services.

Figure 5.5 Illustration of Coborn's Network

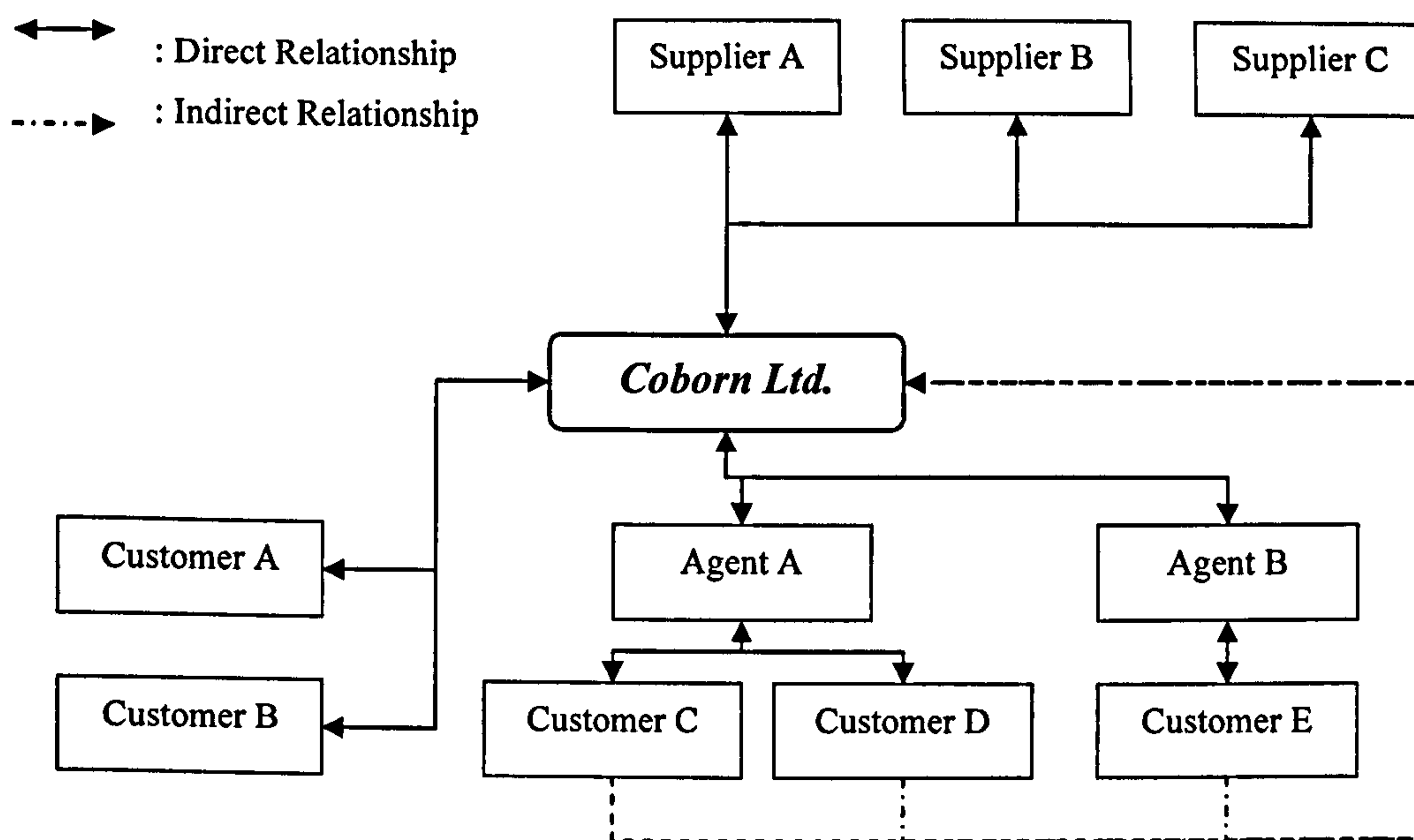


Table 5.20 Coborn's Internal and External Capabilities

	External Capabilities with description	Internal Capabilities with description
Skills and Knowledge	Ability to provide training programme/service module for their customers. Work closely with their customers for new product development, both software and hardware.	Internal skills and knowledge capability as the most important capability of the firm.
Technical Technological	Modem embedded in some of their products, allows the company to respond to technical issues immediately. Work closely with customers for product development.	Proud of their technical and technological capability. However, there are pressures from customers to increase their speed of innovation.
Managerial	Exchange visits with their clients. Maintaining good relationships with their customers by regular face-to-face communication.	The firm was aware of their organisational structure weakness. Pressured by the customers to have continuous product development.
Values	Maintaining good relationships with customers. Technological skills emphasised. To provide any technical support or training programme if required under its own capacity.	Have positive attitude towards their customers. Use any available resources to maintain long-term relationships.

Table 5.21 Coborn's International Process

Intention	Markets	Industry	Involvement with
International Customers' requirement for the products. Increase Coborn's turnover.	Europe, America, Asia-Pacific and part of Asia. Countries have technically advanced industries.	Gem, Optical Lens and Semi-Conductor, etc.	Agents, Suppliers and Customers. Some suppliers and customers have long-term relationship with Coborn via joint-development.

Table 5.22 Coborn's Internet Activities

Forms of Internet Activities	Description
Website	The website includes information such as product specification, sales and contact details and support. Users can download files for software updates and simple self-service instruction.
E-mail	For external communication originally, but has been used more frequently for internal communication. E-mail occupies 75% of all communication and still in growing phase. Also, e-mail has gradually replaced the facsimile facility as the firm could send and receive files instantly without any transcription for both text and technical drawing.
Video Conference	Although the firm has the facility, there is no clear indication of any strong impacts for the firm. However, the firm is interested in VoIP technology and would like to adapt it in the near future.
Online Banking	As the company has bank accounts internationally, the firm has enjoyed the benefits of online banking while managing their accounts remotely.
Others	Having modems embedded with some of the machines has shortened the response time for the repair relating to software problems. Coborn is able to monitor the machine's setting and configuration remotely and is able to determine the level of support needed.

Table 5.23 Forms of Internet and the User Groups

Internet Activities	User Groups
Website	Agents; Potential and existing customers
E-mail	All (includes agents, customers and suppliers)
Video Conference	All
Online Banking	Coborn
Repairs via the Modem Embedded with the Machine	Coborn; Customers

Table 5.24 Key Findings of the Case Four in relation to the Conceptual Framework

Links	Descriptions
Industrial Network vs. Capabilities	The shape of Coborn's network is dependent on the overall industrial environment as well as Coborn's capabilities. Evidence suggest the firm is capable of dealing with customers directly, nevertheless, the company also decided to use agents in assisting their international operations.
Internal Capabilities vs. External Capabilities	Example of joint-development with other customers has demonstrated how internal and external capabilities interlinked to each other. However, the findings also suggest that industrial environments have an effect in terms of how Coborn should keep updated with their capabilities.
Industrial SMEs vs. Internationalisation	The relationship between the firm and internationalisation was due to changes in the overall business environment. Coborn has taken the <i>strategic decision</i> to go abroad and keep expanding their international markets. As a result, 95% of overall businesses are internationally based.
Internationalisation vs. The Internet	The Internet is only part of Coborn's external communication methods. Although Coborn emphasised the importance of face-to-face communication, the firm has been using the Internet to assist further international business activities, including technical support. Particularly with products with modem embedded allows the firm to obtain necessary technical information and shorten the overall communication. It can be said that the Internet has become a technological attribute to the firm's international operations.
The Internet vs. Industrial SMEs	The modem embedded technology that Coborn adapted has shown how <i>competence</i> of the firm exists in designing and maintaining its Internet usage. However, Coborn still maintains traditional business communication methods by exchanging visits and talking to their clients on the phone regularly.

5.5.2 Summary: Coborn

The case has proven that a firm's internal and external capabilities would have a serial of effects when determining the level of interactions within the network. The case has responded to Johanson and Mattsson's (1988) industrial network theory, where the activities and resources are interlinked with each other and bound with the associated actors.

The findings indicate that a key benefit of the Internet for Coborn is the improvement in communication. Coborn used website and especially e-mail for all different kinds of business activities, such as sales, marketing, day-to-day contact and after-sales support. In addition, Coborn has used the website as a platform for users to download any necessary updates and instruction documents for self-maintenance which strengthen the firm's ability for after-sales support. The most surprising finding is that Coborn has integrated the Internet with the products; by having a modem installed within the machine it has enabled the firm to monitor the machine from a remote location. This particular application has dramatically shortened the repair response time and increased the overall responsiveness efficiency as the firm would have the configuration and other relevant information in hand before sending out their technicians or referring to the agents to carry out a repair service.

Although the firm was fully capable to adapt most commonly known Internet technologies, traditional communication was still the main communication method with their customers. Coborn argued that it is necessary for them to provide comprehensive product introduction before sales; however, in order to do so, the firm encouraged the culture of having regular face-to-face meeting to discuss the customers' requirement directly.

5.6 Case Study Five: Bede X-ray Metrology

5.6.1 Company Background: Bede

Based in Durham, UK, Bede X-ray Metrology (Bede) was a manufacturer of x-ray related equipment for the semiconductor industry and it can also be used in some applications for the medical industry. The history of Bede can be traced back to 1978 as a supplier for custom made scientific instruments, with annual turnover exceeding £7 millions, the company have employed 140 people worldwide, with 60 people based in the UK.

Table 5.25 Interactions of Bede's Network

Actors	Agents	Suppliers	Customers	Others
Activities	Order taking and act as initial contact point in the countries that Bede does not have wholly-owned subsidiaries.	Suppliers provide materials and components for Bede. Some of the suppliers have a joint-venture programme with Bede.	Provide direct sales and after-sales services to direct customers. Provide direct technical supports for customers via the agents.	Reflex Sro as Bede's R&D centre, also as part of their supply chain.
Resources	Information exchange, such as customer information, marketing data.	Mainly technical and technological information exchange. Technician personnel exchanges on some occasions.	Mainly technical resources for after-sales service. Bede has much intensive human resources exchange with research institutions.	Exchange of human resources and other information.
International Interaction	Bede insists on using agents even in countries where the firm has its own subsidiaries. This is because they believe in agents' local knowledge.	Suppliers both from the UK and overseas.	Most customers are internationally based.	Reflex Sro have own industrial network.

Figure 5.6 Illustration of Bede's Network

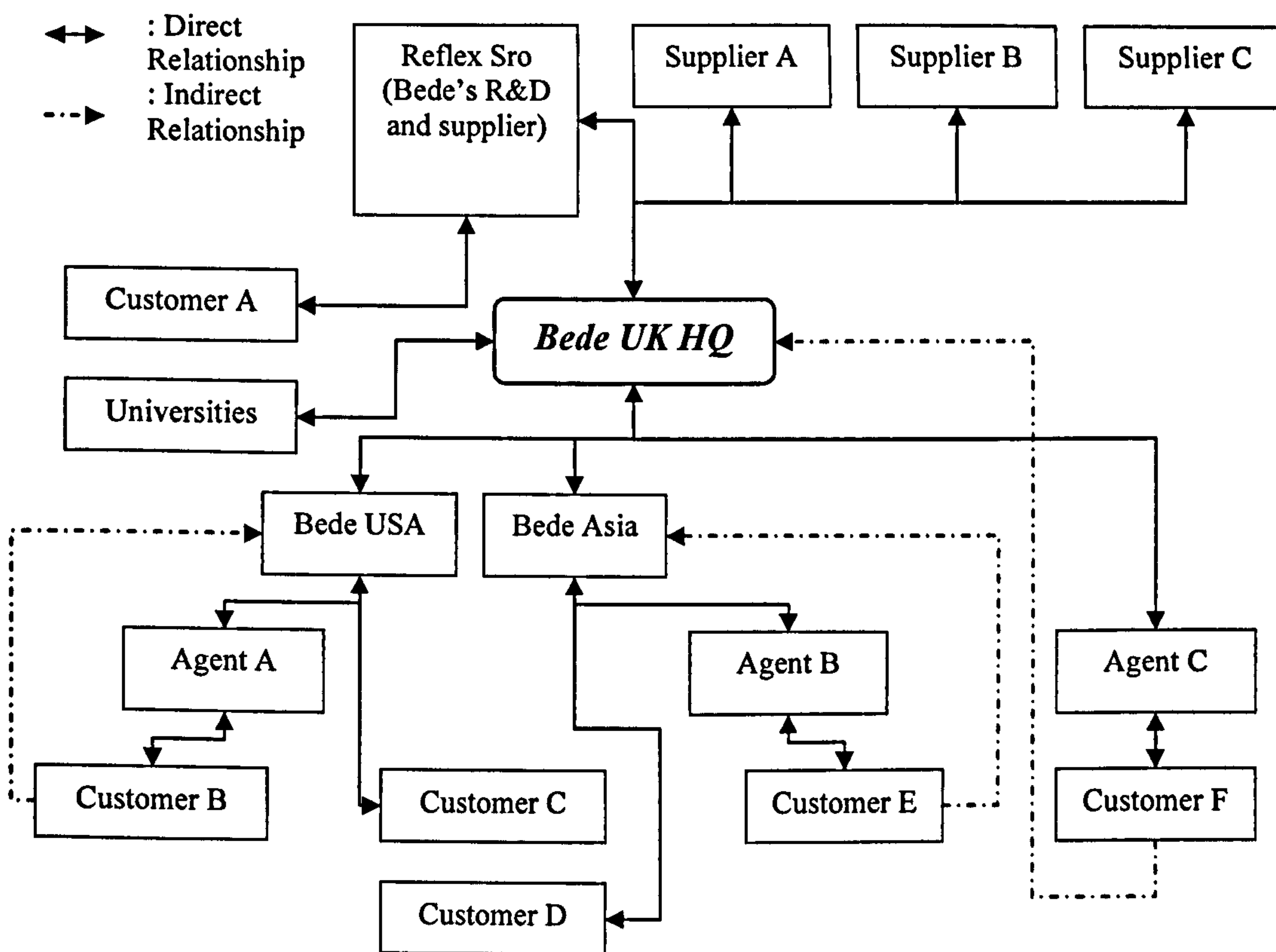


Table 5.26 Bede's Internal and External Capabilities

	External Capabilities with description	Internal Capabilities with description
Skills and Knowledge	Work closely with research centres, receiving training from suppliers. To educate customers new technologies via their website. Provide training and repair service for customers.	Integration of newly acquired skills and knowledge with existing capability. Fast commercialisation and innovation.
Technical Technological	New technology development with other research centres or suppliers via joint-venture.	Considered to be the most important capability of the firm. Ability to coordinate with other components suppliers in order to gain strong technological capability.
Managerial	Regular face-to-face visits with their suppliers and customers. Faster communication for strong supply chain collaboration. The decision to use agents for Asia-Pacific regions, agents have better understanding for local markets and reduce language and cultural barriers.	Proactive management, encourage their employees to receive new knowledge. Maintaining good relationships (and personal relationship) with their clients. Sustain internal technological capability by acquiring external organisations.

Values	Proactive in learning new skills and knowledge from different sources. Adapting different communication methods for different customers. Realised the importance of innovation for future product development.	Technological driven, fast commercialisation and innovation.
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Table 5.27 Bede's Internationalisation Process

Intention	Markets	Industry	Involvement with
Early focus of international markets with overseas' demand raising and saturation of local market.	Mainly Western Europe, USA and Asia (Asia occupies 60% of sales)	Semiconductor and Medical.	Suppliers, Customers, Agents, Academic Institutions. Bede internally: Bede Asia, Bede USA and Reflex Sro.

Table 5.28 Bede's Internet Activities

Forms of Internet Activities	Description
Website	A comprehensive website with information relates to the company and its product. The website was designed mainly for customers and investors. The website also has a knowledge base where users can request documents/papers for latest technology and future technological application. In addition, the website is also linked to the firm's database (Intranet) for the e-mail newsletter function.
E-mail	E-mail is the most important Internet communication method, as the characteristic of e-mail is very convenient and instant especially when it can send files such as video clips, photographs and technical drawings. Also, e-mail is useful for Bede's employees when they are travelling where they can maintain contact with the company and customers.
Video Conference	The video conference is primarily for internal communication. Bede uses video conference to communicate with their subsidiaries, however on some occasions the video conference meeting is conducted if the suppliers or customers have requested it.
Online Chat Room	The online chat room is another method for Bede's internal communication. Unlike the video conference, online chat room is strictly for internal usage purpose and can be used when an engineer is

	in a remote location who requires instant communication with other engineers on base for discussion, such as problem solving.
Others	The firm has a well-functioned Intranet system where they share files and documents, and can be accessed remotely via VPN. This enables travelling employees to review and amend documents if needed and shortens the communication process.

Table 5.29 Forms of Internet and the User Groups

Internet Activities	User Groups
Website	All, including investors
E-mail	All
Video Conference	Internal; occasionally some customers or suppliers
Online Chat Room	Internal
Knowledge Base	Customers; Suppliers
E-mail Newsletter	Customers; Investors

Table 5.30 Key Findings of the Case Five in relation to the Conceptual Framework

Links	Descriptions
Industrial Network vs. Capabilities	Bede has suggested the management can be seen as one of the key influences within their industrial network as the firm is responsible for selecting appropriate agents and decisions of using subsidiaries to handle their international business. Further comments such as joint-venture and acquisition have also shape up Bede's industrial network.
Internal Capabilities vs. External Capabilities	As the firm is in a technology driven industry, Bede has demonstrated how they acquire external resources and transfer for their internal uses. Example such as joint-venture has also suggested the firm's internal capacity and how they managed the activity externally.
Industrial SMEs vs. Internationalisation	Bede has initial plan for their internationalisation process by using agents and setup their own subsidiaries. Furthermore, the firm kept expanding by acquiring Reflex Sro, who used to be one of Bede's suppliers. Therefore, it can be argued that the relationship between industrial SMEs and internationalisation is based on a <i>strategic approach</i> .
Internationalisation vs. The Internet	Bede has used the Internet extensively for its international business. The use of the Internet has assisted the firm to maintain constant communication with its overseas subsidiaries/employees which have impacts on Bede's internationalisation process. In other words, <i>appropriate uses of technologies</i> can help the firm to communicate more

	efficiently.
The Internet vs. Industrial SMEs	Arguably, the degree of commitment and the ways of using Internet technology has impacted on how Bede delivered their after-sales services. It can be said that Bede's <i>competence</i> in using the Internet allows them to choose appropriate communication channels with their industrial counterparts.

5.6.2 Summary: Bede

Referring to the conceptual framework, this case has proven that the relationship between the Industrial SMEs and Internationalisation was a strategic option since the case had an early internationalisation focus. However, the Internet was not necessarily used as a technology or a tool in relation to an internationalisation decision, but to assist the firm to speed up the communication process where it can lead to further international expansion. In terms of the Industrial SMEs and the Internet, it has been suggested that the degree of Internet usage depended on the SMEs' resources and their competences. In terms of managing in the industrial networks, the case recommended that industrial actors, activities and resources were influenced and depended on the case firm's external and internal capabilities. Especially, the resources and activities were determined by the degree of involvement that Bede can offer.

Specifically, the contribution of the Internet for Bede's internationalisation was for communication purposes. It was suggested that the Internet provides an infrastructure for the company to communicate internally for which they have integrated technologies such as video conference and online chat rooms to ensure the operational flow. Bede also used other forms of Internet to communicate with their external industrial actors, mainly e-mail and website.

E-mail ensured Bede had consistent communication with their clients, with additional benefits of cost and time saving. Although the use of the Internet has shortened the distance between Bede and their industrial actors, existing communication still cannot be ignored, such as the face-to-face communication with their clients for establishing their relationships initially. Also, activities with suppliers required frequent discussion

and feedback; a personal visit would ensure mutual understanding such as product specification between two parties in a joint-venture or joint-development status.

Despite that Bede was on the third stage of the Uppsala internationalisation model, there was no indication that the firm's internationalisation decision was based on the development of the Internet. Nevertheless, there were indications that Bede uses the Internet in assisting its international operations, and to accelerate its communication cycles. Table 5.30 is a summary of the key findings from this case study in relation to the conceptual framework.

5.7 Case Study Six: Thomas Swan Scientific Equipment Ltd.

5.7.1 Company Background: Thomas Swan

Located in Cambridgeshire, UK; Thomas Swan Scientific Equipment Ltd. (TSSE) was one of the leading manufacturers and suppliers of Metal Organic Chemical Vapour Deposition reactors and components for the semiconductor industry. Originally TSSE was called Thomas Swan & Company, established in 1983 as a specialist chemical company for semiconductor equipment. However the company was acquired by Aixtron A.G. in 1999 and as a result, a new company name of TSSE Ltd. was given.

Before the acquisition, TSSE's main customer base had been concentrated mainly in academic practices (universities) for research purposes. Since TSSE was acquired by Aixtron, the firm has sharply increased sales with industrial manufacturers due to the demand for semiconductor products (Managing Director). Currently, TSSE have 75 employees with an annual turnover of £27million for the financial year 2005. According to the Managing Director the product they sell can be described as "*capital equipment for semiconductor industry*".

Table 5.31 Interactions of TSSE's Network

Actors	Agents	Suppliers	Customers	Others
Activities	Some agents and sales representatives were used for TSSE's sales and distribution channels. In addition to TSSE's existing channels, they also use Aixtron's channel since the acquisition. Some agents have the ability to provide after-sales services (initial contact).	Provide parts and components for TSSE. Increasingly demand for TSSE to out-source in searching for cheaper manufacturing cost. Due to out-sourcing a lot of direct relationships have been created and much frequent direct communications involved.	Direct communication with their customers for after-sales support. On some occasions, TSSE have joint development with customers for developing newer technology. However, during pre-sales stage TSSE do not normally set involved with potential customers but TSSE's agents.	Aixtron can be seen in two different roles to TSSE. One is their parent company that provides supplies and shared distribution channels. The other role is their competitor role where they are competing with each other in terms of technologies. Also, the company's knowledge gained through collaboration with universities.
Resources	Mainly acted as a representative for TSSE. Majority is orders taking with limited technological information in exchange if the agent does not have the capacity to carry after-sales services.	Resources such as technical issues or human resources exchange are frequent as TSSE and their suppliers have constant communication.	Technical resources mainly with their customers. However, some customers will have further human resources exchange as these customers require TSSE to provide equipment servicing training.	TSSE share Intranet resources with Aixtron, mainly documents. Exchange of human resources for expertise and share their distribution channels.
International Interaction	Agent is the point of contact for TSSE and their customers. Maintaining a good relationship with the agent is what TSSE emphasised.	Strong interaction between TSSE and Aixtron based in Germany. Apart from that, TSSE have limited interaction with other overseas suppliers as most suppliers are based in the UK.	TSSE acted as an information hub for their international customers for technical support such as modification or equipment training.	Different forms of Internet communication methods were used to contact their international partners (suppliers, customers and agents). However, a lot of face-to-face communication was still remained for relationship building.

Figure 5.7 Illustration of TSSE's Network

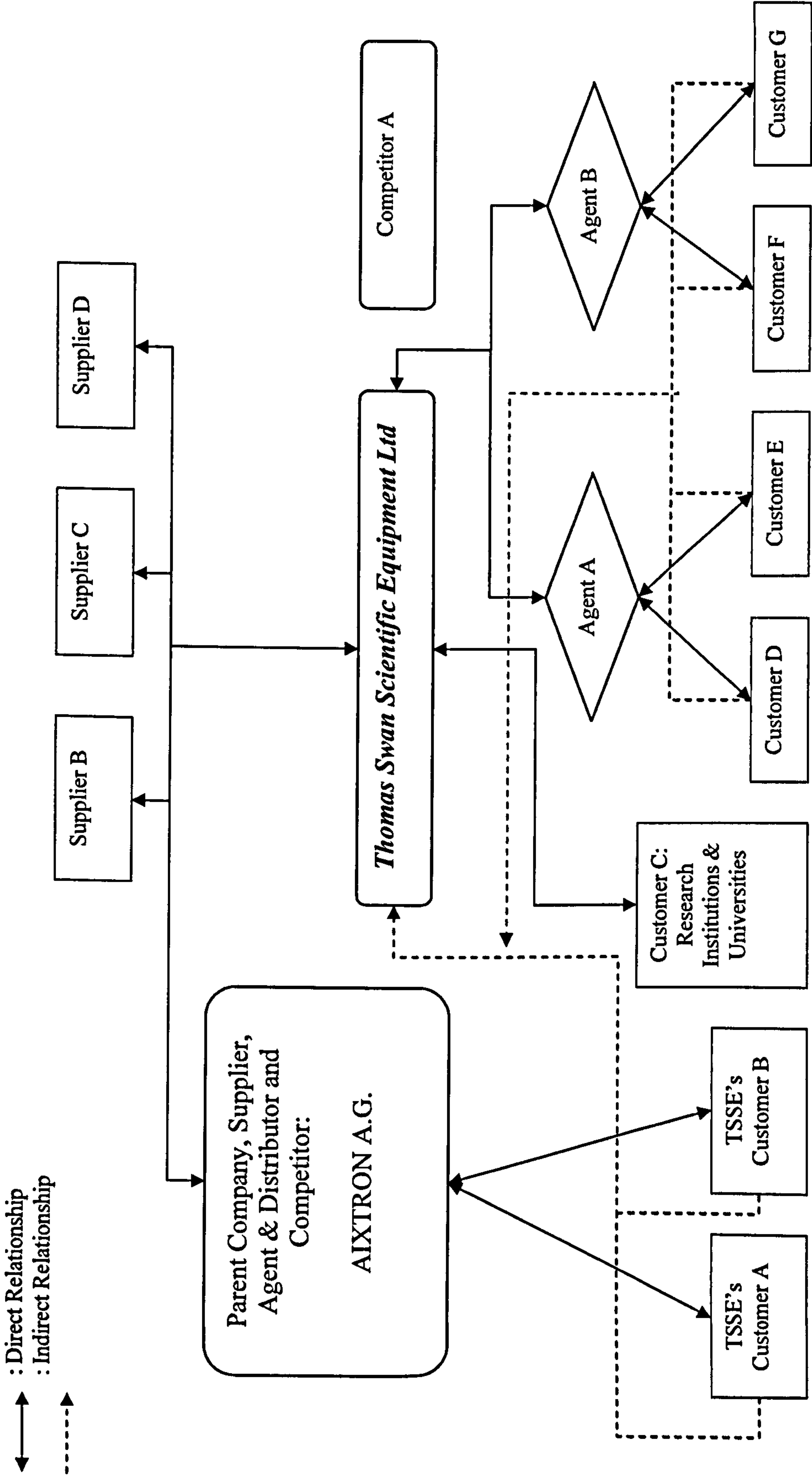


Table 5.32 TSSE's Internal and External Capabilities

	External Capabilities with description	Internal Capabilities with description
Skills and Knowledge	Joint research with research institutions has gained the firm's skills and knowledge required. Strong relationship building skills of the firm's agents.	Original or acquired skills are to be used in conjunction with technical/technological capability
Technical/Technological	Limited opportunities to team up with industrial actors as the customers prefer to keep out any suppliers due to commercial reasons.	Technology is the most vital asset of the firm. Skills gained from the joint programme have brought forward the firm's technological competence and further integration.
Managerial	A standard of information management system was created within their network.	Understand the value of their employees. Decision made to use external resources (out-sourcing).
Values	Value the customers with efforts to understand their culture. Not necessary to apply someone's culture to themselves.	Value the employees' potential by giving them opportunities such as further education. In return, it benefits the firm's technological knowledge and relationships with academia.

Table 5.33 TSSE's Internalisation Process

Intention	Markets	Industry	Involvements with
Not intended to go to international market as the company was founded by a researcher who has existing contacts internationally through conferences.	90% in the Asia (including Asia Pacific region); 10% in between the Europe and the USA.	Semi-conductor, LED	Agents/distributors, suppliers (including out-sourcing), industrial customers, research institutions (customer and joint-development partners), parent company (Aixtron) who share their sales & distribution channels with TSSE, a competitor in technologies also.

Table 5.34 TSSE's Internet Activities

Forms of Internet Activities	Description
Website	TSSE have a basic introductory level information input for their website. Mainly to provide company or brief product information for their potential customers. However, the website is not supplier friendly as there are no relevant application interfaces or information given for the suppliers.
E-mail	E-mail is widely used by TSSE or their suppliers and customers. The main advantage of e-mail for TSSE is it reduces the time to communicate as well as e-mail having the ability to attach electronic data files which is essential for them as it will reduce human error when discussing over the phone. One downside is that suppliers or customers are expecting to have instant replies and it does create some management issues of control staff's time schedules.
Video Conference	Although TSSE have the ability to use a video conferencing facility, only some suppliers and few customers have the ability to do so. However, TSSE recommend that Video conferencing is an excellent tool once the relationship has been established. Nevertheless, traditional face-to-face communication and personal contact still cannot be ignored.
Others	The development of TSSE's Intranet system is well-established and can share or communicate with their international agents by using standard software. This has the advantage over standardisation on TSSE's operations.

Table 5.35 Forms of Internet and the User Groups

Internet Activities	User Groups
Website	Customers mainly
E-mail	All
Video Conference	Suppliers mainly; Customers (increasing usage)
Intranet	TSSE; Aixtron (parent company)

Table 5.36 Key Findings of the Case Six in relation to the Conceptual Framework

Links	Descriptions
Industrial Network vs. Capabilities	TSSE is highly dependent on their customers as they only sell a small amount of expensive equipment per year. Therefore, not only the firm's relationships with other industrial actors are vital but the firm's own capabilities, such as R&D, technical skills and knowledge, etc.
Internal Capabilities vs. External Capabilities	TSSE suggests that technical capability is one of the most important elements for them, despite limited further opportunities to work with customers; TSSE has managed to have close relationships with research institutions for joint-development. TSSE has learnt and gained valuable resources throughout the interactions.
Industrial SMEs vs. Internationalisation	TSSE's internationalisation process has changed since the firm combined their distribution resources with Aixtron. It is argued that changes within the industrial network/SMEs has resulted in TSSE takes <i>strategic decisions</i> to expand their international business rapidly in order to survive in the fast moving international market place.
Internationalisation vs. The Internet	The case does not have any evidence of how TSSE use the Internet for their initial internationalisation process. However, the findings suggest that the company has adapted the Internet in later stages where they use it mainly for communication. Additionally, the Internet provides TSSE with tighter communication with its parent company. Internet <i>technologies</i> are vital for TSSE at the moment for their international communication.
The Internet vs. Industrial SMEs	TSSE has emphasised that they have strong commitment to advanced Internet communication. However, the future decision is highly dependent on the reaction/trend of the overall industrial networks. In other words, TSSE is competent to use other Internet technologies if their clients want to raise their IT/communication standards.

5.7.2 Summary: Thomas Swan

TSSE was original funded due to the founder's close relationship with academic research, with no intention to expand the company internationally initially. Although the Internet did not have direct impact on the company's internationalisation process initially, it has helped the company in recent years as the Internet is a faster and reliable communication tool for TSSE and their counterparts.

The findings indicate that internal and external capabilities are tightly integrated by having good management practices. Yet, the Managing Director believed that by

having a good understanding of 'culture', it would be a bonus for the company. This has resulted in TSSE insisting on using local agents to encounter different customers from different regions, despite the fact that the firm could possibly abandon their existing sales and distribution channels while using Aixtron's sales and distribution infrastructure after the acquisition.

On the other hand, TSSE argued that technological capability is the most important capabilities as the firm has to maintain technological advantage over their competitors. Hence, the company acquired the level of skills and knowledge which are needed in order to achieve advanced technologies. Additionally, both values and managerial capabilities can be seen as the driver for the organisation according to the Managing Director. This is reflected in how TSSE view the value of technology advances with a robust support network and proven technology, which requires managerial input.

Ultimately, the Internet has provided a platform for TSSE's industrial network to exchange some resources which can be done electronically. From a different perspective, TSSE were likely to keep frequent contact via the use of the Internet with their domestic and international industrial actors which would sustain the relationships once the relationships had been established. Yet, the firm has to recognise the differences in such diverse cultures.

5.8 Case Study Seven: Agar Scientific Ltd.

5.8.1 Company Background: Agar

Established in 1972, Agar Scientific Ltd. (Agar) is a distributor and manufacturer of microscopy-related accessories. The Essex based Agar employs 23 people with an annual turnover of £2.5 millions (figure based from year 2005). In addition, Agar's products can be found in more than 50 countries worldwide.

Table 5.37 Interactions of Agar's Network

Actors	Agents/Distributors	Customers	Suppliers
Activities	Overseas agents and distributors handle Agar's international sales.	UK customer: orders taking and providing direct after-sales support. International customer: only provides technical support if requested.	Supply finishing goods for Agar to distribute. Some suppliers also provide materials for Agar to manufacture.
Resources	Information exchanged, such as market data. Orders taking.	Technical advice.	Information exchanged for product development.
International Interaction	Direct communication with agents and distributors.	No direct involvement, however, Agar provides direct technical support for international customers if they request it.	n/a: no international suppliers involved.

Figure 5.8 Illustration of Agar's Network

↔: Direct Relationship
 →: Indirect Relationship
 (Technical Support)

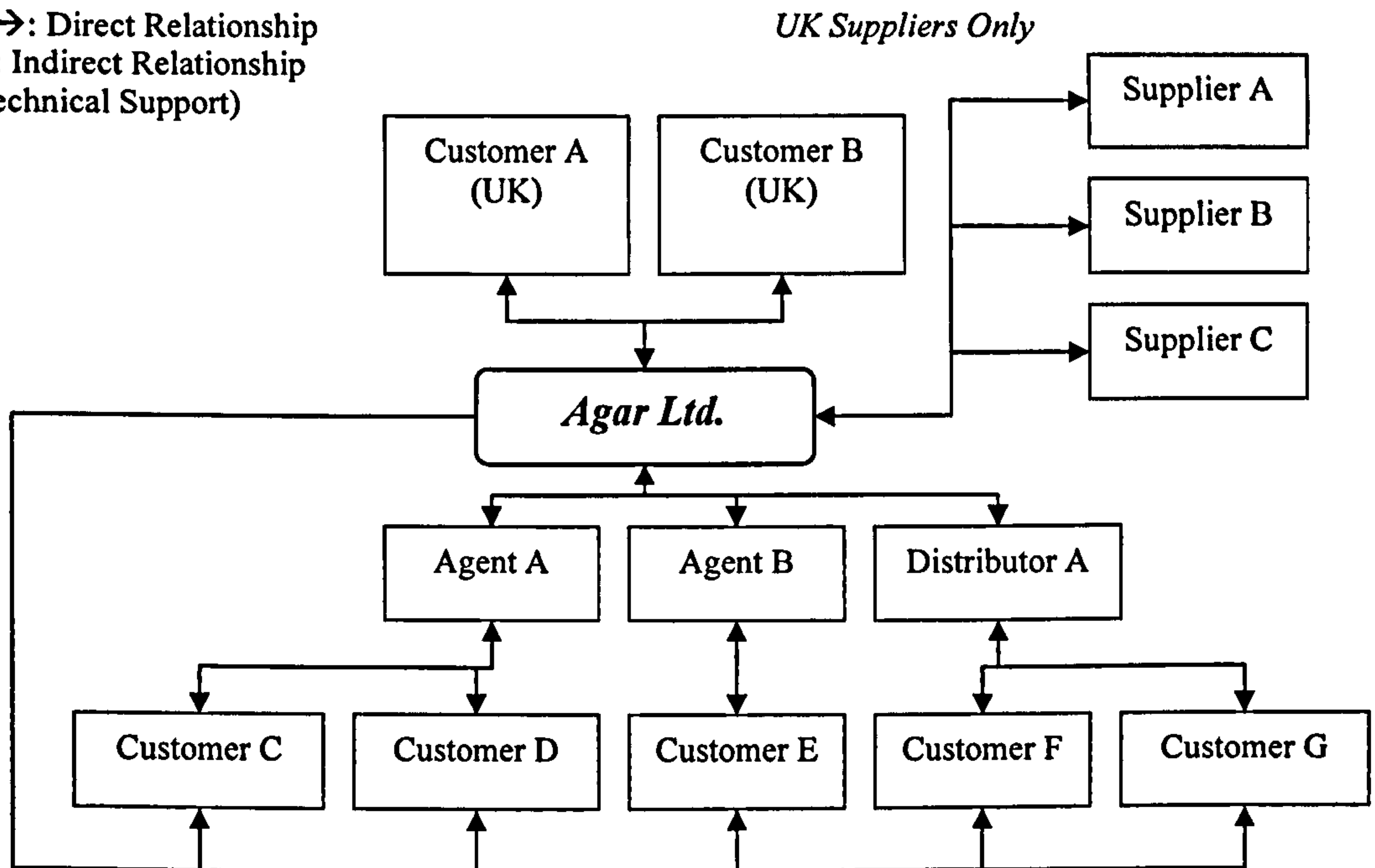


Table 5.38 Agar's Internal and External Capabilities

	External Capabilities with description	Internal Capabilities with description
Skills and Knowledge	The development of 'administration for distribution' as their most important capability. Their ability to select appropriate agents or distributors.	Some research activities, but mainly focused on distribution. Strong experience in their sales team.
Technical Technological	Not technologically focused. However, if customer requires training module, they will provide it if necessary. Use online database for order tracking and account management for their agents and distributors.	Not a technological leading company. However, strong technological knowledge is required by their sales team to provide good after-sale services.
Managerial	Emphasis on the unique service provided by the company. Maintaining good relationships with suppliers, agents and distributors. Development of 'administration for distribution' capability	Responsible for coordinating distribution and selecting appropriate agents and distributors. Maintaining good relationships with their clients.
Values	Service emphasised	Perceives the firm as a distributor manufacturer. Rely heavily on the sales team.

Table 5.39 Agar's International Process

Intention	Markets	Industry	Involvement with
Early focus on international market, through company founder's personal contact with academia and technicians worldwide.	Apart from UK, Europe is the largest overseas market. Also fast expansion to Asia, Far East region in particular.	Universities, Medical (hospitals), Laboratories, etc.	Suppliers, Agents and distributors, direct customers (only in the UK).

Table 5.40 Agar's Internet Activities

Forms of Internet Activities	Description
Website	A very plain website at the moment with brief company background, contact details and product line introduction. However, a separate website link (not via the homepage and is password protected) is given to the agents and distributors, where the link provides much advanced functions such as order tracking, stock level checking and managing accounts.
E-mail	To be used when communication with industrial actors for faster communication. Particularly useful for contacting international clients.
Others	The new website is under construction at the moment with integrated functions such as online order/purchase and downloadable electronic catalogue.

Table 5.41 Forms of Internet and the User Groups

Internet Activities	User Groups
Website	Customers
Website (via a separated link with online order system)	Agents and distributors
E-mail	All

Table 5.42 Key Findings of the Case Seven in relation to the Conceptual Framework

Links	Descriptions
Industrial Network vs. Capabilities	Agar has suggested that to manage its network efficiently, an “administration for distribution” capability is needed. It is because Agar sees itself mainly as a distributor and has less consideration for its manufacturing capability.
Internal Capabilities vs. External Capabilities	To understand the importance of having appropriate agents/distributors to represent the firm, Agar has created its unique selection and understanding of distribution process. Although the firm has its own production line, there is no strong evidence of how it integrates internal and external capabilities. It was suggested that the product line and the product quantity are small and have no great influence over the overall business.
Industrial SMEs vs. Internationalisation	Agar has early focus on the international market as the founder has international contacts. It is argued that the firm has extended their international focus throughout the years. Recently, the firm has decided to expand its Internet competence in order to satisfy increasing demand, which can be seen as a <i>strategic approach</i> .
Internationalisation vs. The Internet	There is no indication of how the Internet influences Agar’s internationalisation at the early stage. However, the firm has introduced the Internet communication slowly in order to have the same communication method as their counterparts. To sum up, the Internet can be perceived as a communication <i>technology</i> that allows the firm to spend less time and have frequent contacts with their counterparts, in return to secure their positioning in the international market.
The Internet vs. Industrial SMEs	Agar has benefited from faster communication with the use of the Internet, and decided to expand the company’s Internet technologies. Therefore, it was predicted that the firm’s Internet <i>competence</i> would have impacts towards their international business.

5.8.2 Summary: Agar

The case presented shows that the relationship between internationalisation and the Internet can be perceived as a communication tool which speeds up the process for the firm’s international business activities. On the other hand, the relationship between the Internet and industrial SMEs can be concluded as the firm’s competency to use the Internet, which contributes to international activities. Finally, the relationship between industrial SMEs and internationalisation is said to be a focus rather than a strategy, due to the intention of internationalisation initially; however, the firm started to

increase its Internet competence for further international business, so it can be argued as a strategic decision.

Conversely, the activities and resources within Agar's industrial network have been driven by the firm's capabilities to coordinate with different tasks accordingly. Furthermore, the findings suggest that internal and external capabilities were decidedly associated with each element of the capabilities. In addition, the case also introduced a new term of "administration for distribution" capability, as the interviewee has constantly mentioned and suggested it is vital for Agar as they are not only a manufacturer, but also a distributor. The key findings of this case study in relation to the conceptual framework can be summarised in Table 5.42.

5.9 Case Study Eight: Accent Optical Technologies

5.9.1 Company Background: Accent

The name Accent Optical Technologies (Accent) was formed in the year 2000 with the acquisition of Bio-Rad semiconductor measurements division. Although Accent's worldwide headquarters was currently based in the USA, it was originally based in York, UK. Even now, Accent in York is still the core foundation of Accent as it is the European headquarters and the worldwide manufacturing headquarters.

In 2006, Accent (2006) employed in the region of 200 people, in comparison with the figure in 2005 when the company employed 230 to 240 people worldwide including 150 workers based in the UK. Although there was no figure available for Accent's 2006 annual turnover, the 2005 figure was approximately £28 millions. Accent has two major divisions, silicon metrology group and lattice engineering group, which are both mainly involved with the semiconductor industry.

Table 5.43 Interactions of Accent's Network

Actors	Agents/Sales representatives	Customers	Suppliers	Others (wholly-owned subsidiaries)
Activities	Sales and marketing coordination.	Sales and orders taking. Some customers have joint-programmes with Accent. Provide direct technical support.	Materials supplied from the suppliers. Accent assists their suppliers to design production goods from time to time.	Mainly sales and marketing oriented tasks. HQ in the UK would provide support to their overseas' offices.
Resources	Exchange market and customers' information.	Exchange information that is needed for joint-programmes.	Exchange resources mainly on technical and engineering issues.	Internal information and human resources exchanged.
International Interaction	Accent still relied on agents to handle their international business.	Most of the customers were international based.	Most of the suppliers were based overseas.	n/a

Figure 5.9 Illustration of Accent's Network

↔: Direct Relationship

→: Indirect Relationship, with limited involvements

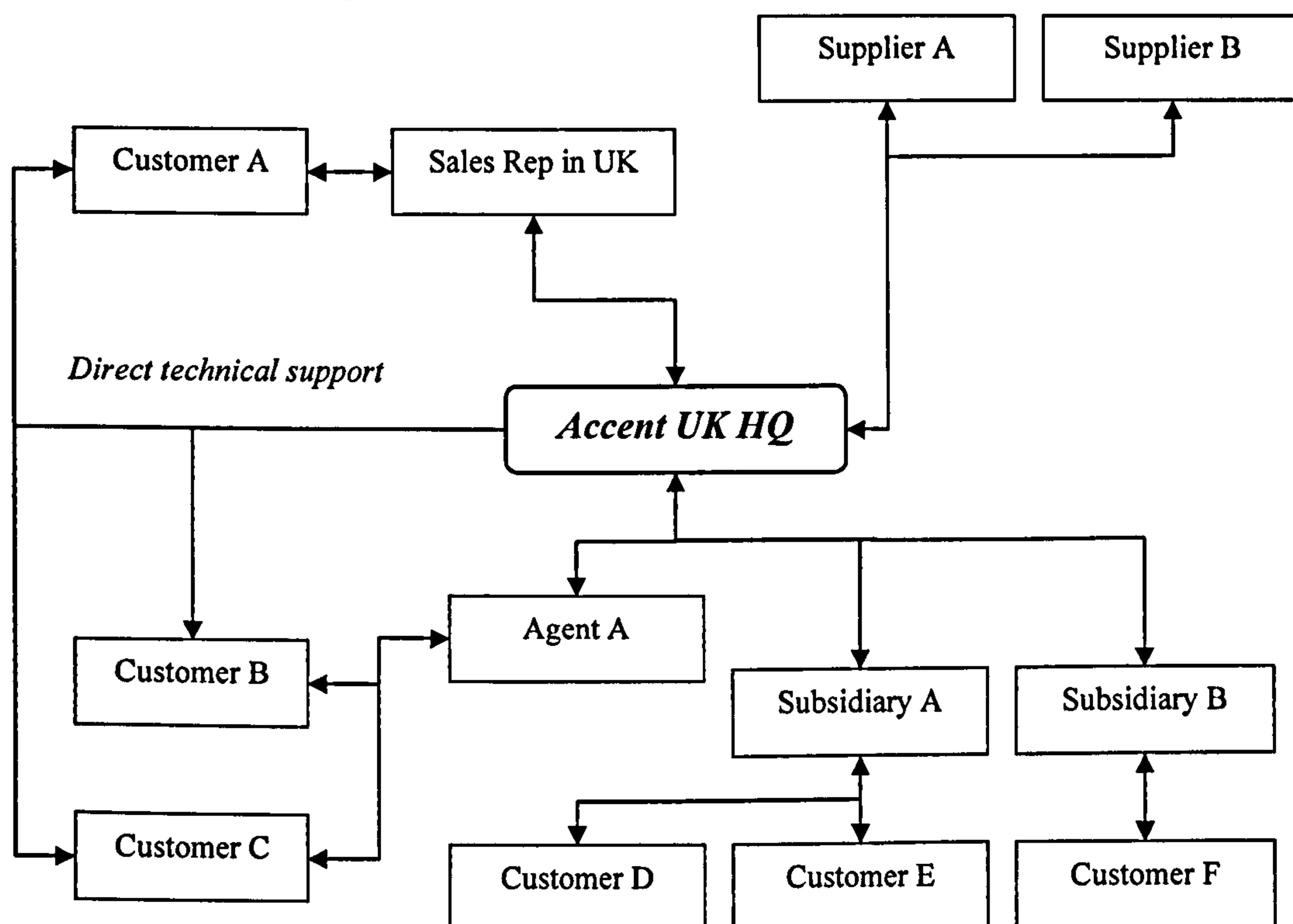


Table 5.44 Accent's Internal and External Capabilities

	External Capabilities with description	Internal Capabilities with description
Skills and Knowledge	R&D activities with suppliers and customers. Joint-development with other components suppliers (customers would need to get the products from Accent and their components suppliers).	Integration of new skills and knowledge gained externally with existing capability. Direct support to their customers.
Technical/Technological	Work closely with other industrial actors and have collaboration activities: equipment compatible issue.	Aware of short product life cycle in the semiconductor industry, rate of innovation. Invested in their Internet infrastructure, for different level of Internet services across different actors or internal organisation.
Managerial	Acquire external organisations and strengthen the firm's skills and knowledge.	Maintaining good relationships, face-to-face communication. Keep an eye on the industrial development.

Values	Learning through R&D activities and acquisition.	From technological driven to profit driven. Understand the importance of capabilities integrations.
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Table 5.45 Accent's Internationalisation Process

Intention	Markets	Industry	Involvement with
No intention to expand to international market initially. Instead, the firm has grown with the market.	UK, Europe, USA and Asia Pacific regions. Accent has followed their customers and expanded the market to other developing countries such as China and Malaysia.	Semiconductor, Universities and Research Institutions.	Agents, Sales Representatives, Suppliers and Customers for direct technical support.

Table 5.46 Accent's Internet Activities

Forms of Internet Activities	Description
Website	A multi-functional website with information such as company history, product, press releases, investor relations, customers support, etc. The website also can transcribe into 4 different languages: English, Chinese, Japanese and Korean. Occasionally, selected customers or suppliers would be given a separate website link with password; this enables Accent's clients to access the firm's database to download confidential material or large files that it is not permitted to send as an attachment in the e-mail.
E-mail	E-mail is the main communication method for Accent to contact their clients. E-mail is also being used for handling day-to-day business communication.
Video Conference	The video conference facility is purposely built for internal communication between Accent and their subsidiaries. This allows the firm to hold a virtual face-to-face meeting across different locations.
VoIP	Accent has been using VoIP extensively for their internal communication. The employees would use VoIP to contact someone who works from home or at a remote location. The firm uses VoIP to contact some of its clients as well, as long as these clients have the capacity to use VoIP to communicate.
VPN	As an integrated Internet infrastructure, Accent's employees can log on from any location with the Internet connection to access the firm's database and to exchange files.

Others	Accent also uses the Internet to perform online purchasing for some particular components (less complicated and less cost concerned products). In addition, Accent uses the Internet for information searches such as competitors' information and overall industrial trends, as well as to access suppliers' websites for technical solutions.
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Table 5.47 Forms of Internet and the User Groups

Internet Activities	User Groups
Website	All
E-mail	All
Video Conference	Mainly Accent's subsidiaries
VoIP	Mainly Accent's subsidiaries; Customers
VPN	Mainly Accent's subsidiaries; Some suppliers or customers can gain access through a separate link with password protection
Others (Internet connection)	Accent; Suppliers (for purchasing and information search)

Table 5.48 Key Findings of the Case Eight in relation to the Conceptual Framework

Links	Descriptions
Industrial Network vs. Capabilities	The interactions between Accent and their actors are highly interactive. Apart from the firm having its own foreign subsidiaries handling clients in certain regions; it also employs agents to handle its international sales. Additionally, Accent has strong involvement with its customers and suppliers such as joint-development programmes.
Internal Capabilities vs. External Capabilities	Internal and external capabilities are highly associated and have influences on each other, typically technological skills and knowledge; furthermore, the level of the capabilities has an effect on the activities and resources exchanging within the network.
Industrial SMEs vs. Internationalisation	The case suggests that industrial market movement has a huge impact on the firm's internationalisation decisions. The firm has to expand and establish its own facilities to cope with the demands, in this case, the industry shifted from the West to the East, where Accent has its subsidiaries. It is argued that the internationalisation decision is <i>not only the strategic decision but market influences</i> , such as demands.
Internationalisation vs. The Internet	The Internet has assisted the firm to fasten their communication within its network, which is vital as an international company. Although it can be argued that the Internet has contributed to Accent's international activities, there is no evidence to suggest that the Internet has any direct influences

	when the firm decided to go to international market. It can be said that Accent views the Internet as another form of <i>communication tool</i> .
The Internet vs. Industrial SMEs	Accent has demonstrated how it applies the Internet to their international business to a certain extent. Nevertheless, that is due to the firm investing heavily in its Internet infrastructure. Therefore, it can be said that the firm's commitment and decision on the usage of Internet technologies is vital, which arguably is the company's <i>competence</i> .

5.9.2 Summary: Accent

Although Accent internationalised before the adoption of the Internet, the Internet has proven its usefulness for the firm's current business activities by shortening the time of communication. Since the firm was constantly expanding, it is argued that the Internet is to be perceived as a technology in assisting the firm's international business. Nevertheless, the degree of Internet usage was highly dependent on the firm's commitment. In the case of Accent, the firm has heavily invested in their Internet infrastructure.

According to the research findings, it can be argued that Accent has been following the stages within the Uppsala internationalisation model; however, the differences were the intention of the internationalisation. Accent's internationalisation decision was due to the fact that the demand for its product has been shifted from the West to the East. Thus, in order to survive, the firm were forced to expand its business activities into the international arena. Table 5.48 is the summary of the key findings of this case study in relation to the conceptual framework.

5.10 Case Study Nine: Crystran Ltd.

5.10.1 Company Background: Crystran

Crystran Limited (Crystran) was a small optical engineering company specialising in fabricating components from materials such as crystals and glasses etc. The company was joint-founded in December 1993 by the current management team which has brought its skills and knowledge from its former employer, BDH Chemicals. Currently, the Dorset-based company has 19 employees in total with an annual turnover of £1.6 million (based on year 2005 figure) and about 60% of their business accounted for in international sales.

Table 5.49 Interactions of Crystran's Network

Actors	Customers	Suppliers	Others (including informal contacts and sub-contractors)
Activities	Crystran have direct business with customers. Currently international sales occupy 60% of the firm's total sales.	Orders materials. Sometimes those suppliers are positioned as the customers, vice versa.	Some of the customers act as informal agents who take orders from other customers. Sub-contractors are also used depending on the complexity of orders.
Resources	Mainly orders taking and some joint-development which involves technical and human resources.		Share information with informal agents. Outsourcing for sub-contractors.
International Interaction	Direct communication with their customers.	Have suppliers both from the UK and overseas.	Crystran relies on informal agents for part of their international sales where these informal agents have better local knowledge.

Figure 5.10 Illustration of Crystran's Network

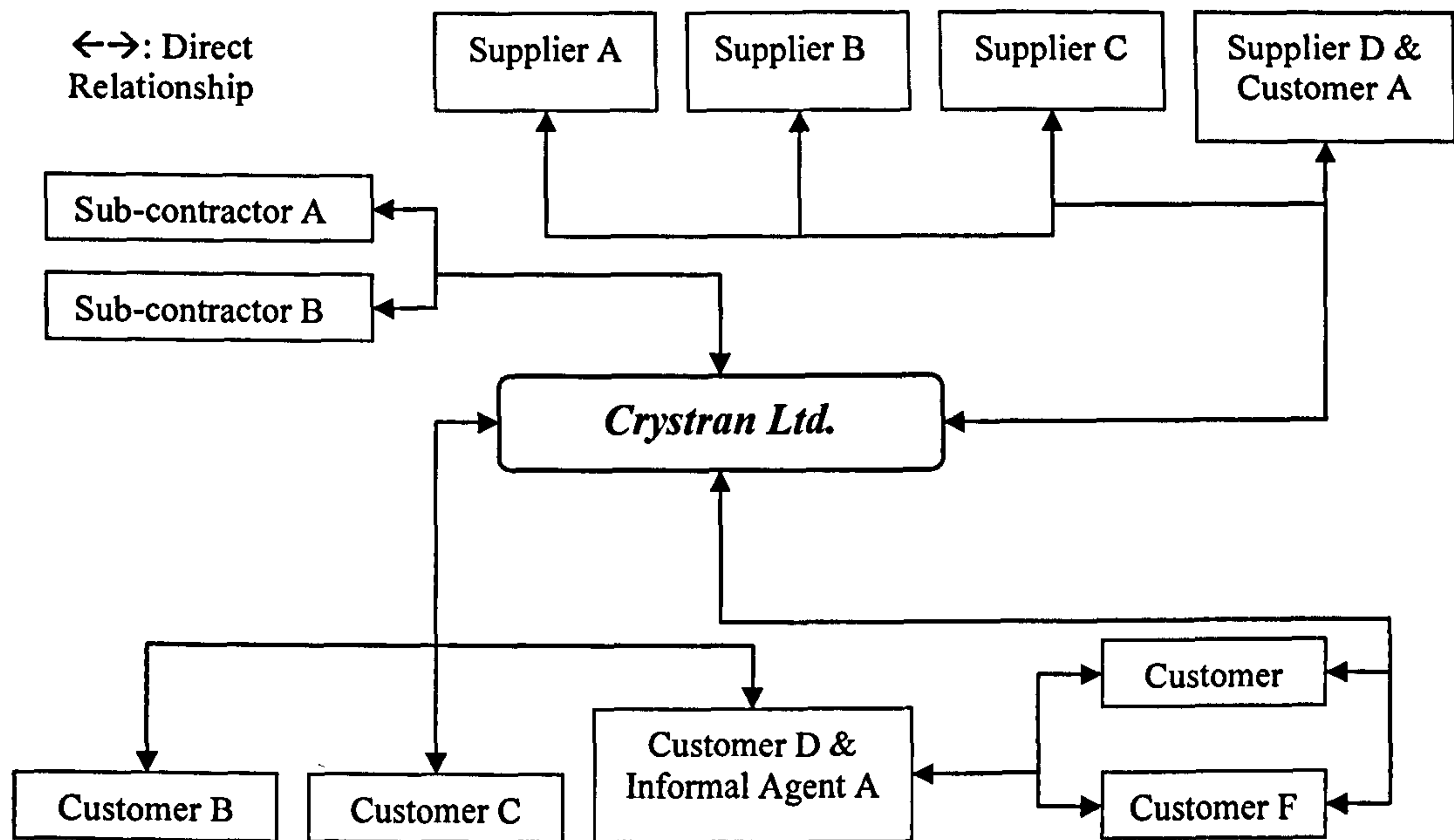


Table 5.50 Crystran's Internal and External Capabilities

	External Capabilities with description	Internal Capabilities with description
Skills and Knowledge	Exchange visits and external training courses for the skills and knowledge required.	In-house training.
Technical/Technological	Exchange activities to ensure the firm has the same level of manufacturing process with others.	Integration of the skills and knowledge gained externally with own technological knowledge.
Managerial	Work closely with informal contacts/agents. Provide direct communication.	Annual appraisal system for staff's knowledge updates. Understand own capabilities, both machinery and employees.
Values	Trust and honesty.	Honesty as their core belief.

Table 5.51 Crystran's Internationalisation Process

Intention	Markets	Industry	Involvement with
Have early focus on the international market. International businesses were created through personal contacts from former job.	International sales have been increased from 30% to 60% currently. The market includes most of developed and developing countries.	Crystal and Optical.	Suppliers, Customers, Sub-contractors. Some customers are also acting as informal agents.

Table 5.52 Crystran's Internet Activities

Forms of Internet Activities	Description
Website	A single page of webpage initially with basic company information. The firm has been developing its website since with more information and other functions such as file downloads. In addition, users need to register an account if they want to download any files which allows Crystran to monitor who has been using the file and how popular are certain files.
E-mail	E-mail has been used since the establishment of Crystran; currently e-mail occupies most of the communication, as commented by the interviewee that their communication is "almost exclusively by e-mail".
Others	The firm recommended that it has the ability to use much advanced Internet functions, such as VoIP, video conference or even online purchase. However, it is not interested in these advanced functions at the moment since it is not cost effective and is not suitable for their business.

Table 5.53 Forms of Internet and the User Groups

Internet Activities	User Groups
Website	All, including general public
E-mail	All

Table 5.54 Key Findings of the Case Nine in relation to the Conceptual Framework

Links	Descriptions
Industrial Network vs. Capabilities	The interactions within Crystran's network depends on the level of interactions, in this case, the firm decided to handle all its relationships directly as it believe it has all required capabilities to do so.
Internal Capabilities vs. External Capabilities	There is no major difference between internal and external capabilities; however, they are highly associated with each other. A lot of activities or resources exchanged depend on the level of interactions requiring different skills and knowledge, technical capacity, management decisions and the firm's beliefs or attitudes.
Industrial SMEs vs. Internationalisation	<i>A strategy.</i> The firm did not follow a sequential pattern to be an international company. Although the case company does not have surplus resources at the early establishment, it is comfortable using existing contacts and using e-mail to communicate with its customers.
Internationalisation vs. The Internet	By adapting and using Internet technologies since the beginning, the firm has taken advantage of cheaper communication methods which allow the firm to keep its cost down and its decision to communicate with their clients directly. It can be said that the relationship between internationalisation and the Internet is due to the advance <i>technology</i> .
The Internet vs. Industrial SMEs	The case company has demonstrated a good example of how <i>competent</i> the firm is by using the Internet to deal with its clients directly. In return, Crystran maintains and keeps expanding in the international markets and has saved large communication costs.

5.10.2 Summary: Crystran

In the case of Crystran, there were strong links between their internal and external capabilities, especially where skills and knowledge, technical and technological capability, managerial attitudes and decisions were highly associated with each other, which can be argued is based on the company's values. Additionally, the firm has

extended their business activities with other actors and has been experiencing a series of exchanges of activities and resources.

The company had an early focus on international business, and they have taken advantage of the Internet since, in this case website and e-mail. It can be said that the relationship between the industrial SMEs and the Internet within the conceptual framework is the firm's know-how of using the Internet as their communication tool; in other words, Crystran have the competence to use the Internet to their advantage.

The relationship between the industrial SMEs and Internationalisation within the conceptual framework can still be described as 'strategy'. The firm has demonstrated that it does not have to follow the sequential stages which are suggested by the Uppsala model to be an international company, nor did Crystran have surplus resources to ignore the sequential development. Instead, Crystran has been taking care of their international customers directly by cost effective communication, which is e-mail. In addition, with trust developed between Crystran and its customers, some of its customers have been acting similarly as their agent, but without any formal agreement.

Nevertheless, the relationship between the Internet and Internationalisation in the conceptual framework can still be described as 'technology'. It is because the Internet was being perceived as a communication tool that allowed Crystran to contact their actors and to arrange various activities or to exchange information. Since the firm has taken the Internet at early stage, it can be argued that the Internet has assisted Crystran's communication strategy when deciding how to deal with both domestic and international customers directly. Table 5.54 is a summary of the key findings in relation to the conceptual development.

5.11 Case Study Ten: Purimachos Ltd.

5.11.1 Company Background: Purimachos

The history of Purimachos Ltd. (Purimachos) can be traced back to 1882 where the founder founded the firm based on a formula for making fire/heat resistance cement. Over time, Purimachos also developed industrial refractory material and a number of rapid setting cements for industrial, trade and DIY markets. The firm has been located in Bristol since its establishment and is one of the three major fire resistance cement manufacturers in the UK. Although the firm has faced a management buy-out back in 1996/7, it has maintained its tradition and did not have any changes in terms of organisation structure or its core product. The company has 20 employees with an annual turnover of about £1.4 million (figure based from year 2005).

Table 5.55 Interactions of Purimachos' Network

Actors	Agent	Supplier	Customer
Activities	Marketing related activities, export goods.	Purchase raw materials and supplier could also produce finished goods and asked Purimachos to sell as their distributor and vice versa.	Two types of customer: retail distributor and individual B2B trading company. Direct support and have the ability to produce customised products.
Resources	n/a	Exchange finished goods and branded as others.	Retail distributors were the main customers where they provided most of the firm's financial resources.
International Interaction	Based in Sri Lanka and was the only agent that Purimachos currently using.	Some materials were sourced from overseas for cheaper costs.	Direct dealing with customers overseas, except Sri Lanka. Technical and marketing activities involved.

Figure 5.11 Illustration of Purimachos' Network

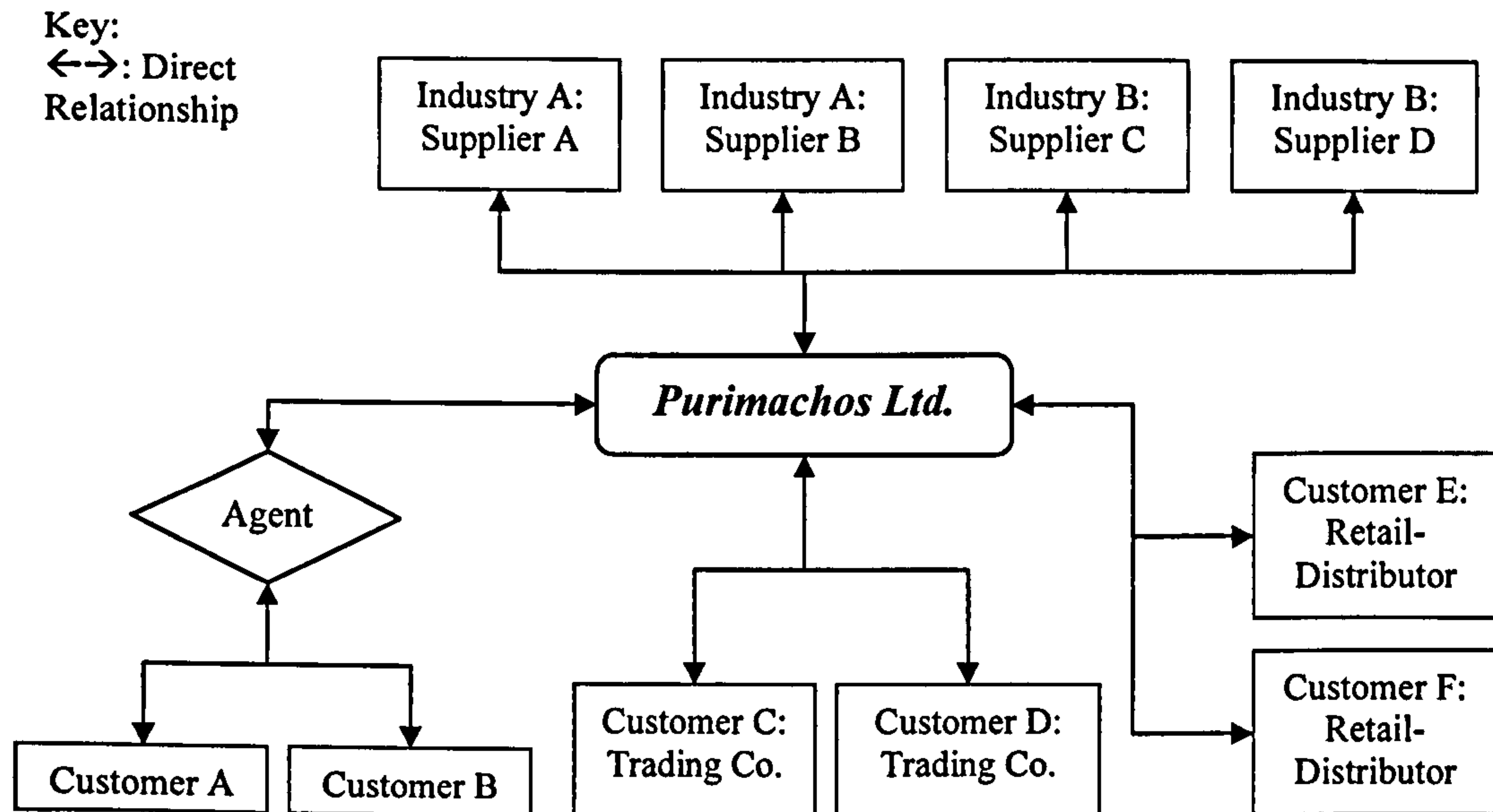


Table 5.56 Purimachos' Internal and External Capabilities

	External Capabilities with description	Internal Capabilities with description
Skills and Knowledge	Based on the internal skills and knowledge capability, the foundation of cement formula.	The foundation of cement formula.
Technical/Technological	Limited technological issues involved. Provide direct technical support for the customers.	Limited technical or technological involvement for manufacturing process. Limited Internet development due to limited internal demand.
Managerial	Adaptation of different business procedures for different clients.	Lack of financial support. Understand own capabilities, both machinery and employees.
Values	Production flexibility	Passive attitude, no aggressive market expansion.

Table 5.57 Purimachos' Internationalisation Process

Intention	Markets	Industry	Involvement with
Forced by the reducing demand of domestic market.	Majority were Commonwealth countries, now expanding to European countries.	Steel, Foundry, Ceramic, Oil refineries and Cement, etc.	Most were direct communication between the firm and their customers. Only one agent used for Sri Lanka market.

Table 5.58 Purimachos' Internet Activities

Forms of Internet Activities	Description
Website	A basic website with company and product information provided. An online feedback survey was also used as part of the website design for quality assurance purposes. However, the website was designed in-house with very limited IT skills.
E-mail	E-mail is the best communication method apart from the face-to-face communication. E-mail significantly reduced the errors that would occur if telephone communication was used.

Table 5.59 Forms of Internet and the User Groups

Internet Activities	User Groups
Website	Potential and existing customers, B2B basis
E-mail	Suppliers; Agents; Potential and existing customers

Table 5.60 Key Findings of the Case Ten in relation to the Conceptual Framework

Links	Descriptions
Industrial Network vs. Capabilities	The case company has a number of activities and resources with different actors within the network. Despite the firm having some degree of power over their suppliers, they have unbalanced power over their customers. This is largely due to the purchasing power and demand of their main customers, which are retail distributors.
Internal Capabilities vs. External Capabilities	Internal capabilities were the key drivers influencing the firm's external capabilities. For instance, the skills and knowledge of the cement-making formula were the foundation of the firm; this is where most of their other capabilities derived from. Another example would be the internal value capability, where the firm did not intend to aggressively expand to international market. This has caused the firm to be laid back and achieves the basic goal of making enough earnings for the firm and their employees.
Industrial SMEs vs. Internationalisation	The internationalisation decision initially was based on direct communication from the customers overseas; however, the firm never really fully explored the potential of international markets. Nevertheless, the recent decision of a much more proactive attitude towards international markets was due to the realisation of limited domestic market development. Therefore, it could be argued that the recent international activities were <i>strategically planned</i> .
Internationalisation vs. The Internet	The Internet was perceived as a <i>communication technology</i> with the expectation of higher overseas inquires as the website can be functioned as a cheaper alternative for advertising. Other forms of Internet that have not been adopted were still under assessment; it would be based on future demand and the firm's IT competencies.
The Internet vs. Industrial SMEs	Although the firm only has limited IT and Internet usage competencies, it was closely monitoring the industrial trend of Internet development. Nevertheless, the final decision would be based on the assessment of the firm's financial capability and the usage demand. Additionally, the overall confidence of handling communications (security issue) and other means of activity (online order, transaction) would need further evaluation in accordance with the case firm's core capabilities.

5.11.2 Summary: Purimachos

It was evident from this case study that the firm was constrained by different actors within the network, for instance, the unbalanced power between Purimachos and its customers where the firm barely had any power over the decisions of the preferred

business communication process, as well as the risks of losing the majority of their sales. This can be also interpreted as why the case realised the need to explore international markets. Also, each activity and resource exchanged between the case company and its suppliers would change accordingly to different scenarios. In other words, a supplier could become Purimachos' distributor in the case where the supplier decided to sell Purimachos' products. This has corresponded with the industrial network theory where actors exchange different activities and resources constantly for different purposes (Johanson and Mattsson, 1988).

Both internal and external capabilities also had significant influence over how the company operated, furthermore, this case study showed that the product types and the nature of the industry would also have influence over the company's capabilities. For instance, the cement industry is one of the traditional industries where the rate of innovation is slow which had a direct impact on the firm's R&D activities, which also led to fewer resources required.

In terms of the relationship between the Internet and internationalisation, the findings suggested that the Internet does not necessarily drive Purimachos for their international expansion. It was because the management realised the need to expand to foreign markets due to limited domestic sales, thus, the management was hoping to use the Internet not only as a communication tool, but to be a cheaper alternative for raising the company's publicity (advertising) internationally. It is also fair to suggest that the Internet was being perceived as a type of communication technology that could assist the firm to have accurate and faster communication.

This case study has indicated that a firm's Internet development is not only due to the firm's financial considerations, but the demand of usage which has direct reflections in terms of product types and nature of industry. In addition, the management's considerations over Internet security have further influences due to the firm's IT capacity and competence. Table 5.60 is the key findings of this case study in relation to the conceptual framework.

5.12 Conclusion

This chapter has presented the key data with summaries for each case company. All of the data shown in this chapter are used for the cross-case discussion in the next chapter, where the findings will be discussed in relation to the conceptual framework. This will lead to the finalised framework and its applications.

CHAPTER SIX: CROSS-CASE ANALYSIS - INTERPRETATION OF INTERNET CONTRIBUTION AND NETWORK ACTIVITIES

6.1 Introduction

The purpose of this chapter is to investigate the research data from a different perspective (horizontally) rather than intra-case analysis (vertically). This chapter also reviews the research data from the previous chapter in relation to the conceptual framework. The outcome of this chapter leads to the completion of the finalised conceptual framework.

To begin with, the analysis of manufacturing SMEs' networks led to further relevant discussions. Analysing industrial actors and their network activities with different types of network resource involved assisted the researcher with expanding and integrating the discussion on the manufacturing SMEs' capabilities. Finally, the analysis investigated the relationships between each research theme (Manufacturing SMEs, The Internet and Internationalisation) from a network approach. For detailed cross-case analysis structure and methods, please refer to Chapter 4.4.2.2 and 4.7.

6.2 Manufacturing Network Actors

Within a manufacturing SME's network, some common network actors have been identified. These network actors included: supplier, agent, customer, business partner and competitor. The '*supplier*' was referred to as an individual or a company that provided parts, components and relevant resources needed for the manufacturing SME in order to complete the production process. '*Agent*' was another actor that commonly appeared in the researched case companies. Agent was defined as an individual or a company that has a formal business agreement with the manufacturing SME for arranging overseas' business activities. In addition, the manufacturing SME would provide sales support for their agent, such as marketing materials, etc.

'Customer' was the third actor within a manufacturing SME's network. Customer was referred to as an individual or a company that purchases goods from the SME, which included distributors. The researcher's intention to categorise the distributor within the customer section was due to the distributor being perceived as part of the manufacturing SME's customers. Another actor within a manufacturing SME's network was 'business partner'. Business partner was defined as an individual or a company that has close associations with the SME in terms of activities, such as joint-development and strategic alliance. Research institution was also categorised within the business partner dimension, this was because the manufacturing SME relied on research institution for product development or joint-research; thus, research institution was in a relationship of working/co-working partner.

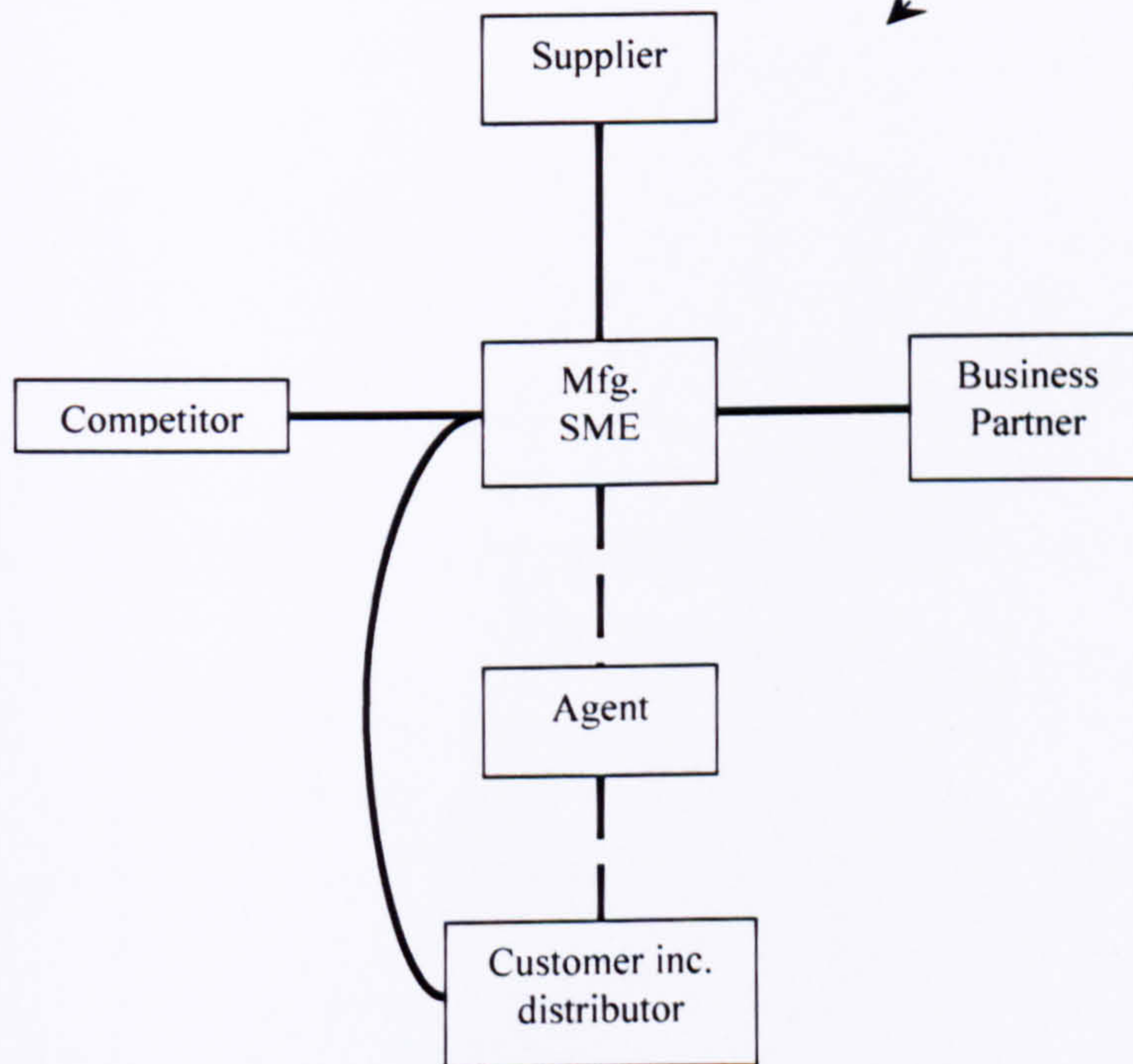
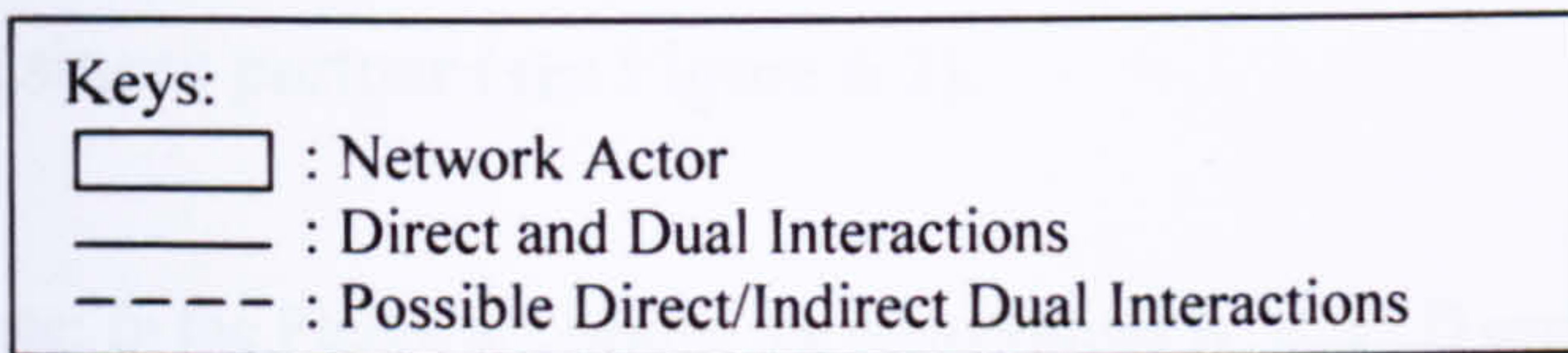
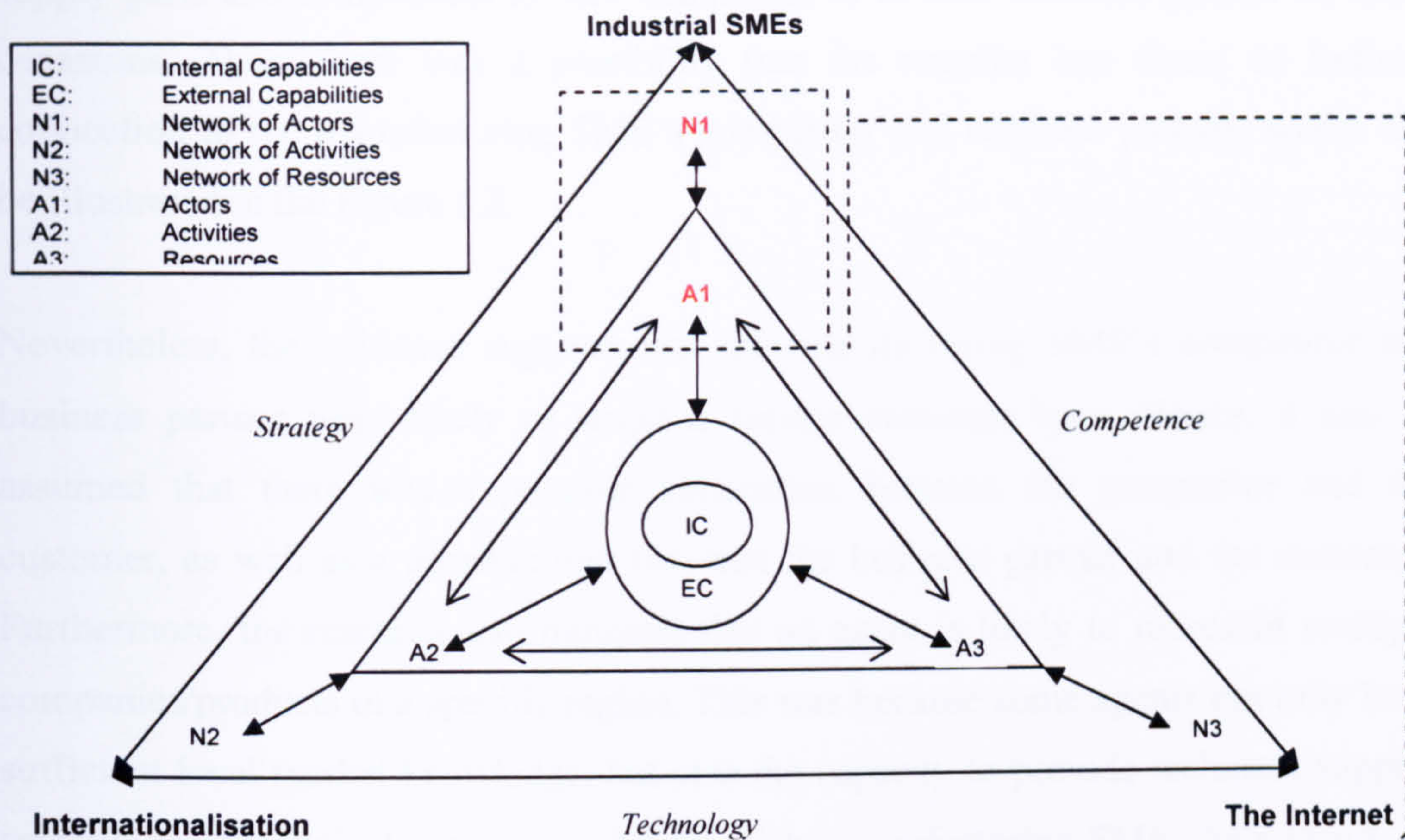
Finally, the 'competitor' was the last actor within a manufacturing SME network. The competitor was defined as a company which is in the same industry as the SME, which involved both direct and indirect competition. Direct competition referred to a competitor whose product is competing with the manufacturing SME in the same market. Indirect competition was to be perceived as the competitor based on the technology instead of their final product. On some occasions indirect competition applied to the situation where two competing firms did not have direct competition but have indirect competition, for example, UK-based firm whose technology is competing with a USA firm, where they may or may not have direct competition in the same market/region.

It is important to note that actors within the manufacturing SME network may change their roles due to various reasons over time. For instance, a supplier could be treated as a competitor if that supplier started involving business activities, such as marketing and sales, within the SME's territory. Another scenario is when a business partner was taken over by the competitor and that business partner was then categorised as the SME's competitor. This suggests that the dimension of A1 and N1 within the original conceptual framework need to be expanded as illustrated in Figure 6.1. Specifically, the links between the manufacturing SME and its supplier, business partner and competitor reflect the business environment, where the manufacturing SME would have direct connection with its supplier, business partner and competitor. In the case of agent and customer (included distributor), where the manufacturing SME may or

may not have direct contact with the customer or employed agent or/and distributor, these connections are illustrated with dotted lines.

Note: Abbreviation for “Manufacturing SME” is used as “Mfg. SME” in Figure 6.1 to 6.10.

Figure 6.1 Network Actors 1: Manufacturing SME's Perspective

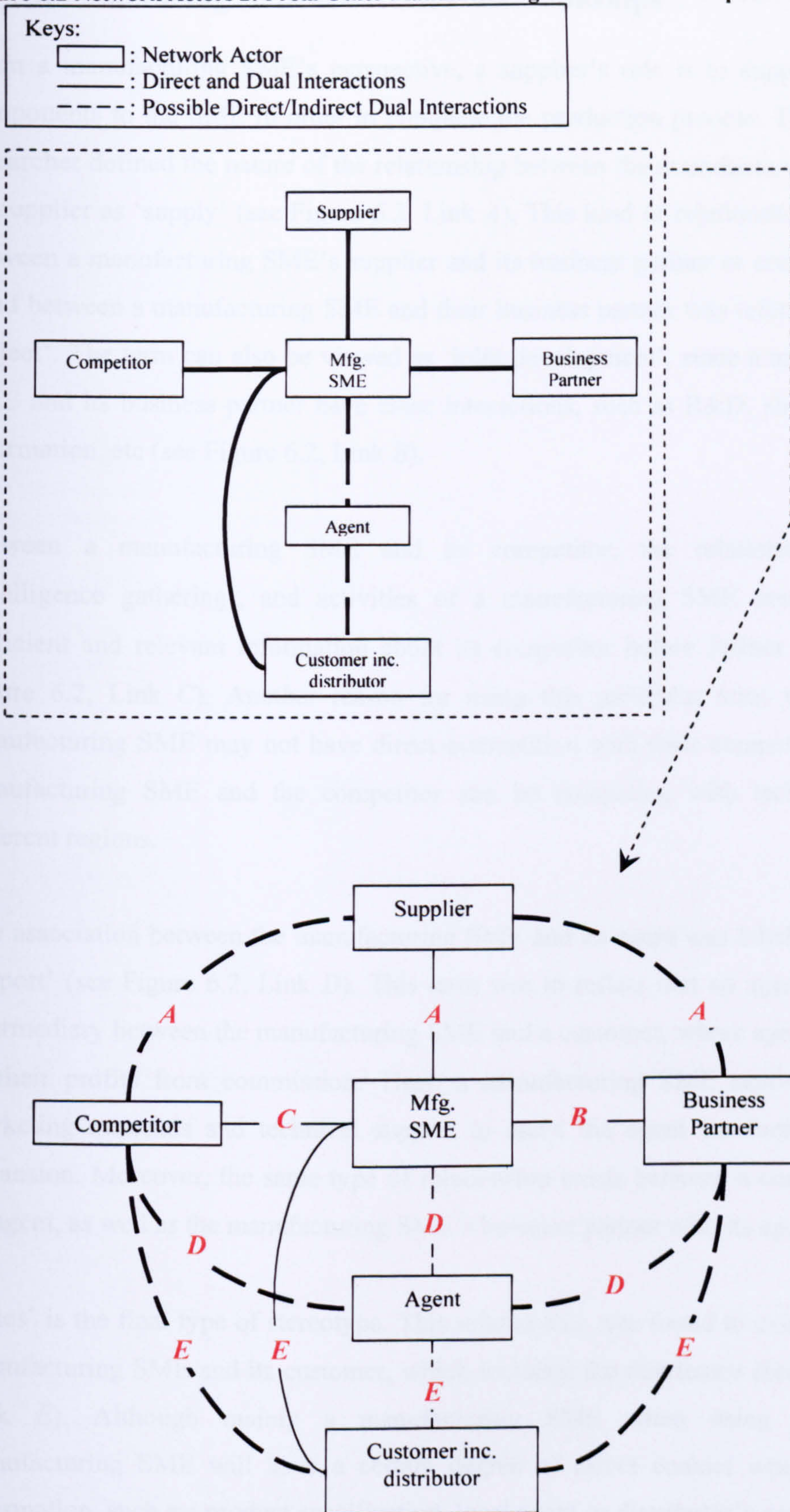


According to the research findings, a manufacturing SME's supplier could possibly supply parts and components to their competitor or to their business partner on some occasions. Thus, there was a possibility that the supplier has direct or indirect connection to the manufacturing SME's competitor and business partner, which can be illustrated in the Figure 6.2.

Nevertheless, the evidence suggests that the manufacturing SME's competitor and business partner were likely to target a similar customer base. Hence, it can be assumed that there was a possible connection between the competitor and the customer, as well as a possible link between the business partner and the customer. Furthermore, the research also indicates that an agent is likely to represent multiple companies/products in a specific region. This was because some agents not only have sufficient local market knowledge, but also the capacity to provide technical support (mostly basic technical support) on behalf of the manufacturing SME. As a result, an agent could have connection with both the manufacturing SME's competitor and business partner (see Figure 6.2).

Note: In the Figure 6.2 below, the relationships A, B, C, D and E are explained in Chapter 6.3.

Figure 6.2 Network Actors 2: From Other Manufacturing SME Actors' Perspective



6.3 Manufacturing Network Actors' Relationships

From a manufacturing SME's perspective, a supplier's role is to supply parts and components to the SME in order to complete the production process. Therefore, the researcher defined the nature of the relationship between the manufacturing SME and its supplier as 'supply' (see Figure 6.2, Link *A*). This kind of relationship also exists between a manufacturing SME's supplier and its business partner or competitor. The bond between a manufacturing SME and their business partner was referred as 'joint-project'. The term can also be viewed as 'joint development', since a manufacturing SME and its business partner have close interactions, such as R&D, sharing market information, etc (see Figure 6.2, Link *B*).

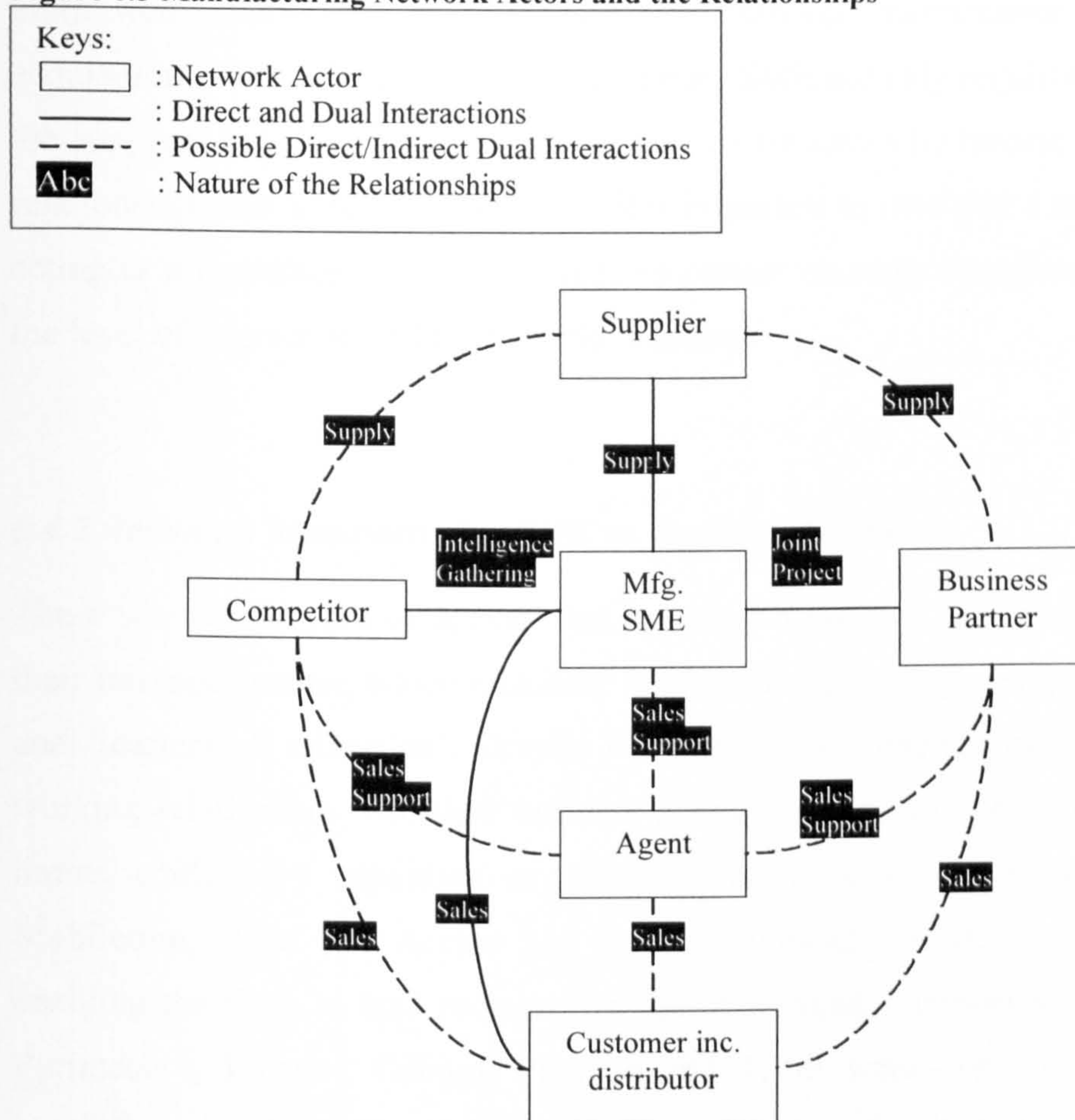
Between a manufacturing SME and its competitor, the relationship enables 'intelligence gathering', and activities of a manufacturing SME need to gather sufficient and relevant information about its competitor before further actions (see Figure 6.2, Link *C*). Another reason for using this particular term was that the manufacturing SME may not have direct competition with their competitor, as both manufacturing SME and the competitor can be competing with technologies in different regions.

The association between the manufacturing SME and an agent was labelled as 'sales support' (see Figure 6.2, Link *D*). This term was to reflect that an agent acts as an intermediary between the manufacturing SME and a customer, where agents earn part of their profits from commission. Thus, a manufacturing SME needs to provide marketing materials and technical support to assist the agent for further business expansion. Moreover, the same type of relationship exists between a competitor and an agent, as well as the manufacturing SME's business partner with its agent.

'Sales' is the final type of stereotype. This relationship was found to exist between a manufacturing SME and its customer, which included the distributor (see Figure 6.2, Link *E*). Although mainly a manufacturing SME when using agents, the manufacturing SME will have a certain degree of direct contact when providing information, such as: product specification, local agent or distributor's contact details, etc. On some occasions, customers seek after-sales support directly from the

manufacturing SME if the agent or distributor is not capable of meeting a customer's demands. Therefore, the 'sales' relationship incorporates: pre-sales services, production consultation and after-sales services. The relationship between an agent and the customer can also be argued as a form of sales relationship due to an agent carrying out similar activities, such as pre-sales services, consultation and some level of technical support. Figure 6.3 below is an extended version of Figure 6.2, with the categorisation of relationships specified.

Figure 6.3 Manufacturing Network Actors and the Relationships



6.4 Manufacturing Network Actors and Their Activities

Different actors are involved within a network with different activities which contribute to parts of the manufacturing SME's operation. This section will address some key activities that exist between a manufacturing SME and their actors from the

basis of Figure 6.3 and the concept of Håkansson and Johanson's (1992) basic structure of industrial networks. The discussion for this section is subdivided according to different network actors.

6.4.1 Activities: Manufacturing SME vs. Supplier

Different actors are involved within a network with different activities which contribute to parts of the manufacturing SME's operation. The findings showed that there were mainly two types of activity: 'resource maintenance' and 'resource acquisition'. This is because the manufacturing SME not only requires resources from the supplier, but also maintains and secures the resources by having a good working relationship with a supplier. However, it is important to note that a supplier could be acting as a manufacturing SME's business partner on some occasions, depending on the level of interaction and relationship intensity.

6.4.2 Activities: Manufacturing SME vs. Business Partner

There were three types of activity that appeared between a manufacturing SME and their business partner, which included: 'lead project planning', 'project coordination' and 'learning & education'. Despite the fact that a manufacturing SME was in a working relationship with their business partner, the level of resources and activity inputs could vary according to different levels of involvement. For instance, Mobiletron, Bede and Accent had surplus financial resources and technologies, enabling the firms to lead projects. On the other hand, companies such as Verplas, Purimachos, Polaron, Coborn, Crystran and TSSE were only able to coordinate activities, i.e. OEMs. However, it is also possible for a firm to have both lead project activity and project coordination such as Mobiletron, Bede and Accent. The final set of tasks within this dimension was concerned with learning and education. This activity contributed to a manufacturing SME by the firm learning different relevant skills or being educated through their business partner.

6.4.3 Activities: Manufacturing SME vs. Competitor

Two forms of interaction occurred between a manufacturing SME and its competitor: 'active competitor information seeking' and 'active market information seeking'. The term active competitor information seeking reflects the action of a manufacturing SME researching a particular competitor's production such as, the competitor's product development or business forecast which would be in direct competition with the SME. Active market information seeking was defined as general information collected by the manufacturing SME, such as industrial news and development, general market trends or information that would have no immediate influence on the SME's current market structure and operations.

6.4.4 Activities: Manufacturing SME vs. Agent

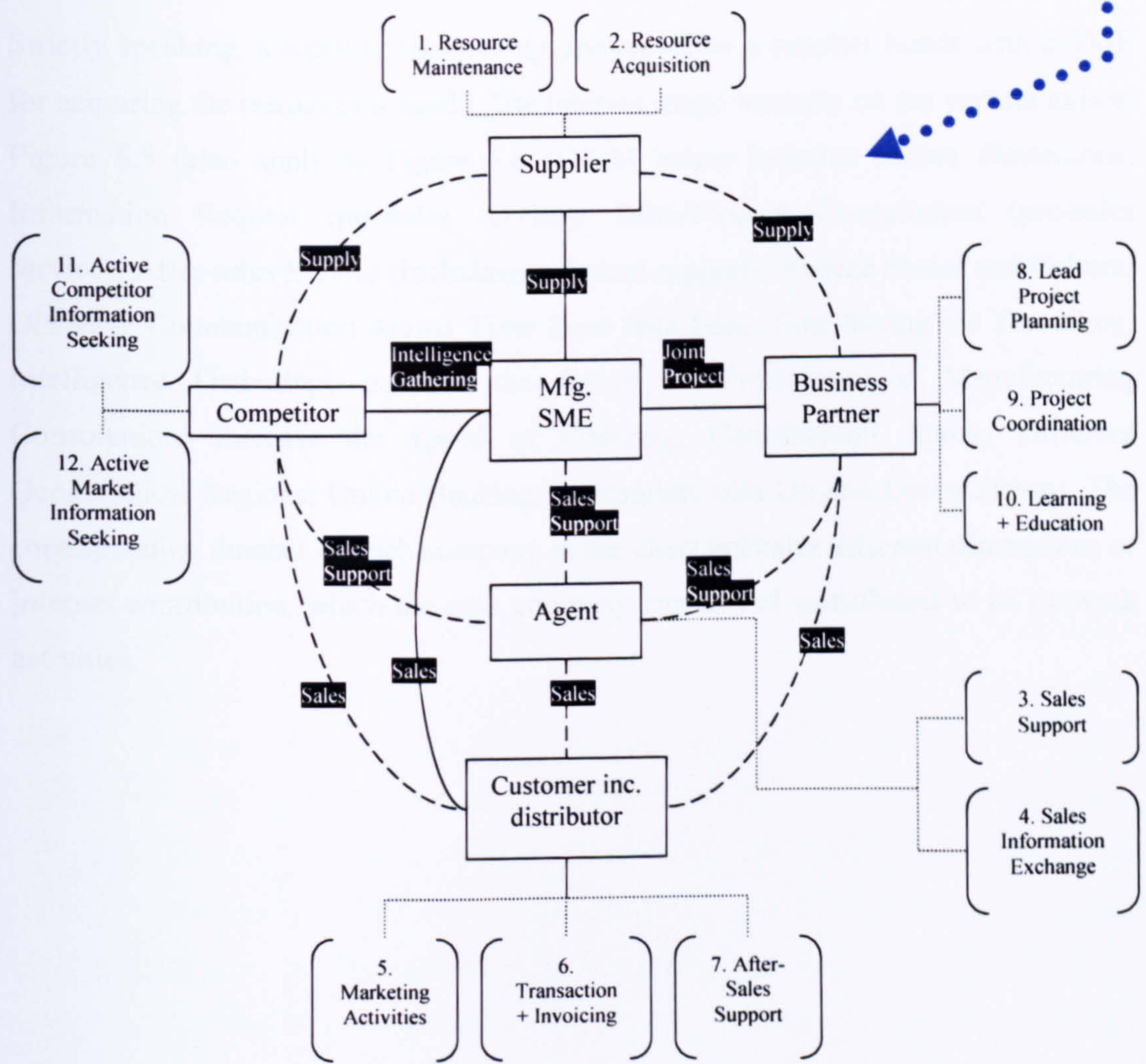
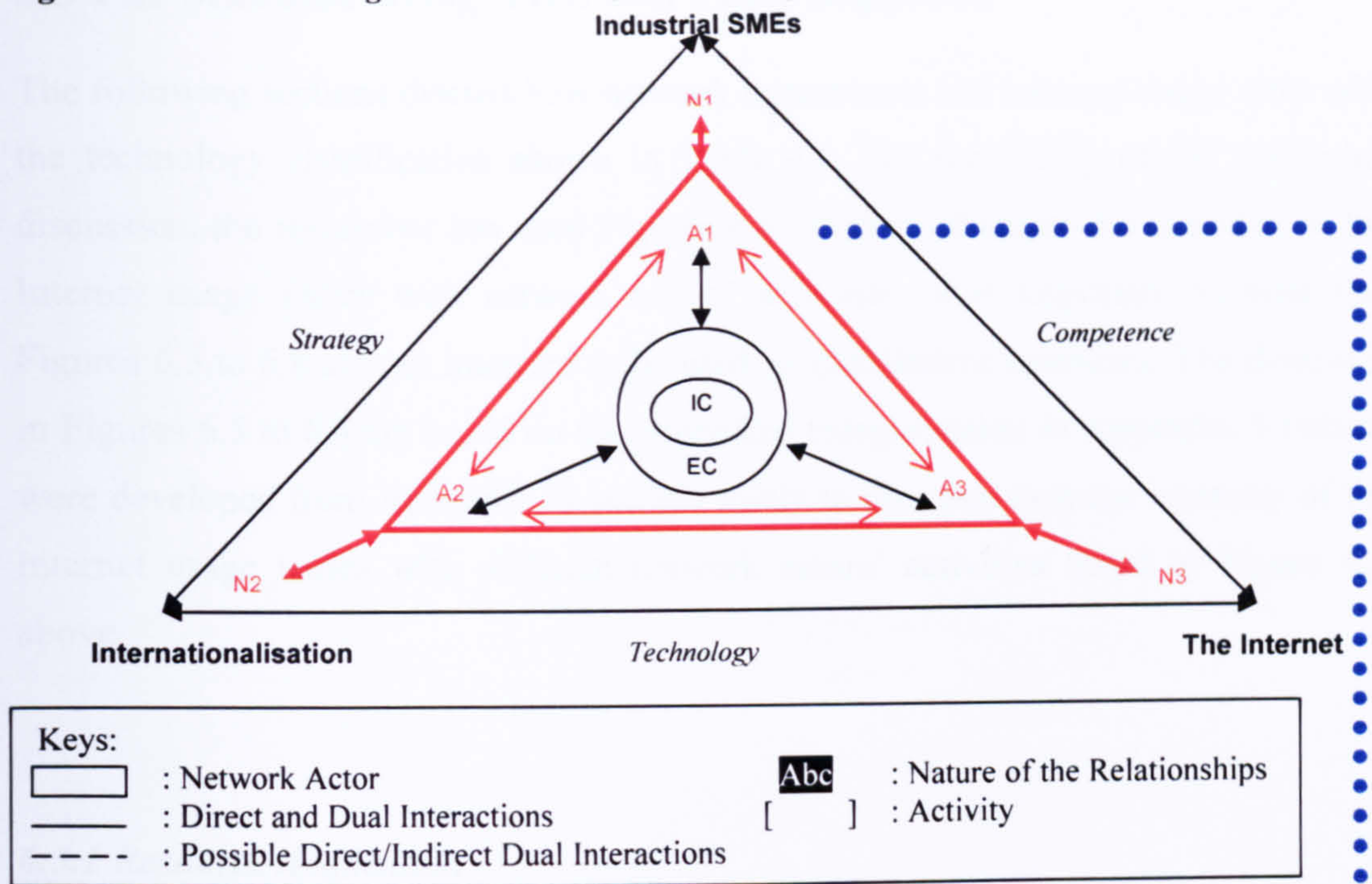
For a manufacturing SME and their agent, there are two forms of activities, which are 'sales support' and 'sales information exchange'. Sales support includes activities such as providing relevant marketing materials and technical advice to support their agent. The sales information exchange refers to the information exchanged between a manufacturing SME and its agent, for instance, customer information, local market data/information, customer's feedback, etc.

6.4.5 Activities: Manufacturing SME vs. Customer

The final dimension to complete the overview of manufacturing networks is the set of the activities between a manufacturing SME and its customer, which includes the distributor. There are mainly three types involved here: 'marketing activities', 'transaction and invoicing' and 'after-sales support'. Marketing activities are to be perceived as the pre-sales service, whereby a manufacturing SME may need to provide company information, product specification and local agent or distributor's contact details. Marketing activities may also include the manufacturing SME's interaction with the potential buyer/customer such as establishment in regional or international exhibitions. The second type is the transaction and invoicing; this happens when a customer purchases goods (new product or replacement parts) directly from the SME. On some occasion that transaction activity occurs if a repair

job has been issued, which also involves other administration processes, i.e. invoicing. If a manufacturing SME provides goods directly to its customer, the company is responsible for any after-sales service. After-sales service includes: repair, replacement, technical advice and such. Figure 6.4 is a completed picture of the relationships between manufacturing actors and activities.

Figure 6.4 Manufacturing Network Actors, Relationships and Activities

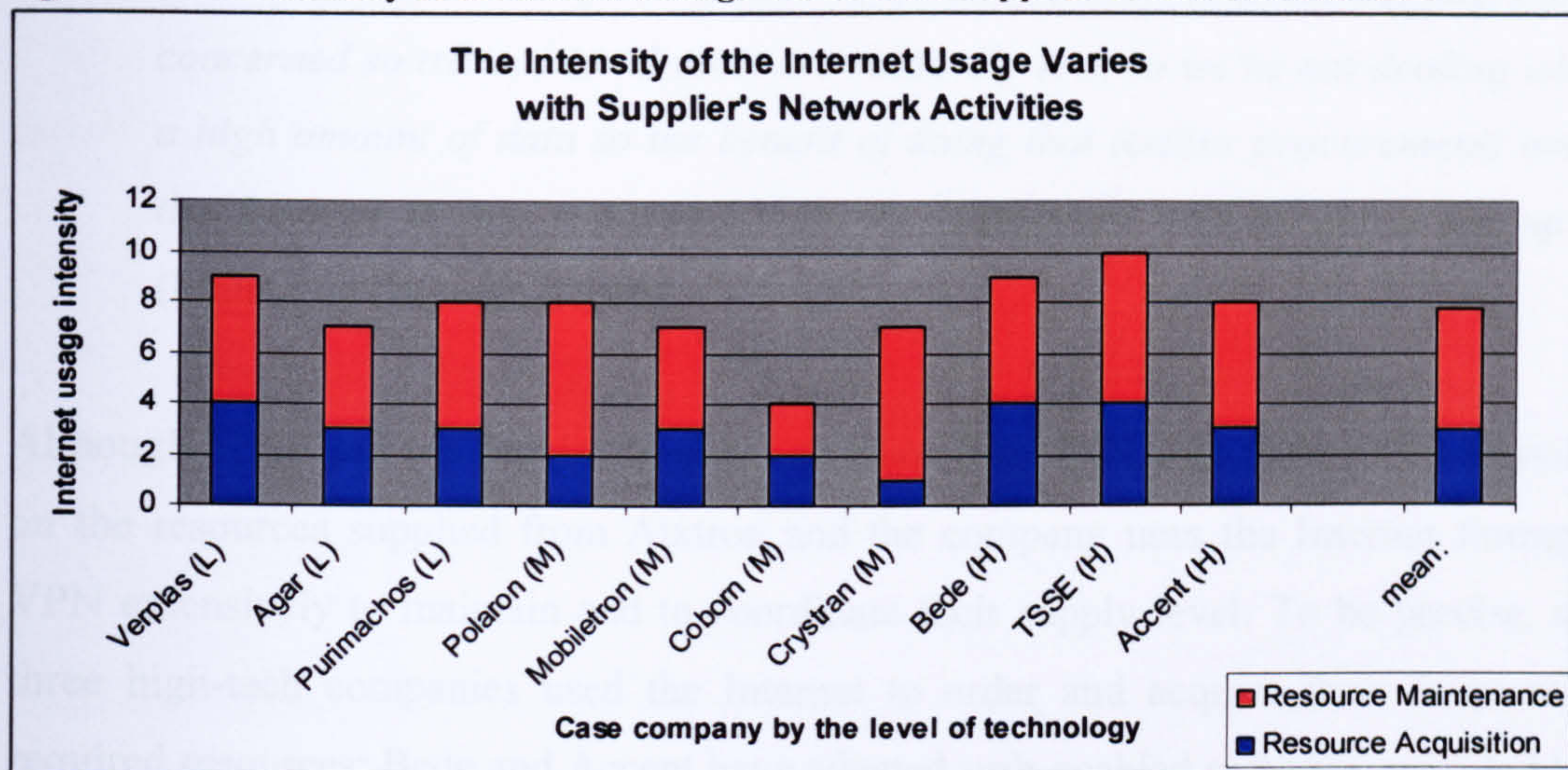


6.5 The Manufacturing SME and Their Suppliers

The following sections discuss how network interactions and Internet usage vary with the technology classification shown in Table 4.3. For the clarity of the following discussion, the researcher has used Figures 6.5 to 6.8 to illustrate the intensity of the Internet usage varies with network actors' activities. It is important to note that Figures 6.5 to 6.8 are not intended to be used as quantitative measures. The diagrams in Figures 6.5 to 6.8 are based on the simplified categorisation in Appendix 5 (which were developed from Appendix 4) and are solely to illustrate how the intensity of the Internet usage varies with different network actors' activities listed in Figure 6.4 above.

6.5.1 Resource Acquisition

Strictly speaking, a supplier relationship involves how a supplier bonds with a SME for acquiring the resources it needs. The Internet usage intensity on the vertical axis in Figure 6.5 (also apply to Figure 6.6 to 6.8) below includes twelve dimensions: Information Request (pre-sales service); Sales/Product Consultation (pre-sales service); After-sales Service (including technical support); Reduce Social and Cultural Distance; Communication Across Time Zone with Ease; Cost Saving for Travelling; Intelligence Gathering; Increase the Speed of Production or Manufacturing Consultation; Increase the Speed of Ordering; Coordination Across Different Geographical Regions; Online Banking; Integration with Up and Down Stream. The corresponding number of each company in the chart indicates different dimensions of Internet contribution, which the case company considered contributed to its network activities.

Figure 6.5 The Intensity of the Internet Usage Varies with Supplier's Network Activities

6.5.1.1 Resource Acquisition: High-Tech Category

The Figure 6.5 showed that three high-tech companies (Bede, TSSE and Accent) have a higher average than the other companies in using the Internet for resource acquisition. These firms use the Internet in a similar way to make contact via e-mail, video conferencing to their supplier for product consultation in the pre-sales stage, such as material, technology compatibility and etc. It is argued that companies within high-tech industries require a higher rate of innovation, which is reflected in repeated investment in R&D activities where these firms require frequent communication with their suppliers.

In addition, three high-tech companies also use the Internet for their procurement. However, due to different requirements, they all adopt different ordering techniques reflecting unique inventory management constraint. For example, both Bede and Accent mentioned that they required frequent supplies of liquid gas for their production where they make repeated orders from BOC (the largest liquid gas supplier in the UK) via BOC's web-enabled software. TSSE also requires liquid gas for their production like Bede and Accent, but TSSE pointed out that they only sold thirty to forty units (capital equipment) per year and it is not necessary for them to have huge investment on the Internet for other management, despite having the capacity to do so.

“...we have a relatively low volume of transactions as far as the suppliers are concerned so transactional costs are relatively low, so we’re not dealing with a high amount of data so the benefit of doing that (online procurement) over the Internet is low compared with the investment cost to get it set up.”

(Managing Director, TSSE)

Although TSSE did not require frequent supplies from BOC, the firm relied heavily on the resources supplied from Aixtron and the company uses the Internet through VPN extensively to maintain and to coordinate their supply level. To be precise, all three high-tech companies used the Internet to order and acquire their frequently required resources; Bede and Accent have adapted web-enabled software provided by BOC, where TSSE use VPN to raise orders from Aixtron, who were perceived as their supplier on this occasion.

Apart from the large suppliers, the companies have a number of smaller suppliers both nationally and internationally. With the smaller suppliers (national and international), there was no indication of activities similar to the interaction with BOC or Aixtron. Instead, these high-tech firms use several Internet applications such as e-mail and a video-conferencing facility to maintain necessary communication with their suppliers. The present study shows that e-mail and the video-conferencing facility have enabled several firms to negotiate the price and to discuss relevant technical issues before purchase. Thus, this indicated that the firms used e-mail and a video-conferencing facility due to their flexibility and interactivity. However, smaller suppliers may or may not have sufficient financial resources. Smaller suppliers can only cope with smaller demand from which they do not have the commitment to adopt an Internet procurement system for their customers.

To sum up: a supplier within a high-tech manufacturing SME’s network will have strong influences on the SME’s approaches to acquiring frequently and repeatedly required resources. A large supplier, such as BOC, has the capacity to provide alternative ordering options for their customer (manufacturing SME) depending on the customer’s requirements and to fit into a supplier’s operational strategy. This is reflected in the arguments of Ford *et al.* (1986) and Johnsen and Ford (2001, 2006), where mutuality exists between firms. Nevertheless, high-tech firms perceived that by

using e-mail and a video conferencing facility it would allow them to have interactive discussions with their local or international suppliers, where there was room for negotiation of price and terms and conditions.

6.5.1.2 Resource Acquisition: Low-Tech Category

Another group of companies also high on resources acquisition activities were Verplas, Agar and Purimachos. These were all categorised within low-tech industry based on their product types and level of R&D activities (see Table 4.3). All three firms were scored high in using the Internet for 'pre-sales and product consultation' when acquiring resources from their suppliers. These speciality firms have demonstrated that they use the Internet (e-mail in particular) to consult product or material information from their suppliers prior to customised production requested by their customers or simply to seek further material support. Both Verplas and Agar have benefited from using e-mail to increase their speed of ordering for resources from their suppliers and maintained regular contacts with their suppliers to ensure the materials/stock levels.

There is no advantage in using the Internet to increase the speed of material ordering due to the material location and type of their primary material: cement needs to be imported from overseas by sea. Purimachos and Verplas have also benefited from other forms of Internet contribution. This is the ability of its technology to facilitate coordination across different geographical regions. The benefit of the ease of coordination across different geographical regions did not apply to Agar because Agar's suppliers were all based in the UK.

Verplas was the only company within the low-tech industry to use online banking with their supplier. This is because Verplas had a number of international bank accounts and was intentionally set up for their international customers (distributors). Since the introduction of online banking, the firm has also benefited by using its system to handle its accounts with their international suppliers. In this scenario, Verplas and its suppliers have *accidentally* benefited from online banking. Conversely, the reasons that both Agar and Purimachos did not adopt online banking are that Agar

viewed there are no major benefits to do so since all of its suppliers are based in the same country; Purimachos viewed it is as unnecessary as they only have a limited number of international suppliers. Furthermore, Purimachos' management contended that due to the sensitivity of financial details, they do not have sufficient confidence that they can use online banking because of their limited IT knowledge and immature IT structure.

To sum up, the manufacturing SMEs within the low-tech industry still have not widened their Internet usage with their suppliers. Three low-tech companies were satisfied with their current Internet communication with their suppliers, which was e-mail. It can be argued that the case companies' suppliers were not as dominant and powerful as other large suppliers, where there is a possibility for the case companies to change their approaches. Despite that, only one firm (Agar) indirectly benefited from the convenience of online banking which was proposed for Agar's customers. There was no indication that any of the case companies plan to integrate online banking into their business operation with the suppliers. The possible explanations for this lack of ambition were: management's attitude and concern for the firm's capability towards sensitive data (both financial and non-financial); locations of the suppliers and no demand from the suppliers for using online banking.

6.5.1.3 Resource Acquisition: Medium-Tech Category

In terms of medium-tech companies, Mobiletron is the only firm that has achieved a score that is higher than the average on resource acquisition in comparison with other medium-tech companies. Mobiletron succeeded with three items: product consultation, increase in the ordering speed and coordination across different regions. Both Polaron and Coborn achieved on different two counts. Polaron scored on product consultation and increase in the speed of production, whereas Coborn also scored on production consultation, but with online banking. Finally, Crystran scored the least focused upon in increasing the speed of production.

There are a number of reasons to explain why the medium-tech category companies have inconsistent patterns of using the Internet for activities with their suppliers,

which included product types and multiple roles played by the industrial actors. Thus, different Internet applications were adapted and adopted, ranging from e-mail, video conferencing facility to ERP. Firstly, as each product is made up of different parts and a number of components, this would determine the number of suppliers needed. For instance, Coborn's laser grinding machines would require more than five hundred different suppliers; whereas Crystran's infrared/ultraviolet optics would require only a few selected suppliers (one supplier to provide optics, a few suppliers to provide chemicals for coating). Furthermore, a firm with fewer suppliers is likely to have an intimate relationship. It was evident from Crystran and Polaron, who rely heavily on a few selected suppliers that the firms would tend to maintain regular contact and have positive influences on the overall speed of production or manufacturing consultation. However, it is important to note that the size and relative strength of suppliers would have an effect on the overall relationship development as evident in Purimachos' case, where larger suppliers have more bargaining power over smaller firms (see Chapter 5.11).

Secondly, multiple roles are played by the network actors within the manufacturing network. Similar to the TSSE, Mobiletron is owned by More Group which has invested heavily in an ERP module in order to coordinate with Mobiletron in the UK. Although Mobiletron source from both nationally and internationally, the ERP module only allowed Mobiletron to coordinate resources from their parent company, which happened to be their only international supplier. Thus, it can be said that their current ERP module is restricted to an internal communication purpose. This is also another reason why Mobiletron have a higher score (coordination across different geographical regions) compared with the other three medium-tech companies.

In short, the use of the Internet between case companies and their suppliers within the medium-tech industry depends much upon the type and the number of resources required. This is because manufacturing SMEs within the medium-tech category are likely to need more resources in comparison with low-tech industry. Since there was no consistency in how the medium-tech companies would use different Internet methods, the key determinants of the chosen methods were based on the locations and the number of suppliers with further consideration of the suppliers' preferences,

which are likely to be affected by the suppliers' operational strategies and the size of the organisation.

6.5.1.4 Summary for Resource Acquisition

To sum up, suppliers are likely to become a dominate manufacturing network actor if they are large in size with surplus financial resources. This reflects the balance of network power, where smaller companies are likely to be forced by the larger supplier to fit into a large supplier's operational strategy over the choice of resource acquisition, which includes the choice of communication channel (Håkansson and Johanson 1992).

However, on most occasions a manufacturing SME is likely to encounter a supplier who is also qualified as a SME (in terms of employee numbers and financial resources). Research findings showed that most of the small-medium sized suppliers utilised by the case companies offered room for negotiation where the use of e-mail enabled both supplier and buyer the flexibility to discuss on product price, specification and requirement. The findings contradicted Poon and Swatman's (1999) conclusions, that SMEs preferred face-to-face negotiation. The present research findings show that all case companies considered e-mail to be capable of handling the negotiation process. It can be argued that manufacturing SMEs started using e-mail on most occasions where they have adopted its use for negotiation process over time.

The Internet did not influence the decision on how manufacturing SMEs acquired their resources, either locally or internationally. The choices of suppliers were based on manufacturing SMEs' own production requirements and financial considerations. That is, the Internet (e-mail in particular) was perceived as an effective non-emergency alternative communication choice for both local and international contacts, as e-mail existed in a form of self-documented text.

6.5.2 Resource Maintenance

This is a dimension that presents how the Internet contributes to the manufacturing SME and maintains the resource relationships with their suppliers. Following the structure of the previous discussion (Chapter 6.5.1), the author used the companies' level of technology to separate the arguments.

6.5.2.1 Resource Maintenance: High-Tech Category

All the high-tech category companies have similar patterns for resource maintenance (see Figure 6.5). Bede, TSSE and Accent all have some similarity on using the Internet such as e-mail and a video conferencing facility to maintain their relationships with their suppliers. The similarity included: reduction in their social and cultural distance from their international suppliers, fast communication across different time zones, saving costs for travelling, activity coordination across different geographical regions and most importantly, the Internet activities with their suppliers have integrated with the firms' overall communication structure.

Because all the companies need overseas resources, firms shared similar practices with their suppliers. It can be argued that all three companies needed their resources from overseas and the Internet (email and video conferencing facility) allowed the firms to reduce their time and running costs for communicating with their international suppliers. However, from another perspective these companies scored consistently because unlike other industries, their resources in the UK are limited. To be specific, the main resources such as silicon were allocated to the Asia-Pacific region (for Bede and Accent) and LED (for TSSE).

Despite the fact that all three firms have VPN embedded within their Internet infrastructure, there was no evidence to indicate that their VPN would have further or advanced integration, such as an ordering function with their suppliers. Although Bede was the only firm that allowed some of their key suppliers to have access to their VPN, access was restricted to a designated area where the suppliers could upload/download progress reports. Even so, all three firms (included Bede) thought that e-mail alone could handle the progress reports/files exchange by a simple

attachment function. This suggested that the capacity of e-mail was sufficient for exchange information and there was no room for direct integration (information → VPN) between the manufacturing SME and its suppliers with current development. Nevertheless, since all information put forward still required internal administration initially, all three firms expressed the view that they preferred the information exchanged through e-mail (information → e-mail → VPN), as indirect integration offered better security.

TSSE was the only company that has gained from the Internet for pre-sales requests with their suppliers. This was due to some of TSSE's customers having direct contact with the firm's suppliers, where the customers would command TSSE to approach certain suppliers for customised products. As a result, TSSE would need to approach an appointed supplier requested by the customer and have a pre-sales information request on component compatibility, etc.

"... if you take the supply chain right back, like mass flow controllers MFCs, these will be specified by (customer) actually they (MFCs) will be specified by these people (customer) who possibly have a direct link right the way back to suppliers of MFCs here." (Managing Director, TSSE)

It is evident that e-mail and video conferencing facilities were the mainstream applications of Internet communication between the high-tech companies and their suppliers. Despite that all three companies have VPN embedded; there was no intention for further direct integration between a manufacturing SME's systems with their suppliers. This approach was reflected in the case of Bede, where there was only limited usage for direct integration. From another perspective, it can be argued that the versatility of e-mail (i.e. attachment, self-documented and easy distribution etc.) enabled the firms to integrate with their VPN indirectly with ease, as well as to increase the level of security.

Unlike materials such as liquid gas or silicone, which were essential supplies frequently required by the high-tech companies, a lot of the parts and components needed to be changed constantly due to fast moving technology. Furthermore, due to the level of technology changed over time, high-tech SMEs needed to upgrade their

parts and components accordingly. Therefore, often it is not cost effective for the manufacturing SMEs and their suppliers to invest in Internet programmes or systems to reduce procurement time. As a result, only e-mail and video conferencing facilities were used due to the speed of communication and flexibility to adopt into the firm's VPN, and it can be re-arranged to suit a firm's internal communication.

6.5.2.2 Resource: Maintenance: Low-Tech Category

All three firms within the low-tech category scored equally on the dimensions of reduced social and cultural distances with their suppliers, as well as communication integration. Since all three firms have mostly established their relationships with their suppliers prior to the Internet development, these firms started to reduce traditional communication methods such as telephone and facsimile by using e-mail to continue the relationship maintenance. Thus, the Internet did not have any direct influence on the initial relationship development, but was perceived as another type of communication tool for relationship development and maintenance.

"Some of our suppliers are friends. We've known them for many, many years. It's just a sort of standard relationship." (Managing Director, Agar)

Verplas and Purimachos both benefit from easy communication across time zones with the use of the Internet. This advantage stems from the situation where they use the Internet to handle and maintain constant communication with their international suppliers. Although, the researcher believes that Agar has the same capacity as the other two low-tech companies' Internet usage for international relationship maintenance (see Chapter 5.8). Interestingly, Agar did not show their capacity on this particular dimension due to all of their suppliers being based in the UK.

Agar was the only low-tech company that considered that the Internet did not contribute to cost saving for travelling. This was because the firm has been limited by their budgets prior to the use of the Internet where the firm has been using telephone or facsimile (now slowly replaced by e-mail) to communicate with their suppliers. In other words, Agar did not make regular physical contact with their suppliers.

Nevertheless, the findings suggest that due to the convenience of the e-mail (speed, text format), firms reduce their telephone bills as gain time saved for less important business travel. For example, clear texts and instructions presented in a series of e-mail exchanges which would take hours (with a domestic supplier) or a few days (with international suppliers); thus, firms can avoid time and cost wasted for organising less important business travel.

Moreover, Agar is the only company within the low-tech industry category that is eligible to use the Internet on a pre-sales information request with their suppliers. This was because Agar's customers or agents would sometimes inquire about other products that are not in the Agar's product catalogue, where the firm would contact their existing suppliers for further information. Unlike Agar, Verplas and Purimachos were very unlikely to require pre-sales information about their materials for their customers. This indicated that products types and companies' roles were significant factors for such as Internet dimension. For instance, Agar considered themselves as a manufacturer-distributor, where they also supply other products from more than five hundred suppliers. This arrangement increases the likelihood of their customers or agents making further inquires. Additionally, these activities have brought Agar's attention to search for new products. Because Verplas and Purimachos were positioned as the manufacturers, customers would need to contact them for any inquiry, not material suppliers.

6.5.2.3 Medium-Tech Category

Companies within this category have the most diverse usage of the Internet for resources maintenance. Both Polaron and Crystran found that the Internet makes a strong contribution to resource maintenance with their suppliers. Although the firms have the same points for this particular dimension, the majority of items scored differently. Mobiletron scored only on four items, but Coborn has the lowest score of two items in all three categories of company.

Polaron and Coborn were the only two companies within the medium-tech category which considered the use of the Internet (e-mail in particular) on pre-sales information

requests from the customer to the suppliers. The similarity was the type of customers both Polaron and Coborn had, unlike Mobiletron and Crystran where their products and network positions were closer to the end consumer. In other words, Polaron and Coborn were being driven by the customers to request further information on parts and materials from their suppliers, then the information was passed to their customers for further actions to be taken. Thus, discussion about new product development between the manufacturing SME and their customer provides refining and tuning of information to a specific standard.

Apart from Coborn, the other companies within the medium-tech category have demonstrated that the Internet has reduced their social and cultural distances from their suppliers. As mentioned, although Coborn have more than five hundred different suppliers (see Chapter 6.5.1.3), it was difficult for the firm to handle all those suppliers at one time. As a result, the relationships between Coborn and their suppliers were much more focused upon on procurement rather than relationship development.

E-mail has assisted Mobiletron and Crystran with rapid communication across different time zones. However, this was not applicable to Coborn as their suppliers are in the same time zone as the firm. However, Polaron has been using e-mail and video conferencing facilities to communicate with their international suppliers but the firm has found out it is hard for them to keep up the communication. This can be explained that, as a result, due to the nature of product application, most of Polaron's customers required 24 hours support apart from using e-mail and video conferencing facilities to contact the suppliers directly. The firm also used the browsing function of the Internet to access trade-based (industrial association) online forum and seek relevant solutions.

Since Coborn did not have strong relationships with most of their suppliers, it is not surprising that the firm did not consider that the Internet had brought down the costs of business travelling. Even though Mobiletron did have a much more advanced Internet structure (ERP system), due to the company culture, the firm would not replace face-to-face communication with their suppliers. Another possible explanation for the difference is that Mobiletron only source from a limited number of suppliers from the UK, so the firm can execute business travel easily with a limited budget. While Polaron and Crystran both scored similarly on this dimension, they have

entirely different reasons for this. The former has been using the Internet (e-mail and video conference) to replace traditional visits where they have both local and overseas suppliers; this was an aspect of their organisational communication transformation since the firm was trying to achieve a paper-less business environment. However, Crystran has been using the Internet (e-mail only) since their early establishment in 1993, and as they did not have large budget initially, it became usual for them to use e-mail communication to replace road visits.

Polaron was the only firm holding the view that the Internet has served them in terms of intelligence gathering from their suppliers. The firm expressed that they would pay regular visits to online forum where they would be able to gather relevant information such as new industrial standards and materials information updates. In addition, Polaron is also listed in an e-mail database where they would receive other industrial actors' information. The industry sector that Polaron did business with, appeared to be very active in terms of information sharing, unlike other case companies and industries where Polaron and their industrial actors worked as a collective group rather than inimically.

“Also, there are numbers of MSI house forums and typical access of numbers of other forums or other people's forums for specific requirement, like materials, engineering issues. Basically, you have a web community. For example, NACE is an email community. NACE is an American association and you log on to the system, so any email on material issues is automatically broadcast to everybody else. So everybody sees it and questions it any answers on substance materials issues, designs and capability of manufacturer.”
(Managing Director/Technical Director, Polaron)

Polaron, Mobiletron and Crystran all thought that Internet has assisted them to communicate with their suppliers across different geographical regions; but Coborn is the only exception. The only explanation was that Coborn only source their materials from UK suppliers, where they treated locations within the UK as a single geographical region. Additionally, Coborn was arguably the only medium-tech company that did not have a strong Internet integration with its suppliers. The firm

was limited in developing relationships with their suppliers due to a large number of different suppliers where the firm has chosen to adopt buyer and seller relationships.

To sum up, there were two aspects which influenced a manufacturing SME's decision to adopt types of Internet with their suppliers: These are company culture and industrial environment. Company culture, such as the nature of important business visits cannot be replaced by e-mail or video conferencing facilities, as well as a firm's commitment to the level of Internet investment. The industrial environment, including a firm's suppliers and relevant industries' culture of using the Internet, also would have direct impact on the degree of Internet usage, i.e. online forum. Therefore, it can be said that the Internet usage was not solely determined by the manufacturing SME, but their suppliers' commitment to it and culture of the SME.

6.5.2.4 Reflections and Summaries for Resource Maintenance

E-mail is the main type of Internet communication for all case companies and their suppliers. This is because e-mail offers the speed and flexibility required by the manufacturing SMEs. Although all three high-tech companies have VPN integrated with the Internet embedded within their overall communication infrastructure, it was evident that the manufacturing SMEs were not fully prepared and lacked motivation to take further direct integration of their internal communication infrastructure with their suppliers at the moment (information → e-mail → VPN). Apart from high-tech companies, medium and low-tech firms also considered that e-mail alone was sufficient for handling most of their business demand.

A manufacturing SME's commitment to Internet investment and their business culture has a direct influence on its preferred Internet methods chosen. For instance, all companies agreed that e-mail can increase the frequency of communication, but it still cannot replace traditional business visits where firms would have direct physical interaction. In addition, there was an indication that industrial environment and culture would also affect the level of Internet usage, such as online-forum. To conclude, the business relationship development is the key driver when selecting appropriate levels of Internet technologies as the Internet does not have any direct

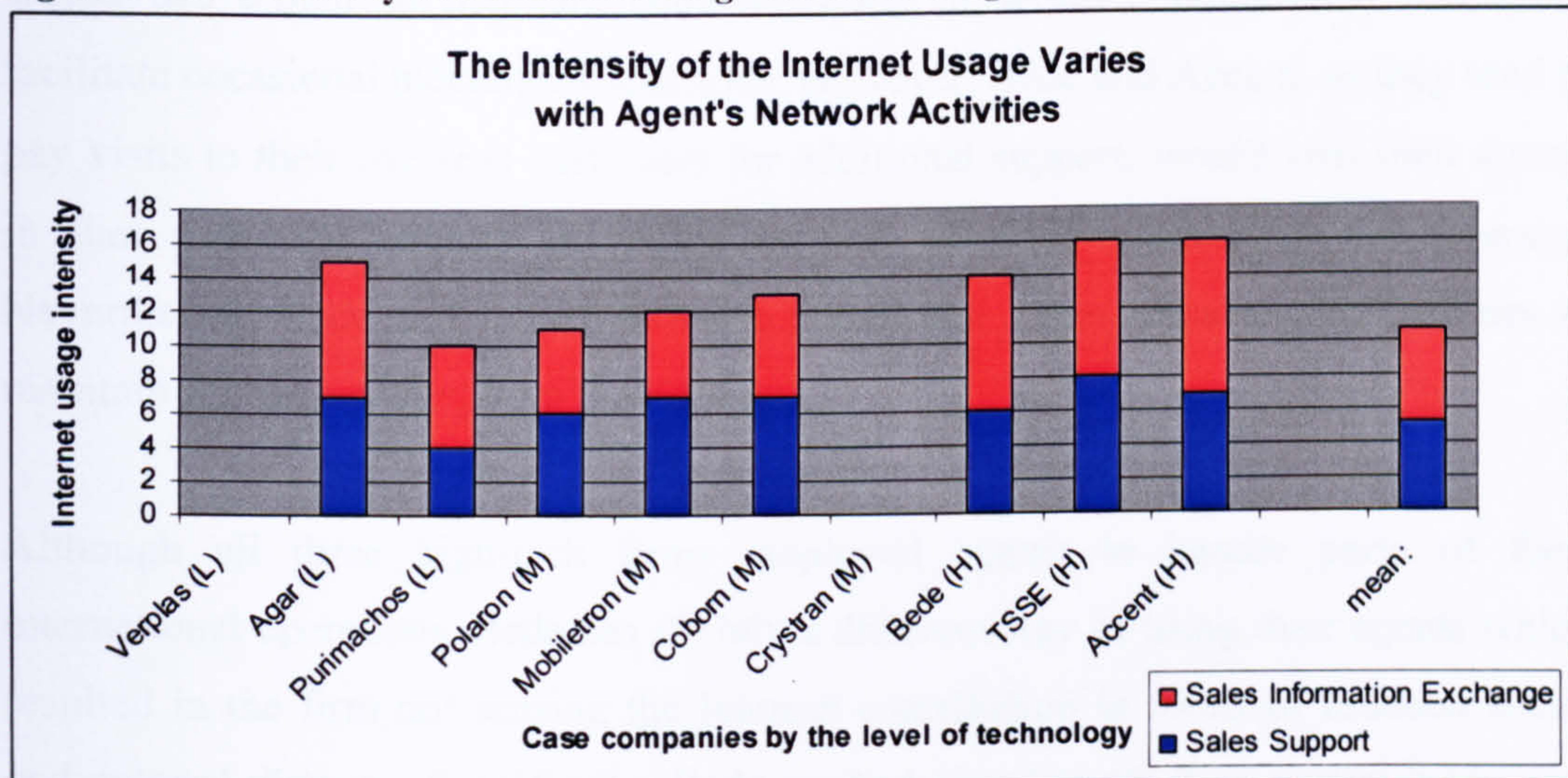
influence toward the initial relationship development, but is just another type of communication tool for relationship development and maintenance.

6.6 Manufacturing SME and Agent

6.6.1 Sales Support

Sales support is one of the two activities that a manufacturing SME must provide for their agents, as most of the agents rely heavily on their suppliers (other manufacturing SMEs) for technical support, product information or marketing materials, etc (see Figure 6.6).

Figure 6.6 The Intensity of the Internet Usage Varies with Agent's Network Activities



6.6.1.1 Sales Support: High-Tech Category

Bede, TSSE and Accent have some similarity where they all deemed that the use of the Internet would assist the firms with their agents in terms of pre-sales information requests, pre-sales product consultation, after-sales service, communication across different time zones with ease and coordination across different geographical regions and communication integration. Although all high-tech companies have direct contacts with most of their customers due to pre-sales consultation for product development, they still relied on their agents to market their products and to provide

basic/low level technical support overseas. Thus, the Internet became useful for the manufacturing SMEs to coordinate activities across different regions and time zones. The types of Internet communication between all three firms and their agents included e-mail and video conferencing facilities.

Interestingly, TSSE was the only high-tech firm that arguably considered the Internet to have contributed cost savings for travelling to their agents. Arguably, there were two reasons for TSSE to consider the contribution of cost saving for travelling. Firstly, although TSSE has its own network of agents, it was relying heavily on Aixtron's existing distribution/agent network; thus, TSSE would contact most of Aixtron's agents via Aixtron. Secondly, since TSSE only sold forty to fifty systems per year and it is not profitable for the firm to visit their agents on a regular basis, instead TSSE would use e-mail to maintain communication or a video conference facility to facilitate occasional meetings/discussions. However, Bede and Accent, as they tend to pay visits to their overseas customers for additional support, would visit their agents in that particular country or region as part of their relationship development. Nevertheless, Bede and Accent still use e-mail and video conferencing facilities to maintain regular updates from their agents.

Although all three high-tech firms employed agents to handle parts of their international operations, Bede has slightly a different way of using their agents which resulted in the firm not sensing the Internet contribution in terms of reduced social and cultural distance. Specifically, Bede worked closely with their agents by having Bede's personnel working under their selected agents as part of their internationalisation approach. The person in the overseas agency who would contact Bede's headquarters was Bede's employee, where Bede did not feel strongly about how the Internet can contribute to the reduction of social and cultural distance. This is to say, Bede has strong involvement with their agents by having their own personnel involved, where the Internet communication can be treated as for internal communication purposes on some occasions.

According to the research findings that there was no indication of how the Internet contributed to the firms search for overseas agents. This is because the agents chosen were based on their level of experience and capability to provide relevant

technological advices with the ability to perform minor repairs. From another perspective, it can be said that an agent's overall capability, as perceived by the manufacturing SME, is crucial as the manufacturing SME relied heavily on support from their agent. The initial contact between these firms and their agents was normally established through industrial exhibitions and referral, where the Internet (e-mail and video conferencing facility) was to be perceived as a supportive mechanism once the relationships were established.

6.6.1.2 Sales Support: Low-Tech Category

The companies within this category had the most diverse scores in terms of how the Internet contributed to the firm and its agents. Verplas did not use any agent, Agar had a lot of Internet activities with their agents and Purimachos had limited use of the Internet. Verplas was the only firm within this category that did not employ agents to further their international business; however, they used distributors instead, which can be treated as part of their customers (see Chapter 6.7).

Despite Agar not having the culture of visiting their clients (suppliers, customers and agents), most of Agar's agents have long established and active relationships with Agar. In addition, Agar positioned themselves as distributor-manufacturer where the firm emphasised the importance of "administration for distribution". Perhaps, it is not surprising that Agar would use the Internet to benefit the firm for both pre-sales and after-sales activities; activities such as pre-sales information requests, pre-sales consultation, after-sales service, reduce social and cultural distance, communication across time zones, coordination across different geographical regions and integration with Agar's communication channels. The Internet methods that Agar adopted included e-mail and an online stock checking/ordering system.

"Well because we're a distribution company, therefore I could see it as 'administration for distribution,' arguably the most important capability for us." (Managing Director, Agar)

Agar adopted an online stock checking/ordering system because the firm sees that the benefits of integration between the Internet and their stock database would increase the speed of communication and administration organisation. There were several reasons behind this decision. Firstly, the nature of the product, all items sold by Agar did not require further modification (standardised products) so agents could place their orders straight forwardly on the electronic ordering system. Secondly, the number of product types; Agar has more than 8,000 products where the firm viewed that by using an electronic ordering system it would speed up their organisation/administration. Thirdly, the number of agents and their locations; because Agar sold their items internationally over 50 countries where they currently have more than 40 agents worldwide, the use of an electronic ordering system would overcome the time-zone differences, thus, speeding up the administration process. Agar did not consider integrating online payment with their electronic ordering system in the near future as the firm was satisfied with their current operational approach. In addition, Agar was anxious about its ability to handle payment security online which would have a direct impact on their industrial relationship where there would be less room for negotiations.

Purimachos scored on four Internet dimensions on pre-sales product consultation, after-sales service, reduced social and cultural distance and intelligence gathering. Although Purimachos did not have a vigorous international business activity (in comparison with Agar or other high-tech category companies), it still managed to use a basic Internet function (e-mail) to communicate and to provide support to their agents. For instance, they use e-mail to exchange product information and to provide technical consultation, etc. Most importantly, the firm realised that exchanging e-mail messages would reduce the language misunderstanding between different ethnical groups in comparison with verbal communication, as e-mail is in text format. As part of the sales support development with their agents, the firm also proceeded with intelligence gathering as the firm would collect commonly seen questions that were generated from their agents (or customers through their agents), and which Purimachos would take that information further to their designated personnel.

Again, e-mail was one of the main Internet communication methods chosen between the manufacturing SMEs and their agents. Apart from e-mail, there were other

Internet methods, such as electronic ordering/stock checking systems that would be integrated with a firm's business operation. However, it was suggested that in order to fully benefit from the use of an electronic ordering or online stock checking system, there was a need to evaluate the possible usage and relevant pre-assessment, such as number and nature of product types and number and location of agents (users). Nevertheless, the research findings suggested that a manufacturing SME can be very sensitive to an online payment function due to a lack of commitment and ability to handle Internet based payments. More importantly, online payment would possibly have an effect in terms of industrial network relationships where there was less room for negotiations.

6.6.1.3 Sales Support: Medium-Tech Category

Within the medium-tech category, Crystran did not use agents to assist them in international expansion; however, Crystran has been using some of their customers who also acted as their 'informal agents' instead (see Chapter 6.7.1.2). Apart from Crystran, three other companies within this category have very similar usages in some Internet contribution dimensions, in which Polaron considered six dimensions of Internet contribution. Mobiletron and Coborn both have seven dimensions of Internet contribution.

Polaron, Mobiletron and Coborn considered that Internet (e-mail in particular) contributed on the dimensions of pre-sales information requests, after-sales service, reduced social and cultural distance and communication integration. This is because these firms depended on their agents for their international operations, thus, frequent communication was made between the firms and their agents. Furthermore, both Mobiletron and Coborn thought that e-mail has increased their speed of ordering due to the ease of coordination across different geographical regions. For instance, Mobiletron speeded up their ordering process by allowing their Greek agents to have total control of the national market, where both Mobiletron and their agents would go through a repeating/standard ordering process via the Internet, either e-mail or online order through Mobiletron's website. Interestingly, Mobiletron's online order system did not have any payment function, which they argued that electronic payment did not

have the flexibility for the agents to negotiate which could possibly affect their industrial relationships.

In terms of cost saving for travelling, both Polaron and Coborn thought that using the Internet would reduce the travelling cost as information would be exchanged easily through e-mail with attachments (video conferencing facility was also used for Polaron). However, there is another possible explanation. Both companies were not very active in visiting their agents, which resulted in both firms considering the Internet as a replacement for existing communication methods and therefore reducing their cost for travelling. Whereas Mobiletron has the culture of visiting their clients overseas, when they would schedule by-pass visits to their agents as their standard business practice, consequently the firm did not perceive travelling costs to have been saved. Additionally, Mobiletron is the only firm within this category that agreed that the Internet contributed towards pre-sales product consultation; it thus can be argued that Mobiletron's agents have more influence on the firm in comparison with other companies' agents, where Mobiletron's agents would provide direct feedback or suggestions for further product modification before the shipping.

In brief, therefore online order systems were only considered when both parties have demands for repeating orders where the products were not designed for further modification, even though an online order system was not planned for further integration with online payment as both selling and buying parties would lose the flexibility to negotiate. Since e-mail is a two-way interactive communication and allowed the firms the flexibility for negotiation, e-mail was still used as their main Internet communication tool. Despite all these firms suggesting the use of e-mail or video conferencing facilities would reduce the cost and time for travelling, the level of impact merely depended on a firm's business practice/culture. In other words, the relationship built through business visits cannot be replaced by e-mail.

6.6.1.4 Summary for Sales Support

The main Internet communication method between manufacturing SMEs and their agents was e-mail. This is because it offered the firm the flexibility for different

communication purposes, such as marketing materials converting into electronic files as attachments or a series of text-based conversations for business negotiations. Firms that have adopted an online order system still retain the use of e-mail for other purposes, such as negotiation, relationship development and order functions.

The findings suggest similarities between manufacturing SMEs for adopting online order systems. The similarities included: the nature of the products, where the products were not designed for further modification; and the number and locations of the agents, where there were demands (fair number of users) for online order systems. Thus, the online order system would benefit the firm by better organisation on handling orders and monitoring stocks. However, the research also found that online payment system integration is still not an option for the manufacturing SMEs as it lacks interactivity for business negotiation, such as price.

Finally, all firms mentioned that the Internet can certainly reduce their time and cost for travelling or communication, which benefits their international operations. However, the level of the benefits would highly depend on a company's business culture (i.e. scheduled business visits) and their relationship intensity (i.e. key clients require frequent visits) with other agents.

6.6.2 Sales Information Exchange

The dimension of sales information exchange is to identify the information shared between the manufacturing SME and their agent, in particular the information regarding the manufacturing SME's product user.

6.6.2.1 Sales Information Exchange: High-Tech Category

All three companies have similar use of the Internet (e-mail and video conferencing facility) for sales information exchange with their agents, such as pre-sales information requests, the search for benefits to reduce social and cultural distance, improved communication across time zones with ease, saving of travelling costs, increasing the speed of ordering, coordination across different geographical regions

and integration communication. Most of the agents are willing to share customers' information with the manufacturing SMEs, as well as the customers requesting further information from the local agents regarding the product suppliers. On some occasions, when a relationship has been established between the manufacturing SME and their customers (due to customised production), the agents would function as a local technical support provider. Although those SMEs carry out regular visits, the Internet has reduced the cost for travelling in terms of sales information exchange. In particular, information such as technical requirements can be easily and clearly attached to an e-mail, alternatively, the manufacturing SMEs would use video conference facilities to discuss technical solutions with their agents and save their time and cost in comparison with direct physical technical support. Companies like Bede and Accent who have their own subsidiaries overseas also taken this kind of approach for cost and time saving.

Management practices have the effect of influencing the extent of information exchanged. For instance, TSSE intends to be optimistic and approachable for their customers to have direct contact during the pre-sales product consultation stage, thus, TSSE's agents would have less responsibility during the pre-sales consultation stage; unlike Bede and Accent where they preferred their customers to approach their agents initially. Although the Internet (e-mail and websites) enabled the customers to make direct contact with the manufacturing SMEs, Bede and Accent preferred their customers to contact them via the agent route. A possible explanation for this is the local agent would be able to make direct contact with the potential customers and discuss further product requirements. If an overseas customer makes direct contact with the firm based in the UK, some potential problems such as the language barrier and delayed messages due to different time zones would result in overall production or sales being postponed.

The research findings indicate that although much information can be displayed or sent through the company website and e-mail, manufacturing SMEs still rely heavily upon their agents to provide more in-depth information. It can be argued that the agents continue to be used by the manufacturing SMEs not only due to the nature of the high-tech products which require detailed assessment, but the customisation services offered by the manufacturing SMEs for their products (equipments) also

require comprehensive pre-sales discussion. In other words, the role of an agent within high-tech manufacturing SMEs' networks was crucial as they can help to reduce the cultural/language barrier when using the Internet for direct communication.

6.6.2.2 Sales Information Exchange: Low-Tech Category

As mentioned in Chapter 6.5.1.2 Verplas did not use any agent to assist them in international markets, therefore this section only includes Agar and Purimachos. Both Agar and Purimachos have scored five items on the following Internet contribution dimension: pre-sales information request; reduced social and cultural distance; communication across time zones with ease; coordination across different geographical regions and communication integration. Although both companies shared some similar Internet contribution dimensions, they have huge differences in terms of how they use the Internet technology with their agents. Purimachos can be perceived as a traditional company, where they only use e-mail (out of all Internet technology) to exchange 'infrequent' information with their agents in comparison with Agar.

Agar has its international network over fifty countries, the firm has adopted a web-based online live stock check. This enabled Agar's agents to have up-to-date information on the stocks they required. Agar also used online stock information to monitor their stock levels. In actual fact, Agar realised that online stock information could benefit both the firm and their agent and shorten the ordering process. Thus, they were planning to modify their existing online stock function to a much more advanced version, whereby the agents can track their orders online and know the overall ordering progress (the new system was completed in mid-2006).

Although Mobiletron (high-tech category) has a similar system, Agar has taken this approach further. A possible explanation for this is that Agar has a large number of agents who would stock their warehouses and have a lot of repeating purchases, since most of the items within Agar's catalogue were small and light items where the end-customers expected that the agents should have enough local stocks. The other reason could be the number of products as Agar has more than 8,000 items within their

catalogue, so by using online live stock information could reduce the frequency of other forms of communication, such as telephone, facsimile and even e-mail. Nevertheless, as mentioned in Chapter 6.5.2.2 an online order system cannot fully satisfy Agar in terms of maintaining industrial relationships, price negotiation or even end-customers' information, thus, information regarding end-customers still needs to be exchanged through mainly e-mail.

6.6.2.3 Sales Information Exchange: Medium-Tech Category

Apart from Crystran, the other three companies in this category have been using agents to further their business overseas. In particular, Coborn suggested the Internet has contributed to six items/activities, where Polaron and Mobiletron considered the Internet has contributed to five items/activities (see Figure 6.6). Polaron, Mobiletron and Coborn have all scored on pre-sales information requests, pre-sales product consultation, communication across time zones with ease and coordination across different geographical regions.

It is interesting to note that all three firms have a similar explanation as Bede and Accent (high-tech category) for the pre-sales product consultation dimension. Although the customers can have direct contact with Polaron, Mobiletron or Coborn; these three companies would prefer their customers to go through their agents. This is because they have known their agents for sometime and have been sharing some common practices, thus, to reduce communication errors these three firms provided product customisation which required precise and accurate information from their customers, via e-mail on most occasions. This indicated that the role of an agent within an industrial network cannot be ignored as they would assist manufacturing SMEs overcome problems, such as culture, language and speed up the overall communication process by sharing standardised business practices.

Polaron was the only company that sensed that the Internet (e-mail) can increase the speed of ordering with the agents. It is argued that Polaron was building a paperless environment where the firm received their orders from their agents through the Internet communication. However, Polaron did not implement an online order system, as most

of their products were custom-built, during which a lot of negotiations and discussions were needed during the pre-sales and production stages. Mobiletron was the only firm which deemed that exchanging sales information via the Internet with their agents could actually reduce their budgets for international travelling as Mobiletron have facilities such as video conferencing and VoIP where they were able to conduct online meetings. In addition, Mobiletron used e-mail and an online order system to monitor other relevant sales information from the agents. Finally, Coborn not only considered that the Internet (e-mail) could assist the firm to gather customers' information through their agents with ease, but to use online banking to shorten the payment process from their agents. It is important to note that Coborn was the only firm to use online banking with their agents within this category. Additionally, Coborn has multiple international bank accounts which were intentionally created before the Internet era for their overseas' agents and customers.

The role of an agent within an industrial network continues to be very important as an agent would have a closer relationship with the manufacturing SME where they can share standardised business practices. Nevertheless, the information exchanged between the manufacturing SME and their agents relies heavily on e-mail, due to its flexibility and ability to carry different types and formats of information/files. Although one of the medium-tech companies used VoIP to communicate with their agents, the other medium-tech companies were not totally convinced to have VoIP implemented. It was because most of the companies were currently satisfied with the use of e-mail and they could not see the benefits of using it, as well as being aware of the additional costs involved.

6.6.2.4 Summary for Sales Information Exchange

The majority of Internet usage between the manufacturing SMEs and their agents was conducted by e-mail due to its flexibility (see Chapter 6.5.2.4). Although the manufacturing SMEs and their agents relied heavily on e-mail, the manufacturing SMEs contended that this mode of communication alone would assist them to shorten the communication process and to share information with their agents instantly.

Nonetheless, the manufacturing SMEs mainly relied on the sales information from their agents, where the agents had most of the direct contact regarding the customers' information. In other words, from a manufacturing SMEs' perspective, the information exchanged between them and their agents was perceived as the most crucial stage where text-based Internet communication (e-mail) fitted into both industrial SMEs and agents' requirements.

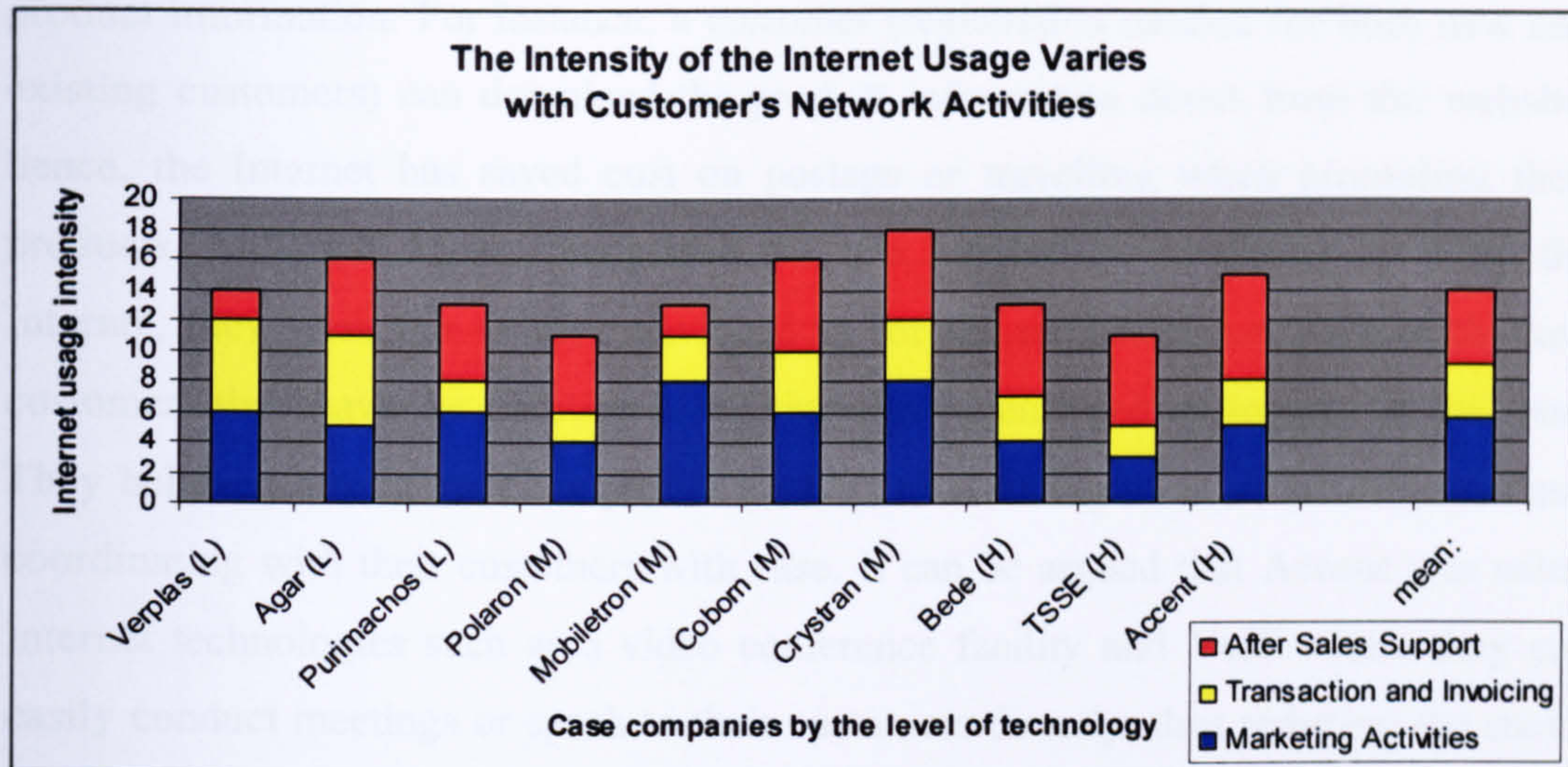
6.7 Manufacturing SME and Customer (include distributor)

This section discussed how the Internet contributed to the manufacturing SMEs towards their customers, which included the distributors (see Figure 6.7). Distributors were included within this section because unlike agents, distributors were perceived as part of the manufacturing SMEs' customers as they tended to order products from the manufacturing SMEs in advance then they would sell on the product.

6.7.1 Marketing Activities

This particular dimension was used to analyse how the manufacturing SMEs use the Internet to conduct their marketing activities with their customers. It is important to note that this element did not include the dimension of after sales support; this will be covered in Chapter 6.7.3.

Figure 6.7 The Intensity of the Internet Usage Varies with Customer's (include Distributor) Network Activities



6.7.1.1 Marketing Activities: High-Tech Category

The three companies within this category all scored less than the average of 5.5 for this dimension. Nevertheless, they all considered that the Internet has some contribution in terms of making pre-sales information requests, pre-sales production consultation and communication across time zones with ease. TSSE preferred their customers to go through their agents for product information on most occasions as the firm viewed that their customers would need to have in-depth discussions with their agents before undertaking the ordering process (Chapter 6.6.1.1 and 6.6.2.1). Moreover, the firm did see the benefits of providing full product information online since most of their clients would require customised production, thus TSSE's website contained limited information regarding the final products.

"It's all debatable because we, this is kind of overall cost but in the short term probably we save a lot of money in terms of unit call, but it's a big initial investment for the infrastructure." (Director of Materials Physics and Global Customer Support, Accent)

Unlike TSSE, Bede did not restrict the direct communication between their customers and the firm as part of their business approach; Bede offered both standardised and

customised products, also using their website to provide much precise and in-depth product information. For instance, a customer (registration needed for both new and existing customers) can download the product information direct from the website; hence, the Internet has saved cost on postage or travelling when promoting their products. Although Accent recognised the cost reduced for travelling by using the Internet, they were not totally convinced as for the marketing activities with their customers they have the tradition of visiting their agents and customers on the road. They believed the Internet has greater benefits of reducing their social distances and coordinating with their customers with ease. It can be argued that Accent was using Internet technologies such as a video conference facility and VoIP where they can easily conduct meetings or speak to their customers directly, thus reducing the social and cultural distance. Nevertheless, Accent did not provide a clear indication of whether these Internet technologies would contribute towards their return on investment (ROI). This is because the firm only implemented (upgraded) its Internet infrastructure in 2002 and the time period had been too short to evaluate their investment.

The three high-tech manufacturing SMEs did not have particularly high scores in comparison with companies in other categories (low and medium-tech) for this particular network activity. This may be because these firms have been using their agents more than low and medium-tech companies for handling their marketing materials with their potential and existing customers due to their needs (need longer time to discuss product specification and requirement, etc.). In other words, the agents were vital for the high-tech companies' network. This is perceived as most evident in the case of Accent where even though they provided multiple language translations on their website (excluding news releases), they still had dedicated e-mail addresses on the website by regions for regional enquiries where they then referred to an authorised local agent.

In brief, the use of website and e-mail assisted the manufacturing SMEs to expose related company and product information directly to their prospective customers. Despite the fact that customers could contact the manufacturing SMEs directly for further information, they were generally referred by the manufacturing SMEs to the local agents who would provide detailed information without language or cultural

barriers. In addition, the manufacturing SMEs preferred the fixed format information sent from their agents, where both parties shared routine practices and thus, reduced the confusion and the time wasted on unnecessary communication between the manufacturing SME and their customers.

6.7.1.2 Marketing Activities: Low-Tech Category

Within the low-tech category, the scores were very close among each other; both Verplas and Purimachos had six items each, where Agar gained five. Nevertheless, these firms shared some similar Internet contribution dimensions, such as pre-sales information request, reduced social and cultural distance and communication integration.

It is not particularly surprising that these firms have been using different forms of the Internet to provide marketing materials or product information for their customers during the pre-sales stage. The most common methods to distribute marketing information were either via e-mail or the website. Nonetheless, the levels of technologies implemented were slightly different. For instance, Purimachos had a non-interactive basic website which displayed the basic product information; Verplas had a much more interactive website where their customers or the website users could either to view the product details online or download the information (full paper-based product catalogue can also be requested via the website).

Agar had a simple website which displayed part of their product lines with limited information; but it did allow customers to review detailed full-line product information. The website was also fully integrated with their existing online stock monitor with an online ordering function for their agents, distributors and some of the direct customers who would need to obtain a set of User ID and Passwords to log in. In order to explain such diverse usage of different Internet technologies, there are three possible explanations. Firstly, the managerial decisions and commitment towards the development of the Internet means that a company needs to allocate their budgets and resources for investing in their Internet and IT infrastructure. Secondly, the usage of the website would depend highly upon on the number of their

customers/users. Finally, the product types where it was evident that non-customised products were much more practical and easier to use on an online order system.

Purimachos was feeling comfortable about its current Internet usage and it has limited customers with limited financial resources which provide it with the reasons to fine tune their current website. Thus, the firm was only keen to perform some limited updates such as a new webpage layout and adding a new FAQ section, except to restructure their Internet infrastructure for functions such as online stock monitoring or product specification downloads.

Both Verplas and Purimachos also suggested that the Internet contributed on the pre-sales product consultation dimension. This was because both firms offered customised production to their customers and they were able to use e-mail to communicate with their customers to discuss the specifications and requirements. In the case of Agar, they argued they are mainly focusing on distribution rather than manufacture, thus, their customers (as well as the agents) do not require pre-sales product consultation for customised production. This indicated that the level of services such as customised production offered by a manufacturing SME would have direct impact on the level of requirement from their customers, which then influenced the usage and activities exchanged within the selected Internet communication method.

In terms of Internet communication across time zones with ease, Purimachos was the only firm within this category that did not totally agree about the benefits of e-mail. From an example provided by Purimachos, this was due to a different social/working culture between different countries which would create misunderstanding between some overseas companies, for instance, Egypt (see the direct quote below). However, this exception was because the Egyptian customer has direct contact with the firm, where there was no local agent or distributor.

“I think sometimes it can work both ways because some companies I find email serves to be a source of frustration. For example Egypt, they have Friday off, and they work the rest of the week. ... So we get it on Monday morning, along with an irate phone call, “Why didn’t you answer my emails?” And so the advantage, which is the speed, the instantaneous nature of an email, is also a problem in some cases.” (Technical Director, Purimachos)

Verplas was the only firm within this category that considered the Internet contributed cost saving for travelling to coordinate marketing activities directly to their customers. That was because the culture of visiting their customers previously, although the firm was still visiting some of their large and important customers, changed whereby has replaced the visits to their smaller customers by sending them marketing or promotional materials online, such as an online newsletter and displaying relevant information on their webpage. Despite this, Agar and Purimachos did not contemplate this particular Internet contribution dimension, it was due to both companies following their existing business practice where they do not have the culture to visit their customers due to the limited budget.

Purimachos also used the online survey (access via their website) for monitoring their customers' feedback. Although the firm considered the online survey would be a good practice to monitor their service quality through customers' direct feedback, they have realised that customers who would have filled in the survey were normally dissatisfied customers and they have used the online survey to show their dissatisfaction rather than to provide constructive comments for further improvement. In spite of this inspirational idea to use an online survey embedded within the company website, it was evident that the online survey function may not be as useful as was expected. As a matter of fact, the online survey initiated unnecessary administration process, whereas positive and constructive comments can be exchanged through regular e-mail communication.

Nevertheless, the e-mail alone has assisted Agar (few products can be customised) and Purimachos in terms of coordinating customers across different geographical regions, but arguably not for Verplas. This was because Verplas only manufactured non-customised finishing products, thus the operations between the firm and their

international distributors were based on a basic selling and buying relationship, rather than coordinating complicated tasks. From another aspect, Verplas worked closely with UK based domestic appliance OEMs; however, it was mainly the OEMs leading the research and design projects, with Verplas in the straightforward position of manufacturing required specifications. Thus, e-mail alone was perceived as a useful communications tool.

6.7.1.3 Marketing Activities: Medium-Tech Category

Mobiletron and Crystran both maintain eight items for using the Internet for their marketing activities with their customers. In fact, the two companies had the most points within this dimension among all ten cases. Moreover, Coborn gained on six items and Polaron gained four items. The four companies within this category achieved some similar uses in terms of pre-sales information requests, pre-sales product consultation and reduced social and cultural distance. This was because all firms had been using website to advertise their product and they also allowed their prospective customers to have direct contact for further information by using e-mail (customers still have the option to contact regional agents/distributors). Since all four companies have offered customised production to their customers, the Internet (mainly e-mail, Mobiletron and Polaron also used video conferencing facility) has supported the firms during pre-sales communication for production consultation.

Both Mobiletron and Crystran suggested that the use of e-mail has advantages, such as making international communication easier, where they can provide instructions for their customers in different geographical regions in most non-emergency matters, such as marketing materials. However, Polaron held a different viewpoint. They agreed that using e-mail or a video conference facility with their customers was useful in terms of exchanging ideas and information, but did not necessarily ease their workload for international communication. Due to time zone differences Polaron has to work overtime in order to accommodate customers' needs as the customers expected instant replies, especially for those customers in regions such as Asia, where there is a huge time difference. It can be concluded that a firm's management approach would have an effect upon how a firm perceived the usefulness of the

Internet, for instance, Polaron was trying to provide instant responses for their customers but the firm had been stretching their resources for overtime operations, such as human resources or running costs.

Mobiletron and Coborn were the companies within this category to which the Internet has contributed the most, in terms of cost saving for travelling and intelligence gathering. This was because Internet technologies such as e-mail would attach large data files or downloadable product information via the website. Therefore, Mobiletron and Coborn has replaced a lot of business visits (both companies were still maintaining visits with valuable/large customers) and experienced a reduction in travelling costs. Moreover, these two firms would actively use the Internet to seek new customers; for example, Mobiletron would search on the websites for prospective buyers by looking at their website and gathering information on what sort of product lines that potential distributors currently had or what types of equipment that customers (garages, automotive manufacturers) were using. Mobiletron felt that they could collect most of the industrial market data via the use of the Internet without relying on a specialised market research company.

Crystran was arguably the only firm within this category to identify increasing the speed of production and the speed of ordering. Unlike the other three companies in the medium-tech category, Crystran did not employ agents to assist their international business. Yet, some of Crystran's customers were acting in a way similar to agents but without a formal agreement between them. Crystran has stated that they have known their 'informal agents' for years and has established a good relationship with them based on trust; thus Crystran has been relying on the informal agents to handle part of their foreign enquiries such as marketing materials and orders. Therefore, the author has categorised the 'informal agents' as part of the customer, which resulted in points gained on the increasing speed of production and increasing speed of ordering.

In brief, websites assisted these companies to gain more publicity as the websites could be accessed by the general public. The websites were perceived as their marketing tools for advertising the companies' profile and the product lines. Although e-mail was widely used by the firms for exchanging all kinds of information, the website was found to be useful for prospective customers as their initial contact.

Furthermore, an e-mail-based newsletter was effective for businesses to distribute messages to specific clients with minimum time and cost both nationally or internationally. A website with a product/catalogue downloadable function was also a valuable method for the firms, as it could be adapted to require requested prospective customers' information before the download which gives a clue to the firms of who is actually interested in their products. Additionally, not only were time and cost saved for the firms, but the download option provided the prospective customers with instant responses to inquiries.

6.7.1.4 Summary for Marketing Activities

Although the use of the Internet has enabled the manufacturing SMEs to make direct contact with prospective customers, the information carried through the website or e-mail still has drawbacks, such as cultural and language barriers. High-tech firms in particular preferred their customers to contact their local agents, as they were accessible to provide detailed information and discuss the product specification in person.

A website was widely perceived as the companies' advertising tool and websites featuring an information download option was regarded as an interactive approach. This was because manufacturing SMEs could gather the prospective customers' information by a simple registration process; whereas the customers could obtain the information instantly without a complicated process. In addition, an e-mail-based newsletter was another Internet technology which saved time and cost when the manufacturing SME wished to broadcast relevant news to specific target audiences.

A number of concerns were expressed about the level of website technologies implemented, which included: company budgets; level of services (customisation vs. non-customisation); nature of products (level of product information needed); number/demand of users and industrial actors (use of agents or distributors). Finally, an online survey incorporated within the company website was found unsuitable for the B2B environment, as most of the feedback would normally be exchanged via

regular e-mail communication; indeed, an online survey was perceived as wasting a firm's administration resource.

6.7.2 Transactions and Invoicing

This network dimension illustrates how the Internet supports manufacturing SMEs in terms of handling transactions or invoicing their customers. Not all of the case companies use online banking to handle and monitor their bank accounts, other forms of the Internet communication technology, such as e-mail, still have some effect on speeding up the administrative processes.

6.7.2.1 Transactions and Invoicing: High-Tech Category

All three firms realised that by exchanging invoices and orders through electronic formats benefited the firms with their communication integrations. This is because electronic forms can be filed or distributed immediately, which shortens the administration process and increases the speed of ordering via their VPNs. For example, an electronic order form can be employed at all levels of an organisation, from the production line up to administration. Nevertheless, the prerequisite for the smoothness of this type of application depends highly on the level of internal communication development, such as the VPN (Intranet). Despite Bede using an Intranet for their internal communication between the headquarters and its foreign subsidiaries, the firm argued that communication between a customer and them was in two phases, firstly, the customer to their foreign subsidiary, followed by the subsidiary to the headquarters. When dealing with issues such as invoicing, Bede considered it to be a two-stage process and would not necessarily speed up the ordering process. This example suggested that a company's organisational structure affects how information proceeds through different layers of communication.

Generally, the three case companies were not keen to employ web-based transactions, such as credit card payments via the interactive website with their customers. This was due to the high price of each individual equipment/product and the customers needed to produce necessary documents, such as letter of credit (L/C) or

transportation/shipping-related papers before the actual purchase. In other words, the process of purchasing high unit priced equipment would involve higher risks for both seller and buyer, where international orders would further involve a complex import and export administrative process.

To sum up, web-based transactions are not being perceived as a practical practice for these SMEs. High-tech manufacturing SMEs only considered using e-mail-based communication for invoicing administration. There were two reasons for high-tech firms avoiding online transactions. Firstly, the product/machinery unit cost was high where the high-tech firms wished to avoid unnecessary administration process for each individual order, i.e. import/export documents preparation. Secondly, the agents/subsidiaries were deliberately chosen for the regions where they had the most businesses. Thus, establishing initial contact between the customers and the agents would benefit their customers in terms of receiving a shorter response time for emergency support. In fact, it can be argued that due to the nature of the industry where responsive technical support is needed, the role of agents/subsidiaries was significant for the high-tech companies. Whereas, the e-mail-based invoicing administration was chosen due to the flexibility of e-mail, which can be integrated with the internal VPN.

6.7.2.2 Transaction and Invoicing: Low-Tech Category

All low-tech category companies considered that by using the Internet to send invoices or using online banking to monitoring the transactions would assist the firms speed up the process of ordering due to the instantaneous nature of the Internet. Unlike the high-tech category, the customers within the low-tech category tended to have more opportunities to have direct contact with the firms. Even so, the network activities of transactions or invoicing would be highly influenced by the product types, types of customers and the manufacturing SMEs' attitudes towards their 'buyers' or vice versa in some cases.

In the case of Verplas, most of its customers were either large distributors such as B&Q and Wickes (large retailers/distributors) or large OEMs. These customers were

capable and willing to cooperate with Verplas's approach of sending and receiving invoices through e-mail and adopting Verplas's electronic order forms. Despite the payment method that Verplas's customers preferred to utilise, Verplas used online banking to monitor the payments internationally which they considered saved time and cost in terms of travelling and coordination across different geographical regions.

Agar did not use online banking as it had concerns over the security issue, for instance, online security over their Internet infrastructure. However, there were other considerations for Agar. For example, the management did not see the need to use online banking as they were satisfied with the existing process for sending and receiving payments. Apart from online banking, Agar held a positive view on using e-mail to attach relevant documents such as invoices and quotation of product prices, due to less risks involved. Most importantly, Agar integrated the online stock database with the electronic forms such as invoices and receipts where the firm had been benefiting from a fast administration procedure. This particular approach could be argued to be effective for companies similar to Agar, as they have a large number of product lines along with a large number of users. It is important to note that most of the users were Agar's authorised agents and distributors, only a small number of customers (large in demand) had direct access to Agar's online order system where Agar treated the customers the same as distributors. For all these reasons, Agar suggested that administration capability was the most important capability for them.

Purimachos maintained similar reasons as Agar for not using online banking, as the firm realised that they had a poor Internet infrastructure and it was likely that their IT equipment would be at risk from Internet attacks. Nevertheless, the management were very keen to adopt electronic communication such as e-mail, for exchanging information which included invoices and receipts. Although the management had a positive attitude, Purimachos were limited by their customers for the possibilities arising from adopting advanced Internet technologies, which could contribute towards the integration of the firm's communication. This was because a lot of Purimachos' customers were large distributors or large construction organisations where they had huge bargaining power over Purimachos.

The unbalanced bargaining power between Purimachos and their customers was not entirely limited by price, but by communications strategy. For instance, a large customer would ask or even ignore Purimachos on some occasions, where the customer produced invoices and receipts in their preferred formats (different customers with different formats). Therefore, Purimachos was tied to their human resources for producing these non-standardised invoices. As a matter of fact, Purimachos knew that it could simply ignore the instructions from their customers; however, the firm needed to maintain good relationships with the large customers since the sales were largely dependent on these large customers. Purimachos changed their normal invoicing procedure in exchange for a better and long-term relationship with their large customers.

The findings suggested that the balance of power within the network would have significant impact on a manufacturing SME's decision on their approach for electronic invoicing. When a firm relied heavily on a few large customers or a firm's product could be replaced easily by another supplier, the manufacturing SME was likely to be constrained by their customers' preferred invoicing methods. On the other hand, when a manufacturing SME's position within a network was unique, e.g. the authorised maker for replacement parts, the SME has a better network position/power for negotiations, such as using their own invoice format.

In general, manufacturing SMEs were not keen to use online transactions with their customers as there were a number of concerns, such as security and limitations. From another perspective, the manufacturing SMEs concentrated on their manufacturing capability, rather than their distributing capability where they had fewer customers. However, there were indications of the future possibility of using online banking to monitor their bank transactions. These would assist a manufacturing SME to coordinate their banking activities if they held a number of international bank accounts.

6.7.2.3 Transaction and Invoicing: Medium-Tech Category

Out of the four cases within this category, Coborn and Crystran used online banking to handle and monitor their bank accounts. Interestingly, Coborn and Crystran held a very similar view to Verplas (see Chapter 6.7.2.2). Both companies viewed that online banking would have few problems in terms of travelling; whereby they could monitor their accounts details on computer screen; especially for Coborn where they have a number of bank accounts internationally. As a result, it was possible for the firm to coordinate the banking activities across different geographic regions.

Although Polaron and Mobiletron did not use online banking, they believed that using e-mail would be enough to handle their administration activities such as invoicing. Since Mobiletron had implemented an ERP system, due to the financial support and strategic decision from their parent company (More Group), the firm was able to benefit from automated electronic invoices which linked to their database if a customer ordered stocks online. Thus, the integration of the automated electronic invoices could be processed automatically and sent via e-mail without a large input of human resources. Mobiletron expressed its view that most of its customers, particularly the UK customers, preferred telephone orders, or a drop in to its warehouse, instead of ordering through their website. In order to tackle this issue Mobiletron had to educate its customers to use its website and hoped to reduce unnecessary waste of their current Internet resources, as well as human resources.

As matter of fact, Mobiletron had invested in the IT infrastructure of some of its customers as Mobiletron required regular communication with them. This particular approach was suggested when establishing long-term relationships and shortened the communication lines with their customers. However, it is important to note that Mobiletron was able to take this approach due to financial support from its parent company where they have surplus financial resources.

The findings suggested that simple Internet functions such as e-mail have been used on most occasions for invoicing, where online transactions were not in consideration. For a company that adopted an ERP system, the current development and usage of the ERP system was perceived as mainly for internal communication, which included

international internal communication. This was due to the firm's customers, who did not have the full Internet capacity to integrate with a much more advanced ERP system. The research also discovered that customer education was another important element which would encourage customers to use an online facility, however, the firm needed to input human resources and give time for education.

6.7.2.4 Summary for Transactions and Invoicing

Despite or because of companies' size and industries, one similarity between all case companies was that they did not offer any web-based online transactions function, such as credit card payment on their websites, as manufacturing B2B customers would often involve large transactions. For most manufacturing SMEs, online banking was perceived as an alternative method of monitoring their bank accounts; even so, some of the firms who lacked IT skills were not keen to use online banking due to suspicion of their internal Internet network infrastructure capacity and poor security.

These findings contradicted Sharma's *et al.* (2001) argument, who suggested that online transactions in a 24/7 environment reduce the risk of traditional order taking and could be a key advantage for the firm. However, the current trends of using online transactions were restricted, due to a lack of management's commitment as well as the financial resources needed. Most importantly, B2B based companies may be involved with a large number of transactions and there was the possibility that they would still need to administrate import/export documents. Thus, it is impossible for the firm to fully adopt online transactions. From another perspective, due to business activity such as product customisation, most manufacturing SMEs still required interactions with their clients, hence, reducing the possibility of fully exploring the use of an online order system.

For those firms that adopted an online order system, they found that their input in terms of human resources and time were crucial, as this would encourage their customers to use the designated system. On the other hand, the balance of power within a network also affects the invoicing and transactions methods adopted by the

manufacturing SME. The balance of power within a network can be determined by the size of an organisation; product quantity purchased in relation to the manufacturing SME's percentage of profits and the level of product alternatives. Nevertheless, most of the companies argued that e-mail was sufficient for handling invoices, as e-mail would be converted and integrated with their internal database for archives or other purposes.

6.7.3 After-Sales Support

This dimension explores how manufacturing SMEs use different Internet methods to enable their after-sales support activities. The after-sales support included providing basic product solutions through e-mail (written instructions), website (FAQs) or using advanced online synchronisation for remote equipment setting.

6.7.3.1 After-Sales Support: High-Tech Category

There are many similarities between the three high-tech companies in their use of the Internet to provide after-sales support to their clients. Primarily, they used e-mail as the basic communication tool for after-sales support, because e-mail is in written format and can be archived for further reference. Furthermore, both clients and the three high-tech firms would describe their problems and solutions in a constructive open forum. Thus, all three companies' supporting webpage (website) contained only telephone and e-mail information for their clients to contact. This was particularly effective for all three case companies as they needed to gather sufficient information such as equipment settings and configurations before providing their clients with the correct solutions. Furthermore, all three firms had encountered some common issues where some of their clients would not necessarily provide full details of any potential issue. Thus, the three case firms needed to reply to e-mails and ask for further information so time would be wasted, especially for clients who were located in geographical regions with wide time zone differences. The other common issue is that their clients tended to contact or send e-mails to the people they were familiar with, i.e. sales representative instead of to the dedicated supporting technicians. Thus, all three high-tech firms argued that clients who did not contact their dedicated supporting

personnel would increase other employees' workloads; typically the sales representative or anyone who a client felt comfortable to contact, which could be anyone in the organisation.

Apart from e-mail, all three case firms have used a video conference facility to provide after-sales support. However, it is very rare for customers to request video conference support as the video conference facility is mainly for business negotiations. Additionally, Accent used VoIP as an alternative to telephone to provide customer support. The VoIP facilities allowed the company's customer support team to work in a very flexible way, i.e. work from home, and were able to reduce the office spaces required. It is important to note that although Accent's customer support team could be working away from the office/site, they could only provide limited support, for complicated technical issues, customer support would refer to dedicated technical personnel via e-mail and VoIP.

Interestingly, TSSE mentioned that they had an idea to have modem-embedded technology with the equipment sold. However, the idea was never implemented, as TSSE's customers felt insecure with the idea that sensitive production/manufacturing configuration data could be leaked to a third party. Although this idea was never implemented for TSSE, Coborn did have a modem embedded for some of their latest development and have enjoyed the convenience of fast and accurate communication for technical support purposes (see Chapter 6.7.3.3).

All three high-tech companies have employees travel around the world, either for technical support or business negotiations, and they have found that the Internet is very effective where their employees could access the firms' Intranet from remote locations. They were able to access information which was located in the internal database via the VPN, whenever communication was needed and time or cost would reduce.

It is clear that the use of the Internet benefited the firms when providing international technical support, as it allowed their technicians to access essential data or to contact their headquarters for additional support. However, before sending out the technicians, e-mail was the most important communication tool as it could carry text-based

information with multimedia attachments, enabling the firm to acknowledge what sort of replacement parts were needed or specialised technicians required. Furthermore, the use of VoIP technology not only provided the company with the flexibility to position their supporting technicians, but it was perceived as the alternative to telephone, where the firm could reduce heavy costs made by international phone calls.

6.7.3.2 After-Sales Support: Low-Tech Category

Within the low-tech category, there were significant differences in terms of the usage of the Internet for after-sales service. For instance, Verplas only scored two items of the Internet contribution, whereas Agar and Purimachos scored on five items each. The reason for such diverse results could be due to the fact that there are different levels of services required based on product types, as well as depending on the degree of capabilities of their customers/clients.

Verplas for example, manufactures domestic ventilation and ducting systems and it does not require a great deal of technical support, as the product is unlikely to encounter technical faults or complicated configuration in comparison with high-tech products. In reality, domestic ventilation and ducting systems can be installed by the end-user with simple instructions. Even if the consumer encountered installation issues, they would normally consult Verplas's customers (distributors) who have sufficient skills and knowledge to give an appropriate level of advice without requesting further technical support from Verplas. Due to limited technical support requested from their customers, the firm hardly experienced the benefit of the Internet for after-sales support. This indicates that Verplas would only use e-mail to provide sales-related after-sales support to their customers, such as exchanging or replacing existing orders.

Despite Agar and Purimachos having a similar pattern, they have slightly different approaches for using the Internet to provide after-sales support. For instance, the majority of Agar's customers who needed after-sales support were someone like their agents, dealing with after-sales issues, such as refunds, exchange or replace existing orders. However, there were two types of customer who would contact Purimachos

for after-sales support. Firstly, the end-users (consumers), where they required further information on product application such as the temperature limitation of the fire cement or mixing application process for sand and aggregate. Secondly, industrial buyers for after-sales warranty for products, such as a pizza oven. The level of service differs for different types of product, as well as different requirements for different types of customer. Agar tended to use e-mail to exchange information and documents for products that needed to be refunded, exchanged or replaced. In contrast, Purimachos not only used e-mail to provide technical support but have a FAQ section embedded in their website (FAQ section was setup shortly after the interview) in order to reduce unnecessary communication with end-users, since the nature of the their operations were B2B basis.

Apart from using e-mail to provide after-sales support, the research also found that the customers in terms of their relation to the product technology, would have a strong influence upon the selection of Internet supporting formats, such as webpage structure. It can be said that low technology products required less complicated after-sales service as most of the customers would have the ability to solve problems by themselves; whereas the low-tech manufacturing SMEs could adopt a FAQ section to answer the most frequently asked questions.

6.7.3.3 After-Sales Support: Medium-Tech Category

All four companies within this category used the Internet to support their after-sales services. However, although Mobiletron had the most advanced Internet infrastructure (ERP) within this category, they scored the least points. To explain this scenario, it could be argued that the power given to Mobiletron's agents and distributors as well as their capacity to deal with their own customer base have powerful influences. As Mobiletron have limited after-sales support and communication with their end-customers, most of the after-sales services relied on the agents. For instance, the agents who represent Mobiletron overseas have the capacity to carry out most of the repairs or other types of after-sales services. The agents would contact Mobiletron if they needed to return products that were not repairable by them; therefore, minimum communication activities were required between Mobiletron and their agents, such as

to arrange return products (documents) via e-mail. From another perspective, Mobiletron reduced their workload by not only selecting reputable and reliable agents, but agents with knowledge and ability to carry out most of the after-sales services.

Crystran did not use any agent or distributor for their international business. Despite some of the customers acting as Crystran's 'informal' agents, these informal agents could only provide simple after-sales services (return and exchange) but not complicated technical support to the buyers. Therefore, from Crystran's point of view, those industrial actors who either purchased their products directly or via the informal agents were all qualified as their 'customers'. Hence, Crystran would provide direct technical support to virtually the entire product user. Even though Crystran needed to cover a huge customer base for after-sales support, the firm argued that a simple e-mail solution would be enough. In other words, e-mail would be sufficient to answer queries as Crystran's products (optics and optics coating) did not involve complex machinery configuration settings or delicate components replacement.

Polaron used distributors for their international business; but the main responsibility of a distributor was not to provide technical support. Thus, Polaron was responsible for after-sales technical support for customised products in particular. Polaron expressed that due to most of their customers being military-based or companies such as BP or Shell for oil field operations, Polaron needed to provide 24 hours support. Since the after-sales support for this kind of customer required instant responses, the firm used e-mail and a video conference facility to support their after-sales services as both e-mail and video conference offers instant or even interactive communication. For example, e-mail can be sent with attachments, such as photos with further explanation in text; video conference facility enabled both Polaron and their customers to discuss solutions with live images and interactive conversations. Perhaps, because of the nature of the industry and the level of support needed, Polaron did not plan to use other Internet communication methods, for instance, online FAQ, as it could only offer limited information.

In the case of Coborn, they used agents who could also provide after-sales support to customers that were limited to basic equipment maintenance or basic repairs. For the more advanced technical problems, Coborn would normally have direct

communication with the customers through the agents' referral. Moreover, Coborn introduced machines that have a modem embedded in some of the latest development, where customers can allow the modem to send equipment configuration data directly to Coborn. This particular method helped shorten the time for the technical support because Coborn did not need to wait for series of e-mail communication to obtain accurate information before giving precise instruction for self-repair or precise components needed before sending out their technician. In actual fact, Coborn was proud of this particular development and used it as one of their unique selling points, which contradicted TSSE's argument. This indicated that the customers in a different industry would have different attitudes towards information sensitivity; as a result, firms adopted different approaches for technical support.

6.7.3.4 Summary for After-Sales Support

The use of different Internet technologies and approaches for after-sales support are highly dependent on the customers' requirements, product types and manufacturing SMEs' agents or distributors' capability to provide after-sales services. For example, Polaron provided 24 hours support using e-mail and a video conference facility due to the industrial requirement. Nonetheless, manufacturing SMEs still have power to pre-determine the level of services they are willing to provide, which results in different levels of commitment on Internet investment. For instance, Coborn had a limited budget to invest in a VPN system, but they chose to use modem embedded technology and shorten the technical support communication and it became one of their unique selling points.

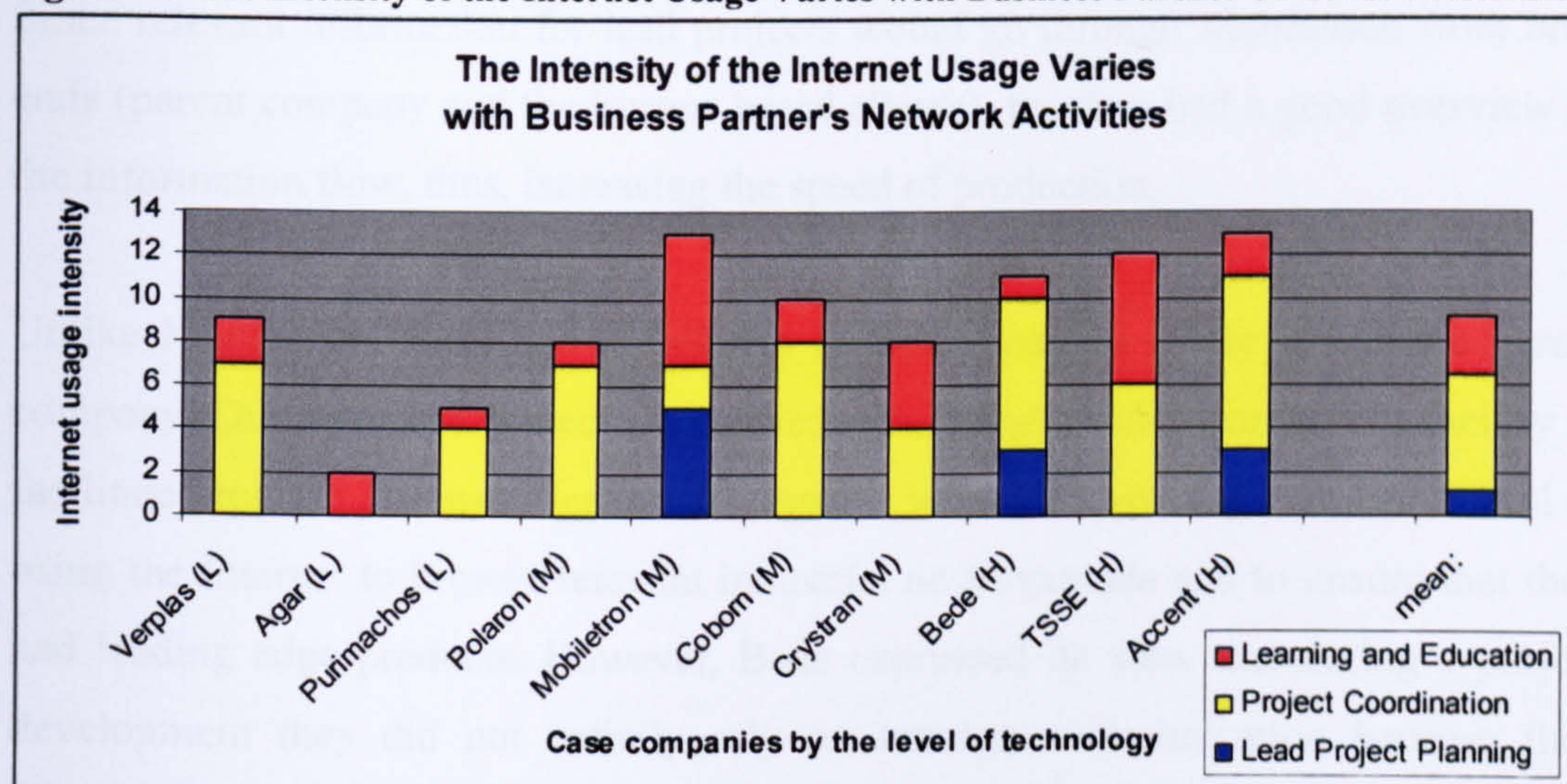
It is evident that current development of advanced Internet infrastructures, such as VPN or ERP systems, were not being used to their full capacity. VPN or ERP systems were still in the stage mainly for internal communication. For after-sales support that required physical presence, the manufacturing SMEs would still need to rely on their technicians, agents or distributors, where the use of Internet technology is more about exchanging electronic documents (refunds, courtesy e-mail) and answering less complicated questions. For example, the implementation of a frequently asked questions (FAQ) webpage was still perceived as a useful function for low-tech

products, as it would reduce the overall workload for the firm when answering the most common questions.

6.8 Manufacturing SME and Business Partner

Apart from the core business, firms are likely to be involved in some business activities with other industrial network actors. Depending on a firm's resources and their position within their network, some companies take a proactive approach to influence their business actors; vice versa, some companies take a passive and receptive approach where they are likely to be influenced by other industrial actors. Therefore, this section was divided into these different dimensions to explore the differences between the usages of different Internet technologies in terms of different network roles, responsibilities or activities. Figure 6.8 below illustrates how the case companies' Internet usage intensity varies with their business partners' network activities.

Figure 6.8 The Intensity of the Internet Usage Varies with Business Partner's Network Activities



6.8.1 Lead Project Planning

This dimension was to investigate companies who had lead project activities and how they evaluated the Internet contribution towards sharing with other industrial actors.

The research found that only three firms out of the total ten case companies had lead project activities. These three companies were the major players within their industry with one or more of the following elements, such as surplus financial resources, leading technologies or market shares, etc. Most of the manufacturing SMEs were in the position to coordinate activities with other larger companies (see Chapter 6.8.2). For this particular section, the discussion will be based on an individual case company, since not all of these companies have the same level of network activities with their business partners.

Due to differing requirements and purpose of each lead project, Mobiletron, Bede and Accent had a range of views about the contribution of the Internet. For example, Mobiletron worked closely with their parent company where the firm mainly acted as an intermediary via their ERP system between the parent company and the UK/Europe-based clients for lead projects. The main advantages here were that the firm considered the Internet contribution was based upon dimensions, such as reduced social and cultural distance and uncomplicated coordination across different geographical regions, as the clients would contact UK-based Mobiletron initially. Since relevant information for lead projects would go through Mobiletron from both ends (parent company and the Europe based clients), the firm had a good overview of the information flow, thus, increasing the speed of production.

Unlike Mobiletron, Bede had a different network position where it was the parent company. During a lead project, Bede used e-mail and a video conference facility to facilitate progress and specification discussions with their working partners as well as using the Internet to browse relevant industrial developments and to ensure that they had leading edge products. However, Bede expressed its view that during a project development they did not entirely rely on Internet communication because they needed to assign their technicians to their business partners to receive relevant technological education. Additionally, project managers needed to visit the business partners to ensure the new product development progress, and the Internet offered the firm the speed for internal communication, as travelling employees could make regular contacts and updates with/to the headquarters through their VPN.

With surplus financial resources and advanced technologies, Accent also had lead development projects in progress. They used e-mail, a video conference facility and VoIP to communicate with their project partners during the product/technology consultation stage. Since the firm had invested heavily in their Internet infrastructure, the firm started to change the internal communication process, which had impacted the organisational structure. They considered that the Internet had speeded up the product development process because their employees were not restricted to certain fixed locations. Accent found that the Internet could be used for regular internal information exchange, which included online meetings. This method enabled their employees to keep in touch with headquarters while in remote locations, thus, increasing the overall productivity.

6.8.1.1 Summary for Lead Project Planning

Despite that Mobiletron had activities in a lead project planning dimension, they were in a position to coordinate communication between their Europe-based clients and headquarters for product development. However, Bede and Accent demonstrated that two key benefits of the Internet were brought to the lead project development. Firstly, travelling employees could speed up the communication process with headquarters by sending and receiving accurate information via e-mail or VPN. Secondly, the flexibility of using the Internet enabled the firms to increase their productivity by engaging their employees to work/communicate while in remote locations.

6.8.2 Project Coordination

Apart from Agar, the other nine case companies all had joint activities, such as development and project coordination with other industrial actors. This section is focused on how manufacturing SMEs used the Internet for project coordination as well as their views on the Internet contribution towards their business operation.

6.8.2.1 Project Coordination: High-Tech Category

Three high-tech firms have similar positions on how the Internet contributes towards project coordination with other industrial actors. They have some similarities in terms of product consultation; to reduce social and cultural distance; communication across time zones with ease; increase the speed of production; coordination across different geographical regions and integration communication.

One of the reasons that these three firms were so similar in terms of the score was that they all had international business partners where they used e-mail, video conference or VoIP to make overseas communication; and coordination across different geographical regions. Another reason is that these firms have known most of their joint development partners for a long time. With such a good relationship developed, they argued that there were no serious issues related to social and cultural misunderstanding and considered the Internet merely as a tool for exchanging technical data. The third reason is that Bede, TSSE and Accent all used an Intranet system embedded within their Internet infrastructure; thus, information and documents were all allocated to a specified location which speeded up the distribution of documents and increased the production process.

From the evidence discussed above, it can be seen that using an Intranet system embedded with the Internet infrastructure would certainly shorten the time for communication as both Intranet and Internet allowed the employees to obtain relevant information with ease. However, a prerequisite to the success of this type of Internet approach is that companies need to have a high standard of document management. Bede for example has a self-designed documentation system where they were able to track each log-in and allow any registered user to amend documents online in any location. Bede also stated that circulating review-needed documents online saved a lot of time, especially for international operations where documents would be completed next day.

6.8.2.2 Project Coordination: Low-Tech Category

Agar did not qualify for the evaluation of project coordination due to the nature of their business approach (see Chapter 5.8). However, the other two low-tech companies: Verplas and Purimachos have project coordination activities with other industrial actors and did suggest some advantages of the Internet.

The main business partners of Verplas were large domestic appliance OEMs with whom the firm have long-term working relationships. Since the OEMs invited Verplas to joint-develop ventilation systems for domestic appliances, the relationship was more intimate as both Verplas and the OEMs needed to input efforts to ensure the clarity of each communication. Although Verplas was a late adopter of Internet technology, it found that e-mail alone was sufficient to handle regular communication with their business partners as most of the joint-development activities, such as exchange measurements for product dimensions or materials specification and limitation. In the case of Verplas, there were three factors which influenced the firm's decision on their level of Internet infrastructure investment. Firstly, the frequency of communication during a joint-developed process; secondly, types of joint-development (i.e. OEMs' core product or add-on accessories) and information required and finally, the complexity of the required information.

Purimachos had a different approach with their business partners, whereby the firm considered that they only had limited usage for the Internet. There were mainly three arguments which could explain Purimachos' limited Internet usage. First of all, there were limited numbers of business partners that had constant joint-development with Purimachos, thus, the firm argued that e-mail alone was sufficient to speed up the information exchange process. Secondly, the level of product technology involved was not changed over decades for fire cement, as a result, for most of the joint-development activities, i.e. changing the percentage of mixing materials, again, the firm argued that e-mail alone was effective. Finally, although the firm expressed that they would like to explore other possibilities of using the Internet, the firm's concerns over Internet security and financial ability were other drawbacks.

“But I do think there are improvements to be made to the website and there is definitely more potential to use it in a better way than we do now. I think that for example there could be specifications downloadable, and safety data sheets downloadable and things like that.” (Technical Director, Purimachos)

“But we’re always restricted by the investment that we can put in. So the main weakness really, is in cash, yes.” (Technical Director, Purimachos)

6.8.2.3 Project Coordination: Medium-Tech Category

Although all four companies have coordination activities with other industrial actors, there was diverse Internet usage within this category. Polaron and Coborn were very active in project coordination with their customers or suppliers for product development. It can be argued that the level of service, such as product customisation was provided by Polaron and Coborn; in addition, the industries in which both companies were involved required product customisation due to individual needs. As a result of this, both firms had frequent communication with their business partners for product development. They considered the use of e-mail benefited the process of product consultation, reduced social and cultural distance, communication across time zone with ease, and increased the speed of production as they could coordinate activities across different geographical regions. As a matter of fact, Polaron has taken the video conferencing facility to another level where they allowed their clients to view the live image during the production process, so that the clients could discuss with the technician their requirements. Moreover, due to the flexibility of e-mail, both firms considered that the information exchanged could be easily integrated with their internal communication infrastructure.

Crystran also used e-mail to coordinate projects with their business partners very similar to Coborn’s approach, but due to the level of the technology involved was not as complicated as Coborn. Crystran considered that their current Internet approach (e-mail) had benefits, such as information exchanged for product consultation and increase in the speed of production. In addition, the firm had adopted e-mail since

early establishment and it does not have the business culture to visit their clients. They already considered that e-mail had the benefit of reducing cost of travelling.

In the case of Mobiletron, although they mainly concentrated on lead project planning, they also had some joint projects with some their business partners based in the UK. Since the firm visited their clients, and as the locations of their business partners were locally based, the firm only used e-mail with a video conferencing facility occasionally and used them to facilitate project coordination. Therefore, they considered that the use of Internet had only increased the speed of production and manufacturing consultation where e-mail communication could be further integrated into the firm's ERP system.

6.8.2.4 Summary for Project Coordination

To sum up, the use of Internet technology in relation to project coordination activity with their business partners could be categorised into the following three ways:

Dimension one: the level of technology. High technology products were likely to involve more frequent communication with a firm's business partners, because they were forced by the overall industrial trend into new product development. Thus, there was a high demand of usage for the firm to exchange information through e-mail or a video conferencing facility. Furthermore, the Internet allowed a travelling development team to access the firm's VPN where they could keep in frequent contact.

Dimension two: the role within a joint-development. Regardless of the size of a manufacturing SME, its responsibilities within a co-operative relationship would have direct influence on their level of inputs. In other words, if a business partner demanded the manufacturing SME to use VoIP or a video conferencing facility to ease communication, the manufacturing SME would need to consider adopting the same level of Internet technologies.

Dimension three: the period for joint-development. A number of case companies showed that their commitment to Internet development for project development was

not purely based on their financial ability. However, the firms did evaluate the usefulness of Internet technology based on the return on investment. That is to say, the manufacturing SME viewed that their current Internet usage (e-mail) would be sufficient for handling most of the activities within a joint-development programme. However, if a project required long-term commitment the manufacturing SME would consider investing in other Internet technology where it could match their business partner.

6.8.3 Learning and Education

The purpose of this section is to discover how the manufacturing SMEs used the Internet for their learning and education activities. The learning and education activities could be argued from the both internal structure of an organisation, as well as from other joint activities with other industrial actors externally. These learning and education activities included: educating and receiving new technologies, receiving other industrial actors' business practices/management or training, etc.

The reason for such diverse usage of the Internet for learning and education purposes can be attributed to two influences upon a manufacturing SME. Internally, every organisation would have a different level of resources for Internet development, thus, the financial consideration was one of the key issues that influenced the firms on how they structured their Internet infrastructure. Another significant determinant of using the Internet for learning and education was highly dependent upon the manufacturing SMEs' need with management's commitment for this type of investment. For instance, although both Mobiletron and TSSE were strategically independent units, they still needed to exchange information or updates with their parent company which was located overseas. Mobiletron and TSSE both had strong financial support from their parent company where they had an advanced Internet infrastructure, such as ERP and VPN. Furthermore, by using video conference facility and VoIP to receive training and education without substantial travel, this fitted into Mobiletron's strategic plan. Similarly, TSSE used a video conference facility, e-mail and exchange files through their private network (VPN) in order to receive new technological updates.

Externally, three aspects have been identified that may result in different usages of the Internet for learning and education purposes. Firstly, the interactions between the manufacturing SME and the industries they involved. For example, the industry that Polaron was involved in way very active in terms of sharing industrial news and information via online forum, either from some trade organisations or private organisations. This kind of activity led to the second dimension where manufacturing SMEs sometimes would be forced by other industrial actors to provide educational materials and vice versa. Thus, the main advantage of the Internet, especially e-mail, was widely used as most manufacturing SMEs (7 out of 10 case companies) considered that this type of information sharing and broadcasting would benefit in terms of intelligence gathering. More than half of the case companies (6 out of 10) also considered that using e-mail-based Internet technology for learning and education could reduce the social and cultural distances, such as broadcast news through an online newsletter, subscription to an other online newsletter, basic e-mail enquires and via an online search engine.

The final aspect was the nature of product technology. In certain industries, technologies moved quickly. Hence, firms within these industries were self-aware of the need for faster technological learning and education. For example, the three high-tech firms had similar activities when seeking new technology and updating new industrial news via methods such as e-mail based communication which included subscribing to an online newsletter from certain trade organisations or academic institutions, video conference and website browsing. Whereas companies in the low-tech category were more relaxed or uninterested in terms of receiving new technological information or educating their clients due to their product technologies not requiring frequent changes; as a result, three low-tech companies all used e-mail-based Internet for communication purposes only.

6.9 The SCIM Framework

This particular section highlights the final construction process of the extended conceptual framework, this is also referred as SCIM (SME Capability for the Internationalisation of Manufacturing) framework. In order to explain the

construction of the SCIM framework, the researcher has divided it into a two-stage approach. The first stage is the capability development of a manufacturing SME, followed by integration of the capability development within the network context.

6.9.1 Stage One: The Capability Development

The multiple-case studies indicate that internal capabilities and external capabilities were highly associated with each other. Furthermore, both internal and external capabilities sets have demonstrated their influences upon the scale, scope and success of activities involved, as well as the level of resources exchanged. There were indications that the manufacturing SME's Internet activities had direct influence upon communication efficiency; whereby companies' resources were constantly exchanging with other industrial actors. As a result, both communication efficiency and exchanging of resources had contributed to companies' international activities. In some cases, the efficiency of communications had a direct impact on the firms' internationalisation strategies.

Both internal and external capabilities are equally important as they should be inter-linked with each other. This is because a manufacturing SME's existing capabilities and capability development are not only influenced by their internal decision-making, but by external network activities interaction. During this process, a manufacturing SME may or may not develop its own capability that is specifically developed for its network. This process is illustrated within the *red* rectangular area of Figure 6.9. Furthermore, there are four consideration factors that contribute to the final decision about a manufacturing SME's internationalisation approach (with no particular order). These factors are illustrated within the *blue* rectangular area of Figure 6.9 and are explained as follows.

Factor One: Industrial Actor's Internet Infrastructure

When a manufacturing SME is developing its IT infrastructure, it does not only have concerns over its own initial budget which is a part of the internal capabilities. The manufacturing SME also considers other network actors' IT development in order to match up the technology for effective communication. For instance, manufacturing

SMEs adopt the use of e-mail because e-mail is used among the other network actors. However, this factor cannot be considered solely without further investigation of other factors within the consideration factors.

Factor Two: Market Environment (Product Demand)

This factor is to look at the overall industrial environment with considerations depending on the nature of the product and demand. For example, when purchasing expensive machinery in a B2B environment, a number of assessments must be carried out before the shipment where the cost of deliveries are high, as well as the necessary after sales/technical support needed. This involves active constant face-to-face communication where the use of the Internet can only support communication efficiency, not online purchasing and transactions. However, for a manufacturing SME producing less technical, less expensive goods with a lot of frequent purchase orders from their agents/customers/distributors, an online order system is very helpful in terms of ordering information clarity and improves the speed of the relevant order related organisation. Nonetheless, these examples also indicate the importance of other factors within the consideration variables.

Factor Three: Type of Resources Exchanged or Required

It is evident that a manufacturing SME requires different types of resources for different activities needed, whether to collaborate, coordinate or cooperate with other network actors. This, however, has a direct influence on a manufacturing SME's decision not only for its Internet development, but also the long-term working relationships with other industrial actors. This leads to the decision making of a company's capability development; whether to strengthen its existing capabilities or to develop its unique capabilities that allows the company to have stable working relationships with others. For example, the distribution capability developed and emphasised by Agar Ltd (see Case Seven, Chapter 5.8).

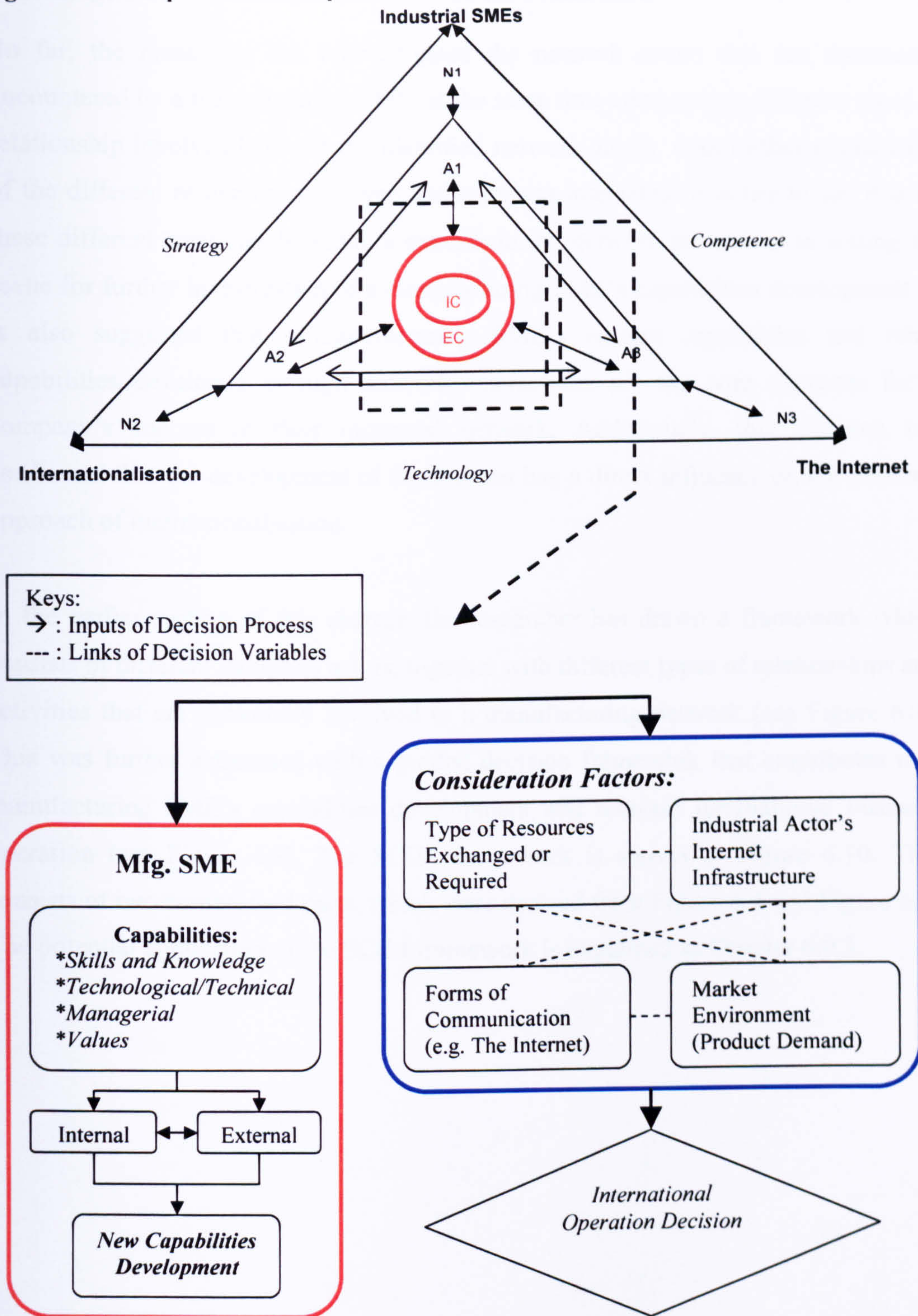
Factor Four: Forms of Communication

This factor is highly associated with a manufacturing SME's culture and values in respect of their industrial counterparts. For instance, a manufacturing SME may prefer a traditional face-to-face communication approach over the Internet. It is largely due to its commitment to provide better services for others within its network, thus, to

have better chances of maintaining long-term working relationships. Nonetheless, this factor is also linked to a company's managerial capability, such as its attitude to adopting new technologies, budget limitation, etc. An example of the managerial capability in relation to this factor is the investment in VoIP or Online Video Conference facilities, as the company is able to offer alternative communication methods for their clients with no significant extra cost in comparison with investment on ERP.

The four factors mentioned above are highly associated with each other and they are inseparable when considering a company's capability development in relation to the network stability. These consideration factors are to be served as elements that need to be investigated by the decision maker for the company's capability development. Additionally, the concerns of a company's international operation decision should include both manufacturing SME's capabilities and consideration factors, which are illustrated in Figure 6.9.

Figure 6.9 The Capabilities Development

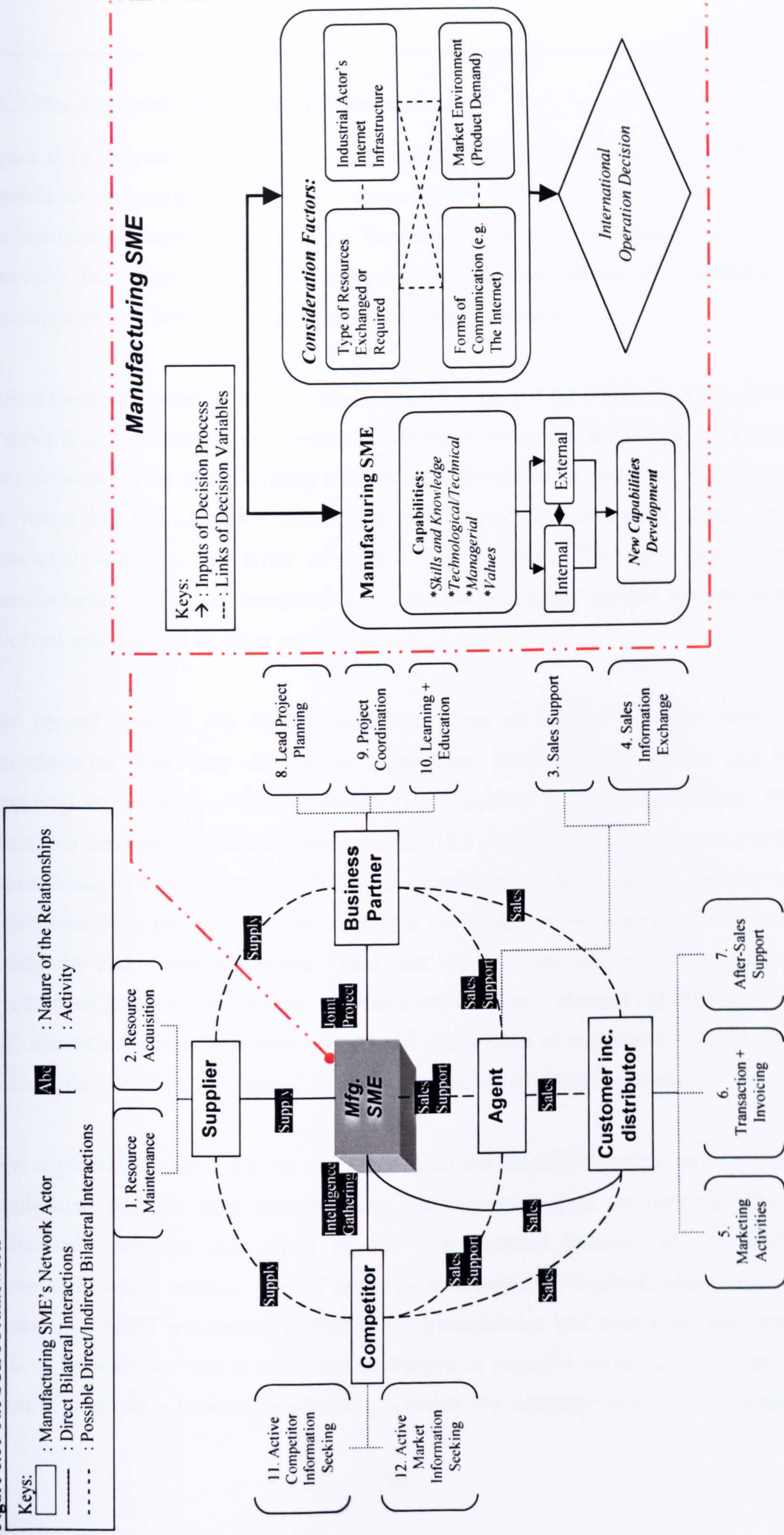


6.9.2 Stage Two: The Completion of the SCIM Framework

So far, the researcher has reinvestigated the network actors that are commonly encountered by a manufacturing SME, at the same time categorising different types of relationship involved between the identified network actors, with further explanation of the different resources exchanged and activities interacted. It is fair to say that all these different components within a manufacturing network are crucial in setting the scene for further investigation of a manufacturing SME's capabilities development. It is also suggested that a manufacturing SME's current capabilities and other capabilities developed through network interactions are the core elements for a company's success in their industrial network. Additionally, this research has confirmed that the development of capabilities has a direct influence on the network approach of internationalisation.

In the earlier section of this chapter, the researcher has drawn a framework which consists of different industrial actors, together with different types of relationships and activities that are commonly involved in a manufacturing network (see Figure 6.4). This was further elaborated with a guided decision framework that contributes to a manufacturing SME's capabilities development and relevant international business operation (see Figure 6.9). The SCIM framework is shown in Figure 6.10. This consists of two compressed parts, which were derived from Figure 6.4 and Figure 6.9. The potential application of the SCIM framework is explained in Chapter 6.9.3.

Figure 6.10 The SCIM Framework



6.9.3 The Application of the SCIM Framework

Figure 6.10 provides a framework that guides decisions for a manufacturing SME's capabilities development and also considerations for using the Internet in its international business operations. This framework consists of two parts: one is the overview of a typical industrial network, and the other shows the capabilities development of a firm corresponding to the industrial network.

Before the development of a firm's capabilities, it is crucial for a manufacturing SME to identify relevant activities or resources needed in order to internationalise through their network. In the manufacturing network map, illustrated on the left of Figure 6.10, the researcher has identified different manufacturing network actors, along with associated activities and types of relationship involved. This map may assist manufacturing SMEs to recognise any potential resources needed or activities involved and required by other network actors.

The second part of the SCIM framework gives an insight into the ways a manufacturing SME may develop its capabilities. This particular section can be perceived as the heart of this framework (see Chapter 6.9.1). Within this part, the researcher demonstrates how a manufacturing SME could reach a decision about their international operation strategy. Firstly, a manufacturing SME should explore its capabilities from four perspectives: skills and knowledge; technological or technical; managerial and company's values. These four types of capability should be further investigated from two dimensions: internal capabilities and external capabilities. It is also important to note that these aspects and dimensions of capabilities should also include the 'consideration factors' suggested within the finalised framework.

New capabilities cannot only be developed from the identified internal and external capabilities, but take other considerations that originated from the network. These contextual influences are placed in the "Consideration Factors" of the SCIM framework, which include: type of resources exchanged or required; other network actors' Internet/IT infrastructure; forms of communication and market environment. This is because the type of resources exchanged or required would have an impact upon a company's network positioning, whether the company needs to cooperate,

coordinate or collaborate with other network actors. Thus, both existing and new capabilities developed need to match the network expectations.

In terms of other manufacturing network actors' Internet/IT infrastructure, a manufacturing SME needs to understand other actors' Internet or IT infrastructure in comparison to its own infrastructure. This is to assess the possibility of IT/Internet integration between two organisations. If not, alternative forms of integration may be needed. This type of consideration would normally appear to a manufacturing SME's supplier or business partner.

The third consideration element consists of forms of communication that can be used for a company's communication development. Different types of Internet communication method would have different purposes to suit each organisation. The researcher has concluded that the use of website and e-mail are common business communication practices. In fact, manufacturing SMEs rely on both website and e-mail the most. This is because the use of a website is perceived as a cost effective method to gain publicity and exposure in international markets. The use of e-mail allows the firm to have direct communication with their clients and vice versa. Other advanced Internet activities, such as VPN or ERP are used by companies which have more financial resources, but also have extensive involvements within the network. This is especially true for companies within the high-tech industries in this research where they have a large number of overseas clients and require extensive technical support. By using VPN or ERP it allowed their travelling employees or technicians to maintain regular contacts. Nonetheless, the majority of the case companies (case two to ten) demonstrated that traditional face-to-face communication is still perceived as an effective method for long-term relationship building and cannot be ignored despite the technological advances.

The fourth and last consideration is the market environment. This factor reflects the necessity to develop relevant capabilities in relation to network activities, such as the consideration over the choice of different Internet methods. For example, if a company sells expensive equipment with low product demand, it may not be a sensible choice to invest heavily in an advanced Internet ordering system for their customers. It would be more sensible and easier to have direct communication via e-

mail, as well as to concentrate its capability development on manufacturing development or product technology.

Apart from the evaluation of manufacturing network actors, activities and resources, all four consideration factors should be reviewed by the manufacturing SMEs. These factors are highly relevant to the management actions involved in making the internationalisation decision. However, it is important to remember that this framework can only provide an overview and as a guide to a manufacturing SME's management when evaluating different internationalisation approaches. For more detailed explanations of the benefits and weaknesses of different types of Internet technology in relation to manufacturing SMEs, please see Appendix 6.

6.10 Conclusion

This chapter has presented the cross-cases analysis in a systematic way. The analysis investigated and categorised the key activities involved and resources exchanged within a manufacturing SME's network. Furthermore, this chapter has established the links between a manufacturing SME and its decision making processes for using different Internet methods to assist its international operations.

Throughout this chapter, the researcher also developed further the conceptual framework by elaborating the internal and external capabilities development, in the form of several consideration factors that need to be taken into account when developing a firm's new capability. Together with other actors, activities, resources and other environmental factors, such as industrial trends, these are crucial for that firm to survive within their network.

The research findings reported earlier in this chapter showed that each company has a different role to play within their network: to coordinate, cooperate or collaborate with others. The appropriate development of capability is essential, which can allow the firms to settle into their network serenely. This would not only benefit the long-term stability of a network, but also ensure SMEs are not being unfairly treated, due to a

dysfunctional relationship caused by unbalanced network power held by larger network actors.

In the next chapter, the researcher begins to discuss the conclusion of this study, as well as how this study contributes to existing knowledge with further recommendations for managerial implication.

CHAPTER SEVEN: CONCLUSIONS

7.1 Introduction

This, the final chapter of the thesis, discusses the research findings, the contribution to knowledge and makes recommendations for academic study and managerial practice. This chapter will firstly review the objectives proposed in Chapter One. Then this chapter summarise the overall contribution to knowledge and research limitations. Finally, the researcher also provides further discussions on related managerial implications and some future research directions.

7.2 The Discussion of Outcome

In the following section, the researcher reports the outcome of this investigation in relation to the original research objectives and goals in Chapter One. In addition, other key findings that have emerged from the research are discussed.

Objective 1: To explore manufacturing SMEs' business network

- What are networks and what components formed a network?
- Why do networks matter for manufacturing SMEs?

This study reflects Easton's (1992a) view of networks as structures. It is evident that a company cannot independently survive within a network; companies are connected and bonded to each other. This is reflected in Hertz's (1998) study of 'domino effects' whereby changes in business relationship initiates a chain effect within a network.

This phenomenon not only indicates the importance of reviewing a network approach in industrial business studies, but signifies that manufacturing SMEs need to observe the complexity of an industrial network and to have correct responses so that they can successfully manage business relationships within a network (Volberda 1998; McGovern 2006; Raymond and Croteau 2006). In addition, the finalised framework (Figure 6.10) also reveals the components that form a manufacturing network.

The present study shows that relationship development is the key to network performance. Manufacturing SMEs need to maintain good working relationships with other network actors not only in terms of establishing long-term relationships, but to survive within a constantly changing network environment. In order for a manufacturing SME to survive and to persuade stable network relationships, it has to act, react or re-react to different activities and resources (Ford *et al.* 1986; Ford 2002a). This also leads to the consideration of the three dimensions of how companies exchange their resources: cooperation, coordination and collaboration (Winer and Ray 1994; Wang and Archer 2004).

This research also confirms the construction of industrial networks suggested by Håkansson and Johanson's (1992). Namely, within an industrial network, manufacturing SMEs are often bonded by a number of interactive activities or resources exchanged, whether it is technical, planning or knowledge bonds.

Objective 2: To examine different views of internationalisation process from manufacturing SMEs' perspective

- What is internationalisation?
- How do they internationalise?

The research shows that manufacturing SMEs have few concerns about defining the term 'internationalisation'. Although all case companies had some degree of international activities, they did not consider their organisations as truly internationalised. This is because manufacturing SMEs normally have a smaller scale of international operation in comparison to LSEs, but also most manufacturing SMEs have experienced the positive benefits of using agents and distributors. Thus, manufacturing SMEs perceive business operations in international markets to be activities within an extended set of relationships. Furthermore, it was evident that manufacturing SMEs tended to encounter companies' in international markets unintentionally; most of the contacts were through referrals from other network actors. In all cases, some forms of alliances (individual relationship/trust or contractual agreement) were in place, which assisted the manufacturing SMEs to overcome the problems of internationalisation. The outcome of this study not only confirms Borch

(1994) and Gilmore's *et al.* (2001) arguments that networking is crucial for manufacturing SMEs, but serves as strong evidence that manufacturing SMEs internationalise through a network approach (Coviello and Munro 1997; Hertz 1998; Coviello and McAuley 1999; Autio *et al.* 2000; Chetty and Campbell-Hunt 2003).

Objective 3: To discover current Internet activities of manufacturing SMEs

- What is the Internet?
- How do different Internet methods contribute to a manufacturing SME's internationalisation in business networks?

Although there are many different types of Internet technology available for manufacturing SMEs, the majority of them referred to the Internet as e-mail and website. This is not particularly surprising, because most of the businesses today are using e-mail and website as common practice.

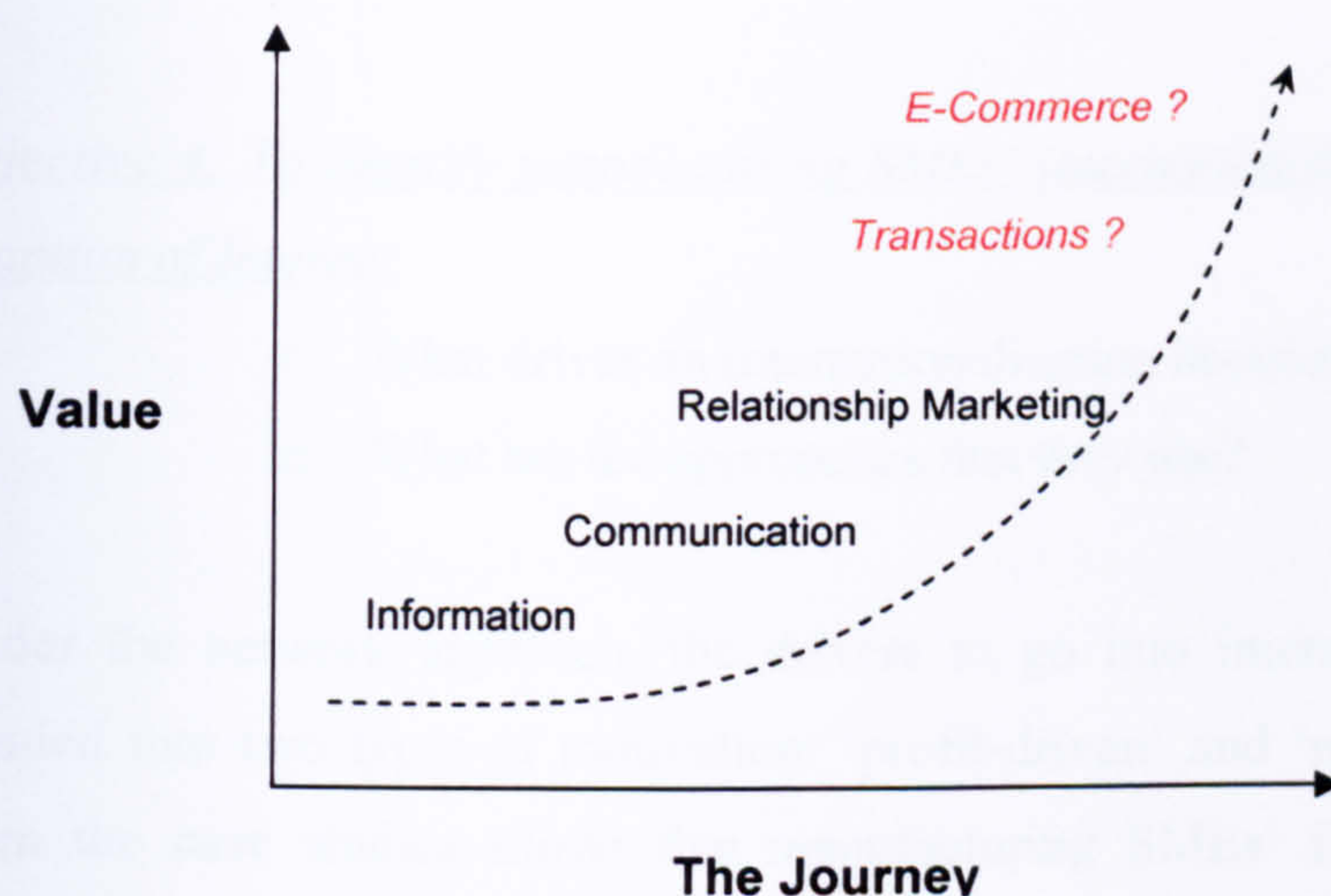
Every case study organisation examined as part of this research found that e-mail was the primary Internet communication. This was because e-mail is cost effective with additional benefits, such as instant delivery of messages and easy communication across different time zones. In some cases, e-mail was found to represent 90% of a company's communication methods. There were two specific benefits of e-mail that manufacturing SMEs most valued. Firstly, e-mail is a text-based method that is useful as a type of formal communication; with the added advantage of easy data archive. Secondly, the versatility of e-mail allows attachment functionality that enables any format of electronic files along with a message. This is particularly useful for those companies involved in a lot of technical information exchanges, whereby they can send and receive technical drawings or blueprints securely and efficiently.

A website was another popular application and considered as a necessity for a company. The decisions concerning the design of a website were mainly on the scale of global coverage. Here, companies were hoping to use their website as an alternative for cheaper advertising and it was common practice that a website should contain company history, product information and contact details. For all high-tech based companies, it provided much detailed information or product specification downloads.

It is argued that a firm within the high-tech industry needs to provide detailed information as part of its customer education and learning. Nevertheless, other smaller firms which have a larger number of product lines also adapt similar practice where they can save on the cost of printing brochures via online catalogue or catalogues downloads.

The scope of this research has also provided an insight into Internet technological evolution. Growth of Internet evolution for manufacturing SMEs can be seen as a three-stage process: information → communication → relationship marketing (see Figure 7.1). The research findings contradicted Sharma's (2002) study, which suggested the Internet evolution can be formed in five stages: information → communication → transactions → relationship marketing → e-commerce (see Figure 2.10).

Figure 7.1 Evolution of Internet Presence for Manufacturing SME



Source: Adapted and Modified from Sharma (2002)

According to the present research study, all ten cases stated that it is impossible for them to use the Internet to conduct transactions or engage in e-commerce. Although in some cases the high product/unit price was the main obstacle, the key factor was the need for business negotiations. During a negotiation process manufacturing SMEs needed to discuss issues relating to import, export, bulk purchasing discounts, product customisation, etc. Thus, the use of the Internet for transactions and e-commerce were not foreseen.

It emerged that the Internet is perceived as just another communication tool to support existing business communication. In addition, the present study supported Damanpour (2001) and Eid and Trueman's (2004) findings, who found that industrial customers decline the use of online ordering not because of the seller's IT capacity but the process involved for negotiations and relationship building. This idea also emerged with Gummesson's (2004) argument that industrial customers favour a selected supplier if good working relationships are established.

To conclude, the current Internet usage of manufacturing SMEs in internationalisation is still in the stage of communication purpose, and to support *existing* communication channels. The growth of advanced Internet usage, such as online purchase functions is unlikely to have any further development and usage due to the nature of the product and negotiation process required. Other potential uses of the Internet and their benefits and problems for manufacturing SMEs can be found in Appendix 6.

Objective 4: To identify manufacturing SMEs' internationalisation processes for the adoption of Internet

- What drives an internationalisation decision?
- What are the approaches that they use?

Under the network approach, the drivers to go into international markets can be divided into two types of motivation: 'profit-driven' and 'market-driven'. Evidence from the case studies shows that manufacturing SMEs' final decision to operate within an international market regardless of a profit or market-driven basis, normally relied on the management, which was normally an individual. However, in terms of internationalisation, there were significant differences between the companies in different industries and these are analysed below.

According to the research findings, a smaller company situated in low-tech industries was normally internationalised through the route of making direct contact with overseas customers. In other words, these companies were reacting to international customers (market demand), regardless of their initial plans (if any) for international markets or the availability of the resources needed. This type of scenario can arise

because the attitudes of these companies tended to be less concerned with international market development. A possible explanation is that they had limited financial resources which restricted overseas development. Instead, they would normally have direct export activities with their existing or potential customers, or make use of agents or distributors.

According to evidence from the case studies, companies within the high-tech industries had much more active international business activities due to the shift of high-tech industries to the Far East region and surroundings. Since the industrial environment for high-tech industries had detailed divisions of responsibility (e.g. one manufacturing SME specialised in few specialised components or products), there were a number of Original Equipment Manufacturers (OEMs) responsible for different production towards the same goal that required UK based firms to provide after sales support. Thus, it is sensible for a high-tech equipment manufacturer in the UK to use agents or company-owned subsidiaries to provide such services. Therefore, message clarity and high speed of communication are essential for these firms and some larger scale IT infrastructure, such as ERP or VPN is needed to support the required operations.

This present study also found that manufacturing SMEs internationalised through the network approach and there is no evidence that the Internet influences a company's initial decision to internationalise. Despite that all case companies had been using Internet technologies to assist their international business communication, new business relationships were essentially developed through building of personal relationships or by referrals from existing contacts.

Indeed, some of the case companies suggested that internationalisation through the network approach would result in a faster international development. This not only endorses Contractor and Lorange's (2002) view, but also confirms the authenticity of Johanson and Mattsson's (1988) network model building.

This study also addressed the insufficient explanations of Johanson and Mattsson's (1998) model that were criticised by Chetty and Blankenburg Holm (2000) as the network model lacked further explanations to address external uncontrollable

variables that would affect a company's internationalisation decision. This research not only identifies the external factors but also establishes the link between these variables and companies' capability development. The SCIM framework also highlights the importance of a company's capability development in relation to the network.

Objective 5: To develop a framework to reflect how manufacturing SMEs adopted the Internet for their internationalisation process

- What factors/elements that contribute the model/framework?
- How do these factors/elements map to the network?

This study has created the SCIM framework that illustrates a process of how manufacturing SMEs reach their internationalisation decision. The SCIM framework not only refines Håkansson and Johanson's (1992) basic structure of industrial networks, but provides detailed components that constitute the network. Specifically, this research has endorsed the importance of manufacturing SMEs' capability development. The development of capabilities not only allows manufacturing SMEs to survive within the network, but to consider factors (consideration variables) that affect their international operation decision.

As highlighted earlier, one of the key contributions of the SCIM framework is to fulfil the missing components of Johanson and Mattsson's (1988) network model. The network model was considered by Chetty and Blankenburg Holm (2000) to lack sufficient elucidation to address external uncontrollable variables that would affect a company's internationalisation decision. As a result, another contribution of the present work is that the framework suggests manufacturing SMEs' capability development is the key which links to their international operations and sustainable network.

Another key aspect of this research is insight into how the Internet evolved within the manufacturing SMEs' setting. The Internet evolution for the manufacturing SMEs can be seen in a three-stage process: information → communication → relationship marketing. The research results show that manufacturing SMEs have tended to ignore

the conventional development stages of transaction and e-commerce proposed by Sharma (2002). This was because manufacturing SMEs tended to adopt a negotiation process and they needed to discuss issues related to import, export, bulk purchasing discounts, product customisation, etc. Thus, the use of the Internet for transactions and e-commerce was still unforeseen (see Figure 7.1).

7.3 The Contribution to Knowledge

The primary contribution of this research is the results from objectives 3, 4 and 5; resulting in the development of the SCIM framework (shown as Figure 6.10). Objectives 1 and 2 are largely confirmative of other research relating to business network and internationalisation theories. The framework identifies the key components of an industrial manufacturing SME's network, identifying resources exchanged and activities interacted. In addition the framework shows factors that should be considered when making international business decisions with the use of Internet, such as the decision for using ERP, VoIP or VPN etc (see Appendix 6).

The research has recognised the actors commonly encountered within the setting of an industrial manufacturing environment, such as supplier, agent and customer etc. as well as providing detailed examples of the resources exchanged and activities interacted. These examples present clear indications of how industrial manufacturing SMEs can obtain and strengthen their capability development, from both internal and external perspectives. The examples also highlight the activities or resources that affect a firm's role within the industrial network, whether it is in cooperation, coordination or collaboration with other network actors. The findings demonstrate a direct link between the industrial network and the development of a firm's internal and external capabilities, through all types of network interaction.

The research supports the network view of the internationalisation process. The case companies followed the network development through extension of network activities and resources, which led to some international market development. This is to say that manufacturing SMEs tended to follow an accumulation process of time and resources

with further extension of network activities and resources exchanged to achieve some different degrees of internationalisation.

The potential of the Internet is also acknowledged within the present study, by showing there are no direct linkage between the uses of the Internet in relation to a firm's initial internationalisation decision.

However, the Internet has proven its worth for international communication, in particularly through e-mail. Apart from the use of e-mail for international communication, the use of VPN, ERP or other advanced IT and Internet infrastructures has been useful for internal communication, in terms of the time saved for accurate information delivery, such as technical data.

The development of advanced Internet infrastructure may not be suitable for smaller firms where there is less demand of usage. Alternatively, the nature of the product may not be useful for using online methods, such as online order or payment functions, due to pre-sales support being needed, i.e. product customisation or negotiations.

In the following sections, the researcher specifically highlights two key themes that surfaced throughout this research. The first section 'capability development' reflects the centre key of the completed conceptual framework. The second section 'decision about Internet-based communication' is to draw attention to manufacturing SMEs' Internet development from a network perspective.

Capability Development

This research indicates that the level of activities and resources involved within the network were highly associated with the firm's own capability. This was because each firm had its own limits or requirements in terms of the resources needed or the activities involved. Thus, the decision of the network interactions was based on the firm's internal capabilities.

According to the present research, smaller companies would have less influence over their network, as these firms normally have limited resources and they were in the position to be influenced by other larger actors for their prospective business

directions. Companies categorised as 'low-tech' industries had slower rates of innovation and a less complicated business environment, i.e. a simpler buyer and seller relationship with less after sales/technical support needed both before and after the transactions; thus, a limited amount of communication required and reduced level of network interactions. Larger companies or firms situated in high-tech industries were likely to have more communication with other network actors, due to the faster rate of innovation as well as frequent pre and after-sale support needed. These companies were better equipped with the necessary skills and tools, such as the use of the Internet for industrial network communication and other associated resources and activities exchanged.

It is evident from the findings that internal competencies are the key drivers for a firm's external capabilities. However, it is important to note that each company would necessarily have strength within a particular type of internal capability. Some firms have strong internal skills and knowledge; other firms would have emphasised their internal technological or technical capability. Some of the companies represented in this research had better internal value or managerial skills, which both make a direct contribution to their external capabilities.

To explain such diverse capabilities developed for different manufacturing SMEs, there are two aspects to be considered: network positioning and industrial environment:

- (i) Network positioning determines the level of interactions required between a manufacturing SME and its network actors, whether to interact, react or re-react. This leads to the different capacities, development through cooperating, coordinating or collaborating with other network actors.
- (ii) Industrial environment can be seen as follow-on from the previous aspect. However, the key aspect of the industrial environment is on the intensity level of interaction, e.g. a firm in a high-tech category is likely to encounter frequent interactions with other network actors for product development, which would force a firm to have a much more proactive attitude to capabilities development to maximise their competitive advantage.

Some case companies had special capabilities which were highly associated with their business environment; for instance, know-how or distribution capability. Evidently, manufacturing SMEs customise the generic capabilities proposed by Leonard-Barton (1992) to their own needs. Most importantly, the internal capabilities would have direct influence on a firm's external capabilities, which led to the different type of interactions within the network. That is, stronger internal capabilities would likely attract industrial actors' attention where the initial interaction would also force the firm to strengthen its external capabilities.

Another interesting outcome was that most of the case companies studied explicitly stated that internal and external capabilities could not be easily separated. In some cases, internal and external capabilities can be integrated and to develop new capability under network influences, which is reflected in the development of the SCIM framework.

Decisions about Internet-Based Communication

There were two aspects to manufacturing SMEs' decision on Internet communication. One concerned the external element and the other was the internal element: both of these were highly associated with manufacturing SMEs' capabilities. Externally, a company needs to decide on the scale of its network and to assess the frequency of the communication needed. For instance, a company in the high-tech industry may require frequent interaction with their customers or agents in order to support their pre and after-sales services. A high-tech firm may also decide to invest a larger sum on their Internet infrastructure, such as VPN or some ERP modules. In particular, the nature of a company's network interactions or activities is based on four decisions:

- (i) The characteristics of the product, as the more complex the product was, the more complex the set of communication needed, and vice versa.
- (ii) Demand for the product, which had a direct impact and influence upon the potential number of website users.
- (iii) Other industrial actors' IT and Internet infrastructure. That is, it was sensible for the company to develop similar communication channels that were compatible or convertible to their own needs (e.g. software).

- (iv) The level of Internet development would also be determined by the role played by the firm's network position, e.g. whether they were leading a development or coordinating with other (different sizes of) sub-contractors, suppliers or OEMs.

In terms of internal perspective, this refers directly to a company's intra organisational capabilities and internal organisational resources. Not surprisingly, the financial element (IT budget) was one of the most important elements which determined the size of Internet development. The size and structure of the company was another important factor to affect Internet development: small enterprises were likely to have less development on their Internet infrastructure as there was a small number of employees that required Internet access. Employees within small companies may also require less travel where there is no need to implement a large communication infrastructure, such as VPN. Most importantly, smaller companies deemed that the use of e-mail alone was sufficient for communication, because most day-to-day business interaction could be conducted via the use of e-mail as e-mail is versatile.

7.4 Research Limitations

To explore, understand and identify how the Internet relates to the internationalisation process for manufacturing SMEs, required that the researcher adopt a qualitative approach. This choice was made because as the research took the perspective that the reality is not only about the social action, but also its causal explanation. That motivated the use of interpretative procedures, which allowed for a rich, colourful and in-depth description of a substantive area.

This research has taken the definition of SME from EC, hence the findings of this study may also be applicable to other countries within the European Union. Perhaps it can be also used in other geographical regions where the definitions of SME are very similar in terms of company size.

Although the researcher has achieved an acceptable number of cases for effective and persuasive results as suggested by Yin (2003) for multiple-case studies, this study has

only instantaneously looked at the manufacturing SMEs over a relatively short period of time. However, it can be argued that the confirmability and creditability of the research outcomes should not be affected or prejudiced in any way, as this research has followed the goals derived from the research objectives.

Despite the number of cases collected was satisfied, the number of interviews was disappointed. Because of the nature of SME's organisation structure (i.e. company size), the researcher often encountered a single interviewee (often the company founder or director), whom arguably to have sufficient knowledge for this study.

The constantly changing network business activities may have affected the plausibility of the research results. For example, during the completion of this research, two of the SMEs (Thomas Swan Scientific Equipment Ltd. and Accent Optical Technologies) have been acquired by other larger companies; therefore, not only the network relationships have changed, but changes in network resources and activities also. This is also an indication of one of the drawbacks if this research had been conducted as a longitudinal study.

The findings suggest that the business approaches of manufacturing SMEs are unlikely to change in the near future. A possible explanation is that the overall industrial B2B environment and the nature of products or services constrain the potential use of e-commerce. Thus, this study was not able to identify how a company can internationalise through the use of the Internet, such as direct selling through the website.

7.5 Implications for Practice

This section aims to reflect on the research from the perspective of manufacturing SMEs in relation to industrial network issues and the use of the Internet for international operations.

Understanding of Capabilities

As suggested earlier, there are two types of general capabilities: internal and external. However, this research has found there are other speciality capabilities that manufacturing SMEs need to ensure that they can develop from their own experiences. For example, the distribution capability identified for Agar Ltd. and know-how capability identified by Mobiletron UK Ltd. The assessment of a company's special capabilities can be traced back to the answer to a basic question: what can the network offer (Ford, 1986 and 2002a)? The answer to this question would identify the most important element that the manufacturing SMEs' network actors need to rely on and help to elaborate such capability in order to gain some added balance of power over other dominant actors.

It is also evident from this research that capabilities can be developed through other network interactions. For example, working closely with research institutions can enable the company to forecast upcoming technologies or enhance the employees' skills and knowledge. Another example is that by having good working relationships with reputable industrial companies allows the manufacturing SME to have opportunities to observe good business practices, including manufacturing management. It is important to note that the strength of a firm's capabilities and their further development would have a direct influence on the adoption and adaptation of the Internet for both domestic and international business activities, as will be considered in the following sections.

Industrial Network Stability

Network stability is a key issue that a firm should be aware of. This is because the level of stability has a direct impact in terms of the network activities interacted and resources exchanged. This may lead to the different requirement or adaptation needed for the internal and external capabilities development. Furthermore, this is likely to initiate significant changes for both domestic and international market development.

Despite the need to maintain the firm's position within the network, it is certain that a network cannot remain rigid. The research shows that the industrial market and environment is quite dynamic. Change to activities, circumstances such as acquisition

between different industrial firms, the entry of new industrial actors (suppliers) needed for production or new resources needed due to product innovation, etc.

It is therefore necessary for a firm to secure and hopefully maintain good relationships in order to have stable and long-term working partners. As is evident in the case studies, companies that display reactive attitudes are likely to be pushed by larger industrial actors or changes in the market environment. Thus this research concludes that a firm should have a proactive attitude, where there is on-going exploration of different working relationships with other industrial actors, and to some extent that a firm should also seek further market opportunities. As a consequence, a smaller company is not being restricted by other actors through unbalanced power within the network.

Internationalisation and the Internet

According to the research findings, fundamental business relationships are built on the basis of trust and years of working experiences. The Internet (website) may be used to raise international awareness, by promotion of the corporate profile. However, there is no guarantee that this will lead to business transactions, which are strongly dependent upon the attitude of the company in handling different clients, suppliers, agents or distributors.

The Internet can increase the speed of communication; which some companies perceive as a way of improving their business operations. Perhaps most importantly, the products and services offered by B2B manufacturing SMEs were different from consumer focused companies, where extensive pre and after-sales services were required. Although the Internet could be used, industrial SMEs required some forms of face-to-face communication, and in-depth discussions or negotiations were needed. This has resonance with the points made in the previous section on network stability and industrial relationships development.

The Development of Communication

Within the usual financial constraints, a manufacturing SME should focus on the following issues if it wants to develop use of the Internet for business operations.

E-mail is perceived as a semi-formal communication which has the same credibility as a traditional business letter, apart from the documents that are needed for import and export, such as a Letter of Credit. Nevertheless, it is essential for a firm (larger companies in particular) to find an appropriate e-mail control system. Management is not about monitoring the contents of e-mail due to individual privacy concerns, but to ensure efficient use of resources for necessary e-mail communication. For example, clients tend to contact someone they know instead of making contact with relevant departments for after-sales support.

A *Website* is another key application. This might include a corporate history, product information and contact information. However, the present study has identified a trend of companies integrating e-mail-based communication with their website for functions such as online newsletter subscriptions. This allows any interested buyers (not necessarily existing buyers) to monitor a firm's product development or relevant news announcement, by which a firm can increase their chances of new businesses. There was no evidence to suggest that the companies researched were concerned that the use of a website or newsletter could leak out sensitive information and lose its competitiveness. The companies realised any information would be searched for via some third parties, one way or another. It is recommended that the website should include the FAQs, so that the company can save time on replying to repeated questions and also educate their clients on product-related issues.

The use of *Online Order or Purchase Systems* in the B2B manufacturing SMEs is under-developed and is expected to remain at a similar level, at least over the short term. Regardless of the financial considerations, the research has found that one of the main reasons companies are not adapting online order or purchase systems is because of the inconsistent IT/Internet development across the network. That is, not all organisations have a similar capacity to use standardised systems, even if there is the capacity to use that system. Another issue relates to the demand of usage and the nature of product type. It was found that an online order system is only useful if there is high demand: such as, distributors who need to frequently and repeatedly place their orders for 'inexpensive' or 'commodity' items. Otherwise, the online order system was deemed to be uneconomic. In terms of online purchasing systems, there was also little evidence from this work that industrial manufacturing SMEs avoided

traditional methods. This is because for these firms the number of transactions involved is relatively high and additional arrangements for export activities are needed. The table presented in Appendix 6 is supplementary information containing the specifying benefits and weaknesses of some common Internet functions that has been uncovered in this research.

7.6 Suggestions for Future Research

It is important to note that this research is exploratory; whereby the researcher has taken a holistic view from different academic contributions, as well as explored relevant issues that influence a SME's decision on the use of the Internet in relation to their network interactions.

The SCIM framework in Chapter Six (See Figure 6.10) can be used as a blueprint for future researchers to apply and test it further. Further research can be carried out from descriptive, analytical or predictive perspectives, but it would be necessary to narrow the scope of research to a particular section of the conceptual framework and examine the relationships identified in greater detail. For example, a future study might explore the view from other network actors and how they perceive the industrial SME's capabilities; or identify which relationships have any impacts that contribute to that industrial SME's internationalisation process and activities.

Another possible direction for future research is to focus on a particular industrial sector (e.g. precision equipment manufacturing SMEs etc.) and apply the SCIM framework to those SMEs within it. Alternatively, the selection of organisations could be based upon the level of technologies involved. Yet a third possibility would be to categorise more finely, different companies by the size of an organisation. Since this has a direct impact in terms of their available resources, which then leads to the scale of operation required.

It should also be possible to increase the number of cases and/or interviews drawn from each organisation. This would strengthen research credibility by clarifying the usefulness and generalise the proposed finalised conceptual framework. It is also

suggested that future researchers to take from a quantitative approach and to investigate the intensity of each relationships/links identified in the SCIM framework; thus, to illustrate and to categorise the importance of each relationship.

A longitudinal study could also be conducted to monitor how manufacturing SMEs react and interact within the ever changing industrial network environment. The SCIM framework could be used to investigate the changing patterns of how different firms adapt different Internet technologies over a period of time, which may be influenced by the overall industrial trend or other network activities. Thus, a more complete picture could emerge for the development of the Internet in relation to an industrial network and relevant internationalisation approaches.

7.7 Conclusion

Managing business in an industrial marketing/manufacturing SME is not just about buying and selling, it is also about managing networks of people. Issues such as trust, relationship building; indeed most human aspects are critical. Despite the advances of Internet technologies, it was evident from this research that business negotiation is a fundamental and enduring element of industrial business. Intensifying the use of the Internet has been perceived as the salvation of manufacturing SMEs but the results from the present work contradict received opinion.

Whilst the Internet enables organisations to expand and deepen their business communications by improving access to the network, these technologies have yet to replace the pivotal role of people at the core of business networks. Indeed, it is the complexity and dynamism of these social interactions and relationships that make the management of business-to-business environments such a fascinating and challenging research topic. It is the human network not the telecommunication network that matters.

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APPENDICES

Appendix 1: Research Indicators

Internal Capabilities:

1. Skill and knowledge capability
 - Contribution of employees' skills and knowledge to internal structure of the company.
 - ◆ Indicator: close engagement/relationship in firm's internal activities.
 - Integration of skill and knowledge with other elements of internal capabilities.
 - ◆ Indicator: outcome of new product development, market development or technology development.
2. Technical system and technological capability
 - Technical/technological competence and integration between each departments.
 - ◆ Indicator: technological development planning and forecasting.
 - Company's technological compatibility within.
 - ◆ Indicator: adaptation and application of technical/technological programme within the company.
3. Managerial capability
 - Manager's ability in co-ordination with internal personnel/department.
 - ◆ Indicator: relationship problem solving and planning.
 - ◆ Indicator: managers' responsibility of internal programme development.
4. Values capability
 - Company's goals and beliefs.
 - ◆ Indicator: understanding of staff's beliefs and attitudes.
 - ◆ Indicator: understanding of company's goals/mission statement.

External Capabilities:

1. Skill and knowledge capability
 - Contribution of employees' skills and knowledge to external structure of the company.
 - ◆ Indicator: close engagement/relationship of firm's external activities.
 - Integration of skill and knowledge with other elements of external capabilities.
 - ◆ Indicator: outcome of new product development, market development or technology development with other companies.
2. Technical system and technological capability
 - Technical/technological competence and integration between the firm and other companies.
 - ◆ Indicator: technological development with other counterparts within the network.
 - ◆ Indicator: adaptation and application of external technical/technological programme within the company.

3. **Managerial capability**

- Experience in managing business network.
 - ◆ Indicator: managers' role and influences between the firm and other partners.

4. **Values capability**

- Ability of accept cross cultural learning and understanding of international relationships.
 - ◆ Indicator: employees' acceptance on other cultures.
 - ◆ Indicator: firm's learning process.

Industrial Network:

1. **Actors**

- Identify key players within the network.
 - ◆ Indicator: company's direct or indirect relationship with key counterparts (suppliers and customers).
 - ◆ Indicator: level of involvement with key counterparts.

2. **Activities**

- Company's involvement and contribution in the network.
 - ◆ Indicator: company's activities and level of involvement which have effects on key suppliers and customers.
- The affect of other actors' activities.
 - ◆ Indicator: changes in the company that may influences by other actors' activities.

3. **Resources**

- Tangible and intangible resources.
 - ◆ Indicator: understanding and company's ability to adapt knowledge and experience through other actors and activities.

Industrial SMEs, Internationalisation and the Internet

1. **Internationalisation strategy**

- Degree of involvement in internationalisation process.
 - ◆ Indicator: firm's current and future internationalisation strategies.
 - ◆ Indicator: level of involvement in international markets.

2. **Internet competence**

- Competence on the use of the Internet.
 - ◆ Indicator: technological programmes that have direct influence on the use of the Internet or vice versa.
 - ◆ Indicator: effeteness of programmes both internally and externally of the company.

3. **Influences**

- The impact of the Internet on the company's internationalisation process.
 - ◆ Indicator: effeteness of technologies/methods used with company's suppliers and customers.
 - ◆ Indicator: compatibility on the collaboration of technologies.
 - ◆ Indicator: benefits of having the Internet in terms of communication process.

Appendix 2a: Pilot Case Interview Questions

Section 1: Company background

1. How many employees?
2. What is your annual turnover?
3. What are your products?
4. Can you tell me more about your personal background and experience?

Section 2: Level and experience in international markets

- ✓ Explain to interviewees the definition of internationalisation.

Internationalisation process is often described as a firm's commitment to increasing foreign activities. Typically, the internationalisation process is a sequential event based on the assumption of a company's activities following a learning curve from acquiring market knowledge and experience.

1. Does your company have any international business activities?
 - a. If "yes", in what countries do you have your business activities?
 - i. When and how did you start your international business?
 - ii. What are the reasons that you wanted to go to international market?
 - iii. How would you describe your current international activities?
 - b. If "no", are you considering having international operation in the future?
 - i. If so, why are the reasons that you do not want to go to international market?

Section 3: Industrial network

- ✓ Explain to interviewees the definition of an "industrial network".

An Industrial network can be seen as a map of the company's interaction with other companies, whether it is in direct or indirect relationships. Because industrial networks not only consider physical contact with others, but also in terms of exchange or transfer any activities or resources. Typical relationships can be demonstrated as suppliers-the firm-customers and the network map can be described as the extended version of the typical relationships.

1. Would you describe or draw your company's business network positioning map?
2. Who are the key components within your business network?
3. How does your company communicate with your counterparts?
4. Can you describe the relationships between your company and your counterparts from the map identified above? For example, direct or indirect relationships; suppliers or customers relationships, etc.
5. What is the impact of these relationships on your company and the others?
6. Does your company experience any exchange of resource from the relationships identified above?
7. Have you experiencing any foreseen change in your business network?

Section 4: Company's external and internal capabilities

- ✓ Explain to interviewees the terms of capabilities.

Because of the complexities of business network and business activities, companies need to interact, react or re-react. These actions conducted by the companies can be described as part of the firm's capabilities. Recent studies show that different aspects of capabilities can effect how a company behaves internally and externally. In other words, what is the company capable to do?

1. How would you describe your company's external capabilities?
2. What about external capabilities of skills/knowledge, technical/technological, managerial and values capabilities? (This question or part of this question will only be asked if interviewees did not mention any of these capabilities in their previous answers from above)
3. How would you describe your company's internal capabilities?
4. What about internal capabilities of skills/knowledge, technical/technological, managerial and values capabilities? (This question or part of this question will only be asked if interviewees did not mention any of these capabilities in their previous answers from above.)
5. From the internal and external capabilities identified, how would you describe the relationship between them? (Examples needed) (For example, they are relevant or not relevant, direct or indirect, etc.)

Section 5: Company's ability of using the Internet

1. Does your company have a website?
2. If so, what are the main functions of your website? (Online catalogue, online purchasing, company introduction, etc.)
3. What other ways you currently using the Internet?
4. What kind of Internet activities are you currently using or will be using?
5. What are your aims in using the Internet?
6. Who has access to the Internet?
7. Do you use any Internet activities with other companies within your business network? If so, what kind of activities are they?
8. Who is responsible for the design of the Internet system? (This question will only be asked if their internet activities are specially designed by other parties, for example, Electric Database Interchange (EDI) programme)
9. Within your company, who is responsible for co-ordinating the use of the Internet?
10. In what ways has Internet improved your company? (Examples needed)
11. In what ways has Internet disadvantaged the company? (Examples needed)

Section 6: The impact of the Internet toward to the company's internationalisation process

1. What kind of Internet activities are you using for your international operations?
2. How do you assess the impact of the Internet? (For example, homepage hits or other means of measurement, etc.)
3. What is the impact of the Internet, in terms of your business relationships and business network?

Section 7: Additional information

1. Would you like to add any comments or suggestions regarding our interview?
2. Would you like to add anything that we have not covered in our interview?

Appendix 2b: Case interview questions

Section 1: Company background

1. How many employees?
2. What is your annual turnover?
3. What are your products?
4. Can you tell me more about your personal background and experience?

Section 2: Level and experience in international markets

- ✓ Explain to interviewees the definition of internationalisation.

Internationalisation process is often described as a firm's commitment to increasing foreign activities. Typically, the internationalisation process is a sequential event based on the assumption of a company's activities following a learning curve from acquiring market knowledge and experience.

1. Does your company have any international business activities?
 - c. If “yes”, in what countries do you have your business activities?
 - i. When and how did you start your international business?
 - ii. What are the reasons that you wanted to go to international market?
 - iii. How would you describe your current international activities?
 - d. If “no”, are you considering having international operation in the future?
 - i. If so, why are the reasons that you do not want to go to international market?

Section 3: Industrial network

- ✓ Explain to interviewees the definition of an “industrial network”.

An Industrial network can be seen as a map of the company's interaction with other companies, whether it is in direct or indirect relationships. Because industrial networks not only consider physical contact with others, but also in terms of exchange or transfer any activities or resources. Typical relationships can be demonstrated as suppliers-the firm-customers and the network map can be described as the extended version of the typical relationships.

1. Would you describe or draw your company's business network positioning map?
2. Who are the key components within your business network?
3. How does your company communicate with your counterparts?
4. Can you describe the relationships between your company and your counterparts from the map identified above? For example, direct or indirect relationships; suppliers or customers relationships, etc.
5. What is the impact of these relationships on your company and the others?
6. Does your company experience any exchange of resource from the relationships identified above?
7. Have you experiencing any foreseen change in your business network?

Section 4: Company's external and internal capabilities

- ✓ Explain to interviewees the terms of capabilities.

Because of the complexities of business network and business activities, companies need to interact, react or re-react. These actions conducted by the companies can be described as part of the firm's capabilities. Recent studies show that different aspects of capabilities can effect how a company behaves internally and externally. In other words, what is the company capable to do?

1. How would you describe your company's external capabilities?
2. What about external capabilities of skills/knowledge, technical/technological, managerial and values capabilities? (This question or part of this question will only be asked if interviewees did not mention any of these capabilities in their previous answers from above)
3. How would you describe your company's internal capabilities?
4. What about internal capabilities of skills/knowledge, technical/technological, managerial and values capabilities? (This question or part of this question will only be asked if interviewees did not mention any of these capabilities in their previous answers from above.)
5. From the internal and external capabilities identified, how would you describe the relationship between them? (Examples needed) (For example, they are relevant or not relevant, direct or indirect, etc.)

Section 5: Company's ability of using the Internet

1. Does your company have a website?
2. If so, what are the main functions of your website? (Online catalogue, online purchasing, company introduction, etc.)
3. What other ways you currently using the Internet?
4. What kind of Internet activities are you currently using or will be using?
5. What are your aims in using the Internet?
6. Who has access to the Internet?
7. Do you use any Internet activities with other companies within your business network? If so, what kind of activities are they?
8. Who is responsible for the design of the Internet system? (This question will only be asked if their internet activities are specially designed by other parties, for example, Electric Database Interchange (EDI) programme)
9. Within your company, who is responsible for co-ordinating the use of the Internet?
10. In what ways has Internet improved your company? (Examples needed)
11. In what ways has Internet disadvantaged the company? (Examples needed)

Section 6: The impact of the Internet toward to the company's internationalisation process

1. What kind of Internet activities are you using for your international operations?
2. How do you assess the impact of the Internet? (For example, homepage hits or other means of measurement, etc.)
3. What is the impact of the Internet, in terms of your business relationships and business network?
4. What is your opinion in terms of using online video conference in comparison with face to face communication?

Section 7: Additional information

1. Would you like to add any comments or suggestions regarding our interview?
2. Would you like to add anything that we have not covered in our interview?

Appendix 3: An Example of Intra-Case Analysis (Bede X-ray Metrology)

1 Company Background

Based in Durham, UK, Bede X-ray Metrology (Bede) was a manufacturer of x-ray related equipment for the semiconductor industry, equipment that can also be used in some applications for the medical industry. The history of Bede can be traced back to 1978 as a supplier of custom made scientific instruments. With an annual turnover exceeding £7 millions, the company have employed 140 people worldwide, with 60 people based in the UK.

2 Interviewees Background

The interviews were kindly offered by the Regional Manager. There were three sets of interview which included the Regional Manager, Quality Engineer with Chief Operating Officer, and Global Sales & Marketing Director.

The Regional Manager has been working for Bede since 2004. His main responsibility was to coordinate the sales and marketing for different regions, in particular the Asia and America regions. The Regional Manager has been involved in the semiconductor industry since graduating from university and worked for Silicon Diagnostic Inc. as Director of Asia prior to the appointment with Bede.

The second interview had two interviewees; the Quality Engineer and the Chief Operating Officer. The Quality Engineer has been working for Bede for the last 23 years, initially as a basic engineer. His main duty was to ensure product quality where he oversaw the manufacturing process from product design, components selection and quality control. In addition, he also worked closely with the IT personnel where he designed and structured Bede's Intranet infrastructure. Furthermore, he also worked very closely with the Chief Operating Officer to deal with suppliers' requirements. The other interviewee was the Chief Operating Officer; his main duty was to ensure the flow of overall production and sales progress. He was also a member of the board of directors.

The final interview was conducted with the Global Sales and Marketing Director. He has been working for Bede since April 2005. His overall responsibility was to manage the global sales and marketing activities. Prior to the appointment with Bede, he had more than 20 years of industrial experience and worked for Philip Semiconductors, Electrotech and Applied Materials at management level.

3 Bede's Industrial Network

Actors: identify key players within the network

-Direct/Indirect relationship

-Level of involvement

As an international company, Bede had a number of different subsidiaries around the world. These were Bede Asia, Bede USA and Reflex Sro. Bede Asia and Bede USA were the regional sales and support centres, whereas Prague, Czech Republic-based Reflex Sro mainly acted as a research and development centre and supplied x-ray optics for Bede.

Surrounding Bede's own network, there were four main clusters of actors. They were agents, suppliers, academic institutions and customers. Bede used agents for some of their international operations, despite the firm having their own regional office. The Global Sales and Marketing Director contended that they still relied on these agents as they had better local industrial connections with local customers. Nevertheless, the agents worked very closely with Bede's regional office as the agents needed to rely on additional support provided by Bede's regional office.

The second cluster was the suppliers. Bede sourced their components from two channels. First was from Reflex Sro, who was also a wholly owned subsidiary of Bede where Reflex Sro had own network of suppliers. The second supplier channel for Bede was local and international suppliers who supplied parts and components direct to Bede in the UK.

The other cluster was academic institutions. Due to the history of Bede, the company had been maintaining a close relationship with some universities and research centres. The intention of separating academic institutions from the customer cluster was that

academic institutions not only purchased products from Bede, but had joint-research development.

The final cluster was the customer, where Bede concentrated their sales and marketing activities. As Bede had international-based customers, the firm used their overseas subsidiaries to handle their clients. Noted by the Regional Manager, Bede Asia and Bede USA had their own customer profiles and they were responsible for their regional customers.

Activities: Bede and actors' involvement and contribution in the network

- Activities and involvement which have effects on the actors
- Influences from actors which change Bede in anyway

Resources: exchange of any tangible and intangible resources

- Bede's reactions to adapt knowledge or experience through actors and activities

The activities between Bede and their agents were mainly sales and marketing with additional technical support. The Global Sales and Marketing Director stressed that Bede had begun reducing the number of agents internationally, especially in the America region where it was Bede USA's responsibility to support that region. However, there were some agents that Bede was still using as the company believed that local agents had a better understanding of the local market. Nevertheless, the agents selected were reputable companies in their home country as they provided comprehensive services to that market. That is to say in countries where activities were handled by the agents, Bede only provided backup services and materials for sales and marketing. Unlike in countries where Bede managed the customers directly, where they needed to provide much more complex marketing and after-sales services.

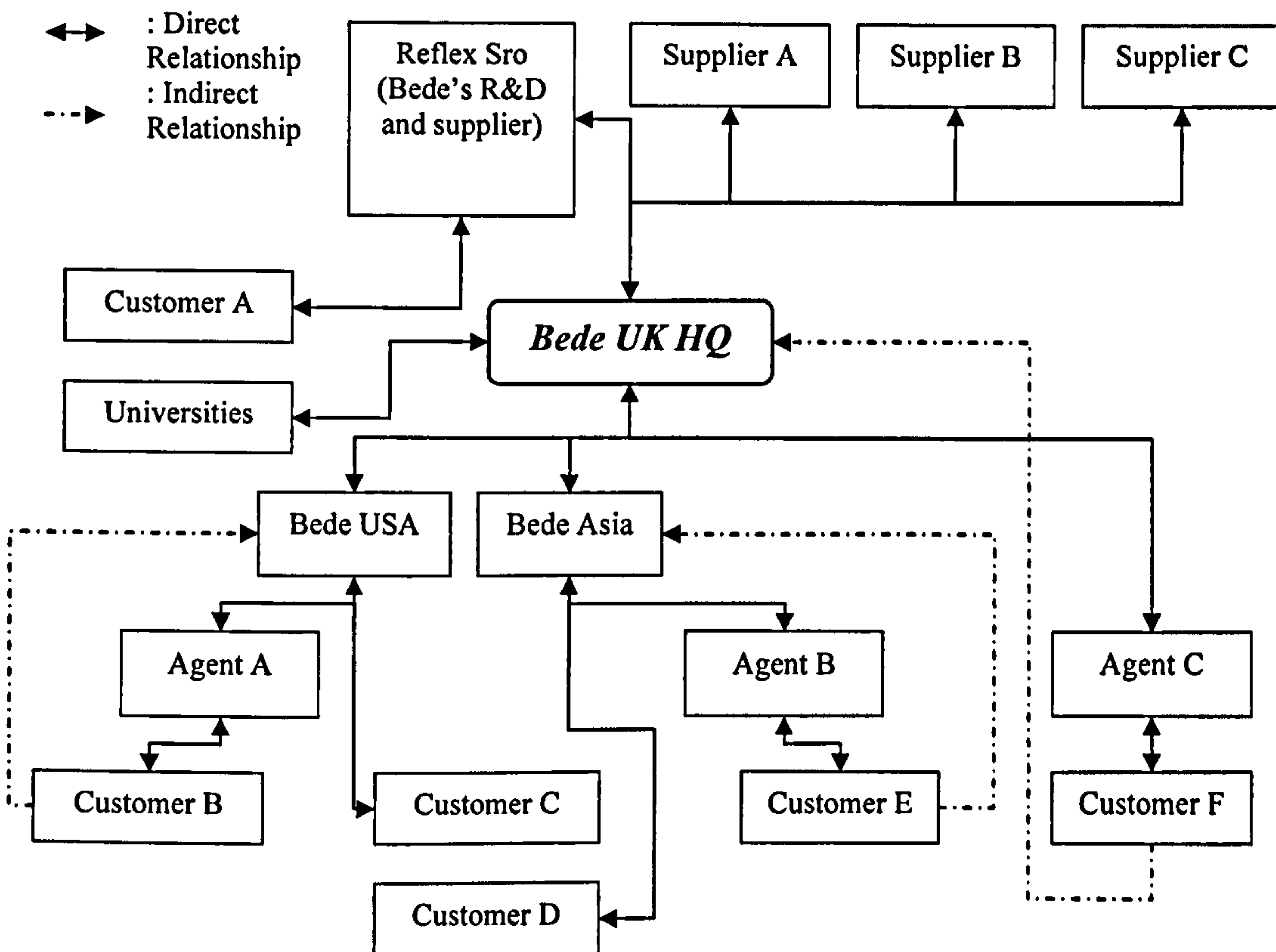
Since suppliers were providing materials and components for Bede, they had very close relationships. According to the Quality Engineer, some of the suppliers were working with Bede in similar ways to a joint-venture. This was because the case firm and the supplier joint-developed specific components for Bede exclusively. In return, the components supplier supplied Bede from a long-term perspective. Bede also worked very closely with academic institutions. The firm sponsored a joint-development programme which allowed Bede to commercialise the new technologies.

Thus, in the three interviews conducted, interviewees mentioned the importance of effective communication to maintaining good relationships with their industrial network. Table 21 highlights a brief summary of Bede's interaction with its network, and the Figure 5 illustrates a simplified Bede's network map.

Table 21 Interactions of Bede's Network

Actors	Agents	Suppliers	Customers	Others
Activities	Orders taking and act as initial contact point in the countries that Bede does not have wholly-owned subsidiaries.	Suppliers provide materials and components for Bede. Some of the suppliers have joint-venture programme with Bede.	Provide direct sales and after-sales services to direct customers. Provide direct technical supports for customers via the agents.	Reflex Sro as Bede's R&D centre, also as part of their supply chain.
Resources	Information exchange, such as customer information, marketing data.	Mainly technical and technological information exchange. Technician personnel exchanges on some occasion.	Mainly technical resources for after-sales services. Bede has much intensive human resources exchange with research institutions.	Exchange of human resources and other information.
International Interaction	Bede insists on using agents even in countries where the firm has its own subsidiaries. This is because they believe in agents' local knowledge.	Suppliers both from the UK and overseas.	Most of the customers are internationally based.	Reflex Sro have own industrial network.

Figure 5 Illustration of Bede's Network



4 Capabilities

4.1 External Capabilities

Skills and knowledge: contribution and integration of skills and knowledge from external activities

- Engagement of the firm's external activities
- Outcome of any developments

Bede was a technology-driven company. It had frequent external activities which enabled it to obtain new technologies; for example, joint-ventures with suppliers and joint-developments with academic institutions. Also, new innovation from Bede's R&D centre (Reflex Sro) all contributed to the firm's development. It is true to say that Bede had strong external skills and knowledge capability.

Technical/Technological: technological competence and integration

- Technological development with others
- Adaptation and application of technical/technological programme

As mentioned previously in the external skills and knowledge capability, Bede was very active in terms of its technological development; for instance, joint-ventures with the suppliers which enabled the firm to obtain components for its new innovations. The Quality Engineer pointed out that he often needed to engage with suppliers and supervise them during the designing process. Also, working closely with academic institutions had helped the firm acquire new knowledge for commercialisation; as the Global Sales and Marketing Director emphasised, the firm was constantly seeking methods for rapid commercialisation from new innovations.

Managerial: influences and experiences in managing of the network

-Manager's role and influences of other actors

Mentioned by the Regional Manager and the Global Sales & Marketing Director, the appointments for their jobs were due to their industrial experience. That was because Bede relied on the experience and relationships that a manager/director could offer. For example, the Regional Manager had only worked for Bede since 2004, however, due to his knowledge and experience of the Asian market, and he was still maintaining good relationships with his existing customers from the previous appointment. This is where Bede relied on his experience to assist the firm in further relationship development with both potential and existing customers. In the case of suppliers, the Quality Engineer had the responsibility of supervising joint-development with the suppliers. Thus, the Quality Engineer had great influence on suppliers' decisions to purchase materials and the compatibility of different parts from other suppliers, etc.

Values: acceptance of organisational culture learning in domestic and international environment

-Employees' adaptability when receiving new cultures from other actors

-Bede's learning process

There were a number of activities that demonstrated Bede's learning process; for instance, the recruitment process. Noted by the Regional Manager, Bede had a preference for recruiting newly graduated PhDs who would have up-to-date innovation and ideas which could be transformed to be part of the commercialisation. Additionally, Bede would send their engineers to universities for short courses as

another method of learning new skills and knowledge; or alternatively, training received from joint-development with the suppliers.

4.2 Internal Capabilities

Skills and knowledge: integration of skills and knowledge obtained to other internal capability

- Outcome of any developments

- Level of engagement

Noticeably, the recruitment of newly graduated PhDs and joint-development with suppliers enabled Bede to obtain the required technology and skills. Bede then took this intangible asset and followed by transforming and then converting the ideas to a commercialised product. Bede also developed training programmes purposely for their customers. The training offered could be perceived by Bede as coordinating their internal and external knowledge obtained, then transferring it to their customers. The Global Sales and Marketing Director also pointed out that Bede used its website to educate customers through their online knowledge base. This could also be perceived as a development of internal skills and knowledge due to the integration between Internet technology and human knowledge.

Technical/Technological: technological competence and compatibility integration within the organisation

- Technological development planning and forecasting

- Adaptation and application of technical/technological programme

As a technological-driven company, Bede cooperated with leading suppliers to develop strong technological capability, plus strong relationships and frequent interaction with academic institutions. This indicates the firm were conscious of any new product development and industrial trend for technology. Apart from Bede's concentration on the core technology, the firm was also aware of Internet integration which could have benefits for future development. The Internet provided a well-established communication infrastructure for the case company to communicate with its suppliers, such as the use of e-mail and databases (via Intranet) to reduce the time wasted during communication.

Managerial: ability to co-ordinate with the firm internally

-Responsibility

-Relationship

Regular communication between the case firm's headquarters and the subsidiaries through their Internet infrastructure assisted the company when sustaining their internal relationships. Bede's positive management attitudes could be assumed as its management was actively recruiting newly graduated personnel as well as examples of new recruitment at management level, which included the Regional Manager and the Global Sales & Marketing Director. Furthermore, supplementary education of its employees proved the encouraging and positive attitude of Bede's management team.

Values: company's goals and beliefs

-Company's beliefs and attitudes toward their employees

-Goals

As one of the main suppliers for the semiconductor industry, technology has always been the key selling point for Bede. From Bede's perspective, innovation and its internal skills and knowledge could be distinguished as the most important elements. Thus, numerous training programmes and short-courses were being deployed, which assisted the firm to maintain their technological level. Moreover, Bede recognised the consequence of maintaining good industrial relationships; the responsibility was laid with the management level that would have frequent communication so as to retain customers in the future. Surprisingly, the Regional Manger also pointed out that Bede used an external consultancy company which assisted Bede in developing business strategies which revealed the goals of the firm as the leading x-ray metrology equipment provider. Bede's internal and external capabilities can be summarised in the following Table 22.

Table 22 Bede's Internal and External Capabilities

	External Capabilities with description	Internal Capabilities with description
Skills and Knowledge	Work closely with research centres, receiving training from suppliers. To educate customers new technologies via their website. Provide training and repair service for customers.	Integration of newly acquired skills and knowledge with existing capability. Fast commercialisation and innovation.
Technical Technological	New technology development with other research centres or suppliers via joint-venture.	Considered to be the most important capability of the firm. Ability to coordinate with other components suppliers in order to gain strong technological capability.
Managerial	Regular face-to-face visits with their suppliers and customers. Faster communication for strong supply chain collaboration. The decision to use agents for Asia-Pacific regions, agents have better understanding for local markets and reduce language and cultural barriers.	Proactive management, encourage their employees to receive new knowledge. Maintaining good relationships (and personal relationship) with their clients. Sustain internal technological capability by acquiring external organisations.
Values	Proactive in learning new skills and knowledge from different sources. Adapting different communication methods for different customers. Realised the importance of innovation for future product development.	Technological driven, fast commercialisation and innovation.

5 Bede's Internationalisation Process and Level of Internationalisation

The history of Bede can be traced back nearly 30 years, initially as a manufacturer of custom-made equipment for universities. Due to the company founder's academic background with well-established personal connections in the UK and strong international contacts via years of international conferencing; thus, the firm began some international activities.

Referring to the Global Sales and Marketing Director, the company had a strong focus for internationalisation development in the early stages. In the mid-80s, the firm started their exporting business activities as there were increasing demands for x-ray machinery for the semiconductor and medical industries. At the beginning, Bede used

a large number of agents to manage their foreign business; however, according to the Global Sales and Marketing Director the firm started reducing its number of agents 6 to 7 years ago as it wanted to offer much more professional services to the industry. In other words, Bede was trying to restructure its network of agents. For example, Bede set up Bede USA as a wholly-owned subsidiary which could provide sales and after-sales support for the American market.

Although Bede also set up Bede Asia for coordinating sales and after-sales support for that region, the firm insisted on retaining some of its existing agents in Asia, due to Bede's argument that local agents had better knowledge of the local market. Nevertheless, the remaining agents were well established and reputable for the markets for which they were responsible and Bede was relying heavily on them for those markets.

In terms of a supply network, Bede sourced its supplies mainly from local suppliers initially. From time to time, Bede extended its supply network internationally and shared joint-development with some international suppliers. There was one example in particular of how Bede changed its shape of supply network: Reflex Sro used to be Bede's supplier as they worked very closely together in the format of joint-venture. However, Bede decided to acquire Reflex Sro and it was now a wholly-owned subsidiary. Thus, Bede continued to use Reflex Sro as the R&D and supply centre, and most importantly, Bede secured its long-term resources and controlled the supply for its competitors. Yet, the Global Sales and Marketing Director mentioned that Reflex Sro was supplying some components for one of their competitors currently.

According to the findings, it can be argued that Bede was on the third stage of the Uppsala internationalisation model where the firm has established foreign sales subsidiaries. Although Bede was using some agents for certain international markets, the majority of responsibility and risk was now held by Bede. Table 23 below highlights the firm's internationalisation process.

Table 23 Bede's Internationalisation Process

Intention	Markets	Industry	Involvement with
Early focus of international markets with overseas' demand raising and saturation of local market.	Mainly Western Europe, USA and Asia (Asia occupies 60% of sales)	Semiconductor and Medical.	Suppliers, Customers, Agents, Academic Institutions. Bede internally: Bede Asia, Bede USA and Reflex Sro.

6 Internet Competence

Bede adopted ways of different Internet usage; for instance, website, e-mail, online video conference, and online chat room. The company's website displayed some basic company's information, such as product, latest innovation/development, reports, contact details and knowledge base. Most of the information on the websites was for customers such as product information and new development, etc. However, information such as company reports was priority for the general public or potential investors. In addition, there was a section named 'knowledge base' on Bede's website. This particular section was for anyone who was interested in articles related to technology or product issues. Although this section was not password protected, anyone who wanted to obtain these documents would have needed to provide their own contact details so Bede could identify any potential customers. Also, the knowledge base served as an education platform for the firm's industrial actors where they could receive news and knowledge of latest technology and further applications (Global Sales and Marketing Director).

E-mail was the most important Internet communication tool for Bede. According to the Regional Manager they needed to have constant communication with the firm. Where people travelled and visited customers frequently, e-mail was the best alternative to mobile phones for maintaining contact. From the Quality Engineer's perspective e-mail was very convenient when sending or receiving files such as video clips, photographs and technical drawings, where they could have instant communication for such complex messages. In addition, the Regional Manager and the Global Sales & Marketing Director pointed out that they also used e-mail newsletters for maintaining contact with people who were interested in the latest developments of the firm, such as investors and customers.

“...as an international company that we need to find a way that is easy for us to communicate internally” (Regional Manager)

Online video conferencing was another Internet tool for Bede's communication. As suggested by the Regional Manager and Quality Engineer, video conference was mainly used for internal communication between headquarters and foreign subsidiaries. The firm had an online meeting room where the equipment was in standby mode and ready for any incoming online meeting. Although the video conference facility was mainly for internal communication, interviewees suggested the system was open for any of their suppliers or customers but would depend on their Internet capacity. Online chat rooms were another form that Bede took into their communication methods; however, the chat room was purely designed for internal communication and not for any external uses. This system enabled Bede's engineers in a remote location to communicate with engineers in the base and to receive further support.

The integration of the Internet and Intranet/Database was another key Internet competence of Bede. As the Quality Engineer pointed out, this particular integration increased the communication flow between the company and people who could not physically be in the office. For example, travelling personnel could access the firm's Intranet and database through the firm's Virtual Private Network (VPN), where they could review and amend files and documents.

Although Bede had a strong Internet competence, all of the interviewees stressed the importance of face-to-face communication and some of the limitations of Internet communication. For instance, when working closely with a supplier Bede's engineers needed to go to the supplier's site for supervision, inspection, and modification discussion where it could not simply be achieved by video conference or e-mail. From the sales and marketing perspective, interviewees suggested the need to make physical visits to their customers to maintain that relationship, and in return ensure that Bede could gain the next order (Regional Manager and Global Sales & Marketing Director). Table 24 below is a brief summary of Bede's Internet activities.

Table 24 Bede's Internet Activities

Forms of Internet Activities	Description
Website	A comprehensive website with information relates to the company and its product. The website was designed mainly for customers and investors. The website also has a knowledge based where users can request documents/papers for latest technology and future technological application. In addition, the website also linked to the firm's database (Intranet) for the e-mail newsletter function.
E-mail	E-mail is the most important Internet communication method, as the characteristic of e-mail is very convenient and instant especially when it can send files such as video clips, photographs and technical drawings. Also, e-mail is useful for Bede's employees when they are travelling where they can maintain their contact with the company and customers.
Video Conference	The video conference is primarily for internal communication. Bede uses video conference to communicate with their subsidiaries, however on some occasions the video conference meeting is conducted if the suppliers or customers have requested it.
Online Chat Room	The online chat room is another method for Bede's internal communication. Unlike the video conference, online chat room is strictly for internal usage purpose and can be used when an engineer is in a remote location who requires instant communication with other engineers on base for discussion, such as problem solving.
Others	The firm has a well-functioned Intranet system where they share files and document, and can be accessed remotely via VPN. This enables travelling employees to review and amend documents if needed and shortens the communication process.

7 The Internet and Bede's Internationalisation Process

"I don't think that the Internet actually influences our decision to go to international, but it does help us speed up the process for internationalisation."

(Regional Manager)

Interestingly, the Regional Manger pointed out directly that the Internet had helped the firm speed up their internationalisation process. This was because the characteristics of the Internet, such as convenience and instantaneous transmission

have assisted the speed of the communication; in addition, Internet was used to conduct basic research for a wider customer base.

In particular, e-mail allowed the firm to have consistent communication with its clients, either in one-to-one communication or one-to-many communication (automated e-mail newsletter). There were some advantages where e-mail could reduce postage cost or travel cost in some cases (Regional Manager and Quality Engineer). There were other advantages, such as overcoming the communication gap if they were communicating with an overseas client (time differences) where Bede could reply to the message during the day and its client could receive the answer instantly or within 24 hours.

The efficiency of internal communication was another key finding of the case. As an international company, Bede ensured their communication flow by giving its employees a laptop each, which allowed them to connect to the Internet and maintain contact. Furthermore, the use of video conferencing allowed the firm to have regular meetings with its foreign subsidiaries without additional travelling costs, as well as the travelling time saved.

Nevertheless, the Internet had some disadvantages where the Regional Manager and Quality Engineer contended that they needed to deal with a lot of irrelevant e-mails which was very time-consuming. For example, customers would e-mail to the person they knew instead of e-mailing to the relevant department, such as the service department. Thus, it created a lot of unnecessary workload and customers may have encountered slower replies (Global Sales and Marketing Director).

Nonetheless, both Regional Manager and Global Sales & Marketing Director stressed that even with the Internet used, they still needed to travel frequently to visit clients and maintain good relationships, which is totally different to sending a message by e-mail. This indicates that the Internet benefited the business most for internal communication. Existing face-to-face communication still could not be ignored as a lot of business activities required face-to-face communication to establish business relationships or carry out product inspections. Table 25 outlines the key functions of the Internet and the subject user groups.

Table 25 Forms of Internet and the User Groups

Internet Activities	User Groups
Website	All, including investors
E-mail	All
Video Conference	Internal; occasionally some customers or suppliers
Online Chat Room	Internal
Knowledge Base	Customers; Suppliers
E-mail Newsletter	Customers; Investors

8 Conclusions of Bede Case

Referring to the conceptual framework, this case has proven that the relationship between the Industrial SMEs and Internationalisation was a strategic option since the case had an early internationalisation focus. However, the Internet was not necessarily used as a technology or a tool in relation to an internationalisation decision, but to assist the firm to speed up the communication process where it could lead to further international expansion. In terms of the Industrial SMEs and the Internet, it has been suggested that the degree of Internet usage depended on the SMEs' resources and their competences. In terms of managing in the industrial networks, the case recommended that industrial actors, activities and resources were influenced and depended on the case firm's external and internal capabilities. Especially, the resources and activities were determined by the degree of involvement that Bede could offer.

Specifically, the contribution of the Internet to Bede's internationalisation was for communication purposes. It was suggested that the Internet provided an infrastructure for the company to communicate internally for which they had integrated technologies such as video conferencing and online chat rooms to ensure the operational flow. Bede also used other forms of Internet to communicate with their external industrial actors, mainly e-mail and website.

E-mail ensured Bede had consistent communication with its clients, with additional benefits of cost and time saving. Although the use of the Internet had shortened the distance between Bede and their industrial actors, existing communication still could not be ignored, such as face-to-face communication with its clients for establishing

their relationships initially. Also, activities with suppliers required frequent discussion and feedback; a personal visit would ensure mutual understanding such as product specification between two parties in a joint-venture or joint-development status.

Despite that Bede was on the third stage of the Uppsala internationalisation model, there was no indication that the firm's internationalisation decision was based on the development of the Internet. Nevertheless, there were indications that Bede used the Internet to assist its international operations and to accelerate its communication cycles. Table 26 is a summary of the key findings from this case study in relation to the conceptual framework.

Table 26 Key Findings of the Case Five in Relation to the Conceptual Model

Links	Descriptions
Industrial Network vs. Capabilities	Bede has suggested the management can be seen as one of the key influences within their industrial network as the firm is responsible for selecting appropriate agents and decisions of using subsidiaries to handle their international business. Further comments such as joint-venture and acquisition have also shape up Bede's industrial network.
Internal Capabilities vs. External Capabilities	As the firm is in a technology driven industry, Bede has demonstrated how they acquire external resources and transfer for their internal uses. Example such as joint-venture has also suggested the firm's internal capacity and how they managed the activity externally.
Industrial SMEs vs. Internationalisation	Bede has initial plan for their internationalisation process by using agents and setup their own subsidiaries. Furthermore, the firm kept expanding by acquiring Reflex Sro, who used to be one of Bede's suppliers. Therefore, it can be argued that the relationship between industrial SMEs and internationalisation is based on a <i>strategic approach</i> .
Internationalisation vs. The Internet	Bede has used the Internet extensively for its international business. The use of the Internet has assisted the firm to maintain constant communication with its overseas subsidiaries/employees which have impacts on Bede's internationalisation process. In other words, <i>appropriate uses of technologies</i> can help the firm to communicate more efficiently.
The Internet vs. Industrial SMEs	Arguably, the degree of commitment and the ways of using Internet technology has impacted on how Bede delivered their after-sales services. It can be said that Bede's <i>competence</i> in using the Internet allows them to choose appropriate communication channels with their industrial counterparts.

Appendix 4a: Cross-Case Comparison Table (Part A)

Part A (case 1-5), page 297 to 307

Part B (case 6-10), page 308 to 318

	Case 5	Case 4	Case 3	Case 2	Case 1
Concept	Bede X-ray Metrology	Coborn Engineering Co. Ltd.	Verplas Ltd.	Mobiletron UK Ltd.	Polaron Components Ltd.
Property	Interview Set 6,7, and 8	Interview Set 5	Interview Set 4	Interview Set 3	Interview Set 1 and 2
Dimension					
Company Size					
<i>relevance between annual turnover and number of employees</i>					
Annual Turnover	Small (£4.8m) vs. Medium (£27.5m) based on EC definition	Small (£3.5m)	Medium (£7.5m)	Small (£4m)	Small (£4m)
Number of Employees	Small (10-49) vs. Medium (50-249)	Medium (50)	Medium (70)	Small (15)	Medium (55)
	Medium (UK 60, Worldwide total 140)				

Company History

type of ownership and year of establishment

Ownership	Private (Family) vs. Public	Private (in stock market)	Private	Private	Private
Year of Establishment	Pre-1993 vs. Post-1993	Pre-1993 (1978)	Pre-1993 (1941)	Pre-1993 (1986)	Post-1993 (2002)
					Pre-1993, merged in 2002

Industrial Environment

product range and type of industry

Product Range	Few vs. Many	Few (>10)	Few (>25)	Many (<150)	Many (<100)	Many (<75)
Nature of the Industry	Low Tech vs. High Tech	High Tech	Medium Tech	Low Tech	Medium Tech	Medium Tech
Type of Business	B2B vs. B2C	B2B	B2B	B2B	B2B	B2B

Internal (Core) Capability

core elements that ensure the firm's competitive advantages

Level of Skills and Knowledge	Less important; Important; Very important	Very important	Very important	Important	Very important	Very important
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Level of Technologies	Less important; Important; Very important	Very important	Important	Important	Very important	Very important
Managerial System	Pessimistic vs. Optimistic	Optimistic	Pessimistic	Optimistic	Optimistic	Optimistic
Company's Value	See descriptions	Technological Superiority and Human Resources	Service, Employees' Loyalty and Capabilities Integration	Integration of Different Capabilities	Integration of Different Capabilities and the Need of Surplus Resources	Integration of Different Capabilities and the Rate of Innovation
Industrial Network						
	<i>main industrial actors</i>					
Number of Suppliers	Few vs. Many	Moderate	Many	Few	Moderate	Moderate
Location of Suppliers	Domestic vs. International vs. Both	Both	Both	Both	Both	Both
Size of Suppliers	Small; Medium or Large	Medium to Large	Small to Medium	Medium	Medium to Large	Mainly Small, Some Medium and Large
Number of Customers	Few vs. Many	Moderate	Moderate	Moderate	Moderate	Moderate
Location of Customers	Domestic vs. International vs. Both	Both	Both	Both	Both	Both
Size of Customers	Small; Medium or Large	Medium to Large	Medium	All	All	All
Others Actors (not include agents)	see the descriptions	Reflex Sro (acquired company), University and Research Centre	None	Customers include distributors and OEMs	Parent Company, Sister Company, University and Distributor	MSI (supplier and distributor), Subcontractor and Distributor

Company's Business Approach

company's attitudes toward business

Relationship with Suppliers	Direct vs. Indirect	Direct	Direct	Direct	Direct
Closeness of the Relationship with Suppliers	Close vs. Loose	Close	Moderate	Close with Parent and Sister Company; Moderate with Others	Close
Communication Frequency with Suppliers	Frequent vs. Rare	Moderate	Moderate	Frequent with Parent and Sister Company; Moderate with Others	Moderate
Relationship with Customers	Direct vs. Indirect	Direct	Both	Direct	Both
Closeness of the Relationship with Customers	Close vs. Loose	Close	Moderate	Moderate to Close	Close
Communication Frequency with Customers	Frequent vs. Rare	Frequent	Moderate	Moderate	Moderate to Frequent During production: Frequent; After purchase: Rare (depends)
Attitude Towards Investment	Pessimistic vs. Optimistic	Optimistic	Natural	Optimistic	Optimistic
Attitude Towards Development	Pessimistic vs. Optimistic	Optimistic	Natural (lack of financial resources)	Natural to Optimistic	Optimistic

Internationalisation Process

approach to international business

Reasons for Internationalisation	Profit Driven vs. Market Driven	Profit Driven	Market Driven	Profit Driven	Market Driven	Profit Driven
Approaches taken for Internationalisation	1. Personal Contacts; 2 Agents and Distributors; 3. Subsidiaries; 4. Others (see descriptions)	1 and 2 initially, 2 and 3 afterward, and acquire Reflex Sro (existing supplier)	1 and 2	1 and 2	2 and 4 (parent company's financial investment)	2 and 4 (close relationship with MSI)
Reasons for Using Selected Internationalisation Approach(es)	See descriptions	Need to provide technical support; still use agents in Asia region due to agents' local knowledge.	Lack of resources at initial stage	Ease for distribution	Agents have better local market knowledge	Can handle less customers
Locations for International Business	See descriptions	Worldwide	Worldwide, mainly EU and Asia	Worldwide, mainly EU	Europe and part of Africa	Worldwide
Dimensions of Network Approach	Control vs. Coordination vs. Cooperation	Control, Coordination and Cooperation	Coordination and Cooperation	Coordination and Cooperation	Coordination	Coordination and Cooperation

Exchange of Resources

type of resource exchanged and interaction with other industrial actors

Skills and Knowledge	See descriptions	Training	Training for servicing	None	Training	Training and Exchange Knowledge
Technical and Technological Resources	See descriptions	Product testing and Material component testing	Product testing and Product development	Product development	Product development	Product development
Others	See descriptions	Joint-development with research institutions	None	Joint-development with OEMs	Research projects with universities/research institutions	Joint-agreement with MSI for distribution
Outcome of Resources Exchanged	See descriptions	Gaining new technologies	Achieve customer's requirement and product development	Achieve customer's requirement and product development	New product development	Gaining new technologies and product development

Internet Infrastructure

different forms of the Internet

Website: 1. Company Background	Yes vs. No	Yes	No	Yes	Yes (however, no detailed company information)	Yes
Website: 2. Product Information	Yes vs. No	Yes	Yes	Yes	Yes (limited information)	Yes

Website: 3. FAQ and Technical Information	Yes vs. No	Yes (request by web-based e-mail)	Yes	Yes (in mid-2006)	Yes (limited information)	Yes (limited information)
Website: 4. Online Catalogue	Yes vs. No	No	No	Yes (also can download and request paper-based brochure)	No	No
Website: 5. News Announcement	Yes vs. No	Yes	No	Yes	Yes	Yes
Website: 6. Newsletter Subscription	Yes vs. No	No	No	Yes	No	No
Website: 7. Multi-language Support	Yes vs. No	No	No	Yes (only company background)	Yes (however, the link is not functionally)	No
Website: 8. Database Search Function	Yes vs. No	Yes	No	No	Yes	No
Website: 9. Online Purchase	Yes vs. No	No	No	No	Yes (order only)	No
Website: 10. Other Relevant Information/Links to Other Useful Website	Yes vs. No	Yes (foreign subsidiaries)	Yes (agents)	No	Yes (parent company and sister company)	Yes (distributors)
Website: 11. Customer Satisfaction Survey	Yes vs. No	No	No	No	Yes	No
Video Conference Facility	Yes vs. No	Yes	Yes	No	Yes	Yes

Voice over Internet Protocol	Yes vs. No	No	No	Yes	No
Enterprise Resource Planning System (Intermediary)	Yes vs. No	Yes	No	Yes	No
Electronic Data Interchange (Advanced)	Yes vs. No	No	No	No	No

Main Internet Usage

Purposes and Functions of using the Internet

Advertising/Publicity	Yes vs. No	Yes	Yes	Yes	Yes
Research	Yes vs. No	Yes	No	Yes	Yes
Procurement for materials (Company to Supplier)	Yes vs. No	Yes (for repeating orders, no transactions, i.e. liquid gas)	No	No	No
Other Online Activities (Customer to Company)	Yes vs. No	No	Yes (modem to transmit remote machinery data. and to provide support)	Yes (live inventory information, online order and tracking)	Yes (video conference integrated in production manufacturing)
Banking (not include direct transactions)	Yes vs. No	No	Yes	No	No

Internal Communication	Yes vs. No	Yes	No	No	Yes	Yes
Online Technical Support/Technical Support via the Internet	Yes vs. No	No	Yes	No	No	Yes
Education (include: glossary, application, etc.)	Yes vs. No	Yes	No	No	No	No
Reduce Face-to-Face communication	Yes vs. No	No	No	No	No	Yes
Increase Communication Frequency	Yes vs. No	Yes	Yes	Yes	Yes	Yes
Scale of Internet/IT Infrastructure	Small (basic functions) vs. Large (integration with EDI or ERP)	Medium to Large	Small (incorporate with database)	Small	Medium to Large	Small (incorporate with database)
Industrial Customer's Internet/IT Usage	Below vs. Same vs. Above the firm's Internet Usage	Below	Same level	Same to Above	Below to Same	Same
Industrial Supplier's Internet/IT Usage	Below vs. Same vs. Above the firm's Internet Usage	Below	Below to Same level	Same level	Below to Same	Same

<p>Management's consideration of the Internet Usage</p>	<p>See descriptions</p>	<p>Number of duplicated information. Different IT level with other industrial actors</p>	<p>Force business to be more communication responsive</p>	<p>Possibility of information missing due to e-mail is one-to-one nature</p>	<p>Others' Internet usage does not have the same level as the firm, additional costs occur. Incomplete e-mail from others, time wasted</p>	<p>E-mail can be abused easily, large number of duplicated e-mail, possibility of information missing and additional workload</p>
<p>Limitation of the Internet</p>	<p>See descriptions</p>	<p>Customers expect fast response, cannot replace face to face communication for relationship building</p>	<p>One-to-one communication</p>	<p>Internal usage control</p>	<p>Internet usage control and one-to-one communication</p>	
<p>Outcome/Contribution of the Internet</p>	<p>See descriptions</p>	<p>Speed of communication, across time-zones, cost saving for travel</p>	<p>Speed of communication, especially sending and receiving drawing</p>	<p>Speed of communication, save on administration cost (reduced number of secretaries)</p>	<p>Speed of communication, cost saving</p>	<p>Speed of communication, across time-zones</p>

Future Internet Development

type of Internet activities that the firm are planning to adopt in the near future

Type of Internet activities for future development	See descriptions	None	Website update, Multiple language website, VoIP	Website (product) update, pictures display**	To complete existing ERP system and to develop EDI system	None
Reasons for further Internet development	See descriptions	None	Update	Product type needs picture display (update)	To standardise the operation between the firm and others, and to cut down cost and time for repeatable tasks	None

** the new website has been updated in mid-2006

Appendix 4b: Cross-Case Comparison Table (Part B)

Concept		Case 6	Case 7	Case 8	Case 9	Case 10	Case 11	Case 12	Case 13
<i>Definition</i>		Thomas Swan Scientific Equipment Ltd.	Agar Ltd.	Accent Optical Technologies	Crystran Ltd.	Purimachos Ltd.			
Property	Dimension	Interview Set 9	Interview Set 10	Interview Set 11	Interview Set 12	Interview Set 13			
Company Size									
<i>relevance between annual turnover and number of employees</i>									
Annual Turnover	Small (£4.8m) vs. Medium (£27.5m) based on EC definition	Medium (£27m)	Small (£2.5m)	Medium (£22m)	Small (£1.6m)	Small (£1.4m)			
Number of Employees	Small (10-49) vs. Medium (50-249)	Medium (75)	Small (23)	Medium (UK 150, Worldwide total 230-240)	Small (19)	Small (20)			
Company History									
<i>type of ownership and year of establishment</i>									
Ownership	Private (Family) vs. Public	Private	Private	Private (in stock market)	Private	Private (family owned previously)			

Year of Establishment	Pre-1993 vs. Post-1993	Pre-1993 (1882), management buy-out in 1996/97	Post-1993 (1993)	Post-1993 (2000)	Pre-1993 (1972)	Pre-1993 (1983), acquired by Aixtron in 1999
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Industrial Environment

product range and type of industry

Product Range	Few vs. Many	Few (Industrial Products: >15) (Trade Products: >15)	Few (>15)	Few (>25)	Many (<1000)	Few (>15)
Nature of the Industry	Low Tech vs. High Tech	Low Tech	Medium Tech	High Tech	Low Tech	High Tech
Type of Business	B2B vs. B2C	B2B	B2B	B2B	B2B	B2B

Internal (Core) Capability

core elements that ensure the firm's competitive advantages

Level of Skills and Knowledge	Less important; Important; Very important	Very important	Very important	Very important	Important	Very important
Level of Technologies	Less important; Important; Very important	Less important	Very important	Very important	Less important	Very important
Managerial System	Pessimistic vs. Optimistic	Pessimistic	Optimistic	Optimistic	Optimistic	Optimistic

Company's Value	See descriptions	Production Flexibility and Employee Flexibility	Honesty (both internal and external)	Technological Superiority and Integration of Different Capabilities	Service and Distribution ability	Technological Superiority and Integration of Different Capabilities
Industrial Network						
	<i>main industrial actors</i>					
Number of Suppliers	Few vs. Many	Few	Few	Few	Many	Moderate
Location of Suppliers	Domestic vs. International vs. Both	Both	Both	Both	Domestic	Both
Size of Suppliers	Small; Medium or Large	Small to Medium	Small to Medium	Medium to Large	All	Medium to Large
Number of Customers	Few vs. Many	Few	Moderate	Moderate	Many	Moderate
Location of Customers	Domestic vs. International vs. Both	Both	Both	Both	Both	Both
Size of Customers	Small; Medium or Large	All	All	Medium to Large	Small to Medium	Medium to Large
Others Actors (not include agents)	see the descriptions	Laboratory; Some customers are also their suppliers, vice versa; sub-contractors	University; Some customers are also their suppliers; sub-contractors	University and Research Institution	Hospitals and University	University and Subcontractors

Company's Business Approach

company's attitudes toward business

Relationship with Suppliers	Direct vs. Indirect	Direct	Direct	Direct	Direct
Closeness of the Relationship with Suppliers	Close vs. Loose	Close	Close	Close	Close
Communication Frequency with Suppliers	Frequent vs. Rare	Moderate	Moderate	Frequent	Moderate
Relationship with Customers	Direct vs. Indirect	Both	Direct	Both	Direct
Closeness of the Relationship with Customers	Close vs. Loose	Moderate to Loose	Close	Moderate to Loose	Close
Communication Frequency with Customers	Frequent vs. Rare	Frequent	Frequent	Frequent	Before purchase: Frequent; After purchase: Moderate
Attitude Towards Investment	Pessimistic vs. Optimistic	Natural	Natural	Optimistic	Optimistic
Attitude Towards Development	Pessimistic vs. Optimistic	Natural	Optimistic	Pessimistic	Optimistic

Internationalisation Process
approach to international business

Reasons for Internationalisation	Profit Driven vs. Market Driven	Market Driven	Market Driven and Personal Contact	Market Driven (previously), now both Market and Profit Driven	Profit Driven	Market Driven
Approaches taken for Internationalisation	1. Personal Contacts; 2 Agents and Distributors; 3. Subsidiaries; 4. Others (see descriptions)	2 (targeted at commonwealth initially)	Direct dealing with customers. However, the firm is using "informal" agents	2 and 3	1 (initially) and 2	1 and 2 initially, 2 and 3 after acquisition
Reasons for Using Selected Internationalisation Approach(es)	See descriptions	Agents have better local market understanding as well as closer to the local customers physically.	Company can handle all international communication. Build on existing contacts, trust	Need to provide instant technical supports.	Personal Contacts. Less cultural considerations by using agents.	Need to provide local support (sales and technical); use Aixtron's subsidiaries for cost saving.
Locations for International Business	See descriptions	Commonwealth countries; Europe	Worldwide	Worldwide, mainly Asia-Pacific	Worldwide	Worldwide, 90% Asia
Dimensions of Network Approach	Control vs. Coordination vs. Cooperation	Coordination	Coordination	Control, Coordination and Cooperation	Coordination	Coordination and Cooperation

Exchange of Resources

type of resource exchanged and interaction with other industrial actors

Skills and Knowledge	See descriptions	Training	Training	Training	Training
Technical and Technological Resources	See descriptions	Product testing/Chemical analysis	Training/Product development	Product testing and Product development	None
Others	See descriptions	None	Short courses	Research projects with universities/research institutions	None
Outcome of Resources Exchanged	See descriptions	Partnership	Synchronise production process/requirement with customers.	Product development and improvement	Closer relationship

Internet Infrastructure

different forms of the Internet

Website: 1. Company Background	Yes vs. No	Yes	Yes	Yes	Yes
Website: 2. Product Information	Yes vs. No	Yes	Yes	Yes	Yes
Website: 3. FAQ and Technical Information	Yes vs. No	Yes (FAQ has been setup since June 2006)	Yes (registration required)	Yes	No

	Yes vs. No	No	Yes	No	Yes (since Mid-2006)	No
Website: 4. Online Catalogue		No	Yes	No		No
Website: 5. News Announcement	Yes vs. No	No	Yes	No	Yes	Yes
Website: 6. Newsletter Subscription	Yes vs. No	No	No	No	No	No
Website: 7. Multi-language Support	Yes vs. No	No	No	Yes	No	No
Website: 8: Database Search Function	Yes vs. No	No	No	Yes	No	No
Website: 9. Online Purchase	Yes vs. No	No	No	No	No	No
Website: 10. Other Relevant Information/Links to Other Useful Website	Yes vs. No	No	No	Yes	Yes (agents/distributors information)	Yes (Aixtron)
Website: 11. Customer Satisfaction Survey	Yes vs. No	Yes	No	No	No	No
Video Conference Facility	Yes vs. No	No	No	Yes	No	Yes
Voice over Internet Protocol	Yes vs. No	No	No	Yes	No	No

Enterprise Resource Planning System (Intermediate)	Yes vs. No	No	Yes	Yes (live stock level)	Yes (partly integrated with Aixtron)
Electronic Data Interchange (Advanced)	Yes vs. No	No	No	No	No

Main Internet Usage

Purposes and Functions of using the Internet

Advertising/Publicity	Yes vs. No	Yes	Yes	Yes	Yes
Research	Yes vs. No	Yes	Yes	Yes	Yes
Procurement for materials (Company to Supplier)	Yes vs. No	No	Yes (for repeating orders only, no transactions, i.e. liquid hydrogen)	No	No
Other Online Activities (Customer to Company)	Yes vs. No	Yes (orders via 3rd party with no transaction involved)	No	Yes (live inventory information)	No
Banking (not include direct transactions)	Yes vs. No	No	No	No	No

Internal Communication	Yes vs. No	No	No	Yes	No	Yes
Online Technical Support/Technical Support via the Internet	Yes vs. No	No	No	Yes	No	Yes
Education (include: glossary, application, etc.)	Yes vs. No	No	Yes	Yes	No	No
Reduce Face-to-Face communication	Yes vs. No	No	Yes	No	No	No
Increase Communication Frequency	Yes vs. No	Yes	Yes	Yes	Yes	Yes
Scale of Internet/IT Infrastructure	Small (basic functions) vs. Large (integration with EDI or ERP)	Small	Small (incorporate with database)	Large	Small to Medium (incorporate with database)	Medium (part of a larger IT infrastructure of Aixtron)
Industrial Customer's Internet/IT Usage	Below vs. Same vs. Above the firm's Internet Usage	Smaller customers- same; Larger customers- Above	Same level	Below to Same level	Below to Same level	Below to Same level
Industrial Supplier's Internet/IT Usage	Below vs. Same vs. Above the firm's Internet Usage	Same level	Same level	Smaller suppliers (below); Large suppliers (Above)	Same level	Same level

Management's consideration of the Internet Usage	See descriptions	System compatibility	None	Number of duplicated information exchanged internally, reduce efficiency	Incomplete e-mail enquires from others, time wasted	Number of duplicated information exchanged internally, distracted by e-mails
Limitation of the Internet	See descriptions	No instant reply for international customers, the overall communication period could be long	None	Missing the human nature	Impossible for instant response as there are a large number of clients	Cannot replace face to face communication for relationship building
Outcome/Contribution of the Internet	See descriptions	Raise company profile, more business, faster communication	Replaced visits and travels. Main communication method, the firm cannot exist without it	Flexibility for employees who need to work remotely; convenient internal communication and to provide customer support	Speed of communication, across time-zones	Easier to make direct communication, speed of communication, across time-zones

Future Internet Development

type of Internet activities that the firm are planning to adopt in the near future

<p>Type of Internet activities for future development</p>	<p>See descriptions</p>	<p>Advanced website for information download</p>	<p>None</p>	<p>Multiple language support on the website</p>	<p>New website featuring online catalogue, online purchase, information search function*</p>	<p>ERP; EDI</p>
<p>Reasons for further Internet development</p>	<p>See descriptions</p>	<p>To save time for unnecessary communication</p>	<p>None (Company is currently satisfied with their Internet usage)</p>	<p>None (still debating)</p>	<p>Update</p>	<p>Will wait for larger actors to adopt fully and proved the technology</p>

* the new website has been setup in mid-2006, however, only online catalogue feature has been added.

Appendix 5: Contribution of the Internet for Network Activities in Relation to Internationalisation

Case 1: Polaron Components Ltd.

Internationalisation and Network Activities

Internationalisation and Network Activities	Supplier:										
	1	1	1	1	1	1	1	1	1	1	
Resource Acquisition									1		
Resource Maintenance	1							1			1

Agent:

Sales Support	1											1
Sales Information Exchange	1								1			

Customer (include distributor):

Marketing Activities	1											
Transaction and Invoicing									1			
After Sales Support											1	

Business Partner:

Lead Project Planning												
Project Coordination									1			1
Learning and Education												

Competitor:

Active General Market Information Seeking (general market trend)												
Active Competitor's Information Seeking (competitor monitoring)									1			

Contribution of the Internet for Network Activities →

Information Request (pre-sales service)	Sales/Product Consultation (pre-sales service)	After-sales Service (include technical support)	Reduce Social and Cultural Distance	Communication Across Time Zone with Ease	Cost Saving for Travelling	Intelligence Gathering	Increase the Speed of Production or Manufacturing Consultation	Increase the Speed of Ordering	Coordination Across Different Geographical Region	Online Banking	Integration with Up and Down Stream
						1					

Case 4: Coborn Engineering Co. Ltd.

Internationalisation and Network Activities

		Supplier:				
	1					
1				1		1

		Agent:				
1		1			1	
1	1		1			1

		Customer (include distributor):				
1	1	1				1
1			1			
		1			1	

		Business Partner:				
1	1	1			1	1
			1			

		Competitor:				

		Business Partner:				

		Business Partner:				

	Information Request (pre-sales service)	Sales/Product Consultation (pre-sales service)	After-sales Service (include technical support)	Reduce Social and Cultural Distance	Communication Across Time Zone with Ease	Cost Saving for Travelling	Intelligence Gathering	Increase the Speed of Production or Manufacturing Consultation	Increase the Speed of Ordering	Coordination Across Different Geographical Region	Online Banking	Integration with Up and Down Stream
Active General Market Information Seeking (general market trend)							1					
Active Competitor's Information Seeking (competitor monitoring)							1					

Contribution of the Internet for Network Activities →

Case 5: Bede X-ray Metrology

Internationalisation and Network Activities

	Supplier:					Agent:					Customer (include distributor):					Business Partner:					Competitor:																								
Resource Acquisition					1					1					1					1					1					1					1					1					
Resource Maintenance																																													
Sales Support	1					1					1					1					1					1					1					1					1				
Sales Information Exchange	1					1					1					1					1					1					1					1					1				
Marketing Activities	1					1					1					1					1					1					1					1					1				
Transaction and Invoicing	1					1					1					1					1					1					1					1					1				
After Sales Support	1					1					1					1					1					1					1					1					1				
Lead Project Planning	1					1					1					1					1					1					1					1					1				
Project Coordination	1					1					1					1					1					1					1					1					1				
Learning and Education	1					1					1					1					1					1					1					1					1				
Active General Market Information Seeking (general market trend)																																													
Active Competitor's Information Seeking (competitor monitoring)																																													

Contribution of the Internet for Network Activities →	Information Request (pre-sales service)	Sales/Product Consultation (pre-sales service)	After-sales Service (include technical support)	Reduce Social and Cultural Distance	Communication Across Time Zone with Ease	Cost Saving for Travelling	Intelligence Gathering	Increase the Speed of Production or Manufacturing Consultation	Increase the Speed of Ordering	Coordination Across Different Geographical Region	Online Banking	Integration with Up and Down Stream
							1					
							1					

Case 6: Thomas Swan Scientific Equipment Ltd.

Internationalisation and Network Activities

	Supplier:					Agent:					Customer (include distributor):					Business Partner:					Competitor:																			
Resource Acquisition					1					1					1					1					1					1					1					
Resource Maintenance	1					1					1					1					1					1														
Sales Support	1					1					1					1					1					1														
Sales Information Exchange	1					1					1					1					1					1														
Marketing Activities	1					1					1					1					1					1														
Transaction and Invoicing																																								
After Sales Support																																								
Lead Project Planning																																								
Project Coordination																																								
Learning and Education																																								
Active General Market Information Seeking (general market trend)																																								
Active Competitor's Information Seeking (competitor monitoring)																																								

Information Request (pre-sales service)	Sales/Product Consultation (pre-sales service)	After-sales Service (include technical support)	Reduce Social and Cultural Distance	Communication Across Time Zone with Ease	Cost Saving for Travelling	Intelligence Gathering	Increase the Speed of Production or Manufacturing Consultation	Increase the Speed of Ordering	Coordination Across Different Geographical Region	Online Banking	Integration with Up and Down Stream
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Case 7: Agar Ltd.

Internationalisation and Network Activities

	Supplier:				Agent:				Customer (include distributor):				Business Partner:				Competitor:			
Resource Acquisition																				
Resource Maintenance	1																			
Sales Support																				
Sales Information Exchange																				
Marketing Activities																				
Transaction and Invoicing																				
After Sales Support																				
Lead Project Planning																				
Project Coordination																				
Learning and Education																				
Active General Market Information Seeking (general market trend)																				
Active Competitor's Information Seeking (competitor monitoring)																				

	Information Request (pre-sales service)	Sales/Product Consultation (pre-sales service)	After-sales Service (include technical support)	Reduce Social and Cultural Distance	Communication Across Time Zone with Ease	Cost Saving for Travelling	Intelligence Gathering	Increase the Speed of Production or Manufacturing Consultation	Increase the Speed of Ordering	Coordination Across Different Geographical Region	Online Banking	Integration with Up and Down Stream
Contribution of the Internet for Network Activities →												

Case 10: Purimachos Ltd.

Internationalisation and Network Activities

	Supplier:					Agent:					Customer (include distributor):					Business Partner:					Competitor:														
Resource Acquisition					1																														
Resource Maintenance										1																									
Sales Support															1																				
Sales Information Exchange	1																																		
Marketing Activities																																			
Transaction and Invoicing																																			
After Sales Support																																			
Lead Project Planning	[Redacted]																																		
Project Coordination																																			
Learning and Education																																			
Active General Market Information Seeking (general market trend)																																			
Active Competitor's Information Seeking (competitor monitoring)																																			
Contribution of the Internet for Network Activities →																																			

	Information Request (pre-sales service)	Sales/Product Consultation (pre-sales service)	After-sales Service (include technical support)	Reduce Social and Cultural Distance	Communication Across Time Zone with Ease	Cost Saving for Travelling	Intelligence Gathering	Increase the Speed of Production or Manufacturing Consultation	Increase the Speed of Ordering	Coordination Across Different Geographical Region	Online Banking	Integration with Up and Down Stream
Resource Acquisition												
Resource Maintenance												
Sales Support												
Sales Information Exchange												
Marketing Activities												
Transaction and Invoicing												
After Sales Support												
Lead Project Planning	[Redacted]											
Project Coordination												
Learning and Education												
Active General Market Information Seeking (general market trend)												
Active Competitor's Information Seeking (competitor monitoring)												
Contribution of the Internet for Network Activities →												

Appendix 6: Benefits and Weaknesses of the Internet from Manufacturing SMEs' perspectives

(3 pages)

Forms of the Internet	Applications	Benefits	Weaknesses
<i>Website</i>	Newsletter subscription	<ul style="list-style-type: none"> ◆ Target specified customers ◆ To be used in conjunction with e-mail. ◆ Reduce communication cost ◆ Gain information on requested party 	<ul style="list-style-type: none"> ◆ Competitors have access to subscribe e-newsletter
	Online catalogue	<ul style="list-style-type: none"> ◆ Can be download instantly ◆ Save time and postage 	<ul style="list-style-type: none"> ◆ Competitors have access to online catalogue ◆ Most of the foreign clients still request translated catalogue from agents/distributors
	FAQ and support	<ul style="list-style-type: none"> ◆ Time saved for answer mostly frequent questions 	<ul style="list-style-type: none"> ◆ Not practical for high-tech industries, only limited information can be displayed on the website ◆ Clients have the tendency to e-mail the manufacturing SME on first instant
	Online survey	<ul style="list-style-type: none"> ◆ Increase a company's overall image 	<ul style="list-style-type: none"> ◆ Not useful for the feedback, most are negative comments ◆ Survey result are not realistic

	Online order/monitor (without payment function)	<ul style="list-style-type: none"> ◆ Can be update instantly ◆ Assist both buyer and seller monitor and order stocks ◆ Effective for repeating purchase 	<ul style="list-style-type: none"> ◆ Only authorised buyers can use this facility ◆ Not practical for low ordering demand purchase ◆ Not practical for highly-valued products, i.e. high-tech MOCVD reactors
	Online forum	<ul style="list-style-type: none"> ◆ Practical for users to post relevant information, can be perceived as another source for FAQ or support 	<ul style="list-style-type: none"> ◆ Depends on the nature of industries, only few industries would use online forum, i.e. collectivism vs. individualism
<i>E-mail</i>	Text	<ul style="list-style-type: none"> ◆ Self-documented, can be archived or integrated to a firm's database ◆ Time and cost saved ◆ Widely used 	<ul style="list-style-type: none"> ◆ Not for emergency communication ◆ Not to replace face to face communication ◆ Volume of e-mail could increased for company who's network position is near consumer
	Attachment	<ul style="list-style-type: none"> ◆ Can attach different types of files, i.e. scanned documents (blue print), video and audio 	<ul style="list-style-type: none"> ◆ Cannot replace formal document exchange, i.e. L/C
	<i>Video Conferencing Facility</i>	<ul style="list-style-type: none"> ◆ Cost saving for international meeting ◆ Can be integrated to the manufacturing process for live discussion 	<ul style="list-style-type: none"> ◆ Cannot replace face to face communication ◆ Not all counterparts have the facility
	<i>VoIP</i>	<ul style="list-style-type: none"> ◆ Work as landline telephone ◆ Save telephone bills, especially for international calls 	<ul style="list-style-type: none"> ◆ Not all counterparts have the facility ◆ No great benefits for companies who do not have frequent telephone conversation with their international clients

Machine Embedded with Modem	<ul style="list-style-type: none"> ◆ Fast and accurate technical data ◆ Time saved for tracking technical faults 	<ul style="list-style-type: none"> ◆ Privacy ◆ Only applicable for certain product types and industries
VPN (Virtual Private Network)	<ul style="list-style-type: none"> ◆ Private access to designated database ◆ Working locations can be flexible ◆ Documents in central database 	<ul style="list-style-type: none"> ◆ High investment cost ◆ Only for internal communication
ERP (Enterprise Resources Planning)	<ul style="list-style-type: none"> ◆ Can be used for internal training ◆ Useful for synchronising information from different subsidiaries ◆ Part of ERP can be integrated with third party for information exchange 	<ul style="list-style-type: none"> ◆ High investment cost ◆ Not all counterparts have the facility