

Strategic Networking and Growth of Technology-Oriented SMEs: Evidence from Singapore

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This paper outlines the findings of a study of 112 technology-oriented small to medium sized enterprises (SME) in Singapore in relation to the role played by strategic networks and alliances in their development and growth. A logistic regression model was built with a dichotomous dependent variable measuring high or low average annual sales growth, and independent variables measuring the range, intensity and richness of strategic alliances held by the firm across the production, resource and social network layers. Findings suggest that firm growth is independent of the network range, but predicted by the intensity (frequency of contact) and the “richness” of relationships within the production network layer (e.g. with customers and suppliers). The study indicates that the capacity of the entrepreneur to build strategic relationships that are commercially valuable is of more importance than the type and size of a strategic network in predicting firm growth.

Key Words: *small business, strategic networking, growth.*

INTRODUCTION

Research suggests that “networks” and “networking” are important entrepreneurial tools that contribute to the establishment, development and growth of small firms (Shaw and Conway, 2000; Mazzarol, 2003). Literature on small firm networking indicates that networks assist small firms in acquisition of information and advice (Birley, 1985; Carson et al., 1995; Shaw, 1997). Donckels and Lambrecht (1995) argue that information contributes to growth of the small firm by strengthening understanding and intuition which in turn make it possible to take the necessary actions and streamline the organisation of the firm that benefit growth. They further postulate that since the gathering of information and its dissemination throughout the external environment is one of the objectives of network formation, it can be inferred that network development leads to firm growth. It has also been suggested that networks contribute to the small firm’s innovation process (Birley, 1985; Leonard-Barton, 1984; Johannisson and Peterson, 1984; Rothwell, 1991). Other scholars suggest that innovation is an important vehicle for small firm growth and success (Storey et al., 1989; Schumpeter, 1996; Burns, 1996)

Relative to other fields of research, small firms have only recently become an area of academic interest (Bygrave, 1989). Churchill and Lewis (1986) argue that small firms’ research “is a field in which the

underlying concepts have not been adequately defined". Thus, while "networks" and "networking" have attracted recent attention of small firm researchers and policy-makers, it is recognised that there is much confusion over the meaning of these terms (Easton, 1992; Grandori and Soda, 1995; Harland, 1996). The diversity of approaches in the study of small firm networks, coupled with a failure to distinguish between small firm "networks" and small firm "networking" activities, has led to different competing definitions and perspectives of networks. The diversity of research approaches notwithstanding, the various research works have nevertheless provided insight into the networks and networking patterns of entrepreneurs and the small firm. This paper seeks to review the literature relating to small firms and networking, as well as examine the relationship between strategic alliances and the growth of small firms. In relation to the literature, particular attention needs to be given to network memberships, the nature of linkages and transactions within networks, and the role networks play in the growth and development of the small firm.

THE CONCEPT OF STRATEGIC NETWORKING

As firms experience the need to be simultaneously efficient, flexible, and adaptive, they have turned increasingly to the network form of organisation. The entire set of existing and potential relationships among firms in a particular industry can be called a "network organisation" (Miles and Snow, 1992).

Wheelen and Hunger (2002) stated that the network organisation allows a company to concentrate on its distinctive competencies, while gathering efficiencies from other firms who are concentrating their efforts in their areas of expertise. Miles and Snow (1992) refer to networks as "modular corporations" made up of multiple specialist companies as their key building blocks. Wheelen and Hunger (2002) define the network structure as one where many activities are outsourced and the organisation is composed of a series of project groups or collaborations linked by constantly changing non-hierarchical, cobweb-like networks.

Jarillo (1988) defined strategic networks as long-term, purposeful arrangements among distinct but related for-profit organisations that allow firms in them to gain or sustain competitive advantage vis-à-vis their competitors outside the network. These networks are “strategic” because they are conceptualised as a mode of organisation that can be used by managers or entrepreneurs to position their firms in a stronger competitive stance. Jarillo (1988) argued that competitive strength of strategic networks is based on sound economic foundation by not only allowing firms to reap economies of scale, but also benefits of internal focus, plus the flexibility to switch suppliers whenever technological or market developments. Jarillo (1988) married this basic economic concept with the concept of the value chain (Porter, 1985). The firm chooses which part of the value chain it wants to compete. The implication of Jarillo’s (1988) argument is that firms are not monolithic entities, that the activities necessary to the production of a given good or service can be carried out either by an integrated firm or by a “network” of firms. If a firm is able to obtain an arrangement whereby it farms out activities to the most efficient supplier, keeping for itself that activity in which it has a comparative advantage, a superior mode a strategic network organisation emerges.

NETWORK MEMBERSHIPS

Various studies sought to examine small firm membership among networks. Some are general in nature, looking at the overall composition of the network, highlighting the importance of family and friends (Birley et al. 1991; Donckels and Lambrecht 1997). In a study of the impact of entrepreneurial characteristic on network structure, Donckels and Lambrecht (1997) found that entrepreneurs with a higher level of education are more likely to have a wider network, allowing them to rely less on family and friends for judgement and advice. However, Birley and Cromie (1988) found that as small firms grow, so does the diversity of their network membership to include professional bankers, suppliers, lawyers and accountants.

Other studies have focused on specific networking activities such as innovation (Conway, 1994; 1997). A study of network relationships and development of successful technological innovations, Conway (1997)

revealed that networks are often found to be large, predominantly informal, localised and diverse. The study also revealed that an entrepreneur's primary network is frequently plugged into a web of other networks, allowing them to tap valuable resources such as knowledge and information from a wider set of relationships within which they are embedded.

What is common amongst the findings of these studies is the importance of the diversity of actors within the network of the entrepreneur or the small firm. This network diversity allows the small firm to draw upon a range of external resources, such as technical knowledge, market information and finance, to supplement the internal resources of the organisation (Beesley and Rothwell, 1987; Conway, 1994; 1997; Dodgson, 1989; Shaw, 1997; 1998).

Jennings and Beaver (1997) propose that a small firm and its owner-manager or entrepreneur is engaged in network of stakeholders with whom the firm must interact in order to secure its future. Within the firm are employees seeking a variety of benefits or outcomes from the owner-manager including job security, job satisfaction, and career development. Surrounding the firm is a range of other stakeholders including financial institutions, customers, suppliers, local government authorities, and the government. The successful entrepreneur can leverage on this network to secure support, finance, and gain market access and market intelligence. Partnering with customers, employees, suppliers, financial institutions and government agencies is a hallmark of successful small firms (Hall, 1992).

NATURE OF LINKAGES WITHIN STRATEGIC NETWORKS

Research has also focused on the nature of linkages between actors within the small firm network. Often, a key distinction is made between informal or personal relationships and formal relationships, such as joint ventures, licensing agreements, and supply-chain linkages with either suppliers or users. The importance of informal or personal relationships, from one actor to another and the nature of these interactions are

often cited (Mitchell, 1973; Granovetter, 1973; 1985; Powell, 1990; Burt, 1992; Spekman, 1996; Olkkonen et al., 2000).

A comparative study by Conway (1994) into successful small- and large-firm technological innovations found that external resource inputs into the development process is more frequently obtained informally by small firms. The study found that relationships with users and customers tended to be informal, with the main mechanisms for interaction being customer-site visits, chance meetings at exhibitions, and telephone contacts. On the other hand, supplier inputs into the innovation process of small firms are found to be largely formal in nature. However, friendship and informality are seen to be important ingredients for successful formal relationships with suppliers, highlighting the value of multiplex relationships (Conway, 1994). Thus, informal relationships represent a valuable intangible organisational resource as well as a key ingredient for building successful formal relationships.

The different levels of alliances can take place both vertically and horizontally and offers firms the opportunity to secure resources and gain access to networks that they otherwise would not be able to obtain without spending much cost, time and effort. Small firms with the ability to successfully leverage on these alliances are frequently able to build and defend their market positions. However, small firms must manage these alliances and relationships otherwise they may find themselves caught in the “tight” end of the spectrum and risk losing control and ownership of the business.

A key benefit of networks for the small firm entrepreneurial process is the access to information and advice. For example, ties with capitalists and professional service organisations are a means for tapping into key talent and market information (Freeman, 1999). Other studies document that small firms consistently use networks to get ideas and gather information to recognise entrepreneurial opportunities (Birley, 1985; Smeltzer et al., 1991; Singh et al., 1999; Hoang, 2000). Beyond the start-up stage, entrepreneurs continue to rely on networks for business information, advice, and problem solving, with

some contacts providing multiple resources (Johannisson et al., 1994). Similarly, relationships with distributors, suppliers, competitors, or customers are important conduits of information and know-how (Brown and Butler, 1995).

Network relationships can also have reputation as well as signalling content (Deeds et al., 1997; Stuart et al., 1999). Operating under resource constraints within an uncertain business environment, resource holders such as potential investors and employees are likely to seek information in assessing a venture's viability and potential. Entrepreneurs seek legitimacy through associations with well-regarded individuals and organisations that in turn can lead to beneficial resource exchanges (Stuart et al., 1999; Calabrese et al., 2000).

ROLE OF NETWORKS IN THE GROWTH OF SMALL FIRMS

Studies have revealed a variety of functions that small firm networks play. These range from the more general such as firm development, competence building or achieving business excellence, to the more specific such as growth of the small firm. Shaw (1997, 1998) highlighted the role of social networks play in the development of small firms. Her research revealed that social networks play both positive and negative roles, depending on network membership and the nature of what flows through the network.

In a study of SMEs in the Australian manufacturing industry, Terziovski (2003) found that networking practices do have a significantly positive effect on business excellence. Quantitative data from a stratified sample of SMEs across the Australian manufacturing industry showed that the strength of the relationship between networking practices and business excellence is significant and positive. He found that networking allowed the small firm to achieve business excellence by: searching and incorporating diverse points of view; challenging the status quo; learning from failures; communicating with people outside the company, including experts; and the allocation of resources to support communication linkages.

The foregoing discussion reveals many contributions in the literature representing different theoretical network perspectives. However, few have been presented so far trying to make network theory operational in a practical context, the result of which in turn could help organisations to position themselves in networks or to develop strategies in a network perspective (Paasche et al., 1993). There are however only few empirical studies available on the impact of network formation on the growth of a small business (Gibb, 1993). Donckels and Lambrecht (1995) tested an explanatory model of the impact of networks on small business growth linking information and communication to firm growth. Using the log-linear technique to analyse a possible casual relationship on data collected from 900 entrepreneurs in Belgium, the results of the study suggested that networks have an influence on the growth of a small business, especially so for medium-sized companies. Donckels and Lambrecht (1995) concluded that if entrepreneurs want to get into the growth league, they must invest in network formation and relationships.

There have only been a handful of studies focusing on the nexus between networks and firm growth and even fewer have actually found an indication of the effectiveness of networks in term of continuous development and growth of new ventures (Ostgaard and Birley, 1995). Among the researches that deliberately study the link between networks and firm growth, most concentrated on understanding the contribution of personal or social networks to venture growth. Birley (1985) found the social network to provide the main sources of help in assembling the resources needed among Indiana start-ups in the U.S. However, no significant relationship was found between growth and no-growth firms. In a similar study, Carsrud, Galio, and Olm (1987) found social networks to have only minimal impact on the development of new ventures owned by women in Texas. Duchesneau and Garner (1988) found lead entrepreneurs of successful firms to be more likely to spend more time communicating with partners, customers, suppliers, and employees than lead entrepreneurs of unsuccessful firms. Johannisson (1990) found that resourceful networks seemed to infuse “new entrepreneurs with belief in future venture growth”. The most recent work by Ostgaard and Birley (1996) on the topic explored the effectiveness of personal networks in terms of firm performance and growth. Using a wide variety of measures of personal networks and range of

growth and performance measures in a survey of 159 owner-managed companies, the research suggested a link between the behaviour and growth of the firm.

Another area of study involves the understanding of the link between networks, resources and small business growth. Research on Sri Lankan small businesses by Premaratne (2001) suggests that entrepreneurial networks provide important resources for firms. Social networks provide more nonmaterial support and information, while organisational networks, especially the supporting networks providing financial support. Premaratne (2001) also argue that networks help to bring firms more resources that in turn help to achieve higher performance. According to Cromie, Birley, and Callaghan (1994), the greater the number of contacts available to a small enterprise, the greater is the chance of acquiring the information and other resources needed at minimum cost. External resources are very helpful in developing products and expanding a firm's market (Falemo, 1989). According to Brown and Butler (1993), the types of information provided by networks are necessary not only for identifying entrepreneurial opportunities that warrant founding a business, but also for ensuring the success of the business. Humphrey and Schmitz (1996) argue that small business can achieve the complementary skills and resources that are essential for competitiveness and survival in the market through entrepreneurial networks.

NATURE OF HIGH TECHNOLOGY STRATEGIC NETWORKS

Of particular interest in the study of networking behaviour among technology firms are the generation and sharing of new ideas among these firms through innovation networks. Innovation networks are simply innovating organisations working together. These networks may include the relationships an SME has with other SMEs, bigger companies, suppliers, clients, universities, or even other research institutions. It is increasingly accepted that the network approach adds an original dimension to the study of innovation (Kivimaki et al, 2000). As technology evolve and become more complex, organisational networks become the keys to successful innovation. Senior leadership can initiate and inspire, but innovation networks serve

as the arms and legs, eyes and ears, doing the actual work of innovative organisations (Jonash and Sommerlatte, 1999). Companies can stimulate networks by encouraging informal communication and by recognizing and supporting network builders. Partnering with external technology suppliers, for example, can be very beneficial as it can provide new product ideas that neither party would have developed on its own. One study by Kivimaki et al (2000) supports this contention as it finds that a high level of information exchange between a lead firm with other firms or suppliers was associated with successful innovation performance leading to a larger number of patents.

Van Aken and Weggeman (2000) argue that the exchange of knowledge between lead firms and their suppliers, and between universities and technological companies, are all examples of highly informal innovation networks. Effective networking is especially important for SMEs since it helps overcome the financial and human resource limitations that prevent them from accessing new technologies that are required for new product innovations (Jones et al, 1997).

The process of innovation may involve collaborative relationships with different partners, each offering significant resources such as complementary know-how, subsidies, new technologies, research and training (Gemunden et al, 1992). Thus, innovation development among high-tech firms has to be seen and understood in wider context than that of a single company,

METHODOLOGY

A logistic regression analysis was performed with the following as the dependent variable and predictor (independent) variables: The binary dependent variable was growth in sales, where low growth = 10% or less in annual sales growth for the past three years; high growth = more than 10% in annual sales growth for the past three years. The predictor variables are shown in Table 1.

Table 1: Predictor Variables

<i>PRODUCTION NETWORK</i>	<i>RESOURCE NETWORK</i>	<i>SOCIAL NETWORK</i>
No. of agreements with key suppliers; No. of agreements with lead customers; Contact hours per week with key suppliers; Contact hours per week with lead customers; Self-reported commercial “richness” of exchanges with production network actors;	No. of agreements with resource network actors; Contact hours per week spent with resource actors; Self-reported commercial “richness” of exchanges with resource network actors;	No. of memberships in social organisations; Contact hours per week spent with social actors discussing business; and Self-reported commercial “richness” of exchanges with social network actors.

Sampling

Out of a total of 140 companies surveyed using snowball sampling technique, 112 companies qualified to form the data set for the study. The companies were SMEs from the targeted high technology sectors in Singapore: chemical & environment technology; electronics component & system; information technology & services; and manufacturing & engineering system. Furthermore, the selected companies in the data set are deemed “technology-oriented” in having a strong scientific/technical basis as the foundation of the firm. These firms are either involved in product technology (new or better products), or process technology (new and better process and application of technology), or “soft technology” (possess intellectual property). The sample of 112 observations meets the suggested minimum (5-to-1) ratio for logistic regression (Hair et al, 1998) by providing a 10-to-1 ratio of observations to independent variables in the analysis sample.

FINDINGS

Analyses of the data were carried out using the binary logistic regression module from SPSS Regression Models™. A total of 112 cases were analysed. From the omnibus test of model coefficients, the full model was significantly reliable (chi-square=96.66, df=11, p<0.0005) (Table 2).

Table 2: Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	96.656	11	.000
	Block	96.656	11	.000
	Model	96.656	11	.000

This model accounted for 57.8% to 78.5% of the variance in the growth categories (Table 3), with 81.4% of low growth firms and 91.3% of high growth firms successfully predicted. Overall, 87.5% of predictions were accurate (Table 4).

Table 3 Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	52.518(a)	.578	.785

a Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

Table 4: Classification Table(a)

Observed			Predicted		
			GrowthCat		Percentage Correct
			.00	1.00	
Step 1	GrowthCat	.00	35	8	81.4
		1.00	6	63	91.3
	Overall Percentage				87.5

a The cut value is .500

Table 5 Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step	CusConHr	1.179	.522	5.103	1	.024	3.252
1(a)							
	PNetVal	2.043	.844	5.863	1	.015	7.714
	Constant	-14.943	3.730	16.051	1	.000	.000

a Variable(s) entered on step 1: SupAgrNo, CusAgrNo, SupConHr, CusConHr, PNetVal, ReAgrNo, ReConHr, RNetVal, SocMemNo, SocConHr, SNetVal.

Table 5 gives the coefficients and the Wald statistic and associated degrees of freedom and the probability values for each of the predictor variables. This shows that only intensity of relationship with lead customers (measured by weekly contact hours) and “richness” of production network relationships reliably predicted firm growth (Wald statistic above 5).

DISCUSSION OF FINDINGS

The results suggest two noteworthy points. First, results of the analysis point to the importance of production networks in the growth of technological-oriented SMEs. Secondly, firm growth is independent of the range of networking relationships within a firm’s production network. Results of the logistic regression suggest that size of network is not a significant predictor of firm growth. What seem important are the amount of time and effort invested and the value of commercial exchange these actors bring to the relationship. The significance of relationship intensity with network actors, as measured by frequency of contact, points to the importance of the networking process or how networking is done. Firms that have “rich” exchange relationships with production network actors and have greater relationship intensity with them especially lead

customers tend to have higher firm growth. The performance of the SME depends very much on how the entrepreneur, the firm or individual actors within the firm network to build commercially meaningful and fruitful relationships with their respective partners. That is, it is the networking process that is important! This is consistent with the findings of BarNir and Smith (2002) and Premaratne (2001) but contrary to the findings of work by Aldrich (1989) and Burt (1982, 1992) which stated that a broad range of network relationships provides greater access to valuable resources for growth. In interpreting the findings of the present research viz-a-viz findings of other researchers, one has to be mindful of the context in which the findings are borne. Two contextual frames, both the social cultural and business cultural contexts are relevant.

The study is done within the context of Singapore with a predominantly Chinese majority. The traditional Chinese networking behaviour stresses the cultivation of interpersonal relationships and harmonious ties (Zhao and Aram). Many Singaporean entrepreneurs and business owners are of the Chinese race. Although the owner-managers in Singapore are English-educated and have been exposed to Western influences, their basic cultural values persist. This is not difficult to understand considering many Chinese Singaporean business managers are first and second generation descendents of immigrants from China. Thus building relationships in a largely Chinese cultural context requires more time and effort than it usually takes in the Western environment. It requires frequent visits, social exchanges through informal meetings at the golf courses, exchange gifts and patience. This explains the research findings that firms with “rich” exchange relationships and greater relationship intensity with partners tend to have higher growth performance.

This need for depth in relationships that requires time and patience to cultivate and maintain also explains the observation that having a greater or broader range of network relationships (which supposedly provides greater access to valuable resources for growth) do not contribute to growth performance. Evidence from in-depth case studies of three high and three low growth firms from the same sample shows that having a broader range and networks can be counter-productive as it can lead to undirected networking and wasted time and effort in cultivating relationships that have not direct consequence to firm performance. The case analyses have shown that for social networking to have any impact firm growth, such networking needs to be highly selective and focussed. Although both high growth and low growth firms have the same contact frequencies with actors within their social networks, owner-managers of high growth firms are more focussed in their approach and network with individuals and organisations that can contribute to their firms' development. In other words, only strategically focussed and purposeful social networking, and not merely "socializing" with people of like minds, can contribute to an SME's superior performance.

The statistical relationship linking networking intensity and value of commercial exchanges to the growth performance of technologically-oriented SMEs in this study is only relevant to production network relationships and not resource and social network relationships. This is contrary to suggestions from the literature that in general, social networking contributes to firm growth and development (Van de Ven et al., 1984; Duchesneau and Garner, 1988; Ostgaard and Birley, 1995; Shaw, 1997, 1998). How can one make sense of such an observation? Singapore has always pride itself to be a country with a high degree of transparency in its business culture. This explains the lesser role played by social network actors in the growth and development of the firm. On the other hand, findings of the present study shows that partners in the value added

chain, especially key suppliers and lead customers feature as important players in providing production resources for the growth of SMEs. This finding is consistent with Singapore industrialisation path where many of the technologically-oriented SMEs are niche players in the overall value chain that relies on key suppliers and lead customers in its initial survival and subsequent growth. Consequently, technologically-oriented SMEs that have high intensity of networking and “rich” relationships with key suppliers and lead customers have shown to have high growth rates.

CONCLUSION

From a theoretical perspective, this study bridge a gap in the literature with regard to the inadequacy of traditional research approach for studying growth of technology-oriented companies. For the managers of SMEs, the findings suggest that networking can indeed be a viable strategy that managers can adopt to grow their firms. SMEs managers should “invest” time and effort to cultivate and maintain business relationships rather than merely building a broad network of contacts. This research has produced insights into how business relationship can contribute to superior performance outcomes in general and the nexus between strategic networking and growth of technology-oriented SMEs in particular. It is hoped that these insights not only increased our understanding of strategic networks and networking, but also demonstrated that strategic networking and business relationships are an interesting and exciting area to explore, both for its theoretical and managerial implications. This is especially so in the current ever changing and complex business environment which require firms to cooperate and collaborate to remain relevant.

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