Promoting growth of indigenous knowledge-based industry via the Triple Helix system: a case of the Thai dessert industry

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Abstract

This paper explores the Triple Helix system as a framework for the growth of small and medium-sized enterprises (SMEs), by using the case of the Thai dessert industry. It examines the relationship between social capital of firms and technological capability development in this industry as well as the importance of policy initiatives for networking development and collaboration between industry, university and government agencies. The paper highlights the significance of social capital as a factor that facilitates networking and knowledge sharing. The paper also explores the extent of social capital for each category of the Thai dessert firms - namely, household-based, community-based and factory-based firms - and how this relates to the enterprise and innovative behaviour of firms in terms of networking with other firms, with government and non-government agencies, and with academia. A questionnaire survey of 159 firms has provided empirical evidences to argue that social capital is one of the most important factors for technological capability development in SMEs. Social capital facilitates knowledge flow and exchange in the network and increases SMEs' opportunities to access external knowledge and financial resources. At present, government policy in Thailand is focusing on development of community business and promotion of networking between government, university and industry. The study also explores policy interventions, which aimed at promoting the growth of SMEs, particularly with the respect to innovativeness and long-term development of small indigenous firms as in the case of the Thai dessert industry.

Key words: Triple Helix system, SMEs, social capital, and government policy

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1. Introduction

Competitiveness of firms largely turns on their innovation performance, which is conditioned by the level of their technological capability. Innovation is presumed to derive from a network of collaboration between actors in the triple helix system. The stronger the linkage and social relations between actors in the system, the higher the probability for innovation to occur. The extent of social relations that SMEs forge with other firms and agencies and the extent to which these relations are underpinned by trust together account for what is generically referred to as the social capital of SMEs. This is important because the extent to which SMEs would grow and flourish is presumed to be contingent upon the size of social capital they have developed over time. However, the technological capability building and innovation performance of small firms, especially in developing countries, has been characteristically weak, particularly with respect to the ability to adjust to advances in knowledge and technology systems (Arnold, Bell et al., 2000). The persistence of this problem can in large part be attributed to the fact that SMEs are poorly networked between themselves and with other agents like universities, government institutions and other industries, which means that their ability to share and gain knowledge is limited.

This paper explores the Triple Helix system of innovation as a framework for the growth of small and medium-sized enterprises (SMEs), by using the case of the Thai dessert industry. It examines the relationship between social capital of firms and technological capability development in this industry as well as the importance of policy initiatives for networking development and collaboration between industry, university and government agencies. The paper highlights the significance of social capital as a factor that facilitates the triple helix network. By using empirical data form a questionnaire survey of 159 Thai dessert firms, the study provides substantial evidence in support of the view that social capital is one of the most important factors for technological capability development in SMEs. Social capital facilitates knowledge flow and exchange in the triple helix network and increases SMEs' opportunities to access external knowledge and financial resources.

The remainder of this paper is in four parts. The first part discusses the triple helix system as a basis for technology and innovation. The second part discusses the role of social capital and government intervention in SME innovation and the development in developing countries. In particular, the discussion will explore the argument that weak social capital arising from the existing state of the SME sector in developing countries has consequences that are reflected in the risk perception of firms; the transactions cost of engaging in innovative ventures; the flexibility of access to resources; and the degree of competition within the sector. The third part provides research methodology and data analysis. The fourth part discusses empirical evidences of the extent of social capital in the three categories of the Thai dessert firms; the relationship between social capital and technological capability development; and government policy and its interventions. The paper is concluded in the fifth part.

2. The Triple Helix System of innovation

The concepts of national and regional innovation system use the geographical dimension as a point of departure to explain technological development and innovation, arising from the interactions of institutions and organisations as key players. The Triple Helix System does not

defy the principles underlying the NIS or RIS. Rather, it seeks to explain the evolutionary nature of the mechanism that defines the dynamics of change in the relationship between the actors in the system. Knowledge generation through the process of learning and knowledge use are issues central to the system. Leydesdorff and Etzkowitz (1996) proposed an evolving 'Triple Helix' (TH) model of innovation explaining the relation, interaction, and linkages between government, university and industry. These actors reflect the underlying dynamics of change in the system in the way they interact.

As an innovation network, the 'Triple Helix' is a dynamic system, akin to the double helix in the DNA network. The TH network focuses on the role of the university plays in boosting and driving innovation (Etzkowitz & Leydesdorff, 2000). The TH model views the university as the institutional sphere responsible for knowledge production; industry concentrates on production; and the role of the state is to maintain and improve condition favouring linkage development. The model also shows how interaction between the three institutional spheres evolves into a hybrid of institutional culture in which institutional boundaries are blurred and each actor can 'takes the role of the other' in some circumstances (Etzkowitz, 2008).

In developing countries, the TH approach has been widely adopted as a tool to analyse policy for industrial clusters at regional level. For example, the study of Irawati (2007) indicates the role of university in the provision of knowledge transfer and skill development for small and medium-sized enterprises and industrial cluster development in Indonesia. Regional universities conduct various types of capability development programmes for industrial cluster development such as training, consulting, and business incubation. However, the government still needs to be involved at all stages of industrial cluster development to improve linkages and networking between and within industrial clusters and supporting organisations.

Also in developing countries, intermediary or bridging institutes are increasingly required to interface universities and firms to expand the triple helix network (Yokakul & Zawdie, 2009). This is because the university system in developing countries is at the early stage of transition from traditional university to entrepreneurial university and they are not as yet keen to transfer, distribute and commercialise their knowledge (Saad, Zawdie et al., 2008). Intermediary agencies also play a crucial role in regulating the speed and direction of technological learning in the industrial sector throughout their project-monitoring scheme to ensure the accomplishment of collaborative projects.

The TH model is a network-based approach relating social relations and collaboration that facilitates knowledge exchange and dynamic system of interactive learning. The development of trust is important for establishing effective links among actors in the triple helix system. Such links are particularly important for the circulation of tacit knowledge which is often transferred through informal relationships. Informal activities, informal meetings and individual relationships between knowledge organisations, universities and firms including personnel movement also increase the extent of trust and encourage collaborative projects as well as creating the norm of reciprocity throughout a network (Casas, 2003). This would strengthen triple helix links and maintain long-term relationships by building up social capital resulting in the improvement of regional and community development.

3. Social capital and SME innovation

3.1 SMEs as drivers for social and economic development

There has been growing interest in SMEs as major drivers of industrialisation in developing countries. Generally speaking, SMEs account for a high proportion of the total number of industrial firms, for example, a proportion of SMEs[1] in Thailand is about 99.7% of all enterprises (OSMEP, 2009). Consequently, industrial policy in developing countries has largely focused on the technological capability building with the view to improving the innovation performance of the SME sector as a strategy for strengthening the performance of the wider economy. Although SMEs are considered to be significant as a source of innovation (OECD, 2002), their innovation performance, particularly in the context of developing countries has remained somewhat patchy at best. Much of the innovation deficiency in SMEs is said to be due to the prevalence of social capital deficit and the lack of appropriate policy provisions to remove the constraints on social capital formation and hence on the development of the culture of innovation in SME communities (Morgan, 1997; OECD, 2005).

SMEs are important vehicles for local community development in both social and economic terms. Agglomeration of small household firms to form community-based businesses can help increase income of the community and underpin development of social network among community members as well as with external organisations (public agencies and universities). Raco (1999) argues that the geographical concentration of small firms can be growth-effective, particularly if supported by appropriate policy incentives. Such agglomeration of firms brings about a powerful 'institutional thickness' of a community or industrial cluster, which enhances the learning capability and competitiveness of the community of firms. Small firms in a community can become creative and innovative by learning from their neighbours' success stories. The emergence of entrepreneurial communities within the SME sector can help promote the innovation culture among SMEs and can also create spillover effects that are beneficial to the economy at large (Nijhawan & Dubas, 2007).

SMEs are also significant as a source of indigenous knowledge (IK) which is embedded in their social and economic activities. IK is dynamic in the sense that it has continually evolved through the creativity of indigenous people in the course of their interactions with the external environment (Flavier, de Jesus et al., 1995). Indigenous knowledge characteristically occurs in the form of tacit knowledge which is not documented and, hence, is difficult to transfer. Basically, tacit knowledge is orally transferred from generation to generation and from person to person through social relationships and network systems where social capital is developed through those social activities (Agrawal, 1995; World Bank, 2004). The concern now is how to promote indigenous knowledge by infusing scientific knowledge and modern technology into it without, however, undermining the basic characteristics that define the essence of indigenous knowledge. There is substantial evidence supporting the view that far from being sterile and retrograde, as it is often perceived to be, indigenous knowledge has in it the seeds, which, if properly nurtured, would be capable of generating innovation and growth (Mauro & Hardison, 1999; World Bank, 2004). Technological learning in the SME sector would result in the

[1] According to the definition of small and medium sized enterprises (SMEs) in Thailand, SMEs refer to enterprises with less than 200 employees and fix assets less than 200 million Baht (1 USD ~ 33 Baht).

occurrence of 'disruptive technological innovations'[2], which by combining the tacit aspect of IK with the explicit or codified aspect of knowledge based on science and technology would make SMEs innovative and competitive, and significant participants in the triple helix system of innovation.

3.2 Social capital as a key factor for networking and SME innovation

It is argued that 'social capital' plays a key role in expediting the innovative process and technological capability development at the level of firm (Maskell, 2001). Tangible factors or the conventional production factors such as financial investment, labour and other infrastructures appear to be not enough for firms to improve their technological capability and innovation (Westlund, 2005). Pierre Bourdieu (1986) is the pioneer who tried to analytically conceptualise the concept of social capital. He defined 'social capital' as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalised relationships of mutual acquaintances or recognition" (Bourdieu, 1986, p. 248). His seminal work focused on the advantages and benefits of power functions deriving from being included in the network, and the social obligations resulting from social capital. However, he did not explicitly mention the role of trust in connection with social capital formation and development (Siisiäinen, 2000), while the broad definition of social capital in contemporary development studies considers trust to be one of important elements contributing to the social capital complex (Coleman, 1988; Putnam, 1993; Woolcock, 1998).

Putnam (1993) explains social capital in terms of trust, norm and network – attributes that enable collaboration resulting in mutual benefits. A country with high social capital index would be expected to perform better in terms of economic growth and social well-being than one with low social capital index. Many scholars have noted that social capital is an important factor that stimulate innovation through interactive learning, knowledge sharing and innovation network (Fountain, 1997; Chaminade & Roberts, 2002). The absence or else weakness of the 'social capital' base of an economy would result in the failure of the major social and economic actors to interact and generate innovative ideas and economic growth (Grootaert, 1998).

Unlike large firms, SMEs have limited resources at their disposal, particularly financial capital, which constrains their scope for becoming creative, innovative and competitive. On the other hand, it is argued that they could make up for this shortfall, at least in part, through the provision of social capital. This would enhance SMEs' ability to innovate through triple helix networking, thus facilitating their interactions with other firms and knowledge agencies. Social network activities increase the advantages small firms can have in terms of access to resources and knowledge from various sources including support from public agencies, and access to markets.

In a weak triple helix network and social capital deficit, indigenous knowledge (IK) would be sterile and incapable of creativity and innovation for lack of interaction with new ideas and knowledge from outside the geographic and ethnic/family boundaries. What we have in this

[2] Disruptive technologies and innovations outperform established or mature technologies by taking away from them the size, capacity, reliability and price advantages that once gave established technologies a competitive edge in the global market. It offers a low cost approach of delivering goods and services that would otherwise be delivered by relatively high cost established technologies (Bower & Christensen, 1995; Christensen, 1997).

scenario is regionally distributed independent SMEs with no cross-boundary transactions. The absence of cross-boundary transactions means there is no scope for knowledge exchange, cooperation and hence innovation. This is because IK would be advanced by external transactions of technological infrastructures from university R&D, clustering of firms in related industries and business-service firm network (Feldman, 1994).

As mentioned, SMEs provide ideal vehicles for the emergence and development of 'disruptive' technologies. These are technologies that would make SMEs innovative and competitive not only in local markets but also globally. However, the state of SMEs in developing countries would not warrant the occurrence of innovation as a systemic phenomenon short of policy interventions to make up for shortfalls in resource and triple helix networking provision. The key problem militating against the innovation prospects of SMEs in developing countries is the preponderance of the weak social capital base of the sector resulting from the fragmented and least networked nature of the sector. The weak social capital base has the effect of mitigating the innovative capability of SMEs by increasing the risk and transactions cost of innovation (Cooke & Wills, 1999). Moreover, fragmentation of the sector for lack of networking reduces the degree of competition in the sector, and the lack of competitive pressure would make SMEs reluctant to take the risk to innovate (Porter, 1990). Thus, although it may well be that SMEs provide a fertile ground for budding enterprises with the potential to innovate, it is important to note that these enterprises would be ineffective agents of innovation unless they are supported and equipped through structured policy interventions (OECD, 2005).

Small indigenous firms, like the Thai dessert industry, thrive largely on the basis of implicit knowledge; but there is a limit to which they could grow if they do not engage in knowledge exchange with other firms and organisations. Where there is such transaction, the knowledge base of indigenous firms would grow, increasing the scope for the firms to be creative and innovative, thereby enhancing the market appeal of their products and their risk disposition. Social capital building is important for firms to build their business confidence and seek to be competitive.

There are three main categories of the Thai dessert firms, namely household-based, factory-based, and community-based firms. The household-based firm is the smallest unit with less than ten employees and very limited resources. The community-based firm has at least seven persons from different families, all in the same community. Community-based firms are expected to have high social relations which enhance the effectiveness of their engagement in economic activities. Factory-based firms constitute the smallest proportion of all Thai dessert firms but they have higher entrepreneurial capability than firms in the other two SME categories. The three categories of firms are expected to have differences in social capital stock and This hypothesis will be put to the test in this paper.

At present, government policy in Thailand is focusing on development of community business. The evidence base of this policy is not, however, all too clear particularly with respect to innovativeness of firms. In view of this, the aim of this paper is to explore the distribution of the innovative and entrepreneurial attributes mainly among community-based and factory-based firms. The paper also explores the extent of social capital for each category of firms and how this relates to the enterprise and innovative behaviour of firms in terms of networking with other firms, with government and non-government agencies, and with academia.

4. Methodology

The data for investigation of the research problem derives from a sample survey conducted in 2009. Questionnaires were administrated to 726 sample firms from the three categories of the Thai dessert industry, which are drawn from the databases of the Thai confection industry (TCI) and Thai Tambon website. A response rate of questionnaire return is 22% or 159 usable data. Interviews with the owners or managers of 22 of the Thai dessert firms are conducted as a supplement to questionnaire survey to elicit information largely of qualitative nature relating to behavioural patterns. Interviews were also conducted with relevant government agencies and universities to obtain information on the policy mechanisms and instruments of intervention for promoting the development of SMEs through knowledge sharing and exchange.

A set of questions representing measurable variables was created based on the review of relevant literature and the feedback from preliminary study with the Thai dessert firms. The data obtained from the survey can be categorised into three groups: quantitative, qualitative and categorical data. Firms were asked to provide information during 2006 - 2008 for technological capability development. The questionnaire also uses the five-point Likert scale for measurement. Measurement items and internal consistency reliability (Cronbach α) of the questionnaire are presented in Table 1. The Cronbach α coefficient ranges from 0 to 1 and the score greater than 0.7 would render the constructed scale reliable and robust (Pallant, 2007). However, low Cronbach α is commonly found when the topic contains fewer items. In this case, the value of mean inter-item correlation is then considered and the value should lie between 0.2-0.4 to be robust. In Table 1, Cronbach α coefficient of ability to access finance is lower than 0.7 but the mean-item correlation lies in the acceptable range. Therefore, this factor is included in the analysis.

Table 1 Measurement items and Cronbach α coefficients

Factor	Detail summary	No. of items	Scale Min.	Scale Max.	Cronbach α
Social capital and networking	Trust; network and network development; frequency of contact; strength of ties; knowledge and information sharing; norms and reciprocity; transaction cost and repeated transactions; honest and truthful	16	1	5	0.76
Risk taking propensity	Perception of risk in running business; opportunity to success in launching new products, investment in business and technology	10	1	50	0.73
Competitive pressure	Pressures from new entrants; new products; substitute products; competition and rivalry; and employee poaching	10	1	5	0.83
Ability to access finance	Funds, grants and loans from public agencies and financial institutions	3	1	5	0.45* (0.204)
Government support	Impact and support from government interventions extracted from the two government policy documents in Thailand	10	1	5	0.78
Degree of technological capability development	Product and process development; efficiency of investment in business and technology	3	1	5	0.88

*mean inter-item correlation is in parenthesis

Kruskal-Wallis and Mann-Whitney U test have been used to compare three and two categories of firms, respectively. Multiple regression analysis has been employed to explore the relationship between technological capability development (TCD), social capital and other factors affecting TCD. The stepwise regression method has been employed to yield the best predictors of the model.

5. Results and discussion

Response from questionnaire survey provides 159 usable samples which can be classified by firms categories as follows: 90 household-based firms (57%); 43 community-based firms (27%); and 26 factory-based firms (16%). Descriptive statistics are shown in Table 2.

Table 2 Data and descriptive statistics

Variables	Household-based			Community-based			Factory-based			All firms		
	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.
Extent of social capital and networking	64	3.22	.54	25	3.81	.45	20	3.52	.42	109	3.41	.56
Risk taking propensity	81	33.38	3.74	38	33.47	4.60	26	32.15	6.12	145	32.15	6.12
Degree of competitive pressure	79	3.03	.76	37	3.53	.72	25	3.41	.62	141	3.23	.76
Ability to access finance	83	1.90	.92	39	2.50	1.10	26	2.21	1.11	148	2.11	1.03
Government support	86	2.95	.89	39	3.82	.74	26	3.23	.93	151	3.22	.93
Degree of technological capability development	85	3.40	.85	39	3.92	.74	26	4.06	.69	150	3.65	.84

5.1 The extent of social capital and networking in the Thai dessert industry

Table 2 shows that means of 'social capital and networking' in three categories of firms are different, ranking from the highest to lowest as follows: community-based firms (3.81); factory-based firms (3.52); and household-based firms (3.22), respectively. In table 3, the Kruskal-Wallis test and Mann-Whitney U test have confirmed that the means of three firm categories are statistically significantly different at least 5% significance level ($p<0.05$).

Table 3 Descriptive statistics of social capital and Kruskal-Wallis test

Means of aggregated social capital	Mean	S.D.	N	Kruskal Wallis Test	
Household-based firms	3.22	.54	64	Chi-Square	23.197
Community-based firms	3.81	.45	25	df.	2
Factory-based firms	3.52	.42	20	Sig.	.000*
All firms	3.41	.56	109		

* $p < 0.01$, at least two categories are statistically significantly different at 1% level

Table 4 Mann-Whitney U test for social capital

Firm category	Z	Asymp. Sig. (2-tailed)
Household vs Community	-4.560	.000**
Household vs Factory	-2.447	.014*
Community vs Factory	-1.965	.049*

Significant at *$p < 0.05$, **$p < 0.01$

The highest social capital in community-based firms could be because community-based firms profoundly engage more on social network and social cohesion (Woolcock & Narayan, 2000) than household-based and factory-based firms. Elements of social capital are also explored to indicate which elements contribute to these differences among three categories. Community-based firms are more likely to trust other people, especially knowledge sources and supporting institutes than the other two categories. Trust is an important factor facilitating network development and interactive learning (Carayannis, Alexander et al., 2000). Also, trust can reduce risk in inter-firms relationship promoting strong link (Lane & Machmann, 2006). For these reasons, trust would help firms easily to make links and expand network with external organisations for knowledge exchange and access to external resources which support innovation activities. The survey also indicates that community-based firms have better relationships with government agencies and knowledge institutes than the other two categories.

The household-based firms are essentially traditional in character, and so operate on a cottage industry basis using traditional technology and hence their network is limited. Community-based firms would be expected to be innovative. They have social and economic advantages over household firms in that their community network facilitates access to finance and to sources of knowledge and information. Thus, unlike household-based firms, community-based firms would often find themselves engaged in knowledge exchange and knowledge sharing within the community of firms. On the other hand, the factory-based firms individually operate in a competitive environment. They are by definition expected to have the entrepreneurial flare that would enable them not only to withstand the pressure of competition, but also to innovate and set new standards in the industry as pioneers. But they also share the culture of household-based firms in that they tend to be somewhat reclusive and reluctant to sharing and exchanging knowledge, particularly with firms in the same industry. They would however share knowledge and best practices, albeit to a limited extent, with firms in the supply chain; and they would use their networks largely as a conduit for obtaining knowledge and information from other firms and organisations.

5.2 Relationship between social capital and technological capability development

Even though the focus of this paper is on social capital, other factors are also considered in a stepwise multiple regression analysis as environmental factors influencing TCD – namely: competitive pressure; risk taking propensity; ability to access finance; and government interventions. TCD at firm level is expected to be increase as a result of high levels of these factors. Prior the regression analysis, correlation coefficients (r) of each explanatory variable were checked to ensure that it is not too high ($r > 0.7$). For multicollinearity testing, the values of 'variance inflation factor' (VIF) and 'tolerance' of each variables were calculated. For robustness and reliability of obtained regression model, the values of VIF should be less than 10 and tolerance should be greater than 0.1 (Pallant, 2007). The VIF and tolerance values obtained form the regression model in this study conform to those values.

Table 5 Multiple regression analysis of technological capability development

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	.035	.429		.081	.935		
Social Capital	.662	.130	.436	5.102	.000**	.783	1.277
Competitive pressure	.275	.090	.247	3.055	.003**	.872	1.146
Gov Support	.147	.073	.162	2.006	.048*	.873	1.146

Model significance p = .000***, statistical significance at less than 1% level (p <0.01),
F-value = 24.328, df = 105, N = 106, Adjusted R^2 = .40,
Statistically significant at *p < 0.1 level , **p < 0.05 level , *** p < 0.01

In Table 5, standardised coefficients in the regression model show that three variables important for TCD of the Thai dessert industry, ranking from the highest impact, are social capital; competitive pressure; and government support. The model is statistically significant at less than 1% significant level and it explains 40% of variance (Adj R^2 = 0.4). Social capital is found to be highly significant factor that has positive impact to TCD in the Thai dessert industry. Social capital enhances opportunities for development by creating knowledge network, and stimulating learning process. Social capital also helps access to sources of knowledge which can improve internal capability and human capital. The results of this study is consistent with an empirical study by Landry et al. (2002) that social capital determines innovation in manufacturing firms; and Kang et al. (2009) that social capital promotes innovation performance at firm level by increasing inter-firm knowledge transfer. This is also consistent with the contributions to the literature by many scholars such as Cooke and Wills (1999) Tsau and Ghoshal (1998), Westlund (2005), Sahakijpicharn (2007) and UNIDO (2006).

In relation to competitive pressures, competition may have positive and negative impact to innovation performance (Aghion, Bloom et al., 2005). In this study, competitive pressure is also proved to be a driver for development and innovation in the case of Thai dessert industry. However, development and innovation process would be slow without access to sources of knowledge and government support. From interviews, many Thai dessert firms are very small having limited capital and traditional knowledge base. Supports from government and public agencies would help firms access to more advanced knowledge, collaboration, including financial support for development projects.

It can however be argued that exposure to new ideas through networking and access government support would have significant implications for differences among firms in terms of the effectiveness of their management and organisation systems; the quality of their products and services; and the degree of their competitiveness. A good policy framework would give suitable intervention directions, making public interventions a successful catalyst for innovation process. Low impact from government interventions in the regression model of TCD and results from surveys would imply that the policy intervention is less successful in the Thai dessert industry. In the next section, we will discuss the extent of policy intervention to promote the growth of the Thai dessert industry.

5.3 Government policy to promote triple helix linkages and SME development

Table 2 show the overall government support and impact of government intervention to be in the range of medium level to pretty low particularly with respect to technological and innovation supports. There are many reasons limiting the impact and efficiency of government intervention. We found from the interviews conducted that the main reasons are the discontinuity of the support; lack of commitment, determination and honesty of public staff; limited funding; and lack of technical advisors. Discontinuity of supporting projects is caused by lack of effective long term planning and political instability making supporting schemes change overtime. Moreover, deteriorating government-university-industry links occur at the interface between firms and public agencies. It occurs when the local environment fails to support good governance and promote cooperation and strong linkages (Ritter & Gemünden, 2003). This would limit network development and knowledge transfer by reducing the trust of firms in public agencies. Inadequate provision of technology advice is another important problem that accounts for ineffective matching of the technological needs of firms and the technologies supplied. Many firms use machines to reduce labour force but capital intensive modes of operation are rather complicated as they require the availability of skills to man, operate and maintain the machines. But the machines used by Thai dessert are not of the type that can deliver mass production of acceptable products.

The survey data may fail to support that the government interventions to promote technological capability development and innovation for the Thai dessert industry is successfully effective for long-term growth and development. However evidences of best practices are still found in the industry (see Yokakul & Zawdie, 2010; Yuwawutto, Smitinont et al., 2010).

6. Conclusion and policy implication

Innovation involves social process, and does not develop in the absence of social capital based on trust, norms and networks (Ruuskanen, 2004). This study confirms that social capital is important for technological capability development and innovation in SMEs, at least in the case of the Thai dessert industry. The paper has argued that exposure to new ideas through triple helix network and access government support would have significant implications for differences among firms in terms of the effectiveness of their management and organisation systems; the quality of their products and services; and the degree of their competitiveness. Triple helix networks link firms with knowledge sources; public services and supports; and related firms across business lines. However, it is trust and norms that facilitate network development resulting in greater opportunities to access more resources, such as knowledge and information, finance, public supports etc., necessary for business and innovation performances. Therefore, network based on trust is more effective for long-term relationship and knowledge exchange.

The co-existence of the three categories of firms in the Thai dessert industry suggests the possibility for the evolution of firms from household to community or factory-based firms, following policy and market stimuli. This paper argues that community-based and factory-based firms are more receptive to new ideas than household-based firms and that the more entrepreneurially oriented firms in the household-based category are likely to evolve into entities

corresponding to either the community-based or the factory-based firm categories. The choice of growth trajectories open to household firms is influenced by a number of factors including: the extent of resource endowment in terms of capital and management skills; government policy support; proximity to other firms; and perception of market risk. Those firms in the household-based category that are relatively well-placed in terms of capital and management skill endowment would be expected to evolve as factory-based firms, and those that are not so well-endowed would be expected to be in the community-based firms. But social capital is higher in the community-based firms than in the factory-based firms. Community-based firms are well networked, and this enhances interactive learning within the community of firms, and also the transfer of technological knowledge and management skills from research-based knowledge institutes.

The Thai dessert industry is an indigenous industry which could be considered as a growing industry with potential for innovation. To compete in wider market, government interventions are required for technological capability development and innovation. This study bears out the importance of policy interventions to promote social capital and network development leading to collaboration between industry and industry; and between industry and university and government agencies. A strategic industrial policy should be put in place to support sustainable and robust economic development through industrial upgrading and technological capability building (Lauridsen, 2010). Industrial policy should emphasise on SMEs to enable them to develop their technological and innovation capability. Results from the study suggested that policy framework and interventions should be developed by considering following issues: continual support and integrated services; network development based on social capital creation; and public intermediary as a catalyst for social capital building and triple helix system.

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