Developing an effective industrial cluster from strawberry farms: A case of Dahu Township in Taiwan

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Abstract: Dahu, a small township in northern Taiwan, is famous for its produce of strawberries. Near Dahu, there are some attractions, such as hot springs, native Taiwanese tribes and a national park named Shei-pa. In order to better support more small businesses in this area, the local government is eager to promote an industrial cluster of agriculture and tourism based on the well-developed strawberry farms. In this research, the authors investigated 200 strawberry farmers to examine forming factors of the cluster, and effects of cluster on organizational performance. The findings are firstly, capital resource is regarded as the most effective forming factor of the cluster. Secondly, institutionalization, interaction mechanism and knowledge flow positively intermediate the clustering effects on organizational performance. These findings have important implications for the local government and the businesses as well.

Key words: industrial cluster; organizational behavior; organizational performance

1. Introduction

Dahu is a township of Miaoli County at northern Taiwan. Miaoli has a soft sand beach along the west coastline, hills in the center and lush mountains of 3,000 meters to the east. Miaoli has various agricultural industries and products. As to the people, Miaoli has Hakka, Fukien, Atayal and Saisiat. With such diversified natural and cultural resources, the Miaoli County government has been inspecting local agricultural, fishing, manufacture, accommodation and catering industries, and tries to utilize their advantages to form a successful recreational tourism industry. Nowadays, Miaoli county government proactively promotes “One Town One Product” to make the county distinguished by local specialties, and Dahu Township is famous of its strawberry. Strawberries were introduced into Taiwan by Japanese as early as 1934. At first, Japanese tried to plant strawberries at the high-altitude and cooler areas around Yangming Mountain. Afterwards, Dahu residents started to plant strawberries in the Dahu area since 1958, and until 1983, a common transportation and marketing system was developed. With the suitable climate and dryness of land, as well as the hard working of farmers, Dahu Township now has become so-called the “kingdom of strawberry” in Taiwan. Today, many Dahu farmers run

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their strawberry farms as tourism orchards. The opening of strawberry farms for tourism fruit-picking not only brings higher sales margin to farmers, but also growth to related peripheral industries. For example, visitors to Dahu Township would like to go to nearby historical monuments and other neighboring areas like Jhuolan Township famous for its abundant and various fruits, Taian Township famous for its hot spring, Shei-pa National Park and Malaban Mountain. This research is aimed to help the local government promote an industrial cluster of agriculture and tourism based on the well-developed strawberry farms. A model of industrial cluster and organizational performance will be developed as a framework of this investigation and research.

2. Conceptualizing the model

Industrial cluster is a phenomenon of the agglomerate economy. It is also defined as an industrial connection among economic developments of different industries that clusters a variety of companies in a specific place, aiming to generate benefits to each other. Weber (1929) explained the advantage of industrial cluster, based on perspectives of the clustered companies, from “internal economics” and “external economics”. The theory is regarded as the fountainhead of related theories of industrial cluster. Hoover (1948) extended and elaborated Weber’s theory by delineating the agglomerate economy into three categories: scale economies, localization economies and urbanization economies. In recent years, the famous scholar Michael E. Porter viewed the industrial cluster as a foundational concept in industrial development. Other scholars like Czamanski and Ablas (1979) also indicated the industrial cluster can show geographical centralization in their studies, and regarded the phenomenon as the industrial complex. According to studies of Anderson (1994), Rosenfeld (1995) and Feser and Bergman (2000), the industrial complex means the industrial cluster in specific geographic locations. In conclusion, we define the industrial cluster to be the connection among those companies who make similar products or have supply chain relationship. The connection often contributes to geographical proximity of their company locations. Geographical proximity is proven to be advantageous for clustered companies, such as exchanges of industrial information and share of local resources that are beneficial to enhance their competitiveness.

After the industrial cluster is formed, clustered companies then naturally build up a co-existence relationship. Feser and Bergman (2000) supported this concept as well. They think clustered companies of related industries are composed of one or several relationships. The relationship may come from connection of importers and exports or suppliers and buyers, geographical proximity, resource sharing with business-related local organizations, and informal cooperation and competition. Anderson (1994) also raised his viewpoints that individual efficiency and competitiveness are comprised of three aspects: buyers and suppliers, partners and competitors and the status of resource sharing. In summary, the organizational relations among clustered industries are geographic proximity, vertical cooperation among companies, horizontal competition among companies, horizontal cooperation among companies, and resource sharing. The authors use these concepts to measure the cluster level.

In Porter’s famous Diamond model (1990, 1998) there are four determinants of national competitive advantage, including factor conditions, demand conditions, related and supporting industries, and firm strategy, structure and rivalry. The factor conditions can be regarded as forming factors of an industrial cluster, and the related and supporting industries means an industrial cluster.

In summary, the authors identify four forming factors of an industrial cluster, including high-quality human resources (Porter, 1998; Olson, 1998; Bahrami & Evans, 1995; Porter, 1990), technological knowledge (Porter,

1998; Olson, 1998), capital resources (Porter, 1998) and basic infrastructure (Olson, 1998; Porter, 1990). In addition, we propose behaviors of clustered companies, including the interaction mechanism among clustered companies (Porter, 1990; Feser & Bergan 2000; Anderson 1994), institutionalization (Uzzi, 1997; Mohr & Spekman, 1994) and the knowledge flow system (Pouder & John, 1996; DiMaggio & Powell, 1983) mediate the cluster effect on organization performance. The conceptual framework is illustrated in Fig. 1.

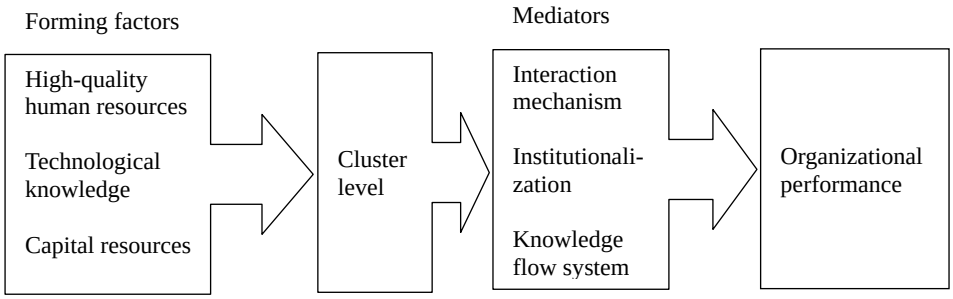

Fig. 1 Conceptual framework of industrial cluster and organizational performance

3. Methods

To measure each concept in the framework, the authors develop a questionnaire consisting of 68 questions of Likert scale of 7 points. The authors distribute questionnaires to strawberry farmers in person to collect data. 200 farmers were surveyed, and excluding incomplete samples with unclear answers and incomplete data, the authors have 160 effective samples.

Then the authors conduct factor analysis to screen out those items with eigenvalue greater than 1. The absolute value of factor loading of the remaining item after Varimax rotation must be greater than 0.5. Each remaining item is regarded as a random variable and given a name.

Consequently, the authors conduct regression analysis to analyze the relationship among variables. There are three parts of analysis: Firstly, the authors analyze effects of forming factors on industrial cluster; Secondly, the authors analyze effects of industrial cluster on interaction mechanism, institutionalization and the knowledge flow system; Lastly, the authors analyze effects of interaction mechanism, institutionalization and the knowledge flow system on organizational performance.

4. Results

After data reduction, the authors reduce our number of question items from 68 to 16. Each item is regarded as a variable and given a name. The variables and their belonging constructs are summarized in Table 1.

As to the effects of forming factors on clustering level, the authors found capital resource is the most influential and significant factor. Its standardized regression coefficients for all aspects of clustering level are greater than those of worker knowledge and basic infrastructure, and more significant. The result is shown in Table 2.

Secondly, the authors analyzed the effects of cluster level on interaction mechanism, institutionalization, and knowledge flow system, the three mediators between cluster level and organizational performance. The authors found each mediator is significantly affected by at least two variables from cluster level; in other words, the three moderators are positively associated with clustering level. Among the variables of cluster level, vertical

cooperation and resource sharing have most broad effects. They affect all of the three mediators. The regression result is shown in Table 3.

Table 1 Variable list

Construct	Variable	Accumulative variance (%)	Cronbach's α	Eigenvalue
Forming factors of industrial cluster	Worker knowledge	66.628	0.80	3.415
	Basic infrastructure			3.081
	Capital resource			2.832
Cluster level	Vertical cooperation	86.712	0.75	2.601
	Resource sharing			2.267
	Horizontal cooperation			2.034
	Horizontal competition			2.953
	Geographical proximity			2.363
Interaction mechanism	Reliable communication	73.212	0.82	2.809
	Conflict resolution			3.780
Institutionalization	Mimetic isomorphism	69.994	0.80	2.802
	Coercive isomorphism			2.798
Knowledge flow system	Knowledge flow	65.439	0.92	5.350
Organizational performance	Operational performance	76.317	0.85	3.082
	Behavioral performance			2.495
	Innovation performance			3.581

Table 2 Regression analysis of forming factors and cluster level

Construct	Variable	Cluster level				
		Geographical proximity	Vertical cooperation	Horizontal competition	Horizontal cooperation	Resource sharing
Forming factors	Worker knowledge	0.254	0.127	0.568	0.731	0.812
	Capital resource	0.693**	1.112***	1.370***	1.030***	1.109***
	Basic infrastructure	0.116	0.304	-0.582**	0.313	0.356
R^2		0.146	0.316	0.309	0.273	0.348
F		13.188	35.506	34.462	28.95	41.098
P		0.000	0.000	0.000	0.000	0.000

Notes: * significance level 0.1; ** significance level 0.05; *** significance level 0.01.

Table 3 Regression analysis of clustering level on interaction mechanism, institutionalization and knowledge flow system

Construct	Variable	Interaction mechanism		Institutionalization		Knowledge flow system
		Reliable communication	Conflict resolution	Mimetic isomorphism	Coercive isomorphism	Knowledge flow
Cluster level	Geographical proximity	-0.031	-0.097	-0.145*	-0.092	-0.067
	Vertical cooperation	0.2730***	0.238***	0.073	0.173**	0.263***
	Horizontal competition	0.146*	0.122*	-0.023	0.169	-0.029
	Horizontal cooperation	-0.128**	0.172**	0.078	0.045	-0.091
	Resource sharing	0.246**	0.212**	0.382***	0.184*	0.343***
R^2		0.419	0.545	0.249	0.365	0.334
F		21.751	36.149	10.007	17.394	15.121
P		0.000	0.000	0.000	0.000	0.000

Notes: * significance level 0.1; ** significance level 0.05; *** significance level 0.01.

Lastly, the authors examine effects of interaction mechanism, institutionalization, and knowledge flow system on organizational performance. The authors found that organizational performance is affected by these mediators because each performance variable is significantly and positively associated with at least two variables from these mediators. Especially, innovation performance is affected by interaction mechanism, institutionalization and knowledge flow system, all of the three constructs. The regression model explained up to 64.6% of the variance of innovation performance score. The results are summarized in Table 4.

Table 4 Regression analysis of interaction mechanism, institutionalization, and knowledge flow on organizational performance

Construct	Variable	Organizational performance		
		Operational performance	Behavioral performance	Innovation performance
Interaction mechanism	Reliable communication	-0.099	0.032	-0.011
	Conflict resolution	0.251**	0.324***	0.475***
Institutionalization	Coercive isomorphism	0.350***	0.044	0.241***
	Mimetic isomorphism	0.043	0.087	-0.045
Knowledge flow system	Knowledge flow	0.152	0.475***	0.324***
R^2		0.271	0.613	0.646
F		11.210	47.761	55.065
P		0.000	0.000	0.000

Notes: * significance level 0.1; ** significance level 0.05; *** significance level 0.01.

5. Conclusion

Basing on results of regression analysis, capital resource is the most effective forming factor of the industrial cluster. Its influence on vertical and horizontal cooperation, resource sharing, horizontal competition and geographical proximity is greater than those of basic infrastructure and worker knowledge. Therefore, in fostering the cluster, the local government may set its priority of efforts first in making capital resource more accessible to small businesses and second to improve the infrastructure or worker knowledge of this area.

Secondly, the authors proved institutionalization, interaction mechanism among companies, and knowledge flow positively intermediate the cluster effects on organizational performance. In other words, businesses joining a cluster may enhance performance through interaction with other members, better sharing of industrial knowledge, and further institutionalization. For small businesses, since that the cluster helps to enhance organizational performance is evidenced here, participating in the Dahu industrial cluster is a smart decision.

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(Edited by Ruby and Chris)