

Evaluation and ranking of the factors affecting the formation of business clusters (An Empirical Evidence: Business Cluster of Higher Education at North Khorasan Province)

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ABSTRACT

Clustering has led to success in a competitive market and companies can solve their problems related to the risks associated with a decrease in the demand and market intelligence. The aim of this research is to investigate the factors affecting the formation of higher education at North Khorasan Province.

The data collected from questionnaires distributed among 200 managers and experts in higher education in North Khorasan Province. Then the data were collected and analyzed using FAHP method. The results show that all of seven variables include factor conditions, local demands, support institute, focus geographic, relationship, innovation and structure, strategy and rivalry effects on Cluster Formation of Higher Education at North Khorasan higher priority. The formation of business clusters of higher education is an intangible factor and every development of it can be implemented by attention to seven of its explanation variables in the real world.

KEYWORDS: Cluster, Business, Higher Education

1. INTRODUCTION

Nowadays, the business clusters play a salient and pivotal role in developed countries' economic and industrial policies. Clusters can be considered as competitive tools for networking, which not only facilitate access to strategies of regional development, but also enable companies for competing in the world market (Felzensztein, 2001).

Investigating business clusters has significant importance as it can accelerate economic growth and job creation. The clusters can be considered as proper models for industrial development through their division of specialist, cooperation between the industry, cooperative learning and other affairs needed for being competitive (Robelloti, 2005).

Higher education is the center of training the specialist human forces that can be transferred to the society with new ideas and thoughts. Higher education including universities and centers of human force training are the main designer and founder of the basic framework of growth and progress in societies (Good, 2003).

The current study deals with the generalities of this issue. At first, the problem and its significance are stated. Then, the proposed conceptual model is described. Then, the scope (subject, time and place) of the study and hypotheses are mentioned. At the end, the key terms used in this research are defined.

2- Higher education's business clusters

Higher education is the center of training the specialist human forces that can be transferred to the society with new ideas and thoughts. Higher education including universities and centers of human force training are the main designer and founder of the basic framework of growth and progress in societies (Khoshfar, 2007). Today, the power is hidden in pioneer knowledge. So we can consider higher education and related researches about it as the guarantee of the national security and national development of societies and even societies' survival. In the 21 century, education and transfer of information from one side and the production of knowledge on the other hand will be determining factor of countries' development (Shaban Varki & Ahanchian, 2005). Considering the kind of higher education in the country and also its growing trend to the virtual world, it is necessary to keep pace with the world to achieve development.

Higher education is a kind of education that is presented to increase the level of individuals' practical skills, supplying the specialist human forces, development of cultural heritage, creating new ideas and the research context. Higher education is a global industry that is presented with different purposes in all developed countries and in most of the developing countries. In confronting with 21st century's necessities, the higher education institutions are subjected to reforms in enhancing economic role of knowledge, information and technology (Bassett, 2006). Economic firms can be able to make sure about their progress and position in the

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world market through innovation and this will be guaranteed by educating and training work specialist force in education system. Attendance in the international arena of economy, politics and culture needs the expert and efficient human forces. One of the most important preparations for attendance in the international arena is professional and skilled preparation and human force supply that can be achieved through university education.

Training creative innovative human force and conducting higher education policies and research budgets to the competitive needs, legal and spiritual and technical supports for awareness and access to the world's standards are effective issues for attending in global arena that needs government support (Nahavandian, 2006). From Portes and Landolt's (1996) perspective, universities and institutions of higher education are one of the important constructive centers for social wealth. For the realization of this, we must define special educational programs and activities in the system of higher education. For example he suggests that those communication skill which create respect, trust, empathy and group skills like conflict solution, cooperative problem solving and cooperative decision making should be considered as fundamental skills in BA. Levels to be educated.

Higher education as the highest educational level of the community possesses considerable importance, as it has an important role in the growth and development of society in different technology, scientific, cultural, economic, social and political dimensions and the result of all activities and efforts of the educational system reflects on it. In other words, if we meet all the ends of educational system, the total output of this system can play an important role in raising the quality of different sections of the society (Rahmanpoor, et al., 2008).

Business cluster includes a community of economic organizations and individuals and companies with special skills or knowledge related to executive activities. In addition, these companies or organizations such as universities, research centers, industrial and technical associations that develop economic activities and mutual cooperation and sharing technical knowledge. The existence of these kinds of institutions refers to a kind of "cooperative economy" (Schmits & Nadvi, 1999) and form a "middle level" among the high level of economic policy and companies' competition in the micro level. The cooperative or middle level factors are very effective in promoting purposeful cooperation and increasing the performance of companies located in cluster (Altenburg & Stamer, 1999).

In addition to this, according to the findings of Manch, by the rise of the thoughts of creating business clusters in preliminary stages and then, their institutionalization, it can be possible to make special relations with scientific and training centers that it will result to providing trained and skilled human resources in all kinds of manufacturing processes. Another point that was mentioned by this researcher is the fact that the total services of governmental and private organizations could be better observed with the existence of business clusters (Valizadeh, 2006).

Importance of industrial development in developing countries has made many of these countries to consider the formation and strengthening small and medium industries in the form of cluster as a strategy for regional industrial development and to use them as an strategy for creating employment that is able to improve companies' competitive power and to increase their exports simultaneously (Mehrpooya and Majidi, 2004). Therefore it can be concluded that higher education cluster can be classified as business cluster.

3-research model

The successful experience of regions and industrial clusters in some of the European countries, especially Italy, encouraged the social and economic experts to believe that there is a completely clear model or characteristics and components in these countries that can be used in any other place. Indeed, the framework of the cluster is not an analytical model, but it is a list of the established principles (Robelloti, 1995).

According to the theoretical literature review, different approaches are proposed effective factors on business clusters' formation, but no model was found which covers all characteristics of cluster business. So, the current study extracts all influential factors in business cluster's formation in higher education, then these factors were classified in seven categories and the following model was proposed.

Table 1.Documentation of Model's Factors

documentation	factor
Ketless (2004), Brenner (2004), Becattini (1979), Belandi (1982), Marshall (1920), silli (2005), Shamoradi (2005), Yamawaki (2002), Russo and Clara (2000), Rosenfeld (2001), Robelloti (1995)	Geographic focus
Porter (1990), Ketwal (1998), Brusco (1910), Sangburger and Paik (1992), Robelloti (1995), Porter (1998), Chia- chi (2009)	Strategy of the firm, construct, competition
Robelloti (1995), Dinmohammadi (2005), Ketless (2004), Enright (1993), Becattini (1979), Maskell (2001)	Relations between firms
silli (2005), Albo (1995), Naserbakht (2004), Shamoradi (2005), Dinmohammadi (2005), Burner (2004)	Facilitating innovation
Enright (1993), Porter (1990), Porter (1998), Chia- chi (2009), Isbawi (2007), silli (2005)	Domestic demand
Enright (1993), Porter (1990), Marshall (1920), Chia- chi (2009)	Environmental factor
Marshall (1920), Akandi (2003), Enright (1993), Porter (1990), Yamawaki (2002), Chia- chi (2009), Isbawi (2007), Robelloti (1995), Burner (2004), Brusco (1990), Majidi (2003), Bianiki (1986), Paik (1992), Dinmohammadi (2005), Becattini (1990)	Network of organizations and related and supporting industries (public and private)

1-Condition (environmental) factor

Status of factors available in firm and the method which the firm chose to compete or cooperation (like preparation and availability of natural resources providers, or their cheapness, the work along with knowledge and technology related to inputs). Condition (environment) factor is as same as talent and potential. This factor is related to raw materials, skillful human force in the region, infrastructures and universities. Role of the government and local firms is more vital on this factor. Government played a key role in better creating a cluster. The government should supply water, freeway, systems for communication and so on. The government also played a major role in educating human resources (Porter, 1990). Environmental factor divides into two components: First basic factors include land, water, primary materials, education, qualification or the amount of skill in using IT, transportation and communication. Second, advanced factors include cluster-centered research plans, the transmission of knowledge and technology, high skill of labor force, standards for quality guarantee, and expertise information in the global markets. As stated before, this factor is related to physical potentials and this is while the background factors of social, cultural and political have the same values.

2-3- domestic demand factor

It is one of the components of well-known model proposed by Porter that depends on the growth of national (or local but not the international) demand and the product's market. When customers, demand a monotonous and a considerable amount of the goal products, then the industry provide the necessary capacity and modeling the economy of scale. Industry tends to innovation and reducing costs when customers are special. This combination of scale economy and innovation in companies led to a global position for domestic companies. Though when goods are produced more easily in the world market, the local demand may have fewer lusters (Porter, 1990). Based on Porter's model, the following parameters can be introduced for this factor:

- local customers' bargaining
- customers' needs and expectations
- local demand for national and international goods.

The firms which act within a cluster usually identify needs of customers more transparency and speed. The firms in a cluster have an advantage as they have awareness of the current needs of customers and due to the concentration of the firms that are put together to the relevant industries and due to the concentration of specialized firms of gathering information and due to more advanced procedures of customers. The cluster firms usually identify the trend of customers' behavior changes faster than individual firms (Aleomran, et. al, 2012).

3.3.factor of supporting organizations (state and private)

A network of local and private firms that support clusters' economic factors is one of the important factors in investigating business clusters (Robelloti, 1995). The pivotal policy that is implicated from the studies of (Schmitz and Brusco,2007) is that: "We cannot create industrial clusters only by policy makings interventions, but if a number of firms groups which are specialized and are concentrated in a geographical area, then the organizations can support industrial growth and innovation". In the industrial areas of Italy, the effective intervention of state and private agents in regional and country levels played an effective role. The internal dependence of firms and domestic organizations of an industrial cluster are the key factor for a cluster's success and identity. This dependence between firms is formed through intervention and cooperation atmosphere that public, state or local organizations facilitate it. Governmental organizations and planners of infrastructures have a key role in providing physical infrastructures, services and several facilities such as providing finance through cheap loans, providing financial and credit services, providing information system and coordinating the different parts and political and economic regional organizations through industrial and guild committees, the banks and other organizations.

4-Geographical concentration factor

One of the cluster's definitions focus on the point that the members of the cluster are habited near each other in a particular geographic region that all kinds of economy of scales result of the geographical gathering of companies shall be found. Economy of scale develop with special business communications and relation with customer and supplier in business clusters (Altenbeurg&Srammer, 1999).The geographical areas located near each other provide an inner relationship between the firms. They are related through a specialized or common sector. For example in biotechnology section, the jobs are related in places that universities exist or facilities have been considered for research and development. It is important for clusters which are in the same geographical area to be related for the purpose of competing, employees and products and resources. This allowed them to work together more effectively (Rosenfeld, 2001). Moreover, when there is relation between all the aforementioned factors, so the ideas are disperse easily and innovations are development. As a final result of creating strong regional clusters and attracting various customers from all over the world, will be to search for specialists (Freezilu, 2007).It is presumed that in regional economy, the main reason for development of industrial zones and formation of great industrial cities is the savings resulted from units' association that they cause positive effects in production and the expense of producing a firm is decreased due to the increase of other

companies' production. Such savings occurs when the expenses of producing firms in an industry will decrease with the increase in production of that industry.

The idea of economy to scale by geographical accumulation has a long history in economy that belongs to the first experiences of the specialization by (Adam Smith, 1723, 1790) labor and its explanations by (Marshall, 1920).

5.3. Factor of communication between universities

The industrial clusters usually seen as a group of firms and economic or noneconomic institutions which are related and compete and cooperate with each other horizontally and vertically. They have variety of fields to cooperate such as common purchases, using networks of common distribution, technological communications, common research, training personnel, managers' joint training, group standardization programs, joint studies of market, buying joint useable technologies and also using common labor market like formation a common human resources (Enright, 1996). There are a collection of strong ties to the front, back, horizontal and relations of labor market which are based on market and nonmarket transactions of goods, services, information and individuals (Rabellotti, 1995). Inner link of clusters contains two forms of horizontal and vertical connections. In a vertical link, different stages of production or production phases and common services in a local complex and the input and output chain of a special good's production forms and develop. In horizontal link, similar opponent firms which produce particular goods focus in a particular place and compete and cooperate each other in different matters (Maskell, 2002).

Patnam (1993, 2000) believes that hidden concept of social capital claims that first: relations and "social networks" have value and second: the social capital among the members, create a tendency for accomplishing the mutual services and works for each other in the form of a "treadmill process" that this norm is based on relations and social networks.

The concept of social network can be considered in different categories. "Connective networks" connect similar people to each other and communicate between them and create attraction to professionally compensate mutual services between the group members based on treadmill process.

The bridging networks are different kinds of social networks which link different people to each other and create attraction to compensate mutual services between the group members based on treadmill process. Social capital make value for the members of network through foreign savings resulted from sharing knowledge, participating in risk and etc., and in human capital merely people are important, while in social capital, the social connections are important.

Social capital is considered as the interactive part of implicit knowledge; a network of communications and relations which share implicit knowledge with society and social structure that facilitate cooperation and interactions. Definition and dimensions of social capital is so vast that there is no single view about it. So, there is no single idea about the role of its elements and economic development. Information, social capital and implicit knowledge are important elements of economic development process. (Valizadeh, 2008).

Geographical borders are not limitations for social capital. The social capital goes beyond the geographical borders in different ethnics. For example, India use financial, commercial and knowledge of various ethnic groups and also small and scattered Chinese groups all over the world use mutual connections and interaction.

Social capital can facilitate financial support of firms in clusters and formation of mutual and special relations between firms and individuals.

6.3. Innovation factor

Enright (2002) stated that the relation between clustering and innovation can be resulted from internal knowledge in social interactions. A cluster can develop and adopt with different forms of technology and also the technology and innovation within a cluster result the stress of competing with other product that it is one of the advantages of innovation in the cluster.

The innovation can be generally called the attempts done to trading new ideas. Of course the common definition often presented for innovation in firms called innovation "a set of new processes that firms use them to design and produce products, this process maybe utilized for the first time in designing and producing a products and the its design may be innovative but there is no need that this design propose for the first time and it may designed before but its application in production and design of a product may be new (Nelson & Rosenberg, 1993). Innovation manifests in several forms including the forms of knowledge-center and technology-center to new methods of organizational operations. In some cases, innovation overlaps the concepts of imitation and copying that using this type of innovation is easy between the firms and expand easily among them, but the output of this type of innovation has a descending trend. Considering the existing complexity and medley in the concept of innovation, its measurement has little importance. Identification of the relation between the innovative activities and its results is difficult, because countless and to some extent vague variables affect the results of the innovation (Anderson & Napir, 2004).

7-3. strategy, construct, competition

Passing from the traditional boundaries and existing classification of goods and industries can be considered as an important source of innovation and to increase the clusters 'competitive power. So, the specialization of the activists inside the cluster and their concentration on a special realm are complement and eventually synergy resulted from mutual learning is necessary effective and efficient clustering (Dunning, 2000). Many of the companies (especially small firms) do not identify a specific strategy for their competition because small companies don't have necessary economic power for commitment to competitive strategy. The strategy of these companies often is unofficial, passive and deductive. These companies may achieve proper competitive strategies through participation in cluster. When there is consistent competition between rivals, customer suppliers, then consistent improvement will appear in the quality and capabilities of the employees' capacity. With regard to a lot of local agents and the absence of a dominant or progressive company, the companies 'relations will be identifiable due to the existing balance between competition and cooperation (Brusco & Lisony, 1992). The competition conducted horizontally between companies in the same level, in other words between the companies expertise in similar product or activity and the competition is not just based on the price but also contains the scope of the productions. In the literature, the competition on quality, design, speed and flexibility in adjusting (with market) as the competitive subjects in special industrial areas is emphasized (Pike, 1992). The concept of "cooperation" belongs to the relations between companies, contractors, distributors and relations between companies through establishing institutions that offer group and consult services (Robelloti, 1995). Any economic saving is along with expense decrease and competition have a mutual relation with expense decrease. Although different factors play role in competition, but its most important element is producing with the lowest cost. Industrial clusters help costs' reduce through various kinds of savings.

Today the high ability of companies is due to their industrial technologies and in these conditions, the competitive strategies include strategies of integration and transfer of property. Change in industrial production and development technology in large industries utilizes through small and medium business activities and improve utilizing these industries. The technology needs for big industrial firms is a big technology through research and development and through small and medium businesses of advanced technology (Zirak, 2010).

Specialization is one of the main advantages of link between the firms. Regional concentration of similar economic activities and the existence of strategic links between firms improve a specific degree of specialization (Alonso-Villar, 2005; Pietrobelli & Barrera, 2002).

The competition decrease the transmission cost for customers and let them to change to a supplier in the same industrial cluster. Local competition is a competition in a complete level in the field of a game. The competitors face the same rules and are the same rules for market labor force, the same trade cost and the same basis of supply. In such a competitive environment, the specialization of products and services develop more and the contenders in different environments strengthen local competition with other related firms and enhance cluster's function as the competition is tangible (Dadash poor, 2010).

A criterion is defined for each factor with regard to documents presented above:

Table 2. Conceptual framework of the study

variable	Factor
1- Human resources 2- Capital resources 3- Knowledge resources 4- Physical resources (physical infrastructure)	1-Condition (environmental) factor
1-educational demand 2-interaction with industry (the existence of local industries)	2-domestic demand factor
1-state and private organizations 2-service supporter organizations and firms 3- related supportive industries	3- factor of supporting organizations (state and private)
1-availability of customer 2-availability of competitor 3-Economies of scale 4-Dissemination of and information technology	4-Geographical concentration factor
1- horizontal networks 2- vertical networks 3- social capital 4- legal contracts	5-Factor of communication between universities
1-basic decision makers 2-interaction with research firms 3-cooperation with competitors	6-Innovation factor
1-The technical, logistical, financial and administrative structure 2-Specialized labor division 3-competitive market	7-strategy, construct, competition factor

4- Method of study

The first issue is in writing research methodology is determining the type of inquiry. Determining the method of study is an important issue, because when type of research determined, then the scholar will realize different stages of the research, the main research objective, the expected results, the kind of data analysis and procedures (Rezvani, 2012). The present study is a descriptive and applicable research that implement a documented and phenomenon investigation in the environment and new conditions in a point of time. In other words, the current research is a case study and the data collected as a library and field study (via questionnaire and interview). On the other hand, as we know that the necessary credit to choose and application of appropriate indexes in company should be based on experimental measurements, so the current study used conceptual model to fill the gap (the gap between theory and experience). In fact, the present research tries to rank influential factors on business clustering formation through the mentioned model for higher education clusters in North Khorasan with considering the environment and internal conditions. The technique used in this research is the FAHP technique in environment phase. In fact, the researchers applied phase concepts, phrasal statements as statements with natural and colloquial language to evaluate strategies and to apply more suitable and precise analysis for them. After distribution of questionnaires in the first stage and interviewing experts of higher education clusters, 27 questionnaires out of 40 distributed questionnaires analyzed.

5- Findings and results

Nowadays, the clusters are considered as important tools for strengthening industrial development, innovation, competition and growth. Although the primary forces for cluster creation are private companies and individuals, but other groups like governments and institutions affiliated to the government and in national and regional levels affect cluster creation. Companies' gatherings in the form of clusters provide common use of experiences and facilities, possibility of creating joint facilities, and collective implementation of affairs. Furthermore, quick transfer of existing knowledge and innovation in the cluster is one of their main advantages. Therefore it can be said that clusters are influential in different fields of companies' performance and cause advantages for firms.

According to the aims of the present research, it can be concluded that the process of higher education business cluster's formation is an invisible variable that its observation and measurement is not tangible and practical and it is necessary to measure it through some tools in the real world as done in the current study by means of seven factors: conditions, native demand, supported organizations, geographical focus, communication between universities, innovation, strategy, structure and competition and related structural equation. Research findings showed that any promotion in higher education business cluster formation in the investigated sample can be achieved through those seven variables in the real world.

Based on the findings of the research, the government did not have significant role in cluster formation and higher education plays a significant role in training individuals and specialist forces. On the other hand, with establishing and development of globalization phenomenon, countries realized that the only possible way to get success is the knowledge achieved through higher education. Therefore, it shows the government's weakness in this realm because the budget devoted to higher education section had no growth compared to other economic sectors.

The communication factor almost had not any role in higher education cluster formation and that is due to lack of communication between universities and an indication that the universities are unable to meet their main end –i.e. production and dissemination of knowledge- and it is one of the reasons of the country's scientific dependence on foreign countries and their scientific productions. With regard to the increasing progress in the communications, it is important to create and improve communicative infrastructures, education of internet and other modern media. It is expected that progress in creating and improving communicative infrastructures reduce the role of geographical concentration in cluster formation.

In the native demand case, the universities' need to connect industry is important. Because there are few connections between universities' and industry in North Khorasan province. This connection has a considerable role in creation and development of higher education clusters. In addition, a suitable connection between university -government- industry has a significant role in this case.

Table 3-ranking of the main factors with regard to the method of FAHP

CR ^m , CR ^s	Variables ' rank	weight	variables	Main factors' rank	Main factors
<0.1	1		-The technical, logistical, financial	<u>2</u>	strategy, construct, competition
	2	0.49	and administrative structure		
	3	0.27	-Specialized labor division		
		0.24	-competitive market		
<0.1	1	0.46	-basic decision makers	<u>6</u>	Innovation
	3	0.13	-interaction with research Firms		
	2	0.41	-Cooperation with competitors		
<0.1	3	0.03	-Human resources	<u>1</u>	environmenal factor
	4	0.15	-Capital resources		
	1	0.41	-Knowledge resources		
	2	0.41	-Physical resources(physical infrastructure)		
<0.1	1	0.50	-state and private organizations	<u>7</u>	supporting organizations
	3	0.22	-service supporter organizations and firms		
	2	0.28	-related supportive industries		
<0.1	2	0.45	-educational demand	<u>3</u>	domestic demand
	1	0.55	-interaction with industry (the existence of local industries)		
<0.1	1	0.59	-availability of customer	<u>4</u>	Geographical concentration
	4	0.10	-availability of competitor		
	2	0.19	-Economies of scale		
	3	0.12	-Dissemination of and information technology		
<0.1	3	0.04	-horizontal networks	<u>5</u>	communication between universities
	2	0.42	-vertical networks		
	1	0.51	-social capital		
	4	0.02	-legal contracts		

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