

The Study of Industrial Clusters Performance in Islamic Republic of Iran (The Case Study of Yazd Ceramic and Tile Cluster)

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Abstract:

Today, since industrial clusters affect the organizational competitiveness both national and international levels and introduces a new perspective towards the location of business establishment, most countries use industrial cluster development strategy.

Industrial clusters have been also considered in Iran and the industries adapted to and coordinated with the mentioned approach have tried to locate their business at the better conditions of competition and market gain within the country, region and throughout the world. In this article, at first industrial cluster, its advantages and disadvantages have been defined, and then, the history of industry and industrial cluster of Yazd province and Yazd ceramic and tile cluster performance examination tools and at the end, the strengths, weaknesses, opportunities and threats Yazd ceramic and tile cluster have been investigated.

Keywords: industrial clusters, ceramic and tile cluster, strength, weaknesses, opportunities & threats (SWOT), YAZD

Introduction

All countries hope to achieve increasingly developments which grow fast. Nowadays many developed countries are using strategy of industrial clusters development because they influence the competitiveness of industrial clusters in the country as well as beyond national borders and show new ways of thinking about the place of dealing and earning. Industrial clusters influence competition through increasing of productivity based on settlement of companies and providing quick guidelines for development and innovation and encouraging of new business. Recently this method in Iran attracted many attentions based on industries compatible with mentioned method which attempts to provide a better and competitive market place for the country, region and the world.

A new approach proposed nowadays in the discussions of regional and industrial development is that different regions depending on, natural, human and organizational advantages or available industrial should pay serious attention to the development of a limited number of industrial clusters and facilitate different dimensions for organization of clusters. In these situations they can be successful in international markets and hold more valuable sectors of

related goods from their value chain and they can reform or reconstruct existing structures against world problems.

Industrial Cluster Definition

Using various definitions provided by the thinkers, industrial clusters can be defined a set of correlated firms, professional suppliers, service providers, the firms consisting of dependent industries, and interconnected institutions each one of which is linked to another one to save the added value supply. This set works in a common field, is concentrated in a certain geographic area, is able to synergy, and has created the possibility to use external savings and has common challenges and opportunities.

Forming industrial clusters has many advantages, a number of which are mentioned below:

1. Regional economic growth and encouragement of more investment in the region
2. More effective cooperation between public and private sector
3. Improvement of efficiency and increase of productivity in small and medium enterprises
4. Development of adaptability and flexibility in small and medium enterprises in the fields of product, market, technology, management and organization considering trade liberalization across the world and economic globalization
5. Possibility to achieve criterion-driven interests, market knowledge, local interaction-dependent innovation and technological progress
6. Make the education endogenous, development of new skills, professional and efficient division of labor, use of external savings, reduction of transaction costs, elimination or reduction of market entry restriction
7. Easier and faster access to suppliers of raw materials, services, specialist human resources
8. Economic justification of establishing and strengthening service and support centers in various areas such as marketing, reference laboratories, technical and financial and consultations ...
9. Proportion to indigenous social structures
10. The most appropriate development path
11. Facilitation of the developmental process

Shortcomings of Industrial Clusters

1. They fail to act properly if there is inappropriate copying of models without considering specific conditions
Of performed model in other countries.
2. Adjustment of products according to customer demands may cause problems in the cluster interests

History of industry and industrial clusters in Yazd province

Yazd's name has been long associated with industry, productivity, and industrial activities and artisans of the province have had a distinguished and considerable role in providing the goods required throughout the country since many years ago. Hard work, compassion, contentment and saving have been associated with the essence of the people of this desert province and

underlies their elevated culture in terms of work and production and this has provided the good cultural groundwork along with other relative advantages such as competent and experienced managers and employers, optimal growth of higher education, richness of the mines, being located in the center of the country and infrastructural facilities and appropriate services regarding ways, railways, airports, energy, telecommunications, etc. have provided suitable setting to develop industry in the province. Yazd province has an exclusive place in Iran's industry and a significant part of the country's industrial products; especially in the textile and non-metallic minerals sector, is produced in Yazd Province.

The History of Earthenware and Tile in Yazd Province

The History of Earthenware

Pottery is a several thousand-year-old art in Yazd province. The art of pottery in Yazd, especially in Meybod city, is presented by special designs that are inspired by the desert climate. Earthenware and ceramic manufactured in Meybod city are famously known for its genuine imprints depicting sun, poultry and fish: sun is the symbol of the shining desert sun, poultry is the symbol of desert birds, and fish ironically refers to the water shortage in this land.

Ceramic manufactured in Meybod city, on which sun, poultry and fish are imprinted, won the golden medal in Munich 1971 International Exhibition.

The History of Tile

The most eminent tiling left from the ancient Yazd dates to the Timurids reign, from fourteenth to sixteenth centuries.

In 1970s, the manufacture of tile was for the first time industrialized in Yazd, but up until 1978 tile and ceramic were entirely manufactured by traditional techniques. The first tile manufacturing industry in Yazd province to produce once-fired small-sized red tiles was started in 1978. From 1990 to 1999, with the birth of the new construction and reconstruction age in Iran, several other manufacturing companies emerged in Yazd province. Since 2000 this industry has been significantly developing in this province. Today, 160 billion square meters of tile, i.e. about 50% of the total tile production in Iran, are manufactured by the industries in Yazd province.

Categories of Cluster Products

The cluster tile and ceramic products manufactured in Yazd province can be classified into the following categories:

- Glazed flooring tile
- Glazed wall tile
- Granite and porcelain tile
- Third-fired tile, including different types of flooring and wall bonds and single-flowered tiles
- Miniature tile

Among the above mentioned products, glazed flooring and wall tiles along with granite and porcelain tile are considered as the main products manufactured by this cluster, while the other products form an insignificant part of this cluster products. In sum, cluster products include: 65% flooring tiles, 25% wall tiles, and about 10% granite and porcelain tiles.

Statistical population and sample

Statistical population of the study is all small, medium and large active textile industrial units in the city of Yazd based on 3ISIC code.

Sampling method:

For this research, after conducting the required studies, two classification-sampling methods are selected with appropriate and systematic allocation.

Determination of the **Classification Sample** size (n) with proportional allocation:

Since in the main definition of cluster, units are divided into small, large and medium categories, the following formula applies and in other words, each class has been relatively shown with Q_h and P_h and $P_h = \frac{A_h}{N_h}$ where A_h is volume of large units of each class and N_h is

the total volume of each class. V is the estimating variance which has been assumed to be a constant value and when the estimating variance of value sum of the units is already determined, sample size will be estimated from the following method:

$$s_h^2 = \frac{N_h}{N_h - 1} P_h Q_h$$

$$n_0 = \frac{N}{V} \sum_{h=1}^L N_h s_h^2 = \frac{374 * 77.197}{41} = 702$$

$$\hat{n} = \frac{n_0}{1 + \frac{n_0}{N}} = 244$$

Also Sample size estimated through Kakran method with error volume of ($E = 0.037$ and $0.05 = \alpha$ and $p = 0.5$) is as follows:

is obtained from the following formula: Size of the classes of (n_h)

$$n_0 = \frac{Z_{\alpha/2} * p(1 - p)}{E^2} = 702$$

$$\hat{n} = \frac{n_0}{1 + \frac{n_0}{N}} = 244$$

$$n_h = n * \frac{N_h S_h}{\sum_{h=1}^L N_h S_h}$$

Research tools:

To investigate the function of Yazd textile cluster, we used a questionnaire tool including human resource pivots, raw material supply network, technology, network access to markets, financing and capital provisions and coordination agency; the collected data indicates that:

The human resources employed in the ceramic and tile cluster
Data from the questionnaires on human resources shows that:

- Regarding use of technical power and skill of human resources of other similar units by ceramic and tile cluster units, 33.3% of Non-metallic mineral products units have used technical power and skill of human resources of other similar units.
- Regarding the time of using technical power and skill of human resources of other similar units by ceramic and tile cluster units, 100% ceramic and tile cluster manufacturers stated that they have continuously used technical power and skill of human resources of other similar units.
- Regarding the question of how do you evaluate the result of using the human resources skill of the similar units? 40% of ceramic and tile cluster units have evaluated it to be very desirable .
- Regarding the question of whether the ceramic and tile cluster units are content with other similar units using their human resources skill or not? 20% of ceramic and tile cluster units have expressed their interest in lending their human resources skill to their counterparts.

Raw material supply network in ceramic and tile cluster

Information provided by the ceramic and tile cluster units on raw material supply network indicates that:

- 53% of ceramic and tile cluster units purchase their required raw materials directly from the raw material manufacturers.

In response to the question of “if raw materials are provided directly from the manufacturers, where these units belong to”?

- 10% of ceramic and tile cluster units have stated that they are within the city of Yazd.
- 90% of the ceramic and tile cluster units have stated that their raw materials suppliers are outside the city of Yazd.

Regarding the question of whether ceramic and tile cluster units desire to cooperate with other similar units regarding raw material supply or not?

- 100% of ceramic and tile cluster units have expressed their willingness to cooperate with other similar units on raw material supply.

Technology in ceramic and tile cluster

ceramic and tile cluster unites were asked whether all the operational levels of their production are performed in their own units or not? The responses provided by the ceramic and tile cluster units were as follows:

- 83.3% of ceramic and tile cluster units department announced that all the operational levels of their production are performed in their own units

ceramic and tile cluster units expressed their reasons for assigning a part of their manufacturing operations to other units as follows:

- 100% of ceramic and tile cluster units referred to their lack of required machinery to perform certain desired operations as their reason for assigning a part of their manufacturing operations to other units.

Regarding the exchange capability of technology, ceramic and tile cluster units were asked whether they have ever used their own machinery to complete the production of other units or not? The responses provided by the ceramic and tile cluster units were as follows:

- 83.3% of ceramic and tile cluster units have responded that they have used their own machinery to complete the production of other units.

Their response regarding the cooperation of units on technology exchange indicates that:

- 100% of ceramic and tile cluster units have periodically used their own machinery to complete the production of other units.

Regarding the question of whether ceramic and tile cluster units are willing to provide their counterparts with machinery services or not, the answer is:

- 50% of ceramic and tile cluster units have expressed their willingness to provide their counterparts with machinery services.

Regarding the cooperation of units on the exchange of technical methods and knowledge of production, the units' comments are as follows:

- 33.7% of ceramic and tile cluster units have announced that they have cooperated with other similar units on the exchange of technical methods and production know how.

Market access network center in ceramic and tile cluster

Regarding the market access network, ceramic and tile cluster units was asked about their marketing methods. Their responses indicated that:

- 50% of ceramic and tile cluster units have declared that their products were marketed directly by themselves.

In response to the question of "if the goods are sold by ceramic and tile cluster units, where will these products be presented?" ceramic and tile cluster units responses are as follows:

- 100% of ceramic and tile cluster units have stated that they market main part of their goods outside the city of Yazd and a part of it in the city of Yazd.

ceramic and tile cluster units were asked whether they have ever enjoyed the cooperation of the other similar units to identify new markets for their products or not? Their responses have been as follows:

- 40% of the ceramic and tile cluster units have stated they have enjoyed the cooperation of the other similar units to identify new markets for their products.

Regarding the time the ceramic and tile cluster units spent to cooperate in identifying new markets, their answers have been as follows:

- 100% of ceramic and tile cluster units have had short-time cooperation

The financial issues in ceramic and tile cluster

ceramic and tile cluster units were asked some questions regarding the financial issues which are as follows:

ceramic and tile cluster units were asked whether they have faced serious financial issues to continue the activities of their own units or not? The answers of ceramic and tile cluster units have been as follows:

- 60% of ceramic and tile cluster units have been facing serious financial issues.

Regarding the desirability or undesirability of the result of financial assistance of Non-metallic mineral products units to similar units, the answers of ceramic and tile cluster units have been as follows:

- 80% of ceramic and tile cluster units have evaluated the result of financial assistance of ceramic and tile cluster units to similar units and helping them to be desirable.

Regarding getting facilities from the banking system, ceramic and tile cluster units were asked whether they have used banking facilities to establish industrial units or not? The answers given are as follows:

- 100% of the ceramic and tile cluster units have used banking facilities to establish their own industrial unit.

ceramic and tile cluster units were asked whether they agree with establishment of finance fund which is formed through membership and investment of units and aims to help to meet the financial needs of the partner units or not? The answers of ceramic and tile cluster units have been as follows:

- 100% of ceramic and tile cluster units have agreed with the establishment of finance fund which is formed through membership and investment of units and aims to help to meet the financial needs of the partner units.

Regarding the establishment of finance fund, the ceramic and tile cluster units have been asked whether they agreed to join the fund or not? The answers provided by ceramic and tile cluster units are as follows:

- 100% of ceramic and tile cluster units declared their intention to become a member and invest in the fund.

Coordination in ceramic and tile cluster units

Regarding the topic of harmony and establishment of a non-governmental organization for this purpose ceramic and tile cluster units were asked whether there is any trade or professional association in their industry or not? Their answers have been as follows:

- 67% of ceramic and tile cluster units have stated that there are trade or professional associations in their industry.

ceramic and tile cluster units have been asked that at which level do the trade or professional associations work in their industry (city, province, and country) and the answers provided by ceramic and tile cluster units are as follows:

- 25% of ceramic and tile cluster units have announced that their trade association works within the city.
- 25% of ceramic and tile cluster units have announced that their trade association works at the provincial level.

- 75% of ceramic and tile cluster units have announced that their trade association works at country level.

ceramic and tile cluster units were asked whether they are a member of their own trade association or not? The answers provided by them have been as follows:

- 75% of ceramic and tile cluster units are a member of their own trade association.

Regarding the coordination, ceramic and tile cluster units have been asked "if the issues related to the manufacturing units are supposed to be organized through the formation of a non-governmental organization in order to increase their share of national and international markets and solve existing problems, what combination is appropriate for it?" the answers of the units have been as follows:

- 100% of the ceramic and tile cluster units believe that the mentioned organization should be established through the presence of the similar industrial units.

Evaluation of the points of strength & weaknesses and opportunities & threats of ceramic and tile cluster

SWOT analysis can be performed in various fields such as marketing, supply chain of information systems, and etc. Essentially, this analysis proves to be valuable when used for the current situation, but this analysis can also be used to formulate the strategies. Using SWOT analysis (strengths, weaknesses, opportunities and threats), it will be possible firstly to analyze the internal and external environments and also to be able to make strategic decisions which balance the organization competitions through appropriate job opportunities.

Evaluation of strengths, weaknesses, opportunities and threats of ceramic and tile cluster

Strengths of ceramic and tile cluster

1. Acceptable quality of the products at the level of international standards
2. Having modern technology with a high and flexible level of automation
3. Land access
4. Access to financial resources and liquidity for investment
5. Low environmental costs
6. Centralized growth of industry in the cluster
7. Access to high quality raw materials
8. Lower labor costs
9. Access to and low cost of energy (natural gas and LPG)
10. Access to advanced industrial structure in the region
11. Relatively suitable supply of the growing domestic market by domestic manufacturers

Weaknesses of ceramic and tile cluster

1. Lack of popularity of Yazd tile cluster in the international markets
2. Failure to provide clear and determine guidelines for the exports by Iranian manufacturers
3. Low prices of the exported cluster tile

4. Strong dependency on the domestic market and limitation of the cluster export markets to the non-wealthy neighboring countries which directly results in a low international experience, primarily because of several decades of the domestic market protection
5. Low production per capita
6. Unused capacity in some areas of production
7. Extreme production capacity: installed capacity is higher than the domestic demand.
8. High cost of maintenance due to the lack of local service companies
9. Low productivity of labor and capital
10. Shortage of human resource skills compared with modern and advanced equipment (improper order of installation, technology)
11. Problem of high transport cost
12. Inadequacy of educational, research and laboratory services
13. Inadequacy of managerial, marketing, designing and technical skills
14. Poor design
15. Low quality of the production glaze inside the cluster
16. Poor packaging
17. Low social capital
18. Lack of joint meetings to discuss and share experiences
19. Failure to meet the diversity needed by society on design, color and size of products

Opportunities of ceramic and tile cluster

1. Rich markets with high consumption in the region (the Persian Gulf states) and more distant markets with high consumption (Western Europe)
2. Neighboring countries spending postwar reconstruction era
3. Increasing consumption of ceramic tiles at the international level
4. Development of railway network
5. Advantages of direct foreign investment in the supply chain services (maintenance) and in the supply of unnatural materials (glossy and glazy)
6. Trade globalization
7. Establishment of special economic zone
8. Changing use patterns
9. Privatization of domestic competitors
10. Better use through the installed technology efficiency (more flexibility)
11. Supporting role of local and central authorities
12. Innovation in industrial clusters

Threats of ceramic and tile cluster

1. Significant increase in global competition
2. Significant increase in China's exports
3. Cheap products from China and India
4. Entrance of new competitors with high production capacities
5. Surplus production at the national level
6. Water scarcity
7. Increase in the fuel carriers prices

8. Limited mineral resources
9. Lack of WTO membership
10. Increased environmental tendency
11. Labor and social security and tax laws
12. About 40 percent of the domestic competitors are government companies
13. Political sanctions on the restriction of access to the imported¹ technology and spare parts and raw materials

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