

## Zinc industry cluster development in Zanjan province

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**Abstract:** Introduction: This paper presents a study on cluster development of Zinc industry in Zanjan province. The industrial clusters are a model of industrial organization which has entered in industrial development literature through recent decades as one of the newest strategies for regional development. The Zanjan Zinc industry can be defined as the province development axle, for it plays an important role in province economy from point of production and employment, investment and exchange technology. The activity of the industry is international and the rivalry is very high in the level. The factors can help to the rivalry are management between corporation and university, regulations and laws, guild, scientific and education organizations, technology and interaction among university and industry and community capital.

**Key words:** Zinc Industry Cluster; Zanjan Province; Development Strategy

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### 1. Introduction

Industrial clusters are "geographic concentrations of firms and competing, completed and/or related industries which have business relationship together or common need to special abilities, technology and substructures. The clusters members may be directly competing with each other to provide other inputs members or be other member's output buyers (Porter, 1998).

Zinc is one of the most essential and frequently used non-ferrous metals and sorts as heavy metals and the most used in galvanized industry to prevent corrosion of metals.

Some countries like China, Peru, Australia, Canada and US are from proposed global countries regarding to zinc production. Iran is the fourth huge mineral producer of lead and zinc in Asia after China, Kazakhstan and India. Also, Iran has the sixth place for ingots production.

In Iran, Zinc is produced in the central provinces like Isfahan, East Azerbaijan, Hormozgan and Zanjan.

In this study, we will consider the concept of cluster to study the possibility of implementing the cluster development activities in Zanjan province.

Zanjan province is the most essential province for profiting from four active mines in the country from point of having metal mineral resources. The most important and biggest zinc mines are *Angooran* (Located 130 km southwest of Zanjan City), *Irankooh* (Located 20 km southwest of Isfahan City) and *Bafgh* (Located 120 kilometers southeast of Yazd City). Among the three mines, *Angooran* mine has located in Zanjan province. This mine is the provider of raw

material of more than 60 factories in the country and so its importance is quite clear.

After imposed war, by considering *Angooran* mine, the attention of internal specialists have been attracted to zinc technology acquisition and some expand researches in national level have been done to acquire bar production technology from concentrate and *Angooran* mine and it made the production of first ingots in pilot scale in 1992. The production of Ingots was started in 1993 in mineral processing company and then with establishing and setting up Ingots producing, it took ascending route.

Zanjan province has also some developing capabilities as follow:

1. There are a variety of capacities in mining and minerals
2. Zanjan province is holder of strong capacity building and mobilization of national and regional scale such as main roads, highways, railways and airports, settled on the Tehran - Europe axle
3. The unique role of Zanjan as the throat connecting center of Country to the North-West and West.
4. Proximity to major population centers and industrial hubs and good suitable market
5. There are numerous academic centers

### 2. Zinc Cluster Development in Zanjan Province

By considering the studies about Zinc Cluster Development on Zanjan Province and the regional benefits located in the province, it has made industries fortifying, employment and stable development.

Table 1 shows Matrix of weaknesses, strengths, opportunities and threats for the industry. The

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factors that could affect the status of the industry is as follows:

Absence of comprehensive and macro looking and sharp increasing of consumption materials price, regardless of the dramatic decline of zinc ingots in the world, low-tech firms, increasing costs of chemicals, fuel, electricity, annual increasing of mineral machineries production and high customs taxes to import necessary mineral machineries, shortage of raw materials such as sulfuric acid and ruined environmental impacts in zinc ingots process are as another obstacles.

### 2.1. Value Chain

To determine types of relationship and its direction, analyzing of value chain study is important to identify the research team of zinc value chain which you can see in Fig. 1.

As seen in Fig. 1, the cost share of raw materials 45%, transport 10%, energy costs 25%, wages & salary 6%, consumable equipment's 4% and the rest 10% belongs to different costs and the most of it is for raw materials providing.



Fig. 1: The value-added chain in ingots production

Table 1: weaknesses, strengths and strategies of Zanjan Zinc industry

<b>Internal factors</b>	<b>Strength points</b>	<b>Weak Points</b>
	S1 Enjoyment of Zanjan Province from zinc processing background S2 Provincial officials support from industry S3 Existing of skilled artisans in Zanjan province S4 rich in minerals, especially zinc Angooran mine in Zanjan province S5 Existing of large number of processing units in Zanjan	W1 capital-intensity of the industry in using of the technology W2 Enjoyment to the industry from environmental pollution
<b>External Factors</b>	<b>S0 Strategy</b>	<b>WO Strategy</b>
<b>O Opportunities</b> O1 access of Zanjan province to the wide network of rail and road transit O2 Ability to provide expert and skilled manpower O3 Existing of specialized industrial estates in the province O4 Energy providing and communication capabilities in Zanjan province O5 Existing of global export markets O6 Existing of domestic markets in the country	1 - The development of Zinc industry in Zanjan province 2 - Creating conditions for the development of export 3 - Defining and compiling effective cooperation policy, strategy for industry and mining section	1 - Compiling strategic document of zinc national industry and Zanjan province 2 - Complete transfer of zinc industry processing units of Zanjan Province to Angooran region 3 - The development of zinc secondary industries in Zanjan Province
<b>T Threats</b> T1 uncertainty on zinc country strategy and industrial policy T2 Managers were sensitive to industry environmental risks,	<b>ST strategy</b>	<b>WT strategy</b>
	1 - Compiling strategic document of zinc national industry and Zanjan province 2 - Complete transfer of zinc industry processing units of Zanjan Province to Angooran region	1 - contributing to the updating of the production technology 2 - investing to reduce negative environmental impacts on the industry in Zanjan

By considering the present opportunities and threats in industry cluster of Zanjan province to develop and make a clear route, first of all the industry became documentation that is the Zanjan province zinc cluster in Fig. 2.

This map represents the current state of the industry and its relationship with various stakeholders. So, compiling the shortage of the strategy has been identified and presents a summary in future map from 1) types and number of

stakeholders 2) different stakeholders' relationship nature with main companies 3) power of the relationship. The difference between initial and future plan has presented in Fig. 3.

Cluster development requires changes in many dimensions. Cluster development has focused on the need to establish and promote relations between the stakeholders. For example, to enter new markets, competitors might be companies that have already

begun to work closely with other stakeholders, such as institutions, services providers and new customer.

The cluster map presents some information about the nature and strength of relationships required, stakeholders should be in the process of developing relationships that must be maintained in the cluster. A cluster map can be further six main

systems of production that are associated with the deals.

Cognitive studies have been conducted on a total of 35 clusters in the current map units of the production system is 5 large number, 9 average and 21 small units.

There are 13 public institutions, 19 contractors and 12 private services suppliers.

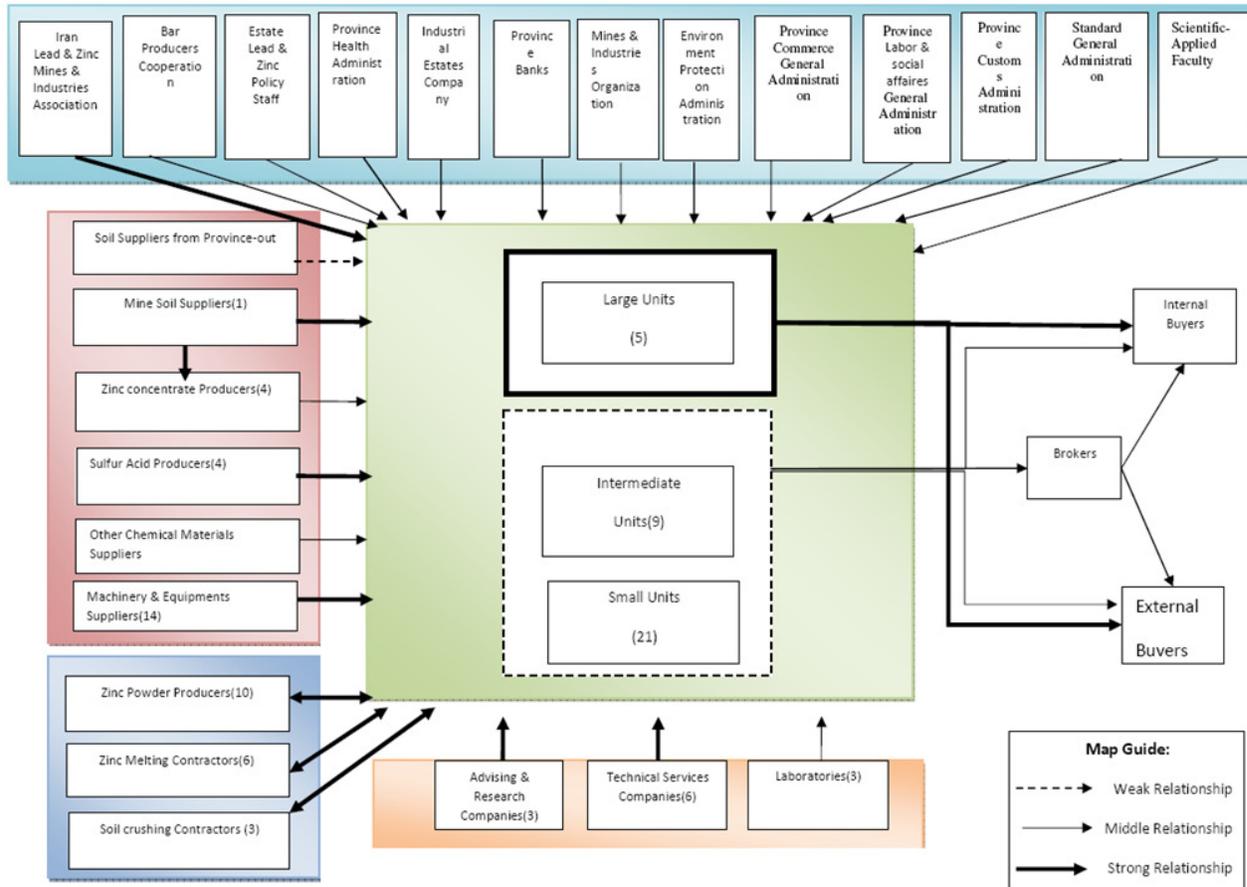


Fig. 2: Present Map of Zanjan Province Zinc Cluster

It should be noted that the researcher proposed some strategies to solve problems, the components that are added to the current map in the map later see.

For example, to help update the technology, we can reduce the environmental impact and the role of universities in the development of future models and/or to develop exports exhibitions and the Union Exporters are proposed.

### 3. Conclusion

Clusters reflect geographical and industrial focus areas that produce a series of related or complementary products and sell them as well as the challenges and opportunities facing the community.

Development of Industries is not allowed without the design and implementation of appropriate strategies. One of the most essential is industrial cluster development

Zanjan province with respect to component model compatible with the industry cluster development is one of the most important clusters of province that has effective impact in some cases like develop and more exploit from exist potential in the industry, enhances the capability labor recruitment, access to new markets and costs reduction , increasing of productivity and competitiveness, local economic development and encourage investment in the region.

In this study, a model of the development of industrial clusters was explained and a model of zinc cluster development in the Zanjan Province was briefly introduced. Although the province development capabilities and holder of many processing units and exploiting from rich mines of zinc in the province, there is not much activity in the field. It is hoped, the study could help to more familiarity with the industrial cluster development.

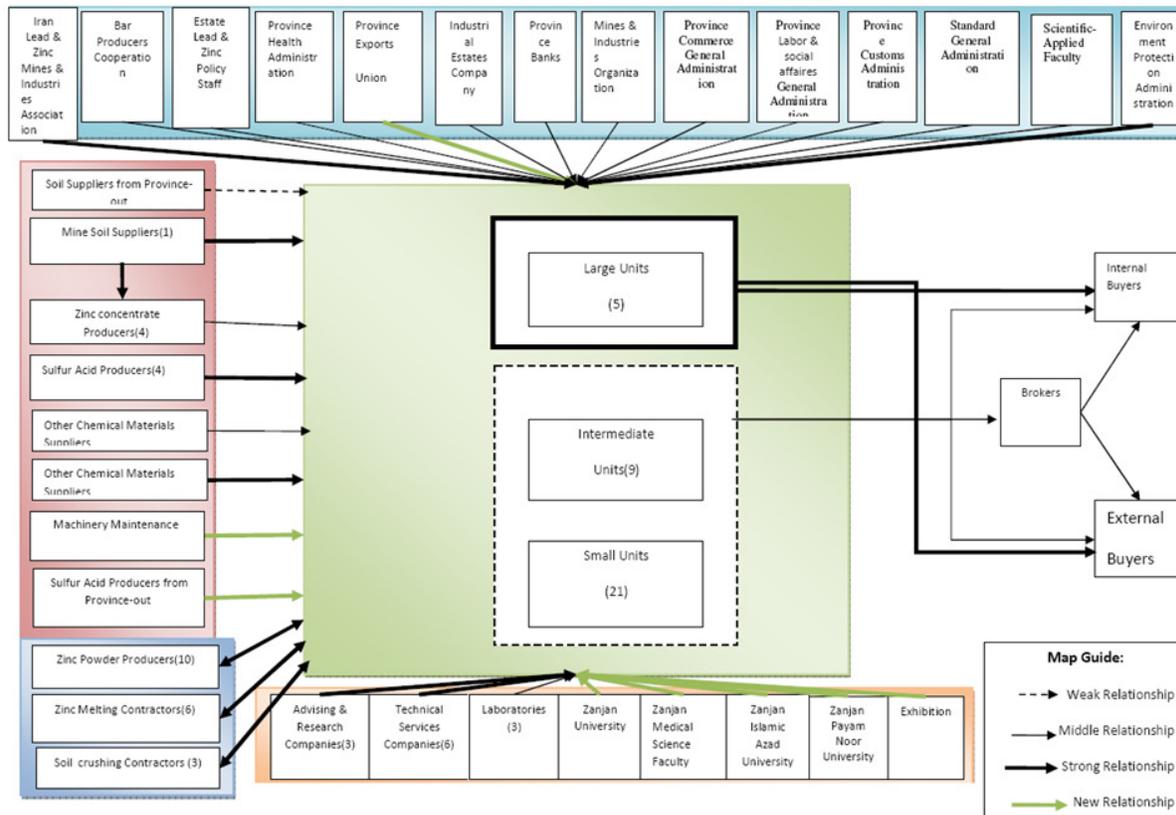


Fig. 3: Future Map of Zanjan Province Zinc Cluster

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