



ORIGINAL ARTICLE

Effective Factors on Positioning Major Industrial Activities

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ABSTRACT

This study strives to first identify effective factors on the positioning and development of major industrial activities across Iran. Second, examine whether there is any sort of difference among effective factors on positioning such activities or not. Third, examine the impacts of government policies on positioning major industries across the country in terms of industrial development. In so doing, the country's total industrial workshops (50 employees or more), that is equal to 2520 workshops have been considered as the sample population among which 263 workshops have been stratified using random sampling method. In order to obtain the required information and their due analysis, a questionnaire was designed and sent to managers or owners of the selected large workshops. The results indicate that convenience of industrial power, adequate land for future expansion of the workshop, cheap land, easy access to energy resources and fuel, the region's economic growth potential and easy access to raw material from the industry perspective (active, semi-active, low active and less active) are important factors among others. There are significant differences between important factors on positioning large industrial establishments located in active and low active regions in terms of industrial development. The study also shows that due factors like encouraging policies and government monitoring on positioning large industrial activities in active areas industrially are not significant. Yet, within industrially low-potential regions they have been influential factors on positioning major industrial activities.

Key Words: physical planning, positioning, industrial development, decentralization, major industrial workshops

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INTRODUCTION

Replacement of industrial activities is highly significant at national and regional physical planning. Because in addition to natural factors, the availability of jobs and job opportunities rising from industrial activity is another important factor to be counted for while specifying the settlement and location pattern involved in city development. Industrial activities would lead to creation of job opportunities directly and indirectly through stimulation of conditioned activities. More importantly, they would result in the emerging population through the recruitment of working force. In other words, "the settlement pattern is strongly bound to industrial and mining activity replacements. Besides, not site-bound activities follow the population spatial arrangement to a great extent." Considering the importance of industrial positioning within space and physical planning, the current study examines the three following goals:

1. Identifying the factors involved in positioning large industrial workshops located in different regions in terms of industry and also specifying the importance of each factor.
2. To investigate if there is any difference between effective factors on positioning major industrial workshops in various industrial regions? In other words, given the degree of regions' industrial development, would there be any difference in terms of effective factors involved positioning major industrial workshops?
3. Examining effects of government policies on industrial positioning located in different industrial regions. In other words, have the government policies been influential in positioning major industrial workshops or not?

Review of the Literature

There are largely two methods of theoretical and empirical for studying effective factors on industrial activity replacement. Theoretical method attempts to provide a general theory of the location of industry so that it could explain the location of industry structure and its changes. Empirical method, however, tries to characterize the factors considered important in the replacement of specific industries. This

method does not tend to formulize these factors into a general theory and therefore it ends up with presenting a descriptive outline. The least cost approach, market area analysis, and profit maximization approach are a few among others presented on the location of a given industry. Loscl is one of the several scholars who considers the market role as an important factor in determining the location of industries and stresses that considering the high rate demand from one place to another, the institutions attempt to respond to the maximum number of demands through market access. Thus, the market can be an important factor in determining the location of industries and is even more important than the least cost approach.

Obviously, far more objective criteria than those suggested by the theories of industrial positioning should be considered. A large number of studies have been carried out on the factors contributing particularly to the selection of industry location. Some of these studies will be mentioned here. Haryn and Parina have studied influential factors in industrial location in Philippine and drawn the conclusion that the following factors are highly significant in industrial positioning:

The current study suggests that the following factors, in terms of importance, receive primary or critical importance in the total location of major industries: ease of access to the industrial power, adequate land and facilities for future expansion of the plant, easy access to road and transportation system, low-cost land, adequate water for industrial use, ease of access and proximity to consuming market, and easy access to the required raw material.

Iran's industrial Decentralization Policies:

Following World War II, most of the developing countries selected major cities, largely capitals, as a safe heaven for industrialization and centralization of such industries to achieve rapid economic growth. In most of these countries import substitution policies were adopted, with the notion that sudden economic development is the only way to achieve rapid industrialization. As a result funding process was concentrated in metropolitan areas. So, they turned into desirable places for other social, economic, political and administrative activities. Meanwhile, the concentration of facilities in these cities attracted rural people and subsequently lead to rapid growth of these centers. Like other developing countries, Iran faced rapid rates of urbanization. In the late 40s, in order to prevent Tehran's rapid and sprawling growth and decentralize industry, some measures and policies were set among which one can refer to the formation of development poles for attracting large private industries and subsequently the formation of intermediate city structure and the reduction of national environment. To achieve these policies, some measures were taken to encourage and control industrial decentralization process (table 1) in the fifth development plan (1352_57) with the hope of reducing the concentration of industries in Tehran.

METHODOLOGY

Population

In order to achieve this study's objectives, large industrial workshops, 50 employees or more, were chosen as the population. Iran's statistical center has classified the country's major industrial workshops into 7 categories based on the maximum number of employees (table 2). So the big industrial workshops, 4,5,5 & 7 classes which is equal to 2520 large industrial workshops with more than 50 employees constitute the study's population.

Sampling and Data Collection

In order to get the list of required large industrial workshops, the last volume of the journal for Iran's Statistical Center in 1993 was used. In this paper, industrial activities are classified based on the International Standard for Industrial Classification (ISIC). Using this paper, large industrial workshops of 50 or more employees were extracted according to industrial activities (9 industrial activities- double digit codes) and industrial quad regions (active, semi-active, low active, less active). Using stratified random sampling, the number of subjects to be chosen from each quad regions and 4,5,6 & 7 classes was determined. From the countries total industrial establishments of the study (2520 workshops), 263 plants were selected. Nitmann allocation method was used to calculate the number of subjects in question. Using the list of the name and address of the major industrial workshops, the number of the major industrial workshops in the four regions was extracted based on the level of industrial development and the industry type (site-bound industries and foot-loose industries).

Incentive Measures

- 1 the establishment of industries located in provinces would gain exemption from income tax:
 - A. those which are 120 km outside Tehran will have five-year exemption from paying income tax.
 - b. industries moving to each of these provinces: Bakhtaran, Kurdistan, Bushehr, Hormozgan, Kerman, Sistan-oBaluchestan, would exempt from paying tax income for 15 years.
 - c. industries moving to out of Tehran for 120 km radius would exempt from paying income tax for 10 years.

d. industries moving to other provinces would receive 12 years of exemption from paying tax income.

Controlling Measurements

1. License is not passed for industries within the range of 120km and 50 km from Tehran and Isfahan respectively.
2. Cutting down on administrative centralization.
3. Preparing a comprehensive and elaborated plan of cities for the control and direction of the land use development.

| class | Max number of the staff |
|-------|-------------------------|
| 1 | 10-19 |
| 2 | 20-29 |
| 3 | 30-49 |
| 4 | 50-59 |
| 5 | 100-499 |
| 6 | 500-999 |
| 7 | 1000 and more |

Having identified major industrial workshops in the four regions, a questionnaire was designed and sent to the managers and owners of selected industrial establishments to collect the required data. This questionnaire attempts to identify the impact of each 35 factors, discussed to be the influential factors in the replacement of industrial activities within the review of the literature, in order of importance. These factors are relevant to raw materials, region's industrial structure, infrastructure facilities, region's growth potential, administrative and welfare facilities, state policies, personal and family motivations. There is an extra section to the aforementioned factors so it covers additional factors not included before. Table 3 demonstrates the number of questionnaires completed by major industrial workshops (50 employees and more) based on industry type, site-bound and foot-loose across the country's provinces.

Determining method of effective factors and their importance in the replacement of industrial activities

As noted before, the questionnaires were designed to identify the influential factors that may have contributed to the current location of the workshops in order of importance ranging from very important, quite important, important, to not-important. Using the method of Herrin Townore [1] to study the factors affecting the location of industrial activities in Brazil and Philippine, there are two criteria "mean index score" and "percent considered important" to measure the importance of each of the factors. In this model, mean index score is calculated this way: 1. very important 2, quite important 3, Important 4, not important. The importance of each factor is also defined as the percent ration of workshops that have announced the effect of the due factor in the replacement very important or quite important to the total workshops evaluated this factor. Important factors are those whose mean index score is 2 or more and their importance value is over 50%. To determine the importance of these factors, first of all the important factors need to be identified under the two criteria of mean index score and percent considered important. Then, mean value importance's of such factors are calculated. Factors with important value higher than the mean one are labeled as "critical factors" or "factors of primary importance" and the rest as "the factors of secondary importance".

| Regions' Industrial Activity Level | Province | Industries | | Total | |
|------------------------------------|----------|------------|-------------|--------|------------|
| | | Site bound | Foot- loose | Number | Percentage |
| Active | Tehran | 20 | 66 | 86 | 32.7 |
| | Isfahan | 15 | 15 | 38 | 10.6 |
| | Zanjan | 6 | 6 | 18 | 6.8 |
| | Khorasan | 2 | 2 | 14 | 5.3 |

| | | | | | |
|-------------|------------------|----|-----|-----|-----|
| Semi-active | Markazi | 6 | 6 | | |
| | Yazd | 3 | 4 | | |
| | Kerman | - | 6 | | |
| | Fars | 5 | 6 | | |
| | East Azerbaijani | 3 | 11 | | |
| | Khuzestan | 5 | 2 | | |
| Low active | Gilan | 4 | 11 | 15 | 5.7 |
| | Mazandaran | 9 | 5 | 14 | 5.3 |
| | Hamedan | - | 4 | 4 | 1.5 |
| | Lorestan | 1 | - | 1 | 0.4 |
| | Kermanshah | - | 4 | 4 | 1.5 |
| | W Azerbaijan | - | 6 | 6 | 2.3 |
| | Semnan | - | 6 | 6 | 2.3 |
| Less active | Bushehr | 1 | - | 1 | 0.4 |
| | Hormozgan | 3 | - | 3 | 1.1 |
| | chahar mahal | - | 1 | 1 | 0.4 |
| | bakhtiyari | - | 3 | 3 | 1.1 |
| | Kordestan | 1 | - | 1 | 0.4 |
| | Kogiluyeh | - | 1 | 1 | 0.4 |
| | Ilam | 82 | 181 | 263 | 100 |

RESULTS

Factors influential in the replacement of industrial activities located in industrial active, semi-active, low active and less active region.

The analysis of the completed questionnaires indicates that the total numbers of 19 factors are involved in the replacement of industrial activities in the active industrial regions (Table 4). Easy access to industrial power, road and transportation system, adequate land and facilities for expansion of the plant, the existence of decent communication system (telephone, teletext, postal service, etc.), enough water to fuel energy sources, low-cost land, access and proximity to consuming markets, region's economic growth potential, the existence of welfare and hygienic services were considered as critical factors or factors of primary importance in the replacement of major industrial workshops located in active regions in order of importance. The factors of secondary importance are as follows in order of importance: the presence of skilled workers, technical and maintenance services, decent public services, easy access to the required raw material, proximity to administrative and political agencies, personal or family incentives of workshop owners (s), industrial site with a reasonable price, technical consultants (technical, accountancy advice agencies, environmental conservation and pollution control). Another important finding of analyzing completed questionnaires was that the total of 17, 14, and 14 factors were involved in the replacement of industrial activities in semi active, low active and less active regions respectively. These factors and their importance, primary and secondary, have been presented in table 4.

| Row | Factors | Importance of factors in positioning major industrial workshops | | | |
|-----|--|---|-------------|------------|-------------|
| | | Active | Semi active | Low active | Less active |
| 1 | Easy access to industrial power | 1 | 3 | 2 | 4 |
| 2 | Easy access to road and transportation system | 2 | 2 | 7 | - |
| 3 | Adequate land for future expansion | 3 | 1 | 3 | 1 |
| 4 | Appropriate communication system | 4 | - | - | 12 |
| 5 | Adequate water for industrial use | 5 | 7 | 1 | - |
| 6 | Easy access to other energy and fuel resources | 6 | 5 | 5 | 13 |
| 7 | Low cost | 7 | 4 | 4 | 2 |

| | | | | | |
|----|--|----|----|----|----|
| 8 | Access and proximity to consuming market | 8 | 10 | - | 5 |
| 9 | Region's economic growth potential | 9 | 8 | 6 | 6 |
| 10 | Welfare and hygienic services | 10 | 16 | 13 | - |
| 11 | Skilled worker | 11 | - | - | - |
| 12 | Technical and maintenance services | 12 | - | - | - |
| 13 | Public decent services | 13 | 15 | - | - |
| 14 | Easy access to required raw material | 14 | 6 | 9 | 3 |
| 15 | Proximity to administrative and political agencies | 15 | - | - | - |
| 16 | Personal and family incentives of the owners | 16 | - | 14 | - |
| 17 | Industrial site with suitable price | 17 | 13 | - | 7 |
| 18 | Technical consultants | 18 | - | - | - |
| 19 | Environmental and pollution control | 19 | 14 | - | 11 |
| 20 | Using bank credit facilities | - | 11 | 11 | - |
| 21 | Similar/complementary workshops in the region | - | - | - | - |
| 22 | Using industrial loan | - | 9 | 12 | - |
| 23 | Easy basic agreement | - | 12 | 8 | - |
| 24 | Easy disposal/purification industrial waste | - | - | - | - |
| 25 | Cheap work force | - | 17 | - | - |
| 26 | 120 km out of Tehran | - | - | - | 14 |
| 27 | Lack of competitors | - | - | 10 | 8 |
| 28 | Industrial districts | - | -- | - | - |
| 29 | Using state subsidies | - | - | - | - |
| 30 | Easy access to railroad | - | - | - | - |
| 31 | Using granted privilege by local authorities | - | - | - | 10 |
| 32 | Easy access and proximity to airport | - | - | - | - |
| 33 | 150km out of Isfahan | - | - | - | - |
| 34 | Easy access to main ports | - | - | - | 9 |
| 35 | Using discount for customs tariff | - | - | - | - |

Table 3: Important factors involved in positioning major industrial workshops located in active, semi active, low active and less active provinces.

Analyzing presented results in tables 3 and 4 indicates that:

None of the following factors were involved in positioning industrial activities (major industrial workshops) in any of the four regions (active, semi-active, low-active, less active): the existence of industries or similar/complementary workshops in the region, easy disposal or purification of industrial waste, industrial town(s), using state subsidies, easy access to railroad, access and proximity to the airport, being outside the range of 50km of Isfahan, using the discount of custom tariffs in positioning industrial activities.

Cheap workforce is only considered an important factor in semi-active regions (of secondary importance). Using granted privileges from local authorities and easy access to the country's ports, out of the range of 120km from Tehran are only accounted for in less active (of secondary importance) regions.

Using bank credit facilities (of secondary importance), industrial loans (of primary importance in semi-active regions and secondary in low-active ones) and the ease of obtaining principle agreement (of primary importance in low-active regions and secondary in semi-active regions) are only considered to be significant in semi-active and low-active regions.

Decent public service is only considered to be important in active regions (of secondary importance).

Easy access to roads and transportation system, adequate water for industrial consumption and welfare and hygienic services are important factors in the replacement of industrial activities in active, semi-active and low-active regions, whereas they are not significant in less active regions.

Easy access to industrial power, adequate land and facilities for the future expansion of the workshop, easy access to other fuel and energy resources, low-cost land, region's economic growth potential and easy access to the essential raw material have been considered as important factors in all four industrial regions (active, semi active, low active, less active).

| Regions' industrial activity level | Site-bound | Foot-loose |
|------------------------------------|------------|------------|
| active | 28.08 | 71.92 |
| Semi-active | 37.93 | 62.07 |
| Low active | 28.57 | 71.43 |
| Less active | 50 | 50 |

Table 4: Nature of industries in four industrial regions based on site-bound or foot-loose factors.

Data analyzing indicates that there is a significant difference among the factors' rating in response to their importance among the four industrial regions: Esperman correlation coefficient shows that there is much more relationship among the important factors in the replacement of major industries located in active and semi active regions (0.7588) to factors in active and low-active regions (0.6640). The least relationship in terms of important rating factors exists between active and less active regions (0.4818). This suggests that there is a noticeable difference between the important factors of active and less developed regions.

DISCUSSION

This study aims at three objectives. Here we hope to represent a summary of these findings relevant to these goals. The results show that 19, 17, and 14 factors have been highlighted to be significant in positioning major industrial workshops in active, semi-active, low active, and less active regions respectively (tables 3 & 4) among which "easy access to industrial power", "adequate land and facilities for workshops for future expansion", "easy access to required raw materials" have been considered as important factors in all four industrial regions. In other words, industrial power, land, energy and fuel resources, easy access to raw material and region's economic growth potential are factors playing a big part in the replacement of large industrial activities within different industrial regions. The Philippine [2] and Brazil [1] study on factors affecting the location of industrial activities regardless of geographical and spatial aspects, indicates that adequate industrial land, access to confident electrification system, enough room for further development of the workshop are highly significant factors in positioning major industries. There is a noticeable difference between active and less active regions regarding the location of major industrial workshops. This means that major industries of active regions consider various factors on the location of industrial workshops compared to less active regions.

In spite of some differences among factors influential across active, semi-active, low active, and less active regions (table 3), they are senseless statistically. This study suggests that none of the factors relevant to incentive and control policies are important in the replacement of major industrial workshops in active regions except for "environment and pollution control" factor. These results corresponds to the findings from the total of the state major industries and those from Philippine [2], Brazil [1], Venezuela [3] and Thailand [4]. It is worth noting that foreign studies have not considered the geographical and spatial aspects of industries. Finally, this study shows that the state incentive and control policies in industrially - ill regions are considered to be effective in the location of major industrial activities.

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