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Comparative analysis of the optimum level of manufacturing capacity in advance of the construction sector in years 2001-2018

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Abstract

The main purpose of this article is a comparative analysis of the optimal level of production capacity of leading industrial industries in the construction sector in the years (2001-2018). In this article, we compare six different industries that are leading industries in manufacturing. These industries are: (Cement, lime and gypsum, wood and wood products, glass and ceramics, construction equipment, home and decorative, stone), in order to determine the optimal level of production capacity in the industries of the leading factories with double-digit ISIC code.Rev.2 and ISIC.Rev.3 Translog cost function was used. Production efficiency is the equivalence of scale traction or cost traction (inverse of scale traction) with one. To obtain the optimal level of production, first from the equation of scale elasticity or cost elasticity with one, a production level was obtained which naturally satisfies the first condition, then the second condition in production was obtained for research purposes. The results of the analysis of the leading production capacity of the construction sector showed; in the cement, gypsum and lime industries, showed that the amount of optimal production capacity in the cement, gypsum and lime industries was estimated at 190%. The wood and products industries use just over 28% of their nominal capacity. In the glass and ceramic industries, the capacity utilization was estimated at 154%. Construction equipment Capacity utilization was estimated at 137%. Home and decorative industries; Capacity utilization was estimated at 149%. Stone industry, the nominal production capacity of these industries is about 41%. Capacity utilization was estimated at 78% in the analysis.

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1. Introduction

The construction industry, with a market volume of about $ 5,000 billion, accounts for a significant share of global GDP. More than 50% of the world's raw materials are used in the construction industry. However, the low productivity of this industry has been emphasized by many scientific and economic associations in the world. About 50 years ago, productivity in non-construction industries almost doubled. The construction industry is one of the leading industries in any economy. As this industry grows, other industries will follow suit. In the construction industry, if rational planning is done, the industrial revolution can take place in this sector. Our country is in dire need of this industry. As many of our current population is currently homeless [8]. And this is a very favourable situation for the country. Also, neighbouring countries have been involved in the war. They need reconstruction. Therefore, it is possible to provide the ground for development in this sector by increasing the birth capacity of factories related to this industry. One of the necessities of economic planning at regional levels is awareness of the production capabilities of different factory sectors [6]. Therefore, determining the position of the key and top industries to direct investment to these industries in different regions for the optimal allocation of resources is of particular importance [4]. Making investments and the importance of guiding the private sector to invest in industrial activities by the economic structure of each region, requires a study of the capabilities of each region and also to determine the expertise of each region in one or more specific activities [1]. In this article, we evaluate the production capacity of the leading factories in the manufacturing industry. Finally, by comparing the production capacities in different years mentioned in the title, the necessary suggestions are made in line with the obtained results.

2. Background Research

Yousefi et al. [9] conducted a study entitled "Comparative study of how to use production capacity in Iran's manufacturing industries." The results of the study showed that except for petrochemical industries, other industries face little use of production capacity. On average, the country's industries use less than 50% of their capacity. (28.7%), paper (29.6%) and wood and wood products (24.1%) less and in other industries except non-metallic mineral products (84.2%) between 41 to 51 The percentage is very small overall.

Rasekhi et al. [3] conducted a study entitled Cost Transfer in Iranian Manufacturing Industries. The results showed that the ratio of focus and economies of scale has a positive and significant effect on the cost transfer rate. In addition, the present study shows that firms with more market power but lower productivity can transfer higher costs compared to firms with higher productivity and lower market power. The findings of this study also indicate a positive but insignificant effect of the number of firms on cost transfer. In general, the amount of cost transfer depends on the market structure.

Shahiki Tash et al. [7] conducted a study entitled Comparative comparison of price gap and final cost in Iran's manufacturing industries and selected countries. The results showed that in some industries the difference between the price and the final cost was very high and in some industries it was small. The results of this study show that out of 22 industries surveyed, 3 industries have higher markups from the United States, Japan, Germany, France, Italy, Britain, Canada, Australia, Belgium, Denmark, Finland, the Netherlands, Norway and Sweden. They have been able to create

a significant gap between price and final cost (MC). Also, out of 22 industries surveyed, 3 industries have less markup than selected countries. In general, the tobacco industry has the lowest markup and the non-metallic mineral products industry has the highest markup among selected countries.

Sadraei Javaheri and Manouchehri [5], a study entitled The Dynamics of Industrial Concentration in Sana They did an Iranian factory. To conduct this study, the models were analyzed using a cross-sectional method for 94 industries with four-digit ISIC codes in 1999 and 2007. Observations show that the adjustment of industrial concentration towards its uniform value is a partial adjustment. Significant and smaller than the uniformity of the intermittent variable concentration coefficient in the models indicate an incomplete adjustment of concentration to a uniform state. This result has also been observed for a subset of industries including 47 industries with high and low advertising intensity categories. In addition, a comparison of the Herfindahl-Hirschman concentration index in these industries indicates that the level of industrial concentration in most industries (63%) has decreased during this period. The results obtained in the classification of industries based on the intensity of strong evidence-based advertising confirm the satin theory that there is an inverse relationship between industrial concentration and market size for industries with the initial cost of exogenous entry (low advertising intensity), this result in industries Endogenous entry fee (high advertising intensity) was not confirmed.

Mani Motameni [2] conducted a study entitled Estimating Informal Income in Iran's Manufacturing Industries. Informal income in firms is formed to reduce profit tax. In the case of a false financial statement, part of the firm's sales are hidden, resulting in a reduction in formal profits. In this research model, informal firm income is considered as a function of the distance between real profit and formal profit. Statistical distribution related to firms' profits shows a special form of beta distribution, the parameters of which are based on a sample of Iran's manufacturing industries. The reason for choosing factory industries is the complex process of converting data into output in these firms, which makes it difficult to accurately audit taxes. Hence, it is not impossible to create informal sales in factories that have a complex production process - despite the VAT system. By simulating profit and creating a random process in the variable related to tax evasion, the probability density function for informal sales is created. The results show that informal income at the 99% confidence level includes between 11 and 12% of sales of factories that have sufficient opportunity and incentive to evade taxes.

3. Research Methods

Many methods have been proposed by experts to estimate the utilization of production capacity of different factory industries, which can be divided into two categories: engineering method and economic method. In this research, economic methods were used with the help of econometric techniques. In another model, the Translog cost function is used to estimate each of the important factors affecting the optimal production in the leading industries in the construction sector. Statistical data of the leading factory industries in the construction sector with 2 if possible digits of industries with international ISIC and SITC codes, which are published by the Statistics Center of Iran in publications related to the census of large industrial workshops Employees and more were used. In this method, after collecting data and converting current prices to constant from econometric techniques, especially the method of the logarithmic transcendental cost function, which was first introduced by Kristen, Jorgenson Lao in 3, which is called translog for short. In fact, the simple expansion of the Taylor second series approximation is around the zero point, which is done according to the logarithmic values of the relation $C = C(t, Q, P)$. The quadratic expansion of the Taylor series is actually a method of approximating an indeterminate form of function that is used in most experimental work,

so the expansion of the cost function in terms of the variables P And Q And t around the points $0\ P\ In = In\ And 0 = Q\ And 0\ It\ n = Equivalent\ to$:
$In\ C\alpha_{\cdot} + \alpha_Q In\ Q + \frac{1}{2}\alpha_{QQ}(In\ Q)^2 \sum_{i=1}^{3} \beta_i In\ P_i + \frac{1}{2}\sum_{i=1}^{3}\sum_{j=1}^{3}\gamma_{ij} In\ P_i In\ P_j + \sum_{i=1}^{3}\gamma_{iQ} In\ P_i In\ Q$
$i, j = L, M, K$
It was used to calculate the minimum cost and estimate the use of production capacity in the industries of leading factories in the construction sector. With the help of other econometric techniques, the factors affecting the utilization of production capacity from the industries of Iran's top factories were estimated. The above function is logarithmic because, first, because in economics prices and zero values are not defined for a firm. In order to expand the Taylor series around the zero point, the values must be converted to a logarithmic form, while in the forms of logarithmic functions the coefficients can be interpreted to stretches, which will reduce the computational volume, on the other hand, the above function is superior It is called, which by applying constraints on coefficients, can be converted into a set of other functions such as CES and Cobb-Douglas, and in other words, it also contains other dependent forms. In explaining technological changes, the problem is that, How a large and heterogeneous range of technological change can be explained by one variable. In this regard, in many different studies, time trend (t) has been used as an indicator of technological change in the model, so in this study, in the cost functions, time counter was used as an independent variable and as an indicator of technological change. In the final model with the entry, the coefficient of technological change is as follows:

$$\begin{aligned} In\ C = \alpha_{\cdot} + \alpha_Q + In\ Q + \frac{1}{2}\alpha_{QQ}(In\ Q)^2 + \sum_{i=1}^{3}\beta_i In\ P_i + \frac{1}{2}\sum_{i=1}^{3}\sum_{j=1}^{3}\gamma_{ij} In\ P_i In\ P_j \\ + \sum_{i=1}^{3}\gamma_{iQ} In\ P_i In\ Q \\ + \sum_{i=1}^{3}\gamma_{it} In\ P_i In\ t + \gamma_{Qt} In\ t\ In\ Q + \alpha_t In\ t + \frac{1}{2}\alpha_{tt}(In\ t)^2 \quad i, j = L, K, L \end{aligned}$$

where:
TC is the total cost of production over a period and includes the total wages and salaries paid to the labor force, inputs, raw materials, depreciation and the opportunity cost of capital.
Q, the physical surface of the product (output);
P_1, the price of labor services in terms of people - Rials;
P_k, capital stock price including depreciation cost and the opportunity cost of capital use;
P_m, the weighted average of the prices of all intermediate institutions, raw materials and energy consumed;
T, the trend of time as an indicator of technological change;
In Translog functions:
War, virtual variables related to war;
Sl_t, is the share of intermediaries, raw materials and energy in the cost.

3.1. Estimation of Translog cost function for cement, gypsum and lime industries

The long-term average cost chart of the cement, gypsum and lime industry shows that there are economies of scale in this industry and costs can be reduced by moving towards the optimal point. Production capacity is increasing. The following equation is estimated to estimate the translog cost function for the cement, gypsum and lime industries.

Table 1: Results of Translog cost estimation function in the production of cement, gypsum and lime industries. References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees by ISIC (Rev.2) AndISIC (Rev.3).

	Coefficient	**t-statistic**	**prob**
C (1)	27.6452319	8.3214892	0.00
C (2)	-5.3218649	-6.3786924	0.00
C (3)	0.6421358	9.21436287	0.00
C (4)	0.1945218	1.3678942	0.33
C (5)	0.8632574	0.9456127	0.00
C (6)	-0.3021468	-8.3216524	0.00
C (7)	0.0452617	11.6451287	0.00
C (8)	-0.0642157	0.3621452	0.00
C (9)	-0.7824513	0.3126427	0. 42
C (10)	0.7456128	2.3124789	0.02
C (11)	-0.7521632	-0.4563217	0.04
C (12)	-0.5524167	-.04124516	0.00
C (13)	-01236417	-0.4563217	0.43
C (14)	-0.6472137	-0.6421795	0.00
C (15)	-0.8241365	-0.5623178	0.01
R^2		0.98	

$$\begin{aligned}\log\left(\frac{TC_{31}}{PK_{31}}\right) &= c(1)+c(2)\times\log(q_{31})+0.5\times c(3)\times\log(q_{31})^2+c(4)\times\log\left(\frac{PL_{31}}{PK_{31}}\right)\\ &+c(5)\times\log\left(\frac{PM_{31}}{PK_{31}}\right)\\ &+0.5\times c(6)\times\log\left(\frac{PI_{31}}{PK_{31}}\right)\times\log\left(\frac{PM_{31}}{PK_{31}}\right)+0.5\times c(7)\times\log\left(\frac{Pl_{31}}{PK_{31}}\right)^2\\ &+0.5\times c(8)\times\log\left(\frac{Pm_{31}}{PK_{31}}\right)^2\\ &+c(9)\times\log(q_{31})\times\log\left(\frac{Pl_{31}}{PK_{31}}\right)+c(10)\times\log(q_{31})\times\log\left(\frac{Pm_{31}}{PK_{31}}\right)\\ &+c(11)\times\log(T)+0.5\times c(12)\times\log(T)^2\\ &+c(13)+c(14)+c(15)\times War+c(15)\times Fall \qquad (3.1)\end{aligned}$$

$$Sl_{31}=c(4)+c(6)\times\log\left(\frac{PM_{31}}{PK_{31}}\right)+c(7)\times\log\left(\frac{Pl_{31}}{PK_{31}}\right)+c(9)\times\log(q_{31}) \qquad (3.2)$$

$$Sm_{31}=c(5)+c(6)\times\log\left(\frac{Pl_{31}}{PK_{31}}\right)+c(8)\times\log\left(\frac{Pm_{31}}{PK_{31}}\right)+c(10)\times\log(q_{31}) \qquad (3.3)$$

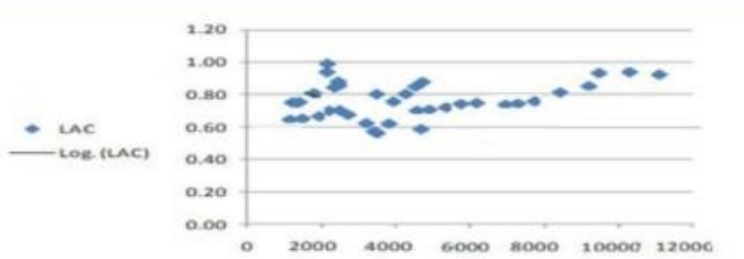

Figure 1: Long-term average cost curve of cement, gypsum and lime industries.

References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees byISIC (Rev.2) AndISIC (Rev.3)

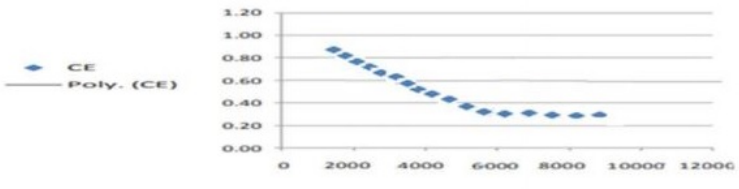

Figure 2: Cost elasticity of each sector of a large industrial enterprise in the production of cement, gypsum and lime industries.

References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees byISIC (Rev.2) AndISIC (Rev.3)

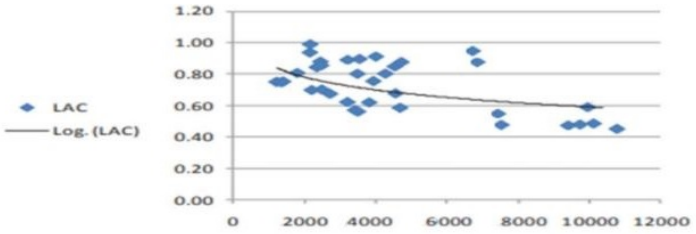

Figure 3: Long-term average cost curve of wood production and wood products.
References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees byISIC (Rev.2) AndISIC (Rev.3)

3.2. Estimation of Translog cost function for wood production and wood products

The wood and wood products industry consists of four sectors of production of wood, furniture, doors, cabinets, consideration of items in this sector shows that more than 45% of the output value of this sector is related to wood production and the rest is the production of furniture, doors, cabinets. The need to pay attention to the sub-sectors of this industry is due to the fact that new technologies in its production and application in the mentioned sub-sectors are different. He was a capitalist in the production of furniture, but he was a user in the production of furniture, doors and cabinets. Examining the long-term average cost chart of this section shows that the slope of the average cost curve is sharply decreasing and economies of scale are of great importance.

In order to estimate the Translog cost function for the wood and wood products industries, the following relation is estimated.

$$\begin{aligned}\log\left(\frac{TC_{32}}{PK_{32}}\right) &= c(1)+c(2)\times\log(q_{32})+0.5\times c(3)\times\log(q_{32})^2+c(4)\times\log\left(\frac{PL_{32}}{PK_{32}}\right)\\ &+c(5)\times\log\left(\frac{PM_{32}}{PK_{32}}\right)\\ &+0.5\times c(6)\times\log\left(\frac{PI_{32}}{PK_{32}}\right)\times\log\left(\frac{PM_{32}}{PK_{32}}\right)+0.5\times c(7)\times\log\left(\frac{Pl_{32}}{PK_{32}}\right)^2\\ &+0.5\times c(8)\times\log\left(\frac{Pm_{32}}{PK_{32}}\right)^2\\ &+c(9)\times\log(q_{32})\times\log\left(\frac{Pl_{32}}{PK_{32}}\right)+c(10)\times\log(q_{32})\times\log\left(\frac{Pm_{32}}{PK_{32}}\right)\\ &+c(11)\times\log(T)+0.5\times c(12)\times\log(T)^2\\ &+c(13)+c(14)+c(15)\times War+c(15)\times Fall \qquad (3.4)\end{aligned}$$

$$Sl_{32}=c(4)+c(6)\times\log\left(\frac{PM_{32}}{PK_{32}}\right)+c(7)\times\log\left(\frac{Pl_{32}}{PK_{32}}\right)+c(9)\times\log(q_{32}) \qquad (3.5)$$

$$Sm_{32}=c(5)+c(6)\times\log\left(\frac{Pl_{32}}{PK_{32}}\right)+c(8)\times\log\left(\frac{Pm_{32}}{PK_{32}}\right)+c(10)\times\log(q_{32}) \qquad (3.6)$$

Table 2: Results of Translog cost estimation function in wood production and wood products., References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees byISIC (Rev.2) AndISIC (Rev.3)

	Coefficient	**t-statistic**	**prob**
C (1)	-18.3421567	-3.1243287	0.03
C (2)	7.6421537	3.4215639	0.00
C (3)	-0.7215348	-3.5421763	0.00
C (4)	0.6823197	1.794328	0.01
C (5)	0.0932147	0.3642157	0.02
C (6)	0.0254173	0.3426571	0.37
C (7)	0.5421387	4.3215642	0.00
C (8)	0.4215361	-2.3124567	0.00
C (9)	-0.2541686	0.7643954	0. 00
C (10)	-0.4763215	-4.642156	0.00
C (11)	-0.8342156	-2.643871	0.00
C (12)	-0.5524167	-.04124516	0.00
C (13)	-0.3641271	-1.532164	0.01
C (14)	-0.1975342	-1.7146382	0.28
C (15)	-0.4536127	-0.6453218	0.00
R^2		0.97	

The table below 2 shows the coefficients obtained from the cost transfer function estimation for the wood products and wood products sector. As can be seen, except for the coefficient $C(6)$ and $C(14)$, other coefficients have a good level of significance.

According to the diagram below 4, the second condition of production optimization is not provided at the production level, where the cost elasticity is equal to one.

Therefore, the functional form of cost elasticity is estimated to obtain the second solution of Equation $CE = 1$ as the optimal production level:

$Y = 0.000000003415244251574x^2 - 0.0004262972712336110 0x + 1.842311624551290000 00$

$R^2 = 0.9754142371923100000$

By estimating a function with a significance level of 97.5%, the intersection points of this function were calculated with the line $CE = 1$ (tensile equal to one).

3.3. Estimation of Translog cost function for glass and ceramic industries

The long-term average cost chart of this industry shows that there are economies of scale in this industry and by moving towards the optimal point, costs can be reduced. Production capacity is increasing. The following equation is estimated to estimate the translog cost function for the glass

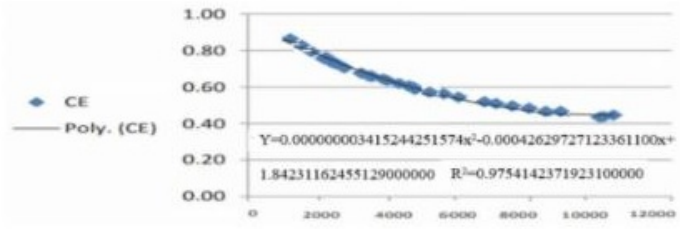

Figure 4: Cost elasticity of each large industrial enterprise in the production of wood and wood products.
References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees byISIC (Rev.2) AndISIC (Rev.3)

and ceramic industry.

$$\begin{aligned}\log\left(\frac{TC_{33}}{PK_{33}}\right) &= c(1)+c(2)\times\log(q_{33})+0.5\times c(3)\times\log(q_{33})^2+c(4)\times\log\left(\frac{PL_{33}}{PK_{33}}\right)\\ &+c(5)\times\log\left(\frac{PM_{33}}{PK_{33}}\right)\\ &+0.5\times c(6)\times\log\left(\frac{PI_{33}}{PK_{33}}\right)\times\log\left(\frac{PM_{33}}{PK_{33}}\right)+0.5\times c(7)\times\log\left(\frac{Pl_{33}}{PK_{33}}\right)^2\\ &+0.5\times c(8)\times\log\left(\frac{Pm_{33}}{PK_{33}}\right)^2\\ &+c(9)\times\log(q_{33})\times\log\left(\frac{Pl_{33}}{PK_{33}}\right)+c(10)\times\log(q_{33})\times\log\left(\frac{Pm_{33}}{PK_{33}}\right)\\ &+c(11)\times\log(T)+0.5\times c(12)\times\log(T)^2\\ &+c(13)+c(14)+c(15)\times War+c(15)\times Fall \qquad (3.7)\end{aligned}$$

$$Sl_{33}=c(4)+c(6)\times\log\left(\frac{PM_{33}}{PK_{33}}\right)+c(7)\times\log\left(\frac{Pl_{33}}{PK_{33}}\right)+c(9)\times\log(q_{33}) \qquad (3.8)$$

$$Sm_{33}=c(5)+c(6)\times\log\left(\frac{Pl_{33}}{PK_{33}}\right)+c(8)\times\log\left(\frac{Pm_{33}}{PK_{33}}\right)+c(10)\times\log(q_{33}) \qquad (3.9)$$

The estimated translog cost function for this industry is significant at the 97% level and all coefficients except $C(4), C(10)$, Mean at least 10%.

3.4. Estimation of Translog cost function for construction equipment industry

One of the most important industries in the country is the construction equipment industry. Given that our country has a basic need for housing. And the number of building units is increasing every day. Therefore, it is one of the leading industries. The long-term average cost chart of this industry shows that there are economies of scale in this industry and by moving towards the optimal point, costs can be reduced. Production capacity is increasing. The following equation is estimated to estimate the translog cost function for the construction equipment industry.

Table 3: Results of Translog cost estimation function in glass and ceramics industry., References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees byISIC (Rev.2) AndISIC (Rev.3)

	Coefficient	**t-statistic**	**prob**
C (1)	14.1234561	9.2514362	0.00
C (2)	-5.3216794	-5.3126472	0.00
C (3)	0.4256137	3.5412962	0.02
C (4)	-0.0215436	-0.0296341	0.35
C (5)	0.5263481	0.5214632	0.00
C (6)	-0.4521364	-1.321565	0.00
C (7)	0.3648721	3.2154362	0.02
C (8)	-0.5421634	-0.4597613	0.00
C (9)	-0.6251347	-1.1362547	0. 00
C (10)	-0.03625148	-0.06542137	0.37
C (11)	-0.5642134	-2.1973254	0.00
C (12)	0.5423871	2.4236281	0.00
C (13)	-0.6357422	-0.7213421	0.00
C (14)	-0.4231564	-0.4325617	0.01
C (15)	-0.5231472	-0.3214521	0.00
R^2		0.97	

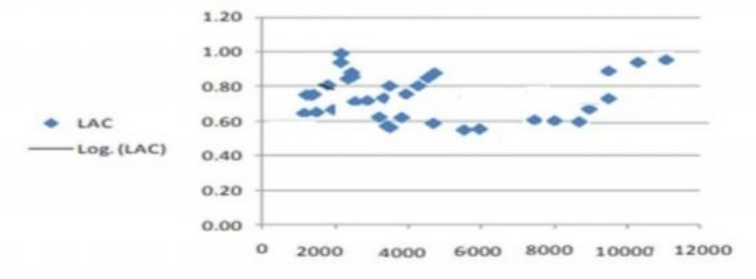

Figure 5: Cost elasticity of each sector of a large industrial enterprise in the production of glass and ceramics industries. References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees byISIC (Rev.2) AndISIC (Rev.3)

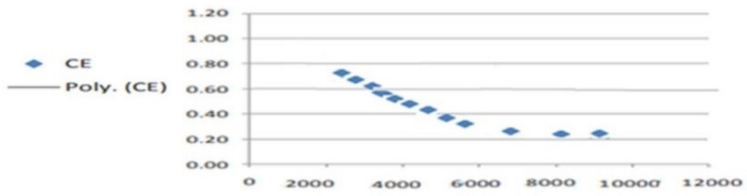

Figure 6: Long-term average cost curve of glass and ceramic industry.

References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees byISIC (Rev.2) AndISIC (Rev.3)

$$\begin{aligned}\log\left(\frac{TC_{34}}{PK_{34}}\right) &= c(1)+c(2)\times\log(q_{34})+0.5\times c(3)\times\log(q_{34})^2+c(4)\times\log\left(\frac{PL_{34}}{PK_{34}}\right)\\ &+c(5)\times\log\left(\frac{PM_{34}}{PK_{34}}\right)\\ &+0.5\times c(6)\times\log\left(\frac{PI_{34}}{PK_{34}}\right)\times\log\left(\frac{PM_{34}}{PK_{34}}\right)+0.5\times c(7)\times\log\left(\frac{Pl_{34}}{PK_{34}}\right)^2\\ &+0.5\times c(8)\times\log\left(\frac{Pm_{34}}{PK_{34}}\right)^2\\ &+c(9)\times\log(q_{34})\times\log\left(\frac{Pl_{34}}{PK_{34}}\right)+c(10)\times\log(q_{34})\times\log\left(\frac{Pm_{34}}{PK_{34}}\right)\\ &+c(11)\times\log(T)+0.5\times c(12)\times\log(T)^2\\ &+c(13)+c(14)+c(15)\times War+c(15)\times Fall \qquad (3.10)\end{aligned}$$

$$Sl_{34}=c(4)+c(6)\times\log\left(\frac{PM_{34}}{PK_{34}}\right)+c(7)\times\log\left(\frac{Pl_{34}}{PK_{34}}\right)+c(9)\times\log(q_{34}) \qquad (3.11)$$

$$Sm_{34}=c(5)+c(6)\times\log\left(\frac{Pl_{34}}{PK_{34}}\right)+c(8)\times\log\left(\frac{Pm_{34}}{PK_{34}}\right)+c(10)\times\log(q_{34}) \qquad (3.12)$$

The estimated translog cost function for this industry is significant at the 97% level and all coefficients except $C(7), C(8)$, Mean at least 10%.

3.5. Estimation of Translog cost function for home and decorative industries

Home and decorative industries include chandeliers, frames and photos along with home decor accessories. It is one of the most in demand industries. The long-term average cost chart of this industry shows that there are economies of scale in this industry and by moving towards the optimal point, costs can be reduced. Production capacity is increasing. The following equation is estimated to estimate the translog cost function for the home and decorative industries.

Table 4: Results of Translog cost estimation function in construction equipment manufacturing sector., References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees byISIC (Rev.2) AndISIC (Rev.3)

	Coefficient	**t-statistic**	**prob**
C (1)	13.2543675	7.6534127	0.00
C (2)	-6.2456384	-6.467329	0.00
C (3)	0.5423164	2.6324583	0.01
C (4)	-0.5362418	-0.4563842	0.00
C (5)	0.5362743	1.4362593	0.00
C (6)	-0.7254631	-2.536241	0.02
C (7)	-0.0213625	-0.02563416	0.27
C (8)	-0.0342561	-0.03215634	0.32
C (9)	-0.5416352	-2.362541	0. 00
C (10)	-0.4362125	-0.4253627	0.00
C (11)	-0.4536217	-1.5326148	0.00
C (12)	0.5632791	3.3645127	0.00
C (13)	-0.5461237	-0.6451279	0.01
C (14)	-0.4632521	-0.4265318	0.01
C (15)	-0.5412738	-0.7254631	0.00
R^2		0.97	

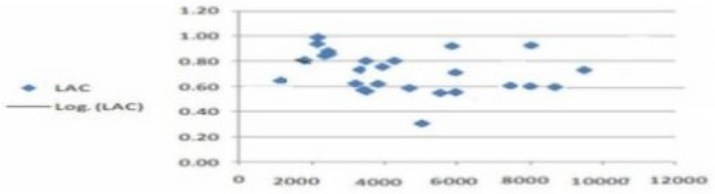

Figure 7: Long-term average cost curve of the construction equipment industry.

References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees byISIC (Rev.2) AndISIC (Rev.3)

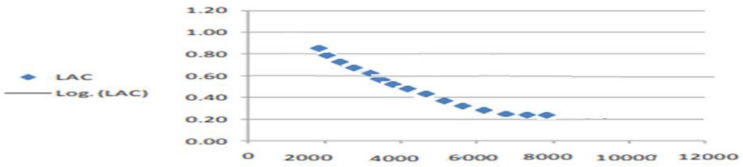

Figure 8: Cost elasticity of each part of a large industrial enterprise in the construction equipment industry.
References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees byISIC (Rev.2) AndISIC (Rev.3)

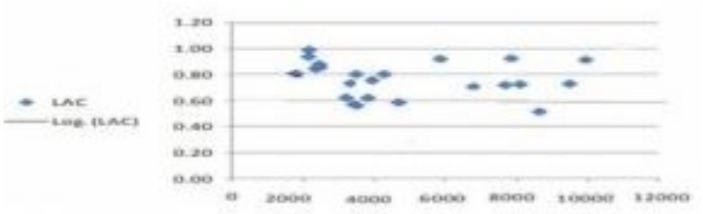

Figure 9: Long-term average cost curve of the home and decorative industries.
References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees by ISIC (Rev.2)and ISIC (Rev.3)

$$\begin{aligned}\log\left(\frac{TC_{35}}{PK_{35}}\right) &= c(1)+c(2)\times\log(q_{35})+0.5\times c(3)\times\log(q_{35})^2+c(4)\times\log\left(\frac{PL_{35}}{PK_{35}}\right)\\ &+c(5)\times\log\left(\frac{PM_{35}}{PK_{35}}\right)\\ &+0.5\times c(6)\times\log\left(\frac{PI_{35}}{PK_{35}}\right)\times\log\left(\frac{PM_{35}}{PK_{35}}\right)+0.5\times c(7)\times\log\left(\frac{Pl_{35}}{PK_{35}}\right)^2\\ &+0.5\times c(8)\times\log\left(\frac{Pm_{35}}{PK_{35}}\right)^2\\ &+c(9)\times\log(q_{35})\times\log\left(\frac{Pl_{35}}{PK_{35}}\right)+c(10)\times\log(q_{35})\times\log\left(\frac{Pm_{35}}{PK_{35}}\right)\\ &+c(11)\times\log(T)+0.5\times c(12)\times\log(T)^2\\ &+c(13)+c(14)+c(15)\times War+c(15)\times Fall \qquad (3.13)\end{aligned}$$

$$Sl_{35}=c(4)+c(6)\times\log\left(\frac{PM_{35}}{PK_{35}}\right)+c(7)\times\log\left(\frac{Pl_{35}}{PK_{35}}\right)+c(9)\times\log(q_{35}) \qquad (3.14)$$

$$Sm_{35}=c(5)+c(6)\times\log\left(\frac{Pl_{35}}{PK_{35}}\right)+c(8)\times\log\left(\frac{Pm_{35}}{PK_{35}}\right)+c(10)\times\log(q_{35}) \qquad (3.15)$$

The estimated translog cost function for this industry is significant at the 97% level and all coefficients except $C(3)$, Mean at least 10%.

Table 5: Results of Translog cost estimation function in the production of home and decorative industries., References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees byISIC (Rev.2) AndISIC (Rev.3)

	Coefficient	t-statistic	prob
C (1)	11.2463157	6.4865328	0.00
C (2)	-5.2541638	-5.3248561	0.00
C (3)	-0.01453628	-0.02315629	0.24
C (4)	-0.4123251	-0.4523168	0.00
C (5)	0.52136246	1.6421532	0.00
C (6)	-0.45362157	-3.6321542	0.01
C (7)	-0.5412364	-0.4512368	0.00
C (8)	-0.32156427	-0.6354215	0.32
C (9)	-0.4512632	-2.3624153	0. 00
C (10)	-0.51243651	-0.4563189	0.00
C (11)	-0.3451267	-1.3245165	0.00
C (12)	0.5416532	2.3541627	0.00
C (13)	-0.6352146	-0.3514261	0.01
C (14)	-0.3421562	-0.6352417	0.01
C (15)	-0.3541267	-0.3245614	0.00
R^2		0.97	

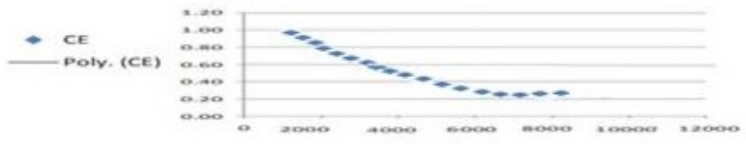

Figure 10: Cost elasticity of each sector of a large industrial enterprise in the production of home and decorative industries.

References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees by ISIC (Rev.2) and ISIC (Rev.3)

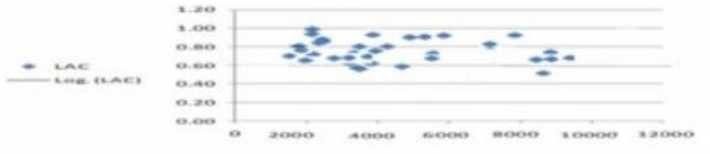

Figure 11: Long-term average cost curve of stone industry production sector.
References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees by ISIC (Rev.2)and ISIC (Rev.3)

3.6. Translog cost estimation function for stone industry

3.6.1. Estimation of Translog cost function for stone industry

The stone industry is one of the important industries. Millions of tons of raw stone are exported every year. If the profit can be obtained several times more than its raw value with proper processing. This industry includes stones used in the construction industry. And stones used in decoration. The nominal production capacity of these industries is about 41%. The long-term average cost chart of this industry shows that there are economies of scale in this industry and by moving towards the optimal point, costs can be reduced. And production capacity is increasing. The following equation is estimated to estimate the translog cost function for the stone industry.

$$\begin{aligned}\log\left(\frac{TC_{36}}{PK_{36}}\right) = {} & c(1) + c(2)\times\log(q_{36}) + 0.5\times c(3)\times\log(q_{36})^2 + c(4)\times\log\left(\frac{PL_{36}}{PK_{36}}\right) \\ & + c(5)\times\log\left(\frac{PM_{36}}{PK_{36}}\right) \\ & + 0.5\times c(6)\times\log\left(\frac{PI_{36}}{PK_{36}}\right)\times\log\left(\frac{PM_{36}}{PK_{36}}\right) + 0.5\times c(7)\times\log\left(\frac{Pl_{36}}{PK_{36}}\right)^2 \\ & + 0.5\times c(8)\times\log\left(\frac{Pm_{36}}{PK_{36}}\right)^2 \\ & + c(9)\times\log(q_{36})\times\log\left(\frac{Pl_{36}}{PK_{36}}\right) + c(10)\times\log(q_{36})\times\log\left(\frac{Pm_{36}}{PK_{36}}\right) \\ & + c(11)\times\log(T) + 0.5\times c(12)\times\log(T)^2 \\ & + c(13) + c(14) + c(15)\times War + c(15)\times Fall \end{aligned} \tag{3.16}$$

$$Sl_{36} = c(4) + c(6)\times\log\left(\frac{PM_{36}}{PK_{36}}\right) + c(7)\times\log\left(\frac{Pl_{36}}{PK_{36}}\right) + c(9)\times\log(q_{36}) \tag{3.17}$$

$$Sm_{36} = c(5) + c(6)\times\log\left(\frac{Pl_{36}}{PK_{36}}\right) + c(8)\times\log\left(\frac{Pm_{36}}{PK_{36}}\right) + c(10)\times\log(q_{36}) \tag{3.18}$$

The estimated translog cost function for this industry is significant at the 96% level and all coefficients except $C(12)$, Mean at least 10%.

Table 6: Results of Translog cost estimation function in stone industry production sector., References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees byISIC (Rev.2) AndISIC (Rev.3)

	Coefficient	**t-statistic**	**prob**
C (1)	25.6425137	9.5421765	0.00
C (2)	-9.7456234	-9.4623187	0.00
C (3)	-0.4521327	-0.5642138	0.00
C (4)	0.9524138	2.8635421	0.00
C (5)	0.8452317	3.7452134	0.00
C (6)	-0.7423651	-1.254631	0.01
C (7)	-0.7452316	-0.6578423	0.00
C (8)	-0.7684534	-0.8546321	0.01
C (9)	-0.8756342	-2.2536421	0. 00
C (10)	-0.6584932	-1.5436281	0.00
C (11)	-0.7892546	-1.5642351	0.01
C (12)	-0.0123654	-0.0325674	0.34
C (13)	-0.8463215	-0.8134251	0.00
C (14)	-0.7452316	-0.6523413	0.03
C (15)	-0.5423156	-0.5623417	0.00
R^2		0.96	

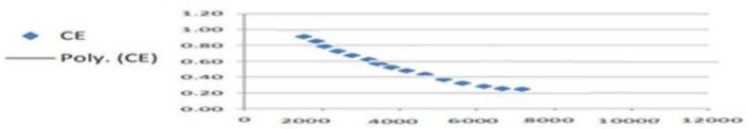

Figure 12: Cost elasticity of each sector of a large industrial enterprise in the stone industry production sector.
References: Findings - by the investigator based on information obtained from the publications and resources related to the project - survey large industries to the top ten employees by ISIC (Rev.2) and ISIC (Rev.3)

4. Conclusion

The results of the production capacity analysis in the cement, gypsum and lime industries showed that the amount of optimal production capacity in the cement, gypsum and lime industries was equal to 645321 million rials. Therefore, considering that during the last few years of the research period, the average real value of each industrial enterprise in the production of cement, gypsum and lime industries was 845321 million rials per year, it seems that the enterprises in this sector of capacity They have used more. So not only do they not have a distance to their optimal production. They have produced more. One of the important things in this industry is the supply of raw materials in this industry. And also the use of modern factory equipment as well as modern and up-to-date machinery. In order for there to be reasonable competition in these industries, they must also make production competitive. And increase exports. The nominal capacity of the industry is estimated at 190%.

The Wood and wood products industry consists of four sectors of production of wood, furniture, doors, cabinets, consideration of items in this sector shows that more than 45% of the output value of this sector is related to wood production and the rest is the production of furniture, doors, cabinets. The need to pay attention to the sub-sectors of this industry is due to the fact that new technologies in its production and application in the mentioned sub-sectors are different. It has been invested in the production of wood but has been used in the production of furniture, doors and cabinets. The results of examining the long-term average cost chart of this section show that the slope of the average cost curve is sharply decreasing and economies of scale are of great importance. The results of the analysis showed that the actual production level was 2543.9 million rials per year, which indicates the minimizing point of the total average cost function. Therefore, considering that during the last three years of the research period, the average value of the real output of each industrial enterprise in the production of wood and wood products was 5642.7 million rials per year, this shows the activity of enterprises in this sector at the level of production much less of the optimal value. And these firms use just over 28% of their nominal capacity. Therefore, it is necessary for this industry to increase its output level or to reduce the number of active industrial units in order to take advantage of the economies of scale of each industrial enterprise.

The results of the analysis in the glass and ceramic industry showed that, in this industry, there are economies of scale and by moving to the optimal point, costs can be reduced. Production capacity is increasing. The amount of optimal production capacity in this industry was equal to 29314.2 million rials. Therefore, considering that during the last few years of the research period, the average real value of each industrial enterprise in the production of glass and ceramics was 31224.35 million rials per year, it seems that the enterprises in this sector used a better way. Capacity utilization here was estimated at 154%.

One of the most important industries in the country is the construction equipment industry. Given that our country has a basic need for housing. And the number of building units is increasing every day. Therefore, it is one of the leading industries. The long-term average cost chart of this industry shows that there are economies of scale in this industry and by moving towards the optimal point, costs can be reduced. Production capacity is increasing. The amount of optimal production capacity will be equal to 41562.7 million rials. Therefore, considering that during the last few years of the research period, the average real value of each industrial enterprise in the construction equipment industry was 48632.72 million rials per year, it seems that the enterprises in this sector used a better way. Capacity utilization here was estimated at 137%.

Home and decorative industries include chandeliers, frames and photos along with home decor accessories. It is one of the most in-demand industries. The long-term average cost chart of this

industry shows that there are economies of scale in this industry and by moving towards the optimal point, costs can be reduced. Production capacity is increasing. The results of the analysis showed that the amount of optimal production capacity was equal to 24513.5 million rials. Therefore, considering that during the last few years of the research period, the average real value of each industrial enterprise in the production of home and decorative industries has been 28763.29 million rials per year, it seems that the enterprises of this sector have exceeded their capacity. They have used a better way. Capacity utilization is estimated at 149%.

Stone industry, including stones used in the construction industry. And stones used in decoration. The nominal production capacity of these industries is about 41%. The results of the analysis of the long-term average cost chart of this industry show that there are economies of scale in this industry and by moving to the optimal point, costs can be reduced. And production capacity is increasing. The amount of optimal production capacity in this industry was equal to 26741.4 million rials. Therefore, considering that during the last few years of the research period, the average real value of each industrial enterprise in the stone industry production sector was 31254.6 million rials per year, it seems that the manufacturing enterprises in this sector of their capacity in terms of They have not used it better. Capacity utilization was estimated at 78% in the analysis.

Suggestions

1. One of the most essential items in important industries such as glass and ceramics is the use of available raw materials. If new equipment and raw materials are provided to companies. They will also increase their production capacity. And profit Companies will get more money.
2. One of the most important and necessary issues in the construction equipment industry is the correct use of the market and the purchasing power of customers in this field. If a more appropriate mechanism is provided in the market in this regard. And due to the urgent need for this type of equipment, the production capacity can also be increased. And make companies more profitable.
3. One of the most important customer-friendly markets in which most housewives are the main customers. Is the home appliance and decorative industry. If modern decorative arts are used in this field. The better competition will be created between firms. And production capacity in these industries will increase. And it will be more profitable for companies.
4. Stone industry is one of the important industries. Millions of tons of raw stone are exported every year. If the profit can be obtained several times more than its raw value with proper processing. Therefore, with the right management in this industry, a lot of profitability can be achieved.
5. Lack of high pressure on devices and equipment in different industries in order to produce more because this causes them to be more worn. And depending on the country and production conditions may lead to the closure of certain industries. In order to produce optimally and continuously and take advantage of the economic potential of firms, they must adopt proper planning concerning their production capacity.
6. In some industries such as cement, gypsum and lime industries, it was observed that they have produced more than their optimal production in the last few years of the period drawn in the research. This capacity can put a lot of pressure on factory equipment in this industry. Therefore, with precise and logical planning and by estimating the amount of use inside and the amount of export, a minimum ceiling for production in each firm should be considered.
7. In some industries such as wood and wood products, it was observed that the activity of enterprises in this sector at the production level is much less than the optimal amount. And

these firms use just over 28% of their nominal capacity. Therefore, it is necessary for this industry to increase its output level or to reduce the number of active industrial units in order to take advantage of the economies of scale of each industrial enterprise.

8. Management and planning at the enterprise level should be as it should be. That production capacity is not affected by critical conditions. And have a sustainable process by optimizing production.

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