

# Proposed Framework for Removing Obstacles in the Exportation of Construction Stones

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## **Abstract:**

Considering the vital importance of the expansion of non-petroleum exports for the Iranian economy, the success of Iran's industrial productivity is in need of a scientific approach in a professional manner. But, a majority of Iran's industrial organizations have been using traditional, non-scientific methods in marketing and exportation of their products. This shortcoming applies even more significantly to the construction stones industries.

This investigative project is an applied research, which includes qualitative variables, as well as a survey type descriptive approach. The results obtained in this investigation were from a survey of 200 construction stone producers and exporters in the Mahallat and Nimvar areas. This survey began in January, 2012, and ended in September, 2013. In this study, Cronbach's 'alpha' was employed with regard to reliability, content analyses, three methods of content analyses, as well as structural, discriminative and validity analyses. In answers to the research questions, factor analysis and correlation tests were employed; and to rank the findings, TOPSIS method was used.

**Key word:** Export, Production of building stones, Intra-Organizational Factors, Extra-Organizational Factors

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## **Introduction**

The economic growth of countries depends on their ability to generate foreign exchange revenues through international trade. In order to improve their gross national product (GNP), outdated industrial and trade practices must go through modernization. For most developing countries, this modernization requires access to foreign technology and knowhow. To acquire

this, and to improve their industrial growth, developing countries must expand their own internal resources. Most developed countries consider their export revenues as the principle source of their foreign exchange, through which old and outdated industrial and trade practices could be improved. (Sanayei, 1381).

In general, the balance of trade, i.e., the relation between imports and exports, indicates the significance of international marketing in a country's economy, as it affects the nation's standard of living. The balance of trade figures indicate the monetary difference between the country's imports and exports, while its imbalance may indicate, for example, whether the trade shortcomings were due to the excess importation of consumer goods, or due to the acquisition of industrial products and infrastructural investments, which would indicate the country's trend toward industrial development. (Rousta, et. al., 1381).

Principle targets of achievement by governments in expediting a country's exports include improved rates of foreign exchange, optimization of foreign exchange, as well as economic growth. This methodology should be aimed at those industries that exhibit relative competitive advantages. these are regarded as external factors, which provide advantages such as improved productivity, increased employment and capital investment, better competition, better quality, lower costs, more support for local industries, improved living standard, higher import revenues, better diversification of exported goods, and investment in areas that include transportation, communication, stability of interdisciplinary organizations, foreign investment, etc (Sanayei, 1381).

The current paper provides a framework specifically for removing the obstacles to the exportation of construction stones. There have been several other research projects aimed at construction stones industries, but none of them have offered a specific framework that addresses both the internal, as well as the external, factors regarding the problems facing the exportation of these products. For this reason, the author, after extensive study and analysis of all the previous research data, and broad field-research in construction stone industry, and after interviews with academic and industrial experts, is presenting such a framework. This paper introduces a framework in which the principle internal and external limiting factors are tabulated and graded, and represents a new approach to resolving these problems.

## **1- Background:**

### **1.1: The Global Stone Industries.**

It is indicated by the available data that global production of construction stones has increased dramatically during the past century. With the exception of 1929, stone industries have shown relative growth, unaffected by economic downturns for the most part (Fahimi Far, 1376).

This increasing trend was even accelerated in 2003. In fact, it was the slight decline in 2002 that resulted in the significant increase in stone production of 2003, to a point that the net production of construction stones reached a new high at around 75 million tons. Following that, an annual rate increase of 11% was achieved, which is the highest rate of growth from the beginning of the decade of the 90s (Stone, 2008).

Currently, the largest sources of decorative and construction stones in the world include Europe: Italy, Spain, Greece, Portugal, Turkey and Poland; and Asia: Iran, Thailand, Taiwan, Syria, Arabia, South Korea, and India. Also noteworthy are reserves in Brazil, Argentina and Australia. (Reis, 2007). It should be noted that China is now among the most significant sources, as well.

Recent global economic boom has encompassed all segments of business, including aspects of export and import industries. This has also applied to stone industries, and international stone trade has been no exception, to a point where this industry has constituted 66% of total international trade during the 20th century (Reis, 2007).

Again, we should remember that the above quote referring to recent global trend, is a dated reference, 2007, and does not reflect the more up-to-date trends in international business.

The global net production of construction stones in 2001 was about 65 million tons, of which 37% was exported with a total value over 35 million dollars (NajafiTabrizi, 1383).

According to the released statistical data, the trade of unfinished limestone varieties had a 17.6% growth over the average of previous years, while in the case of siliceous stones a growth of only 1.7% was seen. Semi finished stones with a trade volume of 3.2 million tons showed an increase of 2.6%, while fully finished products with a volume of 118 million tons indicated an increase of 22.4%. In total, international trade in unfinished stones had an increase of 10.8%, and for the finished stones that figure was 21.9%. It is significant to note that the trend in international trade of stones has shown a steady increase during the recent decade (Stone, 2008).

With the exception of the last two or three years of a downtrend in international trade due to the global economic dilemmas, the trade in construction stones has had an average annual growth of 14.6%, which is double the rate of all other commodities. This trend is a clear indication that any effort to support the growth of this industry is well justified. Obviously, different countries have had their own unique contribution to this trend. Among them, China, India and Turkey played more important roles, which points to the basic economic fact that best results are obtained where better economic incentives and infrastructural conditions prevail. It should be noted that only a few countries have been the beneficiaries of the unprecedented growth of the stone industries in the recent decade.

It is important to note that it was initially the European Continent that was regarded as the center for the production and consumption of construction stones; but today this industry has spread worldwide and developing countries are more actively in pursuit of revenues from the export of this commodity (SiamiNamin, 1378).

With regard to the export of stones, it is noteworthy that only seven countries export more than one-million tons annually. These countries are: China, India, Italy, Spain, Turkey, Brazil and

Portugal. China, according to the available data, has shown the greatest increase in exports, while Italy has dropped to third place by not showing much interest in increasing its export quota. India meanwhile has moved up to the second place in the export of its construction stones. It should be noted that the seven countries mentioned above are responsible for 70% of the total global stone trade. Also important to note is the fact that China and Italy have been responsible for 60% of exports in finished stones (Stone, 2008).

Increase in the production of construction stones, lower prices resulting from competitiveness, and new and innovating modes of consumption and usage for these products, have resulted in significant increase in global demands. Countries such as China and Italy import unfinished stones at lower prices from countries that have high quality resources. They then finish the raw stones and export them at value-added prices to places such as the United States, Germany and South Korea, which are on top of the list of stone-importing countries. Saudi Arabia and the Persian Gulf Emirates are also showing increasing demands for finished stone products, which is perhaps due to the increase in production in neighboring states such as Iran (Stone, 2008).

In general, while fewer countries are involved in export of construction stones, the consumption of these products are much more widely spread internationally.

### **1.2: Iran's Construction Stones Industry:**

Much has already been written and discussed during the past decade about Iran's advantageous position regarding the quantities and varieties of its stone resources. As indicated by the available data, Iran rates as the fifth in quantity, and third in purity of its resources in the world. (Goharian, 1379). Also, with the newly gained popularity of construction stones on the global stage, the commercial importance of this natural resource has redoubled. Data indicate that the consumption of construction stones in the world market has doubled during the past decade. With an annual increase of 88%, this volume has gone up from 436 to 818 million square meters. (Stone, 2008). However, looking at Iran's stone industries, we conclude that Iran has failed to take proper advantage of these opportunities. This is while the production rates during the year 1385 exceeded 11 million tons, which could have ranked Iran as one of the largest contributors in this product on the world stage. Clearly, as long as the country's potentials are not put into action, we cannot regard such potentials as national wealth. It is, therefore, essential to implement scientific methods in extracting this potential wealth to contribute as a major axis of growth in the nation's economy (Stone World Quarterly, 1385).

At the present time, a major portion of Iran's construction stone production is being exported as unfinished or raw materials. In the case of travertine and marble, for example, the exports of unfinished stones are about eleven times the volume of finished products (Foreign Trade Statistics Annual, 1378). According to the available data, the export of Iran's construction and decorative stones has shown an upward trend in the past years. However, the share of finished stones in the export market has actually shown a decrease. Should this trend continue, Iran will soon become a supplier of raw or unfinished stones to the world markets and, instead, become an importer of finished products at a more competitive price than local manufacturers could

offer? With competitors such as China, India and Turkey, this trend would create significant economic dilemmas for Iran (Stone World Quarterly, 1387).

**1.3: The Role and Importance of Non-Petroleum Exports:**

The expansion of non-oil exports is more than just the diversification of other exportable products and services; it entails a strategy of self-reliance and economic development at the same time (Goharian, 2000). This self-reliance and self-sufficiency create immunity to global economic fluctuations through diversification of exportable products, as well as catering to a variety of global markets.

A country's reliance on a single export item creates the greatest danger to that country's economy. This reliance, as is the case in our country, makes the nation's economy captive to that one item, which is subject to fluctuations in global demand and prices (Noghrehkar Shirazi, 1987).

Fluctuations in the revenues from oil exports, the purchasing power of these revenues, as well as the increasing population, and above all, the gradual depletion of this natural resource, have been of great concern for the nation's economists and policy makers, who have reached the conclusion that creating an economy less dependent on oil is inevitable (Ebrahim zadeh Pazhuhi, 1998).

Chart 1-2, Obstacles and remedies for the expansion of non-oil exports (Doa'i, 1385).

Problems	Solutions
1- Lack of consistency in policies.	Better legal and policy consistency.
2- Lack of knowledge of internal/external markets.	Better marketplace information.
3- Control of the economy by government enterprises.	Privatization.
4- Unrealistic foreign exchange rates.	Making these rates more realistic.
5- Consumer appeal to foreign products.	Discouragement of consumer appeal.
6- Lack of efficient transportation networks.	Improvement and modernization.
7- High costs of production of local goods.	Reduction of production costs.
8- Lack of exporting industries' unions.	Formation of exporting industries unions.
9- High risk factor in exports.	Allocation of reasonable subsidies to exporters.
10- Lack of an export culture.	Training programs for exporters.

11- Government bureaucracy over exports.	Removing excessive red-tape and restrictions.
12- Lack of proper packaging of goods.	Attention to principles of marketing in packaging.
13- Lack of attention to exports of services.	More attention to the export of services.
14- Lack of membership in international trade organizations.	Membership participation.
15- Lack of competitiveness of Iranian products.	Creating better competitiveness.

#### **1.4: The Role and Importance of the Exportation of Iran's Construction Stones:**

There are currently more than 4,500 stone cutting and processing units active in Iran, with a total annual output of almost 60 million square meters. Feeding these units are 600 active stone quarries in operation, which produce over 7 million tons of stone per year. These figures indicate that Iran produces less than 15% of the total global production of construction stones. However, considering the extent and quality of Iran's construction stone resources, the potentials are far greater than are being realized at this time (Iran Chamber of Commerce, Industries and Mines, 1388). According to the available data, the number of people employed in factories, mines, and mine related equipment and supplies in the stone industries is about 350,000, which equates to around one million including the average family size, who count on this industry for their livelihood.

Even though Iran produces more than seven million tons in construction and decorative stones, the export capacity of these products has been around 4% of that total. This ratio has been 57% in China's case, 40% for Italy and 32.5% in case of Turkey.

Obtaining accurate statistical figures has been a major problem in Iran, and this is illogical and unacceptable for a country that has significant natural resources. In fact, the high activity in exploration drilling and quarrying of stones seems incongruent with the lack of other important statistical figures.

The export of raw or unprocessed travertine and marbles reached 299,569 tons during 2008, which constituted 40% of total stone exports for the country. That figure included sand and gravel used in road construction. China, with imports of 133,600 tons in 2008, 56.49% of the total, then Italy, 30,500 tons, or 12.9%, and Hong Kong with 11,600 tons, 4.9%, ranked as the top importers of Iranian stones. After these top importers, we have Taiwan 10,800 tons, Japan 4,200 Tons, and India 4,000 tons. Total volume of imported stones from all global sources amounted to 14 million tons in 2008.



One of the reasons for Turkey's success in its export of stones is the increasing rate of imports of travertine and marbles by the United States from that country. America's imports of marbles from Turkey now exceed the quantities imported from Italy. The transportation costs of Turkish products are about 1/3 the costs from Iran; and with exemption from customs duties in the United States, in addition to favorable Turkish government treatment of that industry, better banking facilities and direct contact with the customers, Iran has not been able to compete with this rival.

## **2- The Research Carried Out Regarding Construction Stones:**

The first ever research carried out about Iran's stone industries was in 1972 by the Russian specialist, Chasuftin, for the United Nations (UNIDO). In his report he pointed out that construction and decorative stones are found throughout the country and favorable conditions do exist for their exploitation in most Iranian cities. However, he states that the majority of these natural resources occur distances away from towns, railroads and sources of electric power, which creates difficulties for mining operations. According to Chasuftin, the lack of proper knowledge about these reserves have hampered efforts to develop effective exploitation methods, and, as a result, only easy to access sections have been quarried. This Russian expert pointed to several factors that had created difficulties in the recovery of construction and decorative stones. Among these factors, he has named the following: Lack of general planning and exploitation programs resulting in unregulated work, improper exploitation techniques, unsafe use of explosives, lack of modern machinery and equipment, and lack of enough expert mining technicians required on the job (Guide to Iran's Stones, 1386).

Carlo Montani, chairman of Italy's union of the manufacturers of stone processing machinery, wrote an article in 1373 under the title, "Iran, a great potential for growth in stone industry." After presenting statistical information about the growth of this industry in Iran, He states that Iran is aware of the economic advantages of this natural resource, and predicted a bright future for this industry (Omidian, 1380). Mohammad Hassan Haghgui, in an article titled, "Iran's Stone Industries, After Entering GAT; General Agreement on Tariffs and Trade, Its Effects and Ramifications.", addresses the effects of joining this organization by Iran's stone industries. He considers joining this international organization as necessary, and concludes that, with Iran's natural advantages in these resources, being a member of that organization would prove quite beneficial for the country (Haghgui, 1383). Mohammad Taghi Ansari, in his book, "Foreign Policy and the Expansion of Iran's Stone Export Trade.", has done an extensive survey of Iran's mineral resources, among which construction and decorative stones have also been included. He has pointed to several issues hampering the exploitation, processing and exportation of stone, such as lack of capital investments, lack of proper training for the workforce, poor coordination between the quarries and processing plants, shortage of modern machinery at the plants, lack of scientific approach to marketing, and lack of proper contact and knowledge of global markets (Taghizadeh Ansari, 1379).

JafarErza, in an article titled, "A Look at Attempts to Improve Exploitation, Processing and Export of Decorative Stones in Iran.", has addressed the relative position of Iran with regard to its natural resources and exports during the years 1369 through 1387. He has then pointed to

several factors such as the use of diamond impregnated cutting wire in quarrying, lowering the costs while improving quality, necessary for increasing the export of decorative stones (Erza, 1389).

Jamshid Fahimifar, in his book, "The Global Market for Decorative Stones and Iran's Share.", has done an extensive study of decorative stones industries in Iran and the world, and has compared Iran's case with those of China and India. He has concluded that Central Asian countries and those of the Persian Gulf region present the best markets for Iran's construction and decorative stones (Fahimifar, 1376).

Masood Kamali Ardakani, in his research paper, "An Analysis of Marketing Management Methods and the Export of Iranian Granite to the United Arab Emirates.", has addressed issues relating to the export of Iranian granite. He has concluded that factors such as methods of exploitation, processing and finishing of the products, as well as the knowledge of the regulations in destination countries, cooperation and coordination among exporters, and the availability of market information systems, would improve exporting potential to the UAE states (KamaliArdakani, 1375).

In another research project, Masood Omidian, in his paper titled, " The Exporters' Views Regarding the Effects of Production Methods, Marketing and Information Gathering on Esfahan's Construction and Decorative Stone Industries.", touches on factors such as technology, investment, human resources, primary materials, as well as marketing tactics and market information, whose shortcomings, he maintains, negatively affect that market. He concludes that the availability of market information would improve the potentials for the export of construction and decorative stones (Omidian, 1380).

The following list represents the principle obstacles to the exportation of construction and decorative stones in two categories: intra-organizational and extra-organizational factors.



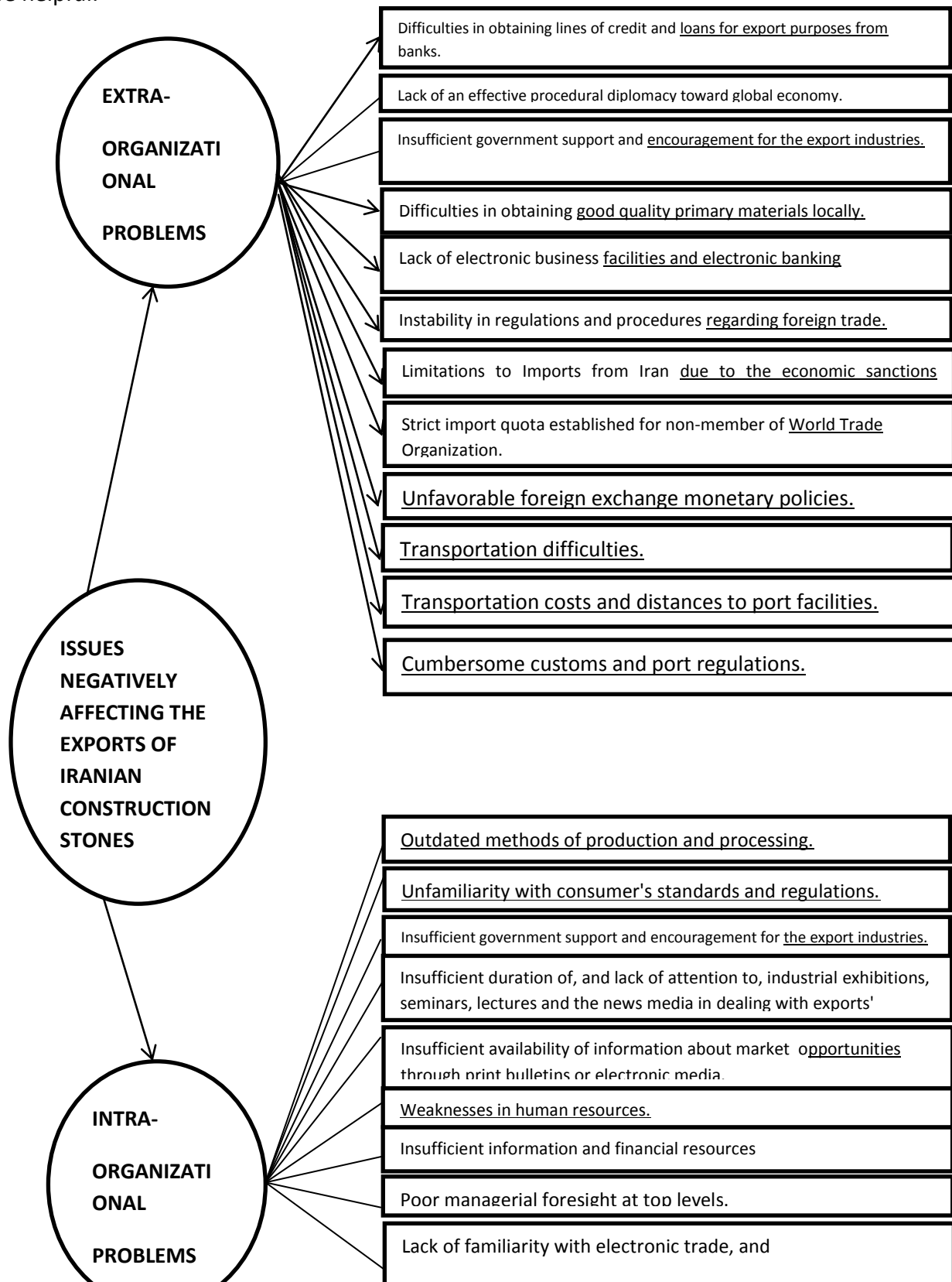
**Table 2-1: Intra-Organizational and Extra-organizational Factors:**

intra-organizational factors	extra-organizational factors
Outdated methods and techniques (Keagan, 1999), (Omidian, 1380), (KamaliArdakani, 1375).	Insufficient government support and encouragement for the export industries (Mohtashamipour, 1389), (Darysavi, Bahmanshir& Associates, 1389).
Lack of the knowledge of the standards and regulations in destination countries (Spiegel & Cunningham, 1971), (Taghizadeh& Ansari, 1379), (KamaliArdakani, 1375).	Difficulties in obtaining good quality primary materials locally.(Chasuftin, 1972), (Darisavi, Bahmanshir& Associates, 1389).
Lack of training and encouragement of the exporters by responsible authorities (Mohtashamipour, 1389).	Lack of electronic business facilities and electronic banking (Sanayei, 1381).
Insufficient duration of, and lack of attention to, Industrial exhibitions, seminars, lectures and the news media in dealing with export issues (Omidian, 1380).	Instability in regulations and procedures regarding foreign trade (Seyyed Mohammad Mir-Mohammadi, 1365), Darisavi, Bahmanshir& Associates, 1389).
Weaknesses in human resources (Keagan, 1999), (Bakely, 1988), (Taghizadeh& Ansari, 1379).	Limitations to Imports from Iran due to the economic sanctions regime (Haghgui, 1383).
Insufficient information and financial resources (Keagan, 1380), (Bakely,1988), (Darisavi, Bahmanshir& Associates, 1389).	Strict import quota established for non-member of World Trade Organization (Haghgui, 1383).
Poor managerial foresight at top levels (Spiegel & Cunningham. 1971).	Unfavorable foreign exchange monetary policies (Seyyed Mohammad Mir-Mohammadi, 1365).

Lack of familiarity with electronic trade, and lack of websites for the exchange of information (Sanayei, 1381).	Transportation difficulties.(Roosta, et. al., 1381).
Insufficient availability of information about market opportunities through print, bulletins and electronic media (Roosta, et. al., 1381), (Taghizadeh& Ansari, 1379), (Omidian, 1380), (Bakely, 1988).	Transportation costs and distances to port facilities (Darisavi, Bahmanshir& Associates, 1389)
	Cumbersome customs and port regulations (Seyyed Mohammad Mir-Mohammadi, 1365).
	Difficulties in obtaining lines of credit and loans for export purposes from banks (Seyyed Mohammad Mir-Mohammadi, 1365).

**3- The Methodology of Research:**

**3.1- Chart:** In view of the covered literature, the following conceptual framework or chart could be helpful:



### **3.1: The Variable Factors of Research:**

The principle variable factors in this research paper are indicated in chart 3-1 on the previous page. Subordinate or secondary factors are those intra-organizational and extra-organizational elements as appear in chart 1-2.

### **3.2: Propositions:**

Based on the reviewed and documented literature on the subject, and within the conceptual framework of this paper, we can address the points of this research as follows:

### **3.3: Fundamental Questions:**

What are the most important factors affecting the exports of construction stones from Mahallat and Nimvar areas?

### **3.4: Secondary Questions:**

- 1- What are the main intra-organizational factors hampering the export of stones?
- 2- What are the main extra-organizational factors in that regard?

### **3.5: Research Methodology:**

This investigative project has been carried out as an applied research, which includes qualitative variables, in a survey type, descriptive calculable approach. Likert's "five-point scale" was used in this research; and the area covered in this investigation included all the producing and exporting companies engaged in construction stones industry in Mahallat / Nimvar region.

This methodology could be presented in two main parts:

First: The review of pertinent literature and analyses of their contents, plus pilot studies in determining the appropriateness and compatibility of the factors or indexes, in order to verify the proposed framework. To design the proposed framework and to identify, validate and rectify the main variable factors in this research, the following methods were applied:

- 1- Determining the sufficiency of identified factors within the available literature.
- 2- Seek the views of four academicians with expertise in marketing and export management.
- 3- Seek the views of three experts in this industry, who have over five-years experience in the field and with sufficient academic background.
- 4- Seek the views of three PhD candidates in the field of marketing and export management.

Chart 1-2 (page 6), represents and identifies the main factors as extracted from the investigations listed above.

Second: To address the majority of issues, descriptive and validation or confirmation methodologies have been applied. The variance analyses have allowed the creation of a new set of parameters with fewer variables. (Kline, 1994). Indexes with weighted factors under 0.5 have thus been eliminated. But before attempting the factor analysis, the sufficiency of the sampling was verified to ascertain the desired degree of accuracy...with the index above 0.6.

To tabulate and rank the factors, TOPSIS method has been utilized to compare these factors to the ideal state. This method was suggested by Yoon Hwang in 1981. In this method, factors are ranked as to their degrees of similarity with the ideal state (Atai, 1389).

### **3.6: The Population and Sample Statistics:**

The population statistics have included all the producers and exporters of construction stones in the Mahallat/Nimvar region. The respondents had to exhibit at least one of the following qualifications:

A- University degrees as analysts or higher, in marketing and export management.

B- Background in export of construction stones.

C- More than five-years' experience in the production of construction stones.

200 questionnaires were handed out to qualified members of the industry, who are active in the processing of construction stones in the Mahallat/Nimvar region.

### **3.7: The Validity and Reliability of the Research:**

To ascertain the validity of the contents of this investigation, the available literature on the subject was first reviewed. Then followed the study of applicability and adjustments of the parameters and factors and their prevalence in the available literature, in which the advice of four university experts with background in research in marketing and export, plus the views of three graduate students and doctoral candidates in the field, proved helpful. Also used was the constructive verification method of measuring the degree of suitability of the various factors' applicability in the proposed framework. (Bagozzi, et. al, 1991; Fornell and Larcker, 1981). Cronbach's "alpha" was used to verify the validity of the findings; a validity factor of more than 0.7 is sufficient to validate the findings. (Christmann and Van Aelst, 2006).

## **4- Research Results:**

Some 200 questionnaires were sent out to the owners/operators of stone processing plants in the Mahallat/Nimvar region, of whom 99.5% were male and 0.5% female. 32% of respondents were 30-40 years of age, 25.5% were between 40 and 50, 26% 50-60, 13.5% were over 60, and 3% 20-30 years old. 32% of respondents had been in business between 5 and 10 years, 18% 10-15 years, 27% 15-20 years, 23% were involved longer than 20 years.

### **4.1: Investigating the Indexes of Reliability, Validity, and Adequacy of Samplings, and Confirmatory Factor Analysis and TOPSIS.**

The results of this research indicate that Cronbach's "alpha" coefficient for extra-organizational factors is 0.727, and for intra-organizational factors, 0.709. The reliability factor for all questions was 0.8, and the KMO index reflecting sampling adequacy was 0.622 for intra-organizational factors, and 0.685 for extra-organizational factors, which indicate both the reliability and the validity of the samplings. These findings then underwent factor analyses and ranked according to the TOPSIS method.

#### **4.2: First Target of Research:**

##### **Identifying intra-organizational factors responsible for creating obstacles in the export of construction stones:**

- 1- Use of outdated equipment and technology.
- 2- Lack of familiarity with the regulations and standards in countries of destination.
- 3- Lack of proper training and encouragement of exporters by appropriate organizations.
- 4- Inadequate industrial exhibits, seminars, lectures, and media coverage dealing with the export industries.
- 5- Insufficient availability of information about market opportunities through print bulletins or electronic media.
- 6- Weaknesses in human resources.
- 7- Insufficient information and financial resources.
- 8- Poor managerial foresight at top levels.
- 9- Lack of familiarity with electronic trade, and lack of websites for the exchange of information.

Chart 4.1 shows the averages, and the deviations from average of responses to the factors listed above. The largest average was seen in factors 2 and 4; and smallest in factor 1.

Chart 4.2 shows the interrelations between intra-organizational factors in a comparative, two-by-two basis.

Chart 4.3 represents Bartlett's test and the KMO index; this index is larger than 0.6 and closer to 1.0, indicating that the results are suitable for the analyses of all the factors.

The statistical numbers in Bartlett's test was 121.510, and a Sigma or summation factor of 0.000, which is smaller than 0.05; again, showing the validity of the factors analyses for the construction of our model.

Chart 4.4 shows the initial rate of communality or participation and the extracted rate of that participation in responses to the questionnaire. The larger the figures in the extracted rates, the better are the variables represented. The selected or extracted communalities in factors 2, 3, 9 and 4, rate respectively as 0.346, 0.387, 0.404, and 0.417; and all are less than 0.5, which allows us to eliminate them in that order from the list, in order to increase the communality figures of the extracted factors for the remainder of the cases.

Chart 4.5 shows three columns: First column contains the initial "Eigen values", which includes those factors that remain in the analysis. In other words, factors that carry Eigen values of less than 1 have been eliminated. Therefore, only factors 1, 2, and 3, with initial Eigen values of 1.933, 1.390, and 1.113 stay in the analysis.

The second column in Chart 4.5 reflects the extracted, non-rotated Eigen values. Here, only the Eigen values of components 1, 2, and 3, are shown. In this column, we conclude from the percentage of variance figures that the component 1 could explain 21.48 percent of the components' variability; while the component 2 explains about 15.44 percent, and component

3, about 12.36 percent. In the cumulative column, we can see that components 1, 2, and 3 together, can explain about 49.28% of the variability's.

The third column in Chart 4-5 shows the rotated extracted Eigen values. Here, we can conclude that component 1 could explain about 17.45 percent of the variability of the variable factors, and the component 2 about 16.35%, and component 3 about 15.39%.

Chart 4-6 displays the components matrix, which shows the number or weight of each of the remaining variable factors.

Chart 4-7 shows the matrix of rotated components, which indicates the number or weight of each of the remaining variable factors after rotation. Here, the greater the net figure of each factor, the more influence it has on the total variance of that variable factor.

Chart 4-1: Descriptive Statistics of Intra-Organizational Factors

<u>Internal Factor</u>	<u>Average</u>	<u>Deviation</u>	<u>Numbers</u>
1	1.19	0.414	200
2	1.82	0.666	200
3	1.47	0.664	200
4	1.82	0.730	200
5	1.61	0.777	200
6	1.57	0.669	200
7	1.40	0.557	200
8	1.64	0.724	200
9	1.68	0.788	200

Chart 4-2: Relational Matrix in Intra-Organizational Factors

Intra-Organizational Factors	1	2	3	4	5	6	7	8	9
1	1	0.161	0.179	0.114	0.228	0.162	0.008	-0.025	0.121
2	0.161	1	0.207	0.177	0.091	0.136	0.103	0.172	0.040



3	0.179	0.207	1	0.158	0.192	0.056	0.180	0.062	0.180
4	0.114	0.177	0.158	1	0.074	0.186	-0.005	0.175	0.202
5	0.228	0.0191	0.192	0.074	1	-0.145	0.130	0.055	0.187
6	0.162	0.136	0.056	0.186	-0.145	1	-0.162	0.100	-0.043
7	0.008	0.103	0.180	-0.005	0.130	-0.162	1	0.085	0.221
8	-0.125	0.072	0.062	0.157	0.055	0.100	0.085	1	0.129
9	0.121	0.040	0.180	0.202	0.187	-0.043	0.221	0.129	1

Chart 4-3: Results of Bartlett's Test and KMO Factor

Value of KMO Factor	0.622
Statistical Weight of Bartlett's Test	121.510
Degree of Freedom	36
Sig.	0.000

Chart 4-4: The results of Initial and Extracted Commonalities For the Intra-Organizational Factors.

Intra-Organizational factors	Initial Commonality	Extracted Commonality
1	1	0.655
2	1	0.346
3	1	0.387
4	1	0.417
5	1	0.512
6	1	0.625
7	1	0.513
8	1	0.573

Compo- nents	Initial Eigen values			Non-Rotated Extracted <u>Eigenvalues</u>			Rotated Extracted <u>Eigenvalues</u>		
	<u>Total</u>	<u>%</u> <u>Variance</u>	<u>%</u> <u>Cumulative</u>	<u>Total</u>	<u>%</u> <u>Variance</u>	<u>%</u> <u>Cumulative</u>	<u>Total</u>	<u>%</u> <u>Variance</u>	<u>%</u> <u>Cumulative</u>
	1	1.933	21.480	21.480	1.933	21.480	21.480	1.579	17.542
2	<b>1.390</b>	15.441	36.921	1.390	15.441	36.921	1.471	16.347	33.889
3	1.113	12.362	49.284	1.113	12.362	49.284	1.386	15.395	49.284
4	0.948	10.532	59.816						
5	0.866	9.618	69.434						
6	0.780	8.671	78.104						
7	0.732	8.131	86.236						

9	1	0.404
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Chart 4-5: Explanation of Total Variances

8	0.643	7.147	93.384						
9	0595	6.616	100						

Chart 4-6: Components' Matrix

<u>Intra-organizational Factor</u>	<u>First Component</u>	<u>Second Component</u>	<u>Third Component</u>
1	0.477	0.163	-0.636
2	0.515	0.601	0.080
3	0.601	-0.073	-0.140
4	0.505	0.360	0.180
5	0.486	-0.391	-0.351
6	0.168	0.771	-0.046
7	0.373	-0.541	0.285
8	0.362	0.171	0.642
9	0.537	-0.291	0.176

Chart 4-7: Rotated Components' Matrix

<u>Intra-organizational Factor</u>	<u>First Component</u>	<u>Second Component</u>	<u>Third Component</u>
1	0.146	-1.149	<b>0.784</b>
2	<b>0.544</b>	0.062	0.216
3	0.294	0.290	<b>0.465</b>
4	<b>0.633</b>	0.028	0.124
5	-0.067	0.402	<b>0.588</b>

6	<b>0.566</b>	-0.544	0.091
7	0.037	<b>0.715</b>	0.013
8	<b>0.619</b>	0.289	-0.325
9	0.253	<b>0.554</b>	0.182

In each line in the rotated matrix of components, highlighted are the largest numbers corresponding to each factor or component. In the first column we find factors 2, 4, 6, and 8. In the second column we find factors 7 and 9. And in the third column we find factors 1, 3, and 5.

It is, according to this factor analysis, possible to list the intra-organizational obstacles to the export of construction stones in three main categories, in their order of significance:

First set of principle intra-organizational factors:

- 1/ Insufficient duration of, and lack of attention to, industrial exhibitions, seminars, lectures and the news media in dealing with exports' issues.
- 2/ Poor managerial foresight at top levels.
- 3/ Weakness of human resources.
- 4/ Lack of the knowledge of the standards and regulations in destination countries.

Second set of principle intra-organizational factors:

- 1/ Insufficient information and financial resources.
- 2/ Lack of familiarity with electronic trade, and lack of websites for the exchange of information.

Third set of principle intra-organizational factors:

- 1/The use of outdated methods and techniques.
- 2/ Insufficient availability of information about market opportunities through print bulletins or electronic media.
- 3/ Lack of training and encouragement of the exporters by responsible authorities.

**4.3: Second Target of Research:**

**Identifying extra-organizational factors responsible for creating obstacles in the export of construction stones:**

Twelve extra-organizational factors have been identified, as follows:

- 1/ Lack of an effective procedural diplomacy toward global economy.
- 2/ Insufficient government support and encouragement for the export industries.
- 3/ Difficulties in obtaining good quality primary materials locally.
- 4/ Lack of electronic business facilities and electronic banking.

- 5/ Instability in regulations and procedures regarding foreign trade.
- 6/ Limitations to Imports from Iran due to the economic sanctions regime.
- 7/ Strict import quota established for non-member of World Trade Organization.
- 8/ Unfavorable foreign exchange monetary policies.
- 9/ Transportation difficulties.
- 10/Transportation costs and distances to port facilities.
- 11/Cumbersome customs and port regulations.
- 12/Difficulties in obtaining lines of credit and loans for export purposes from banks.

The results of this factor analysis are reflected in the following charts:

Chart 4-8: Descriptive Statistics of Extra-Organizational Factors

<u>Internal Factor</u>	<u>Average</u>	Deviation	Numbers
1	1.65	0.707	199
2	1.66	0.806	199
3	1.58	0.747	199
4	1.87	0.904	199
5	1.74	0.740	199
6	1.45	0.701	199
7	1.74	0.752	199
8	1.57	0.755	199
9	1.99	0.980	199
10	1.89	0.923	199
11	1.86	0.865	199
12	1.55	0.671	199

Chart 4-9: Relational Matrix in Extra-Organizational Factors

<u>Internal Factor</u>	1	2	3	4	5	6	7	8	9	10	11	12
1	1	0.030	0.113	0.176	0.222	-0.083	0.193	-0.064	0.141	0.067	0.002	0.150
2	0.030	1	0.086	0.370	0.239	0.004	0.113	0.279	0.239	0.073	0.257	0.033
3	0.113	0.086	1	0.175	0.074	0.102	0.256	0.087	0.229	0.089	0.103	0.165
4	0.176	0.370	0.175	1	0.139	0.113	0.205	0.179	0.324	0.226	0.294	0.207
5	0.222	0.239	0.074	0.139	1	-0.007	0.042	0.023	0.178	0.026	0.234	0.140
6	-0.083	0.004	0.102	0.113	-0.007	1	0.219	0.081	0.073	0.175	0.146	0.062
7	0.193	0.113	0.256	0.205	0.042	0.219	1	0.133	0.367	0.135	0.294	0.082
8	-0.064	0.279	0.087	0.179	0.023	0.081	0.133	1	0.124	0.166	0.247	0.035
9	0.141	0.239	0.229	0.324	0.178	0.073	0.367	0.124	1	0.429	0.487	0.078
10	0.067	0.073	0.089	0.226	0.026	0.175	0.135	0.166	0.429	1	0.228	0.184
11	0.002	0.257	0.103	0.294	0.234	0.146	0.294	0.247	0.487	0.228	1	0.135
12	0.150	0.033	0.165	0.207	0.140	0.062	0.082	0.035	0.078	0.184	0.135	1

Chart 4-10: Results of Bartlett's Test and KMO Factor

Value of KMO Factor	0.685
Statistical Weight of Bartlett's Test	331.021
Degree of Freedom	66
Sig.	0.000

Chart 4-11: The results of Initial and Extracted Commonalities for the Extra-Organizational Factors.

Intra-Organizational factors	Initial Commonality	Extracted Commonality
1	1	0.597
2	1	0.629
3	1	0.298
4	1	0.429
5	1	0.487
6	1	0.418
7	1	0.436
8	1	0.443
9	1	0.535
10	1	0.367
11	1	0.504
12	1	0.275

Chart 4-12: Explanation of Total Variances

Chart 4-13: Components' Matrix

<u>Extra-organizational</u> Factor	<u>First Component</u>	<u>Second Component</u>	<u>Third Component</u>
1	0.266	0.706	0.168
2	0.496	-0.020	-0.618
3	0.400	0.135	0.347
4	0.631	0.084	-0.155
5	0.359	0.492	-0.341
6	0.268	-0.492	0.409
7	0.548	-0.052	0.365
8	0.387	-0.418	-0.345
9	0.725	-0.051	0.081



10	0.510	-0.207	0.253
11	0.669	-0.186	-0.150
12	0.331	0.328	0.241

Components	Initial Eigen values			Non-Rotated Extracted Eigenvalues			Rotated Extracted Eigenvalues		
	Total	% Variance	% Cumulative	Total	% Variance	% Cumulative	Total	% Variance	% Cumulative
	1	2.867	23.891	23.891	2.867	23.891	23.891	2.011	16.760
2	1.309	10.912	34.803	1.309	10.912	34.803	1.914	15.950	32.711
3	1.242	10.352	45.155	1.242	10.352	45.155	1.493	12.445	45.155
4	0.997	8.306	53.462						
5	0.981	8.179	61.640						
6	0.903	7.524	69.164						
7	0.813	6.779	75.943						
8	0.767	6.391	82.334						
9	0.721	6.006	88.340						
10	0.557	4.639	92.979						
11	0.473	3.940	96.920						
12	0.370	3.080	100						

Chart 4-14: Rotated Components' Matrix

Extra-organizational Factor	First Component	Second Component	Third Component
1	-0.034	0.037	<b>0.771</b>
2	<b>0.785</b>	-0.099	0.057
3	0.009	<b>0.445</b>	0.361
4	<b>0.533</b>	0.267	0.271

5	0.422	-0.177	<b>0.528</b>
6	-0.049	<b>0.600</b>	-0.236
7	0.124	<b>0.618</b>	0.197
8	<b>0.570</b>	0.158	-0.306
9	0.447	<b>0.537</b>	0.216
10	0.198	<b>0.572</b>	0.023
11	<b>0.592</b>	0.390	0.036
12	0.11	0.261	<b>0.455</b>

In each line in the rotated matrix of components we find the largest number corresponding to each factor or component. In the first column we find factors 2, 11, 8, and 4. In the second column we find factors 7, 6, 10, 9, and 3. And in the third column we find factors 1, 5, and 12.

It is, according to this factor analysis, possible to list the extra-organizational obstacles to the export of construction stones in three main categories, in their order of significance:

*First set of principle extra-organizational factors:*

- 1/ Insufficient government support and encouragement for the export industries.
- 2/ Cumbersome customs and port regulations.
- 3/ Unfavorable foreign exchange monetary policies.
- 4/ Lack of electronic business facilities and electronic banking.

*Second set of principle extra-organizational factors:*

- 1/ Strict import quota established for non-member of World Trade Organization.
- 2/ Limitations to Imports from Iran due to the economic sanctions regime.
- 3/ Transportation costs and distances to port facilities.
- 4/ Transportation difficulties.
- 5/ Difficulties in obtaining good quality primary materials locally.

*Third set of principle extra-organizational factors:*

- 1/ Lack of an effective procedural diplomacy toward global economy.
- 2/ Instability in regulations and procedures regarding foreign trade.
- 3/ Difficulties in obtaining lines of credit and loans for export purposes from banks.

**4.4: Ranking of the Factors:**

To rank or grade the factors, the classic TOPSIS method was used. The degree of similarity to, or separation from, between the factors and the ideal model, was used to rank the influence of these factors on the problem of export of construction stones from Mahallat/Nimvar region.

*First Phase: Creating the Decision Matrix.*

There are a total of 9 intra-organizational and 12 extra-organizational factors that create obstacles for the exports of construction stones from Mahallat/Nimvar region. The measures or the indicators are collected from the responses to the questionnaire that was circulated. This matrix, therefore, constitutes 21 factors and 200 respondents.

*Second Phase: Determining the Normalized Scale-Free Decision Matrix.*

In the TOPSIS method of determining the relative closeness to ideal solution, normalization is used to eliminate unit values. The norm of two numbers in each line are determined, and by dividing the numbers in each line by the value of the norm of the same line, the non-weighted decision matrix is determined.

*Third Phase: Determining the Vectors of the Weights of Various Factors.*

Since the value or weight of the opinions of all respondents to the questionnaire are equal, the vector of the weight of these opinions can be demonstrated as:  $W=(1,1,1,1,.....1.)^T_{1 \times 200}$

*Fourth Phase: Determining the Scale-Free Weighted Matrix.*

This can be achieved by multiplying the value of scale-free matrix by the vector value of the factors. In other words, the numbers in each line in the non-measured matrix is multiplied by the weight of its corresponding factor in the same line:

$$V_{ij} = R_{ij} \cdot W_j \quad j = 1, \dots, n \quad i = 1, \dots, m$$

Since the weight of all factors is equal to 1, the scale-free *weighted* matrix could be regarded the same as the scale-free matrix.

*Fifth Phase: Determining the "Ideal", and the "Negative-Ideal" Answers.*

This determination is based on the weighted, scale-free matrix figures. Since all the figures are positive numbers, the following answers are obtained:

$$v_j^* = \underset{1 \leq i \leq m}{Max}\{v_{ij}\} \qquad v_j^- = \underset{1 \leq i \leq m}{Max}\{v_{ij}\}$$

*Sixth Phase: Calculating the Distance of the Factors From the Ideal and Negative-Ideal Figures.*

Here, the Euclidian distances of the factors from the "ideal" and "negative-ideal" figures are indicated in the following relationships:

$$s_i^* = \sqrt{\sum_{j=1}^n (v_{ij} - v_j^*)^2} \quad , \quad s_i^- = \sqrt{\sum_{j=1}^n (v_{ij} - v_j^-)^2}$$

Chart 4-15: Distance of Factors From Ideal and Negative-Ideal Answers.

factors	Distance to ideal answer	Distance to negative-ideal answer
1	3.177	0.737
2	2.371	1.768
3	2.846	1.26
4	2.405	1.77
5	2.668	1.58
6	2.745	1.477
7	2.928	1.155
8	2.665	1.57
9	2.59	1.664
10	2.592	1.627
11	2.663	1.625
12	2.747	1.485
13	2.38	1.961
14	2.552	1.691
15	2.936	1.34
16	2.511	1.689
17	2.721	1.558
18	2.227	2.131
19	2.258	2.017
20	2.42	1.885
21	2.733	1.426

*Seventh Phase: Calculating the Similarity Indexes.*

The index of the similarity of factors to the ideal figures is calculated as follows:

$$c_i^* = \frac{s_i^-}{s_i^* + s_i^-} \quad i=1, 2, \dots, m$$

These values range between zero and one. The more the factor resembles the ideal figure; the closer is its index to one.

Chart 4-16: Similarity Index of Factors

Factor	Index of <u>Similarity</u>	Factor	Index of <u>Similarity</u>	Factor	Index of <u>Similarity</u>
1	0.188	8	0.371	15	0.313
2	0.427	9	0.391	16	0.402
3	0.307	10	0.386	17	0.364
4	0.427	11	0.379	18	0.489
5	0.372	12	0.351	19	0.472
6	0.35	13	0.452	20	0.438
7	0.283	14	0.399	21	0.343

*Eighth Phase: Ranking the Factors.*

Factors can be ranked according to their similarity indexes, from the larger to the smaller numbers. The highest number would be regarded as the best sample.

Accordingly, as shown in the following chart, various factors affecting the export of construction stones from Mahallat/Nimvar region are listed in order of importance. We can see that the problem with transportation is rated as the biggest problem, and the use of outdated equipment in production and processing of stones as the least important factor.

Chart 4-17: Ranking the Intra and Extra-Organizational Factors Affecting the Export of Construction Stones from Mahallat/Nimvar Region

rank	Factors of Affecting the Export of Construction Stones from Mahallat/Nimvar Region.
1	Transportation difficulties.
2	Transportation costs and distances to port facilities.
3	Lack of electronic business facilities and electronic banking.
4	Cumbersome customs and port regulations.
5	Lack of the knowledge of the standards and regulations in destination countries.
6	Insufficient duration of, and lack of attention to, industrial exhibitions, seminars, lectures and the news media in dealing with exports' issues.
7	Strict import quota established for non
8	Instability in regulations and procedures regarding foreign trade.
9	Lack of familiarity with electronic trade, and lack of websites for the exchange of information.
10	Lack of an effective procedural diplomacy toward global economy.
11	Insufficient government support and encouragement for the export industries.
12	Insufficient availability of information about market opportunities through print bulletins or electronic media.
13	Weakness in managerial foresight at the highest levels.
14	Unfavorable foreign exchange monetary policies.
15	Difficulties in obtaining good quality primary materials locally.
16	Weaknesses in human resources.
17	Difficulties in obtaining lines of credit and loans for export purposes from banks.
18	Limitations to Imports from Iran due to the economic sanctions regime.
19	Lack of training and encouragement of the exporters by responsible authorities.
20	Insufficient information and financial resources.



21	Outdated methods and techniques.
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As can be seen, the problem with transportation is rated as the biggest problem, and the use of outdated equipment in production and processing of stones as the least important factor.

### **5: Conclusions and Recommendations:**

The research carried out in this paper clearly indicates the importance of energizing and improving the production and exports of construction and decorative stones, preferably in processed or finished form, as a significant contributing factor to Iranian economy.

Attention is directed to several important factors that could help in accomplishing this vital task, as outlined below:

- \* The involvement of government agencies, as well as the Islamic Development Bank, in encouraging and supporting, financially and technologically, the quarry mining and stone processing industries.
- \* Instruction and training, from the managerial levels down to the workforce, in proper use of modern equipment and techniques, in order to maximize productivity while minimizing the costs of production, and thus creating a better competitive environment for exporting to global markets.
- \* Education in modern electronic marketing and information sharing techniques.
- \* Encouraging membership in international trade organizations, especially with regard to stone products.
- \* Facilitating the granting of bank loans for quarrying operations and export purposes.
- \* Discouraging the exports of unfinished or raw quarry stones by exacting higher tariffs.
- \* Encouraging and subsidizing projects aimed at improvements in the transportation industry and port facilities.
- \* The creation of unions of quarry operators and related industries, and encouraging cooperation among the members of these industries to reduce frictions and to improve coordination and more effective management of human resources.

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