Measuring the Relationship between Total Carpet exports and GDP in Iran using ARDL model for the period 2004-2023

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Abstract

The research aims to examine the relationship between Iran's total carpet exports and GDP in the light of changes in the overall price level in the Iranian economy for the duration of the period (2004-2023) Using the standard program (Eviews 9) In order to analyze the relationship between variables, the self-degradation model of distributed deceleration was used (ARDL) The research has reached a range of conclusions, including a long-term balance between total carpet exports and GDP, as it becomes clear to us that Iranian carpet exports contribute positively and morally to Iran's economic growth during the study period. Short-term analysis also shows a short-term relationship between variables. This research reflects the importance of the carpet sector as an important and central factor in supplying and supporting the economy with diversification and lack of reliance on oil exports in the Iranian economy.

Keywords: Iranian carpet exports, GDP, ARDL model.

Introduction

Iranian carpets are one of the most important traditional products with the country's heritage and cultural character. They represent an industry of authenticity and ethnicity emanating from the Iranian heritage. Carpet exports have always played a key and important role in supplying and supporting Iran's economy by contributing to highlighting the role of national exports and creating jobs, especially in rural Iran. Other than this creative industry, it faces significant challenges especially in light of the global economic and political variables, the most important of which are the international sanctions imposed on Iran and the creative and industrial competition of the other countries, the most important of which are India, Azerbaijan and Turkey. However, Iranian carpets have a good reputation globally among consumers as one of the creative industries in which they enter skill and heritage, hence this research attempts to analyse the impact of carpet exports on Iran's GDP for the duration of the (2004-2023) using the ARDL methodology, demonstrating an accurate understanding of the industry's economic relationship with macro-indices and their impact on the economy

Research problem: The problem of research can be summarized in an attempt to track the impact of carpet exports on GDP despite sanctions and weak industry infrastructure in Iran during the period 2004-2023.

Research hypothesis: Research proceeds from the premise that a positive and long-term package relationship between carpet exports and Iran's gross domestic product (2004-2023)

Research Objective: The research aims to measure the impact of carpet exports on GDP, analyze the relationship between indicators and illustrate ways of supporting Iran's carpet industry.

Research methodology: Try to blend descriptive method with standard quantitative approach by applying ARDL model and conducting tests for analysis.

Research structure: Research section into two main axes: -

First Axis: Conceptual and Conceptual Framework for Exports with Emphasis on Iranian Carpet Exports

Second: Analysis of the relationship between Iran's total carpet exports and GDP using the ARDL model for 2004-2023.

Axis I: Theoretical and conceptual framework for exports and importance of Iranian carpet exports

First: Theoretical and conceptual framework for exports

There are several definitions that deal with the concept of exports, but they all have almost the same meaning. The World Trade Organization (WTO) has defined exports as all the goods and services that a particular country produces within its borders and transfers to another country for trading purposes. (WTO, 2020:15), the World Bank has defined exports as those final or intermediate products produced and manufactured within the country's borders and transported out of the country World Bank, 2021:22. Exports may be defined as goods and services produced by a State and sold to other States for goods and services produced by such States or for financial overstatement, or the concept of exports falls within the framework of the reciprocal relationship, which is based on the realization of mutual monetary and in-kind benefits or returns. Exports can also be defined as extractive outputs of a State, if they can extend their influence and control over international markets. (Al-Tajani, 2016:4)

Exports include selling national products abroad for hard currency, so the export sector can be counted as an important foreign exchange sector. (Al Khafaji, 2019:8) Or exports can be defined as exports of tangible material goods that cross the state border and can be inspected and counted by customs officials such as petroleum agricultural products, automobiles... Etc, OHI exports are in the form of services performed or paid by people abroad such as transport services, banks, insurance, advertising and investment income. (Sofian & Osama, 2023:31) So we can define exports is that each country has a comparative advantage in the production of a particular commodity that it produces and exports to another country that does not have a comparative advantage in the production of the same commodity for the purpose of benefiting and obtaining hard currency.

THE IMPORTANCE OF EXPORTS

Most economic studies agree that increasing external demand for a country's exports will lead to an increase in total exports, especially as exports have reduced supply flexibility, as increasing external demand increases the prices of exported goods and this gives the exporting country a great incentive to exploit all its inactive and semi-inoperative economic resources, The demand for factors of production used in the production of export goods increases significantly, resulting in increased prices of factors of production in the export sector, owing to the high marginal benefit of these factors in the export sector, resulting in a part of the factors of production moving from other economic sectors to the export sector or the export sector. (Nuri, 2004:24)

Export helps to expand global markets as the company enables entry into new markets without the need for large investments. Companies can achieve higher returns by exporting products on several agents in international markets. (Sofiane Wasama, 2023:32)

Exports contribute to creating new incomes for the national economy as a result of the sale of goods and services produced within the country and exported to the outside world. (Al-Mohammadi and Khalaf, 2022:43), exports have an effective impact on the productive structure of the source country as exports contribute to increasing national income by providing global markets for surplus domestic production as well as increasing domestic savings because industries will operate all their resources in order to meet the need for domestic production and production allocated for export.

Export development helps absorb global technological developments leading to human development and increased economic growth.Moreover, diversification and development of exports create investments in efficient economic sectors that produce many dynamic commodities and greater competitiveness that can compete with other commodities in world markets, as the development impact of the export sector depends mainly on the links of that sector with the rest of the national economy,(Khudir &Kazemr ,2024: 445)

Exports are an important indicator of economic growth. They are its main driver, making foreign trade an important place in global markets (Behnam, 2019:144)

Adam Smith described exports as the most effective means of expanding markets, which in turn increases national income and thus increases capital accumulation and investment. (Hamadi,2005:4)

Export means a State's ability to achieve commodity, service and information flows to countries and other international markets for the purpose of achieving certain objectives. (Sayavong,2015:343) In addition, the increase in exports leads to an increase in the quality of employment and thus to a decrease in the unemployment rate in the exporting country. (Los,et al:23)

Third Development of Iran's total carpet exports and GDP for the period 2004-2023
The Iranian carpet industry is one of the main crafts, and since ancient times it has always been at the forefront of Iranian non-oil exports. Carpet production plays an important role in terms of

economy and living conditions and over the years carpets in terms of design and dimensions have a special place in global markets. since the late 1980s, the Iranian Government has tried to expand and diversify non-oil exports by facilitating export procedures and granting exporters exemptions. Thanks to Iran's rich oil and gas reserves, the chemical and petrochemical industries have a comparative advantage. Trade liberalization has expanded international markets for resource and energy-based products. However, Iran has not been able to increase its exports of labour-intensive goods, especially in textiles, clothing and leather products, as Iran's non-oil exports face increasing competition in international markets. (Karimi 2008:25)

Table (1)
Carpet exports, GDP and inflation in Iran (2004 - 2023) US $ million

Year	Total carpet expo	Growth of total carpet %exports	Gross domestic product	GDP %growth	Inflation%
2004	629689000	2.00	1.90043E+11	11.00	14.76
2005	637952000	1.31	2.26452E+11	19.16	13.43
2006	597675000	-6.31	2.66299E+11	17.60	10.02
2007	562487000	-5.89	3.49882E+11	31.39	17.34
2008	654931000	16.43	4.12336E+11	17.85	25.41
2009	771918000	17.86	4.16397E+11	0.98	13.55
2010	869796000	12.68	4.86808E+11	16.91	10.09
2011	897427000	3.18	6.26133E+11	28.62	26.29
2012	820591000	-8.56	6.44036E+11	2.86	27.26
2013	657232000	-19.91	4.92776E+11	-23.49	36.6
2014	693669000	5.54	4.60383E+11	-6.57	16.61
2015	641573000	-7.51	4.08213E+11	-11.33	12.48
2016	692844000	7.99	4.57955E+11	12.19	7.25
2017	817320000	17.97	4.8663E+11	6.26	8.04
2018	668471000	-18.21	3.29692E+11	-32.25	18.01
2019	375979000	-43.76	2.8365E+11	-13.97	39.91
2020	318481000	-15.29	2.39735E+11	-15.48	30.59
2021	347759000	9.19	3.59097E+11	49.79	43.39
2022	335171000	-3.62	4.13395E+11	15.12	43.49
2023	325086000	-3.01	4.01505E+11	-2.88	44.58
Compound growth					
2004 - 2023		-3.31		3.81	

Source- :
- https://comtradeplus.un.org
- https://www.macrotrends.net

Compounded growth rate calculated according to the following formula

$$R = \left[\left((PT/P0)^{\wedge}(1/N)\right) - 1\right] * 100$$

Through the table (1) in 2004, carpet exports reached $ 629689000 million with a small growth rate of 2.00%, while gross domestic product (GDP) was $1.90043E + 11 million, 11.00%, this year's inflation rates were 14.76%. In 2005, carpet exports amounted to $ 637952000 million with a small growth rate below the previous year of 1.31%. US $ 597675000 million in 2007 (US $ 562487000 million) and export growth in these years was between (-6.31 and -5.89)% GDP in these years was 2.66299E + 11 and 3.49882E + 11 million while GDP growth was between. (31.39-17.60)% Inflation (10.02-17.34)% We note that the growth of GDP in 2007 has risen significantly but after 2007 GDP has deteriorated due to the imposition of economic sanctions on Iran due to its nuclear programme. In 2008, total exports were $65,493,1000million, while export growth was 16.43%. GDP was $4,12,336E + 11 million. Growth rate was 17.85% and inflation was 25.41%. In 2009, total exports were $7,71,18000million. In this year, carpet exports grew by 17.86% Total export growth rate was 12.68% and the same year's GDP was 4.86808E + 11 million dollars. The output growth rate was 16.91%, while inflation was 10.09% . In 2011 and 2012, gross domestic product (GDP) was 897427000 - $ 820591000 million. Total export growth was $3.18 - 8.56%. GDP was 6.26133E + 11 and 6.44036E + 11 million, while GDP growth was $28.62 - 2.86%. Inflation for the years was 26.29 - 27.26%. In 2013, GDP was $ 657232000 million In 2014-2015, total exports were close to parity, reaching $ 693669000 million and $6,41,573,000, while total export growth was 5.54% and 7.51%. GDP was 4.60383E + 11 - 4.08213E + 11 million. GDP growth was 6.57-11.33% and inflation was 16.61-12.48%. In 2016, total exports were $ 692844000 million, while export growth was 7.99%. GDP was $4.57955E + 11 million. Output growth was 12.19%, inflation was 7.25%. In 2017, total exports were $ 817320000 million, export growth was 17.97%, while GDP was 4.8663E + 11 million and output growth was 6.04%. In 2018 and 2019, total exports were between $66,84,71000 and $37,597,9000million, while export growth was negative, at $ 18% - 43.76%, GDP was 3.29692E + $ 11 million, -2.8365E + $1million, output growth was between $ 32 and $13.97% and 18.01-39.91% inflation. In 2020, total exports amounted to $31,848,1000million, export growth was 15.29%, GDP was 2.39735E + 11million, GDP growth was 15.488% and inflation reached 30.39%. In 2021, total exports reached $34,775,9000million. This year, export growth improved by 43.59% from previous years, 9.19% 2022-2023 Total exports declined to $33,5171,000 and $32,5086,000. Export growth fell to negative $3.62 million and 3.01%. Gross domestic product (GDP) was 4.13395E + 11 and 4.01505E + 11 million for the two years. The main reason for Iran's declining carpet exports is the sanctions imposed on Iran, which have hampered financial exchanges. Some countries have banned the import of Iranian carpets, as well as the suspension of traders' business cards, have been reasons for the decline in official statistics of Iranian carpet exports. India ranked first in the production of carpets after the decline of Iranian carpets and Iran's exit from global markets allowed countries such as China, India, Nepal, Egypt and Pakistan to offer their products as an alternative to Iranian carpets in the market. In addition to dishonest competition indicating that some competitors mimic designs, inscriptions and the use of names of areas that produce hand carpets such as Isfahan, Tabriz and Kashan has had a negative impact on the reputation of Persian hand carpets (Aghdaie,2012: 245) decrease in global demand for Elirani carpets during this

period increased exports of competitors from other countries such as China, India and Pakistan at a lower price than those of Iranian carpets, which led to a decline in exports. (Heydari,2015:516)

Also, the lack of interest in the brand and marketing and the absence of carpet exhibitions to familiarize itself with the features of the Persian carpet (in addition. Economic and financial policies, including: exchange rate swings and the need to return and convert returns to the national currency within a specified period of time. Government support for this sector has declined, including the neglect of propaganda and marketing internally and externally. (Rahmati,2024:43).

Second: Analysis of the relationship between Iran's total carpet exports and GDP using the ARDL model for the duration (2004-2023)
First: Research variables and Dali description
In order to test the research hypothesis and achieve its objectives, independent variables (total carpet exports, inflation) and dependent variables (GDP) have been identified as follows: -
Independent Variable   Carpet exports in total   EX
Independent variable   Inflation   INF
Affiliate Variable   Gross domestic product   GDP
 According to the theoretical framework of the research, it is presumed to test the following dual relationship:-
$GDP =a+b_1EX +b_2INF +ui$
It stands for "EX" to total carpet exports, while "INF" to inflation, while "GDP" to Gross domestic product
Second: Test results.
1-Unit root test
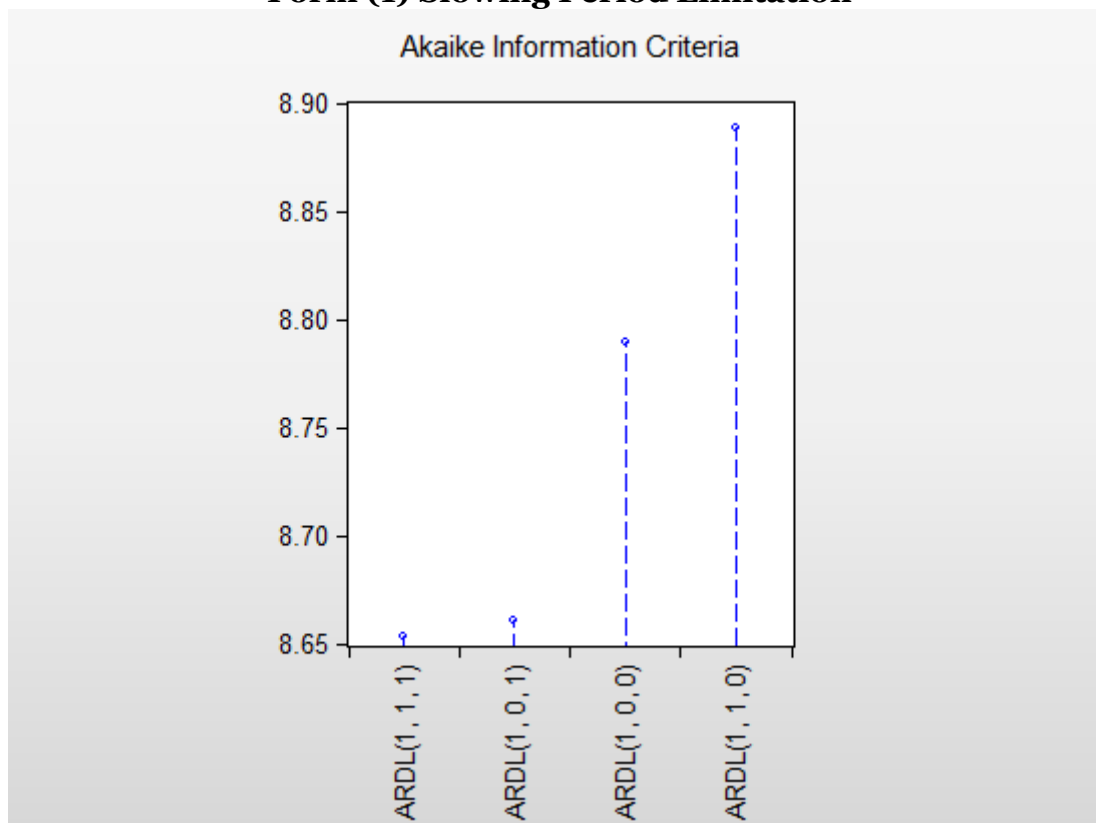
Table (2)
Unit Root Test (PP)

UNIT ROOT TEST RESULTS TABLE (PP) Null Hypothesis: the variable has a unit root				
At Level				
		GDP	EX	INF
With Constant	t-Statistic	-3.0886	-2.6444	-1.4277
	Prob.	0.0447	0.1019	0.5469
		**	no	no
With Constant & Trend	t-Statistic	-3.2244	-2.8048	-2.225
	Prob.	0.1093	0.2123	0.4505
		no	no	no
Without Constant &	t-Statistic	-3.0007	-2.7098	0.0392

Trend				
	Prob.	0.0048	0.0096	0.683
		***	***	no
At First Difference				
		d(GDP)	d(EX)	d(INF)
With Constant	t-Statistic	-10.4738	-7.4637	-4.6677
	Prob.	0	0	0.0019
		***	***	***
With Constant & Trend	t-Statistic	-10.7305	-7.031	-4.6119
	Prob.	0	0.0001	0.0093
		***	***	***
Without Constant & Trend	t-Statistic	-9.7586	-7.6931	-4.6537
	Prob.	0.0001	0	0.0001
		***	***	***

Table of the researcher's preparation accredited the results of the analysis of the program (Eviews 9).

After conducting the unit root test for search variables and through table (2) we show that the variables GDP, EX stabilized at the level while the variable, INF has settled at the first difference with a definite, we go and determine the optimal slowing period as follows:-

Form (1) Slowing Period Limitation

The form of the researcher's preparation by adopting the results of the analysis of the program (Eviews 9)

Through the form (1) we show that the optimal slowing period of the model is Lag 1.

2 - Joint Integration Model ARDL

Table (3) Joint Integration Model Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP(-1)	0.178304	0.250621	0.711449	0.4894
EX	1.092953	0.312639	3.495901	0.0039
EX(-1)	-0.452759	0.364688	-1.241496	0.2364
INF	1.023033	0.467601	2.187835	0.0475
INF(-1)	-1.125459	0.490865	-2.292806	0.0392
C	6.839751	9.150197	0.747498	0.4681
R-squared	0.54	Adjusted R-squared		0.37
F-statistic	3.173	Durbin-Watson stat		1.638

Table of the researcher's preparation accredited the results of the analysis of the program (Eviews 9)

Table (3) shows us the results of the self-degraded slowing model from which we note that the variable (EX) has a positive and strong impact on GDP in the current period, reflecting the importance of carpet exports as a contributing factor to economic growth, either the variable (INF) The effect of inflation in the current period is positive, but it shows a late negative impact, suggesting that high inflation may cause long-term economic stress. Interpretive capacity R-squared was (54R2 = 0.) That is, the independent variable in the estimated model explains 54% of changes in the dependent variable and 36% is due to other variables outside the model, and the model is relatively good at interpreting GDP, but other factors may contribute to the explanation of the rest of the changes not covered in the model.

3- Bounds Test

Table (4) Bounds Test

Test Stat.	Value	K
F- Stat	4.606831	1
Signi.	I0 Bound	I1 Bound
%5	3.79	4.85

Table of the researcher's preparation accredited the results of the analysis of the program (EViews 9)

Table (4) showing the results of the boundary test finds that the calculated value (F-statistics) was (4.606831) and is greater than the small and large values at a 5% morale level. Therefore, the impact of carpet exports and inflation on GDP is long-term, meaning there is a long-term relationship between variables.

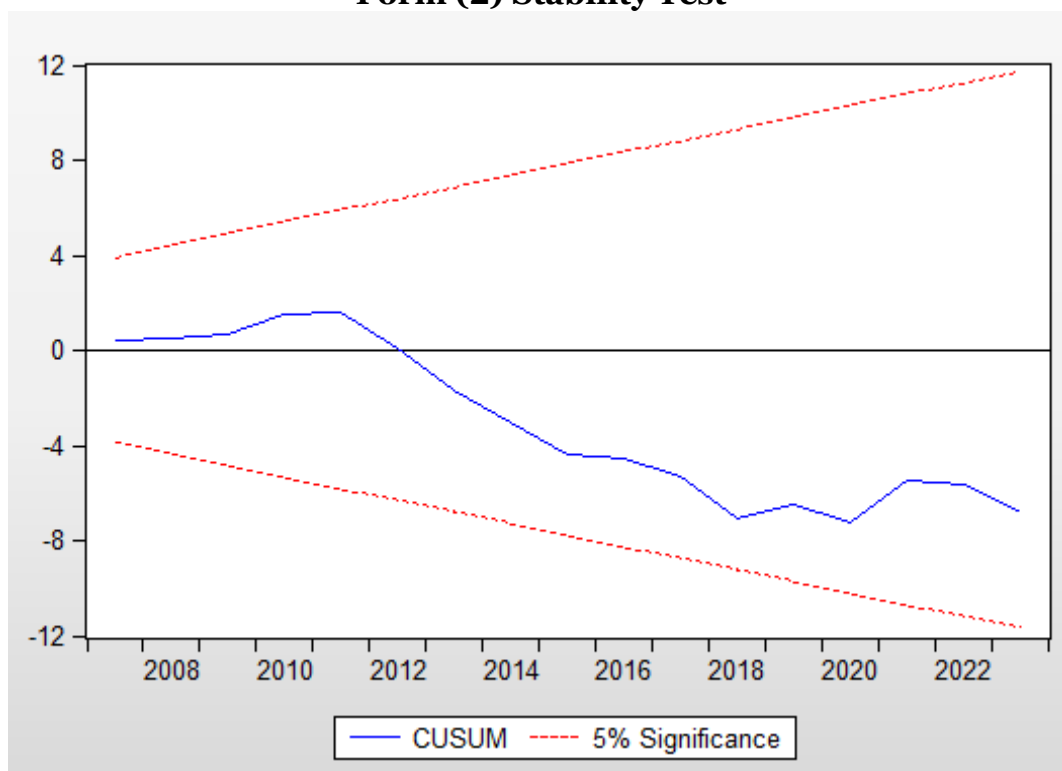### 4-Test the problem of self-association and heterogeneity of contrast

Table (5) Serial correlation test and heterogeneous contrast

Breusch-Godfrey Serial Correlation LM Test			
F- statistic	1.015373	Prop . F	0.3335
Obs*R-squared	1.482253	Prob. Chi-Square	0.2234
Heteroskedasticity Test: ARCH			
F-statistic	0.137452	Prob. F	0.7157
Obs*R-squared	0.153316	Prob. Chi-Square	0.6954

Table of the researcher's preparation accredited the results of the analysis of the program (EViews 9)

From Table (5) after the Breusch-Godfrey Serial Correlation LM Test it is clear to us that the model is sound and free of the self-correlation problem since its Chi-Square value is immoral at the level of 5%, as well as the model is free from the problem of heteroskedasticity.

Form (2) Stability Test

The form of the researcher's preparation by adopting the results of the analysis of the program
(Eviews 9)

Through the shape (2) it is clear to us that the model is stable that the chart is located within the upper and lower boundaries.

5- Estimate ECM error correction form

Table (6) Error Correction Model

Short-term error correction model			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
D(EX)	1.092953	0.312639	3.495901	0.0039
D(INF)	1.023033	0.467601	2.187835	0.0475
CointEq(-1)	-0.821696	0.250621	-3.278637	0.0060
Long-Term Error Correction Model			
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
EX	0.779114	0.432880	1.799838	0.0951
INF	-0.124652	0.518966	-0.240193	0.8139
C	8.323945	11.853598	0.702229	0.4949

Table of the researcher's preparation accredited the results of the analysis of the program

(EViews 9)

Table 6 shows the short-term error correction model that carpet exports and inflation have a D effect on GDP and carpet exports are a strong factor to support GDP. In the long term, the impact

of carpet exports on GDP remains positive but less than in the short term, while the long-term balance shows the correction factor (0.821696 -) indicates a swift restoration of balance if there is any deviation from the long-term relationship, and it is also evident from the above results that carpet exports are a key element promoting economic growth, which is consistent with the importance of this industry in the Iranian economy

Conclusions

1- Carpet exports are of great importance in Iran's economy, playing an essential role and clearly contributing to an increase in GDP.
2- The carpet industry means a culture, heritage and creative craft that characterizes Iran's economy as well as economic importance as a source of collection of hard currencies.
3- The benchmark analysis showed a positive and moral relationship between carpet exports and GDP, which means that the promotion of non-oil exports, including carpets, promotes and supports sustainability and economic growth.

Recommendations

1- The Iranian Government must promote and support the industry sector, especially creative industries, including the carpet industry, because it plays an active and essential role in supplying Iran's economy with hard currencies on the one hand and absorbing a large number of industry operators on the other.
2- To improve and develop the infrastructure of Iran's carpet industry in order to ensure higher efficiency production and good exports of global competitiveness.
3- Develop promotional methods and multifaceted media to promote Iran's heritage and folkloric industries globally, including the Iranian carpet industry, which has a good reputation in international markets.

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