Identifying the Factors Affecting Government Support for Iranian Automotive Industry

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Abstract. This study aims to identify the factors affecting government support for Iranian automotive industry. Initially, based on the research literature, a set of factors was identified and designed as an analytic network process model. To investigate the analytic network model using the Delphi method, the opinion of 25 experts associated with government support for the automotive industry was used to answer the designed questionnaire for pairwise comparison. These experts were chosen through snowball sampling. The research result demonstrated that in experts' opinion, various types of government support are needed to

desirably expand this industry. According to the result of this study, a list of priorities has been provided below: 1) Specific support; 2) management information support and advisors; 3) financial support; and finally, 4) legal support. With respect to the result of binary comparison, the sub-criteria of reduced tax exemption for automakers, economic incentives, joint venture and provision of global marketing services have had the greatest weight respectively in the sub-criteria of financial support, specific support, legal support and management information support and advisors.

1. Introduction

Undoubtedly, the automotive industry has been one of the most important driving forces for the growth and development of countries in the twentieth century. One of the most important strengths of the automotive industry is its extensive relationships with other economic and social sectors of countries in the past and future. This sector of the industry with production of over sixty million cars annually is considered as one of the major manufacturing activities of the world. The World Trade Organization statistics are also indicative of this issue (Commission on Macroeconomics-Iran Chamber, 2013). In Iran, this industry is more than half a century old and has benefited from the government's supportive policies from birth to the present day so that the oldness of this industry and the way governments are dealing with it are quite close (Waqar Baher, 2014). The close relationship between the government and the private sector will lead to development when the interests of the private sector do not dominate the government and the government can represent and coordinate the interests of various groups (Chung, 2013). In general, there are two different perspectives in Iran regarding government involvement in the automotive industry. One group believes that irrespective of the severity or weakness of supportive policies, this industry should be supported because it leads to Iran's economic independence. The second group, while disapproving the supportive policies, argues that Iran has never had any advantage in the

automotive industry and should determine its fate by being in a competitive atmosphere. The results suggest that although this industry has developed slowly and has experienced many ups and downs in different years, it has enough potential to receive supportive policies (Meydari, 2013). The main argument of this research is how government supportive policies should be adopted in order to bring us closer to our long-term goals. Industrial policies can be designed and modified depending on the circumstances and the desired sector. But the main issue that determines the success or failure of industrial policies more than the policies themselves is the government behavior. Government inefficiency can prevent the application of any economic policy. The industrial policies adopted in Iran, one of the most widely used of which is the discussion of customs tariffs, have never been focused on a particular period and it may be said that they have existed since the formation of this industry. But the problem starts when the government has never had a codified plan to which it is committed and the import control or release procedures has been a function of fluctuations in foreign exchange earnings rather than industrial policies and this issue has made automakers faced with the problem of lack of planning. What is common between Iran and other countries which have pioneered in terms of the automotive industry and have enjoyed government support in this field is merely the name of supportive policy. In Iran, only nominal support has been discussed but real support has been neglected. Among the other reasons for this industry to drop behind relative to its global competitors are the lack of a coherent and codified plan for industrial development, lack of long-term investment and facilities for the development and promotion of this sector of the industry and lack of an active role for the governments and parliaments. Our problem in Iran is not the existence or absence of support but is how to do it in governments and especially in Iran. Therefore, this study seeks to examine a set of government support for the automotive industry that can be used as real and practical government support so that it can be provided as the proposed model. Thus, it cannot be avoided by the pretext that the experience of support in Iran has been undesirable.

2. Literature review

Currently, values, culture, government structure, accountability, administrative laws and regulations and political stability have been considered as the causal factors underlying economic development (Motevasseli, 2011). "New institutional economics", argues that economy should be an optimal combination of market, government and enterprise and they should be combined in such a way as to minimize the cost of exchange in private contracts among economic agents (Renani, 1997). The low level of demands, needs and expectations of people, supportive policies of the state, unanswered domestic demand surplus in the years after the revolution and also lack of permission for the entry of foreign cars to the domestic markets are the causes of providing a fully supportive environment for the country's automakers. This phenomenon has been strengthened over time through a positive feedback loop and has continued its positive movement without being influenced by the external threatening factor (Bararpour & Araqi, 2005). Among the important forms of support, we can refer to direct (tariff) support whose effects comprise increased prices of imported goods, import restriction (improved balance of payments), support for domestic products and collection of taxes from the importer and government budget deficit financing and also indirect (non-tariff) support (Industrial Management Organization, 1998). In non-tariff support, the government issues a limited number of licenses for legal imports and prohibits unauthorized imports. In 2013, Iran's Ministry of Industry, Mine and Trade has described the necessary grounds for realizing the goals and development of the automotive industry through attracting the cooperation and support of government agencies, which have been presented in Table (1).

Table 1. Description of the government support services for the Iranian automotive industry (Iran's Ministry of Industry, Mine and Trade, 2013)

Improved business environment	1. Identifying and modifying deterrent factors 2. Maintaining stability in rules and regulations based on transparent principles and well-known global standards 3. Modifying the rules and stabilizing monetary and financial policies 4. Improving the rules and regulations in relation to the facilitation of matters to achieve economic scale, aggregation, merger, dissolution of companies and formation of parent/holding companies, the creation of industrial clusters and so on 5. Production and supply of products in accordance with the principles governing the supply and demand market (market price)
Promotion of technological capabilities	1. Development of inter-agency partnerships (research and development centers, part manufacturing companies, automaker, testing and so on) in the field of purchase and transfer of technology required for the automotive industry 2. The systematic relationship between the automotive industry and universities and scientific-research centers, especially in the field of new technologies leading to sustainable development 3. Development of science and technology parks 4. Development of engineering and consulting services 5. Development and expansion of specialized associations
Competitive raw material production	1. Establishment and development of major raw material production centers required for the automotive industry 2. Development of new technologies in new materials and basic materials for petrochemicals 3. Research and development in the field of recyclable and environmentally friendly materials
Production of competitive parts/assemblies	1. Development and promotion of part and assembly manufacturing industries and value-added lateral industries 2. Direct/joint venture with foreign part/assembly manufacturers with a prestigious brand 3. Establishment and expansion of research and development centers 4. Product design and development in the field of new technologies 5. Design and development of new technologies in the field of electrical and electronic assemblies 6. Creation and promotion of centers for designing and testing automobile parts and assemblies and development of specialized industrial towns in the field of part manufacturing industry

Competitive automobile production	1. Design and manufacture of automobiles under the domestic name 2. Use of a common platform by one or more domestic or global authentic auto manufacturers while maintaining a competitive/exporting advantage 3. Application and development of innovation and new technologies in automobile production 4. Improved quality and safety of domestic production cars at the level of global standards
Development of competitive sales and after-sales services in world class	1. Development of competitive sales infrastructure and after-sales services in world class 2. Development of competitive sales systems and after-sales services in world class 3. Continuous and competitive promotion of customer satisfaction in world class
Imports of automobiles, parts and assemblies	1. Gradual elimination of non-tariff and non-technical barriers 2. Receiving all legal duties subject to domestically produced goods from imported goods 3. Determining and gradually reducing tariffs for five-year periods in order to clarify the competitive environment of the automotive industry 4. Developing automotive standards, automobile parts and assemblies and making them compulsory 5. Quantitative management of volume and variety of car imports 6. Prohibiting the imports of second-hand automobiles, parts and assemblies in compliance with the law 7. Obliging automobile importers to establish sales and after-sales services centers according to regulations approved by the Ministry of Industry, Mine and Trade
Exports of automobiles, parts and assemblies	1. Facilitating and strengthening the required infrastructure and legal grounds of exports 2. Increasing export incentives in proportion to the added value of export products and the ratio of exports to domestic production 3. Promoting the role of automotive industry in regional and global treaties for export development 4. Offering assistance to provide suitable credit lines for target export markets 5. Creating and developing international marketing centers 6. Predicting exports of automobiles, parts and assemblies in contracts of cooperation with foreign parties

Support for domestic and imported automobile users	1. Participation in the development and monitoring of the enforcement of Consumers Rights Protection Act and its executive regulation 2. Monitoring the performance of auto manufacturing companies and car importers in the field of quality and sales and after-sales services according to the notified criteria 3. Monitoring the performance of the customer survey system and dealing with their complaints
Coordinating and tracking the fulfillment of obligations of other stakeholders in the automotive industry	
Providing appropriate grounds for the implementation of economic, social and cultural development programs of the country with emphasis on preserving the identity of enterprises as economic enterprise and making them competitive	
Facilitating the process of attracting foreign direct investment (FDI) with the purpose of transferring new technologies and using their sales/export networks	

Supportive policies are enforced through commercial, monetary and financial policies of the state, leading to a change in motivational structure, transfer of resources and competitive power of manufacturing enterprises (Farzin, 2009). Japanese government support includes: 1) Research and development comprising three phases: A) research and development in the field of primary technologies; B) proving and building the original sample and C) manufacture and initial development (all three phases receive government funding); 2) support for infrastructures; 3) support for market which embraces assistance through goods and property taxes, rent of services to private companies, collection of field data for further research, feasibility studies and subsidies from local governments for purchase. The New Zealand state also has several key tools in its government program to support the automotive industry, which consist of paying $ 6 million a year to support innovation in the electric vehicle industry and reviewing the reduction in tax rates and tax profit margin calculation method for electric vehicles (Xia, 2017).The Chinese government has taken a series of measures, including the policy of financial subsidies, preferential tax policies, technical support policies and infrastructure policies in order to deal with the disadvantages of electric vehicles and promote their acceptance (Zheng et al., 2018). In his research results, Lee et al. (2016) proved that the measures related to financial incentive policies have had a positive impact on encouraging automobile manufacturers to set up

electric vehicle production designs and increase consumer acceptance of these products. In Table (2), the various sectors of the automotive industry on which we can focus and by the improvement of which development can be achieved have been provided.

Table 2. Micro and macro areas of the automotive industry in Iran (Bararpour & Araqi, 2005)

Automotive industry	Growth and learning of car industry employees, training, employee productivity, salaries and benefits, motivation, innovation, leadership
Internal processes	Production, research and development, human resource development management, marketing and sales, quality, sales price, timely delivery of products, after-sales services
Financial	Profitability, costs, revenues
Market	Market share, market share of Iran Khodro, market share of domestic rivals of Iran Khodro, market share of foreign rivals of Iran Khodro, vehicle demand in the domestic market, vehicle supply in the domestic market, vehicle price in the domestic market
Customer	Customer satisfaction with Iran khodro products, customer satisfaction with Iran khodro rivals' products, customer's orders to Iran Khodro
Part manufacturing industry	The price of parts made by domestic manufacturers in the domestic market, the price of parts made by foreign manufacturers in the domestic market, the quality of parts made by domestic manufacturers in the domestic market, the quality of parts made by foreign manufacturers in the domestic market
Government macro policies	Foreign direct investment (FDI), government support policies, customs tariffs, non-tariff cases

The successful policy adopted by underdeveloped countries for the development of the industry is a very complicated system which is briefly outlined (Amjad, 2005): 1. Along with import substitution (allocation of the country's resources in such a way as to increase industrial production in order to meet domestic needs and reduce imports [Industrial Management Organization, 1998]), they have expanded the exports because export development needs increased quality of goods and pushes the environment towards competitiveness. In this way, industry owners are forced to make their goods over time with such quality that they can compete with similar foreign products. 2. In addition to supporting the industry by the state, they have gradually taken steps towards a free market economy and elimination of

subsidies.3. Since raising the quality of goods means employing the most efficient technicians, engineers, researchers, managers and planners, executive directors of these countries have created a sound administrative and executive system that prevents the exercise of influence by the individuals to employ people who are not scientifically qualified or lack the necessary abilities to take responsibility. In other words, the adoption of meritocracy, rather than factionalism, has had a decisive influence on the development of countries. 4. Every failure in planning is considered as a lesson so that for the re-evaluation of development and application plans, the most efficient methods are used. 5. By strengthening and rebuilding positive cultural structures and integrating them with Western capital and technology, they have provided a platform for culture-centric and sustainable development. In the 1820s, Hamilton proposed 11 types of measures for industrial development, which include (Chung, 2013): 1- Supportive duties or tariffs; 2- banning rival goods or imposing duties that are equivalent to the prohibition; 3- prohibition of the export of raw materials used in the manufacture of goods; 4- cash grants (subsidies); 5- awards (special subsidies for Key innovations); 6- exemption of imports of raw materials used in the manufacture of goods; 7- restitution of duties on raw materials used in the manufacture of goods; 8- encouraging new inventions and discoveries in the country and introducing inventions and discoveries of other countries in the United States, especially those related to machinery; 9- reasonable criteria for the inspection of manufactured goods; 10- facilitating cash transport and transfer from place to place; 11- facilitating the transportation of goods. In his research results, Sahebi (2006) stated that to expand competitiveness, it is necessary to prepare the ground for developing competitive conditions and presence in international markets by modifying government policies on taxes and duties, labor law, financial and infrastructure resources and reducing the risk of the investment climate. In the part manufacturing industry, in addition to improved business space, attention should be paid to modifying the relationship between part maker and automaker, increasing the product quality, improving the methods to provide technical knowledge and expanding research and development.

3. Method

Since analytic network process is the general state of AHP and its widespread form, it has all of its positive features, including simplicity, flexibility, application of quantitative and qualitative criteria simultaneously and the ability to check consistency in judgments and can also consider the complex relationships (interdependencies and feedback) between and within decision elements through using a network structure instead of a hierarchical structure. The difference between a "hierarchical structure" and a "network structure" is presented in Figure (1). The analytic network process considers each issue and problem as a network of criteria, non-criteria and options (all of these are called elements) which have been gathered together in clusters. All elements in a network can, in any way, be interconnected. In other words, feedback and interconnection between and within clusters are possible in a network (Garcia-Melon et al., 2008). Thus, ANP can be considered as composed of two parts: Control hierarchy and network matrix. The control hierarchy consists of the relationship between goal, criteria, and non-criteria and affects internal system connection, and network matrix includes the dependency between elements and clusters.
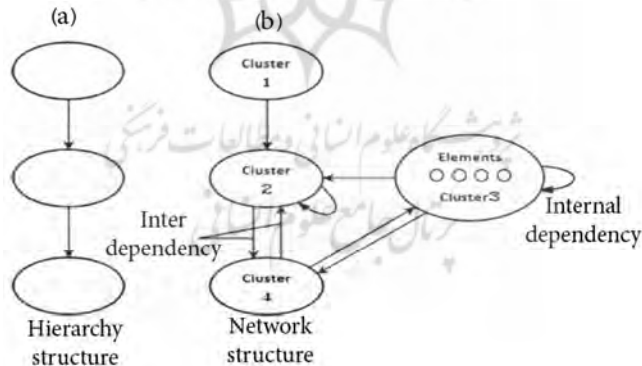
Fig. 1. The structural difference between a "hierarchy" and a "network" (Chung et al., 2005)

Initially, it is necessary to extract all kinds of government support for the automotive industry based on theoretical and experimental texts and interview with experts of the field. Then, the determining criteria, non-criteria and sub-criteria to achieve the research goals should be

identified. The network model to determine government support for the automotive industry is presented in Fig. 2. After specifying the criteria and sub-criteria associated with government support for the automotive industry, the relationship between these factors should be examined. To do so, the opinions of a group of relevant experts are usually used. For this purpose, by using the Delphi method in this study, meetings were held with 25 experts in the field of government support for the automotive industry, who were selected through snowball sampling method and were asked to complete pairwise comparison matrices.
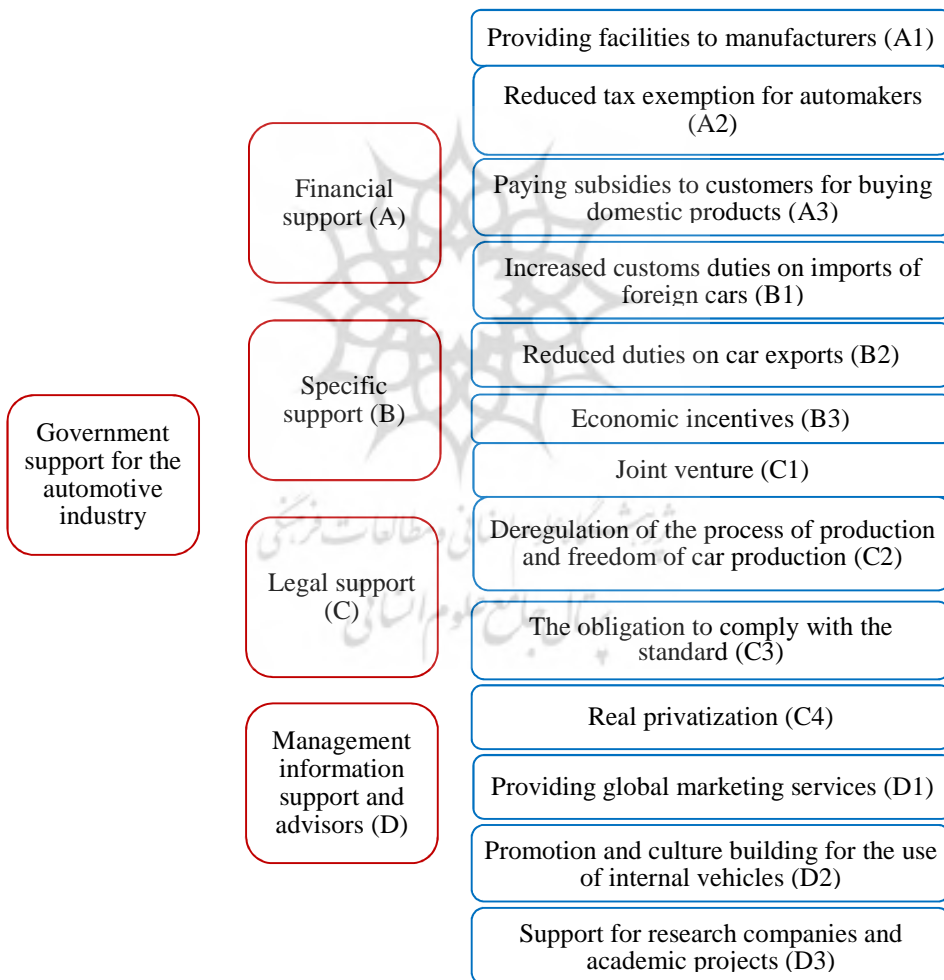

Fig. 2. Network model of government support for the automotive industry

Table 3. Internal dependency of main criteria with each other

Criteria	A	B	C	D
Financial support (A)		✔	✔	✔
Specific support (B)	✔		✔	✔
Legal support (C)	✔	✔		✔
Management information support and advisors (D)	✔	✔	✔	

4. Findings

In this step, comparison matrices of the main criteria, the dependence of the main criteria with each other, non-criteria, and the dependence of non-criteria with each other are formed and their consistency is also controlled. These steps are explained below. Binary comparison of the four main criteria is made based on Saati's 9-quantity scale in the same way as used in the analytic hierarch process (AHP). The result of binary comparison of the main criteria plus the resulting weighted vector (W_{21}) has been provided in Table (4). To achieve the desired result, group judgment is used for binary comparison. In this case, binary comparison matrix elements of criteria are derived from the geometric mean of group views.

Table 4. Binary comparison of main criteria

Criteria	A	B	C	D	Eigenvector (W) 10
Financial support (A)	1	0.545	1.391	0.705	0.200
Specific support (B)	-	1	3.022	1.842	0.415
Legal support (C)	-	-	1	1.336	0.179
Management information support and advisors	-	-	-	1	0.207

Consistency ratio (CR)[1]= 0.04

$$W21 = \begin{pmatrix} A & 0.200 \\ B & 0415 \\ C & 0.179 \\ D & 0.207 \end{pmatrix}$$

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[1] If CR<0.1, then the scores given by decision-makers are consistent and do not need to be reviewed. Hence, pairwise comparison matrix is consistent.

To understand the interdependencies between the main criteria, binary comparison is made between the main criteria in order to achieve matrix W_{22} elements based on Saati's 9-quantity scale. The method of calculating the importance coefficient of each of the main criteria (given their interdependence) is that the binary comparison of other four main criteria (by controlling the first criterion, i.e. the underlying barriers) is presented in Table (5). The method of questioning in this case is as follows: How much is the relative importance of "specific support" compared to "legal support" when "financial support" is controlled?

Table 5. Binary comparison of main criteria with respect to their interdependence with the control of "financial support"

Criteria	B	C	D	Eigenvector (W)
Specific support (B)	1	6.439	2.970	0.682
Legal support (C)		1	0.830	0.129
Management information support and advisors (D)			1	0.189

Consistency ratio (CR)= 0.04

To calculate the matrix related to the interdependencies of the main criteria (W22), there is a need for four other binary comparison matrices in addition to Table (5) (while controlling the consistency ratio of each). Therefore, due to the limited number of pages, we do not include other tables and only provide the results.

$$
W22 = \begin{array}{c} \\ A \\ B \\ C \\ D \end{array}
\begin{array}{cccc} A & B & C & D \\
\left[\begin{array}{cccc}
0 & 0.446 & 0.305 & 0.403 \\
0.682 & 0 & 0.286 & 0.388 \\
0.129 & 0.312 & 0 & 0.209 \\
0.189 & 0.242 & 0.409 & 0
\end{array} \right]
\end{array}
$$

In this step, the importance coefficient of each of the four sub-criteria related to the four main criteria is obtained through their binary comparison (based on Saati's quantitative scale) and these coefficients will form matrix W_{32} columnar elements. The result of binary comparison of "financial support" sub-criteria, i.e. "providing facilities to manufacturers (A1)", "reduced tax exemption for automakers (A2)" and

"paying subsidies to customers for buying domestic products (A3)" and the resulting weighted vector have been displayed in Table (6). To calculate the matrix related to the interdependencies of sub-criteria of the main criteria (W_{32}), there is a need for four other binary comparison matrices in addition to Table (6) (while controlling the consistency ratio of each). Therefore, because of the limited number of pages, we do not insert other tables and only provide the results.

Table 6. Binary comparison of "financial support" sub-criteria

Criteria	A1	A2	A3	Eigenvector (W)
Providing facilities to manufacturers (A1)	1	0.659	0.507	0.224
Reduced tax exemption for automakers (A2)		1	1.472	0.421
Paying subsidies to customers for buying domestic products (A3)			1	0.355

Consistency ratio (CR)= 0.04

$$
W32 =
\begin{array}{c|cccc}
 & A & B & C & D \\
\hline
A1 & 0.224 & 0 & 0 & 0 \\
A2 & 0.421 & 0 & 0 & 0 \\
A3 & 0.355 & 0 & 0 & 0 \\
B1 & 0 & 0.250 & 0 & 0 \\
B2 & 0 & 0.365 & 0 & 0 \\
B3 & 0 & 0.385 & 0 & 0 \\
C1 & 0 & 0 & 0.443 & 0 \\
C2 & 0 & 0 & 0.216 & 0 \\
C3 & 0 & 0 & 0.248 & 0 \\
C4 & 0 & 0 & 0.094 & 0 \\
D1 & 0 & 0 & 0 & 0.449 \\
D2 & 0 & 0 & 0 & 0.271 \\
D3 & 0 & 0 & 0 & 0.280 \\
\end{array}
$$

The 13 sub-criteria (index) indicate the characteristics of the four main criteria, which have been selected based on the purpose of the current research. The interdependencies of these non-criteria are given in Table

(7). To reach this table and determine the interdependencies of non-criteria (and even criteria), opinions of the relevant experts are used.

Table 7. Internal dependencies of non-criteria

D3	D2	D1	C4	C3	C2	C1	B3	B2	B1	A3	A2	A1	Non-criteria
✓						✓							Providing facilities to manufacturers (A1)
✓		✓							✓				Reduced tax exemption for automakers (A2)
					✓	✓		✓					Paying subsidies to customers for buying domestic products (A3)
			✓								✓		Increased customs duties on imports of foreign cars (B1)
✓										✓			Reduced duties on car exports (B2)
		✓				✓							Economic incentives (B3)
							✓			✓		✓	Joint venture (C1)
			✓							✓			Deregulation of the process of production and freedom of car production (C2)

D3	D2	D1	C4	C3	C2	C1	B3	B2	B1	A3	A2	A1	Non-criteria
	✓		✓						✓				The obligation to comply with the standard (C3)
	✓			✓	✓								Real privatization (C4)
							✓				✓		Providing global marketing services (D1)
			✓	✓									Promotion and culture building for the use of internal vehicles (D2)
								✓			✓	✓	Support for research companies and academic research projects (D3)

Binary comparison of sub-criteria with interdependence with the sub-criterion of "providing facilities to manufacturers (A1)" and the resulting weighted vector are presented in Table (8). Considering the limited number of pages, the result of the binary comparison and weighted vector of other sub-criteria with interdependence (with control of their consistency ratio) in matrix W_{33} has been provided (Fig. 4).

Table 8. Binary comparison of sub-criteria with interdependence with the sub-criterion of "providing facilities to manufacturers (A1)"

Criteria	C1	D3	Eigenvector (W)
Joint venture	1	2.419	0.708
Support for research companies and academic research projects		1	0.292

Consistency ratio (CR)= 0.02

		A1	A2	A3	B1	B2	B3	C1	C2	C3	C4	D1	D2	D3
	A1	0	0	0	0	0	0	0.415	0	0	0	0	0	0.245
	A2	0	0	0	0.364	0	0	0	0	0	0	0.525	0	0.189
	A3	0	0	0	0	0.694	0	0.303	0.588	0	0	0	0	0
	B1	0	0.498	0	0	0	0	0	0	0.476	0	0	0	0
	B2	0	0	0.615	0	0	0	0	0	0	0	0	0	0.557
W33=	B3	0	0	0	0	0	0	0.282	0	0	0	0.475	0	0
	C1	0.708	0	0.135	0	0	0.567	0	0	0	0	0	0	0
	C2	0	0	0.250	0	0	0	0	0	0	0.483	0	0	0
	C3	0	0	0	0.636	0	0	0	0	0	0.517	0	0.708	0
	C4	0	0	0	0	0	0	0	0.412	0	0	0	0.292	0
	D1	0	0.299	0	0	0	0.433	0	0	0	0	0	0	0
	D2	0	0	0	0	0	0	0	0	0.524	0	0	0	0
	D3	0.292	0.203	0	0	0.306	0	0	0	0	0	0	0	0

Fig 4. Binary comparison of sub-criteria with interdependence (matrix W33)

In binary comparison of clusters, the columnar cluster related to the "main criteria" is compared with the cluster of non-criteria (Table 10).

Table 9. Binary comparison of clusters

Clusters	Main criteria	Non-criteria	Eigenvector (W)
Main criteria	1	1.41	0.590
Non-criteria		1	0.410

	Goal	Main criteria	Non-criteria
Goal	1	0	0
Main criteria	0	0.590	0
Non-criteria	0	0.410	1

Sub-criteria	A1	A2	A3	B1	B2	B3	C1	C2	C3	C4	D1	D2	D3
WANP	0.055	0.106	0.082	0.064	0.089	0.094	0.114	0.047	0.060	0.034	0.119	0.066	0.069

5. Conclusion

In this article, the analytic network process (ANP) and its application in the automotive industry were raised to identify the factors affecting government support for the automotive industry. The results of this study demonstrate that to support the automotive industry from the view point of experts, we need the following in order of priority: 1)

Specific support; 2) management information support and advisors; 3) financial support; and finally 4) legal support. Based on the final importance vector (W_{ANP}), three sub-criteria of "providing global marketing services (D1 = 0.119)", "joint venture (C1 = 0.114)" and "reduced tax exemption for automakers (A2 = 0.106)" have been the top priorities of the factors affecting government support for the automotive industry. Accordingly, the greatest government investment to support the domestic automotive industry should be made based on these priorities. But considering that in experts' views, three sub-criteria of "real privatization (C4= 0.034)", "deregulation of the process of production and freedom of car production (C2= 0.047)" and "providing facilities to manufacturers (A1= 0.055)" relative to other sub-criteria have been a lower priority for supporting the automotive industry, the government should not spend a lot on such types of support. According to expert opinion, the automotive industry in Iran, in view of the current situation, should not be privatized but should be improved under the government's support.

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