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Identifying and Ranking the Factors Affecting the Transportation of Products from a Marketing Perspective Using the Fuzzy Analytic Hierarchy Process Approach

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Abstract

Economic researchers consider the development of transportation as blood circulation in the economic body of the country, which accelerating its circulation satisfies the vital and basic economic needs faster, and any kind of disorder and slowness in it causes great damage to the process of growth and development. Therefore, some economists and planners have considered the economic growth to be dependent on the development of the transportation sector and the existence of enough vehicles and related facilities. In this regard, Iran is very important due to its special position near the borders of Central Asia and the Caucasus and because it's a bridge between the two major continents of Asia and Europe and has access to open waters. The main problem of this research is to identify all the dimensions and components that affect the transportation (transit) of goods and products, and because we finally want to present a strategy, the next problem is to rank these factors and consider the most important components and dimensions of Islamic Republic transportation. Analytic hierarchical process was used to determine the importance and weight of the criteria and then Expert Choice software was used for ranking. Given that the subject of transportation is a specific and macro issue, investigating it from a marketing perspective is a novel perspective, the studies conducted by students have remained at the research level, and there have not been many related studies on marketing in Iran, the most important limitation of the research was the ability to explain the reason of conducting this research and controlling the interviews. The results of pairwise comparisons and weights are expressed in the following. Accordingly, among the 20 sub-criteria, the use of information technology is ranked first. After that, sustainable development and smart transportation ranked second and third, respectively.

Keywords: Transportation, Marketing, Fuzzy analytic hierarchy process, Uncertainty.

1 | Introduction

The transportation in a comprehensive sense, including management, infrastructure and superstructure is one of the basic needs of today's societies, so that in any country, the promotion of economic, cultural, security and political power depends on having an extensive and reliable transportation network as one of the basic needs [1] and [2]. Some researchers believe that transportation is one of the primary tools of development. In the past, because transportation was considered a secondary need to meet basic needs such as trade, travel, employment, etc., it was not properly addressed [3] and [4]. But today in most countries, transportation has an important role due to the growth and development of the global economy and in order to make the best use of capabilities and opportunities. Other reasons are the intensified competition in the global market and

also the direct role of transportation in reducing manufacturing costs and easy access to the market. So, special attention is paid to transportation in management, planning, and investment [5] and [6]. There have also been many studies in the field of transit and transportation. All these issues have caused the previous attitudes towards transportation to change and it is seen as an important economic-service sector. The movement of products, places of living and human beings has been one of the most important human economic activities from the earliest days of human existence on earth until today, and will most likely remain important until the end of human life in this world [7]. In fact, transportation was born at the same time as human beings and has been developed and evolved with the expansion of human civilization and culture, and its development process in the future will follow human progress in various fields [8] and [9]. Nowadays, transportation is considered as one of the important components of the economy, in national and international level and even in the micro sectors, and due to its infrastructure role, it has a great impact on the process of economic growth of countries. Macro environment is very important in strategy development [10] and [11].

Economic researchers consider the development of transportation as blood circulation in the economic body of the country, which accelerating its circulation satisfies the vital and basic economic needs faster, and any kind of disorder and slowness in it causes great damage to the process of growth and development. Therefore, some economists and planners have considered the economic growth to be dependent on the development of the transportation sector and the existence of enough vehicles and related facilities [12]. Transportation is considered as a result and also a reason of progress and development of countries [13]. In other words, it acts as an effective factor in the progress of countries and, when countries have progressed, the transportation sector grows as an indicator of progress. Therefore, the transportation indicator can be considered as a factor indicating developed or undeveloped of societies and countries. Special attention is paid to transportation (in the general sense) in regional development planning [14].

Transportation is one of the necessities of any human community that leads to the dynamism of economic and social development. Sustainable development in general and sustainable transportation in particular seeks to find a balance between present and future environmental, social and economic qualities in the field of transportation facilities. In fact, sustainable transportation planning and design seeks to achieve solutions to reduce tolls in various sectors.

Transportation networks provide more opportunities for regional development. Major transportation networks between countries promote economic and cultural relations and increase regional security [15] and [16]. The transportation sector is directly and indirectly effective in job creation. In international trade and based on demand, products are transported from countries of origin to destinations that are sometimes located on other continents. Since the transportation sector is responsible for delivering these products to the desired destinations through road - rail - sea - air, so it must necessarily pass through the territory of other countries along this route [17]. In this regard, Iran is very important due to its special position near the borders of Central Asia and the Caucasus and because it's a bridge between the two major continents of Asia and Europe and has access to open waters. Iran has access to the open waters of the region such as the Persian Gulf and Oman Sea. Also, the growth of economic processes in East and South Asia and their interest in trade with the West along with the insecurity of rival routes in Russia and Dagestan, Afghanistan and Pakistan have made this region to be considered by the business world. Special geographical location, actual and potential economic power, security and political stability, having long miles of beach along the international waters and proper equipment are factors that can play an important role in the transit of products from Central Asia and the Caucasus. The main research question is as follows: Which criteria are selected for prioritization of marketing strategies for the transportation development in the Islamic Republic of Iran?

The objective of this study is to design a model for transportation in the Islamic Republic of Iran and according to experts, the model should be designed hierarchically to control costs. To achieve this objective, first existing and influential factors in the transportation development model are identified

through the grounded theory of Glaser and by interviewing experts and specialists, and then the Analytic Hierarchy Process (AHP) method is used to prioritize the identified factors. The main problem of this research is to identify all the dimensions and components that affect the transportation (transit) of goods and products, and because we finally want to present a strategy, the next problem is to rank these factors and consider the most important components and dimensions of Islamic Republic transportation. In the first section of this research, an introduction was presented and a review of the literature will be presented in the second section. In the third section, the analysis method and in the fourth section, the criteria and sub-criteria will be defined. The results will be prioritized in the fifth section and the conclusion will be presented in the sixth section.

2 | Literature Review

Goodarzian et al. [18], presented a fuzzy bi-objective multi-period, three-echelon, multi-product, and multi-modal transportation model. The main aim of their research is to consider the environmental impacts related to the establishment of pharmacies and hospitals. Finally the presented model was solved using Firefly Algorithm and Simulated Annealing algorithm. Majumdar et al. [19], used fuzzy AHP was to incorporate the vagueness of perception of experts regarding the impact of various supply chain risks. They developed vulnerability matrix where each specific risk was mapped based on their respective impact and probability. The outcome of their paper would be very helpful for developing strategies for resilient green clothing supply chains. Koçak and Yercan [20], used fuzzy AHP in cost-effectiveness analyzes. Eleven container ships' voyage cost, revenue and profit are analyzed and compared. The results indicate the proper performance of the proposed model. Arahish [21], identified and prioritized the factors affecting the increase of productivity in ports in his thesis.

In this research, the technique of experts and AHP were used. Based on the results, political factors between countries, equipping and physical development of the port, location of the port, availability of specialized human resources, increasing speed and reducing loading and unloading time, access to railways, roads and air, providing the necessary infrastructure, marketing, using modern technologies and reduction of transportation time were respectively the first to tenth priorities in increasing productivity in Chabahar port. In his thesis, KarimiNasab [22], identified and developed entrepreneurial opportunities in the field of Chabahar-Milk transit road transportation.

This research was applied in terms of purpose and combined (survey, descriptive and analytical) in terms of nature. The statistical population of this study was the experts and authorities of the Department of Transportation, the Department of Roads and Urban Development, authorities and experts related to starting a business, and heavy truck drivers. Fifty people were selected as a sample using the non-probability purposive sampling method. Mousavi et al. [23], analyzed discourse of the Supreme Leader of the Revolution and presented strategic policies for the management of maritime transport. They showed the six components of the development of maritime transport support industries, purposive scientific, research and applied development in maritime transport activities, data collection and dissemination and the fight against abuse and corruption, economic development with emphasis on maritime and port activities, completing management elements of maritime transport, and the development and improvement of maritime transport management system as the main criteria and dimensions of maritime transport strategic policies.

SohrabiFakher [24], developed a model for prioritizing privatization strategies in the framework of public interest in Iran's rail transportation industry. This research aimed to challenge the ways to attract and involve the private sector in the most effective economic leverage, namely the rail transportation industry, considering the public interest, achieving financial goals and changing the role of government from management to regulation. Therefore, the data was obtained from the return of 160 questionnaires sent to 220 experts in this industry and professors and policy makers. The validity and reliability of the questionnaires were confirmed through statistical tests such as non-parametric binomial test that works the same as the parametric t test. SeyedAmini [25], identified and prioritized the factors affecting the

capabilities of the border terminals of West Azerbaijan Province in the transit of products to/from the ports of the Mediterranean Sea. In order to achieve this objective, the border terminals of West Azerbaijan province were selected and due to the multiplicity of these terminals, Tamrchin border terminal was selected as a case study. Also, due to the importance of transit to Mediterranean ports, the two ports of Mersin and Latakia along with the countries that are on the route between this terminal and ports were also examined. In this study, 6 criteria and 17 sub-criteria affecting the capability of border terminals in the transit of products were identified as research findings. Among these factors, equipment and facilities had the most weight and importance, and among the related sub-criteria, the Rail and Road transportation network was more important than other sub-criteria. Liu et al. [26], used a Global Malmquist-Luenberger Index approach to evaluate the green productivity growth of this industry at the provincial level based on the Data Envelopment Analysis and Directional Distance Function. Further, it decomposed green productivity growth into changes in various types of efficiency and technological progress. Finally, this study structured a novel quadrant matrix analysis framework based on the green productivity growth rate and stability, using the matrix to analyze the performance of provincial road transportation industries. This analysis results showed that a fluctuating and slowly upward trend of green productivity over time exists. Solaymani and Kari [27], examined the effects of energy subsidy reform on the transportation sector of the Malaysian economy. The transportation sector in this research was divided into four parts: land, sea, air and other services (port, airport, highway, bridge and tunnel).

The results of simulating the energy subsidy reform policy in Malaysia using the CGE model showed that the implementation of this policy was beneficial for the country's economy and increased trade and nominal and real Gross Domestic Product, reduced demand for a variety of energy carriers and also reduced pollution. However, changes in household welfare especially for the native household were negative. Mukundan [28], conducted a study in China and stated that government policies played a significant role in achieving an average growth of 9.3% in the last 30 years. These policies included the promotion of shipping, ocean trade, shipbuilding and container building by giving low-interest loans from state-owned banks, partnerships with the Korean and Japanese shipping development industries, technology and knowledge transfer, and the training of Chinese engineers by Korean and Japanese counterparts.

The main research gap of this research is the lack of attention of other researches to the identification of all dimensions and components that are on the transportation (transit) of cargo and goods, especially in Iran. In addition, other studies have not considered the ranking of these factors and considering the most important components and dimensions of transportation.

3 | Method of Analysis

This section analyzes the research data. The objective of this study is to design a model for transportation in the Islamic Republic of Iran and according to experts, the model should be designed hierarchically to control costs. To achieve this objective, first existing and influential factors in the transportation development model are identified through the grounded theory of Glaser and by interviewing experts and specialists, and then the AHP method is used to prioritize the identified factors. In AHP method, first the effective factors are identified and then they are weighed and determined by AHP method. All calculations are performed in Expert Choice software. The advantages and contributions of presented FAHP are as follows:

- *The presented FAHP can take into consideration the relative priorities of factors or alternatives and represents the best alternative.*
- *The presented FAHP provides an easy applicable decision making methodology that assist the decision maker to precisely decide the judgments.*

– *Any level of details about the main focus can be listed or structured in this method. By this way the overview of the main focus or the problem can be represented very easily.*
– *Decision maker can analyze the elasticity of the final decision by applying the sensitivity analyzes.*
– *It is possible to measure the consistency of decision maker's judgments.*

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The fuzzy AHP framework is suggested as follows [29]:

STEP 1: Draw the hierarchical chart.

STEP 2: Define fuzzy numbers for performing the pair-wise comparisons.

STEP 3: Create the pair-wise comparison matrix $\tilde{A}$ using fuzzy numbers.

The pair-wise comparison matrix can be expressed as follows:

$$\tilde{A} = \left[\begin{bmatrix} 1 & \tilde{a}_{12} & \tilde{a}_{1n} \\ \tilde{a}_{12} & 1 & \tilde{a}_{12} \\ ... & ... & ... \\ \tilde{a}_{n1} & \tilde{a}_{n2} & 1 \end{bmatrix} \right]. \tag{1}$$

STEP 4: Calculate s_i for each row of the pair-wise comparison matrix

$$s_i = \sum_{j=1}^{n} M_{ij} \times \left[\sum_{i=1}^{m} \sum_{j=1}^{n} M_{kj} \right]^{-1}. \tag{2}$$

Where i represents the row number and j denotes the column number and M_{ij} is triangular fuzzy numbers of pairwise comparison matrices.

$$M_1^{-1} = (\frac{1}{u_1}, \frac{1}{m_1}, \frac{1}{L_1}).$$
$$M_2^{-1} = (\frac{1}{u_2}, \frac{1}{m_2}, \frac{1}{L_2}). \tag{3}$$

In the above formulas l_i, m_i, and u_i are the first, second, and third components of the fuzzy numbers, respectively.

STEP 5: Compute the magnitude of s_i with respect to each other

$$V(M_2 \geq M_1) = hgt(M_2 \cap M_1) = \begin{cases} 1 \, if \, m_2 \geq m_1 \\ 0 \, if \, l_1 \geq l_2 \\ \frac{l_1 - u_2}{(m_2 - u_2) - (m_1 - l_1)} o.w \end{cases} . \tag{4}$$

STEP 6: Compute the weight of the criteria and alternatives in the pair-wise comparison matrix

$$d'(A_i) = Min V(S_i \geq S_K) K = 1, 2, ..., n. \tag{5}$$

STEP 7: Calculate the final weight vector

$$w = (d(A_1), d(A_2), ..., d(A_n))^T.$$
(6)

3.1 | Descriptive Statistics of Respondents

In this section, in order to know the respondents to the pairwise comparison questionnaire in terms of: gender, age, work experience and education, the demographic characteristics of the experts who participated in this study are described. *Table 1* lists the demographic characteristics of the experts (See apendix A).

3.2 | Gender of Respondents

Fig. 1 shows the gender of the respondent experts. As can be seen from *Fig. 1*, there are far more male experts in this industry than women, or at least in this study, the purposive sample includes more men.

This can indicate that men most of the activists and decision-makers in this industry are men.
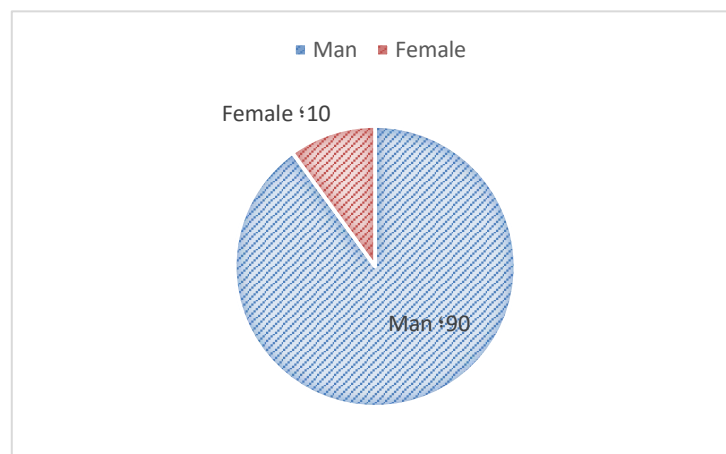

Fig. 1. Gender of respondent experts.

3.3 | Age of Respondents

Fig. 2 shows the age of the respondent experts. As can be seen from *Fig. 2*, 10% of the experts are in the age range of 30 to 40 years and 30% of them are in the range of 51 to 60 years old. The age range with the largest number of experts is between 41 and 50 years which is 60% and indicates that most respondents are middle-aged. Since the development of transportation requires both experience and expertise, these age ranges are acceptable and normal in the whole expert community.

3.4 | Education of Respondents

Fig. 3 shows the education of the respondent experts. As shown in *Fig. 3*, 50% of the respondent experts have a master's degree and 20% of them have a bachelor's degree, and experts with a doctorate or higher degree make up 30% of the respondent population. This shows that most of the respondent experts have experienced postgraduate education, and also, these people need this education in order to be productive in this new field of work.
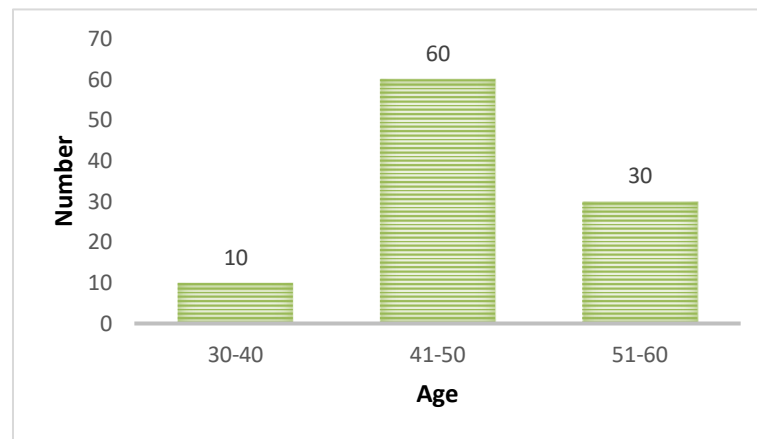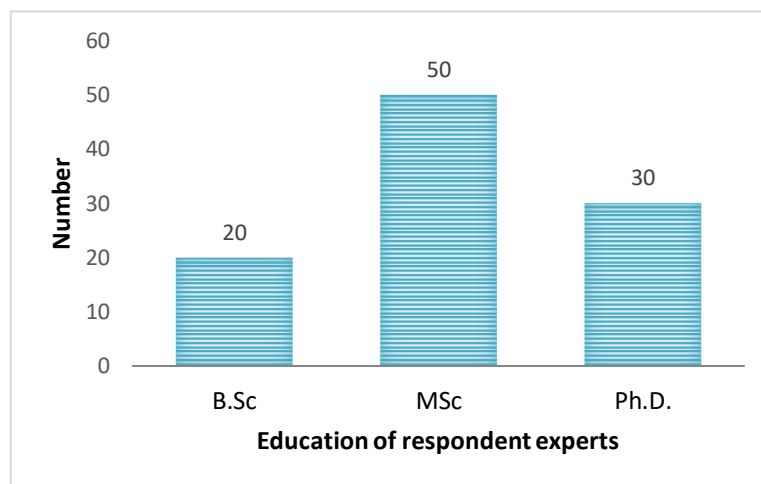
Fig. 2. Age of respondent experts.

Fig. 3. Education of respondent experts.

3.5 | Work Experience of Respondent Experts

Fig. 4 shows the work experience of respondent experts in the field of transportation. As can be seen from *Fig. 4*, 20% of the respondent experts have had less than 10 years of experience and 20% of them have had more than 20 years of experience. Also, 10% have been working in the field of transportation for 10 to 15 years and 50% for 15 to 10 years. These percentages show that these experts are at a very good level in terms of experience to answer research questions because Iran's transportation has faced fundamental changes in previous decades and it is a growing industry.

3.6 | Specialized Field of Transportation

Fig. 5 shows the specialized field of transportation regarding the respondent experts. As can be seen from *Table 1* and *Fig. 5*, experts in the specialized fields of maritime transport, land transport, air transport, strategic transport headquarters, or researcher and university professor, are respectively 20, 30, 20, 20 and 10 percent. This shows that the respondent experts have the necessary expertise in all fields. This issue is also important because the diversity of expertise in different fields is effective in improving the transportation development model.
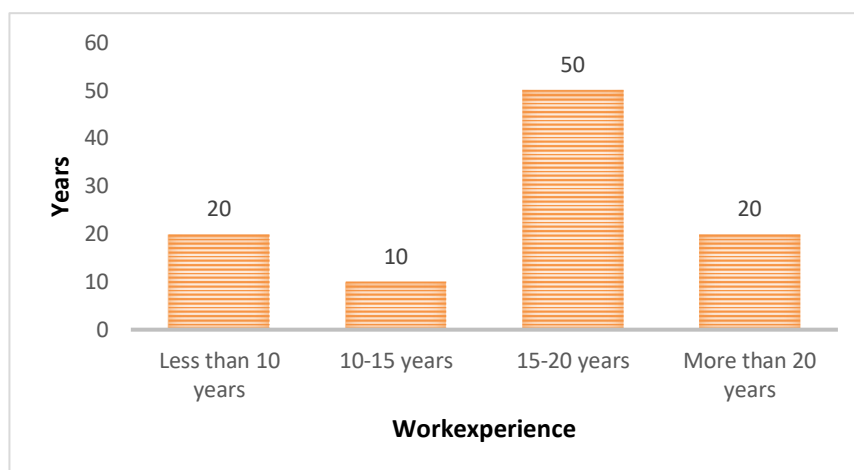
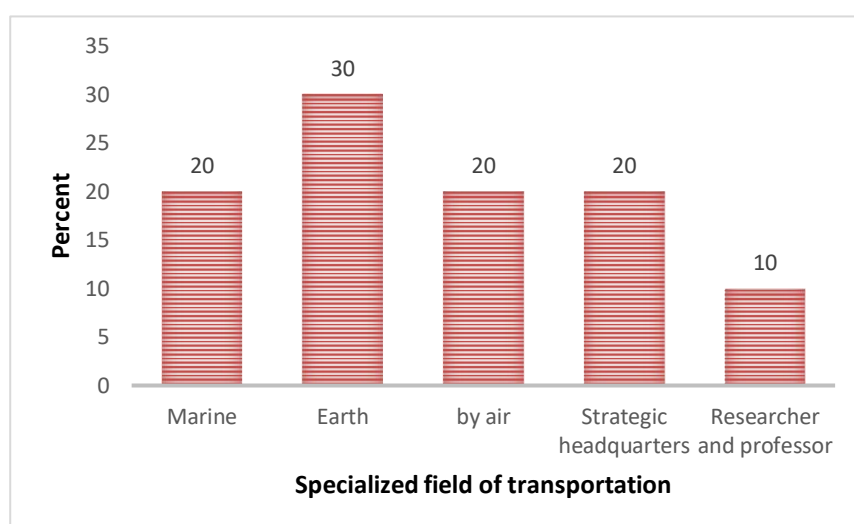**Fig. 4. Work experience of respondent experts.**

Fig. 5. Specialized field of transportation regarding the respondent experts.

According to interviews with 10 experts in the field of transportation in Iran, it has been shown that strategies such as export marketing, sustainable marketing, smart marketing, political marketing and domestic marketing are effective in developing the transportation model of the Islamic Republic of Iran; each of which consists of some sub-criteria. Because the ranking of activities is considered for each factor in terms of importance and having a long-term plan for strengthening and implementing strategies, these strategies and sub-criteria of each will be ranked in the next section. According to these identified strategies, the model designed by the qualitative part of the research is shown in *Fig. 1*.

4 | Introducing the Code of Criteria and Sub-Criteria

In this section, based on the literature review and previous studies, as well as interviews with experts, 20 factors affecting the transportation development model of the Islamic Republic of Iran were identified and extracted in 5 dimensions, which are shown in *Table 1*. The hierarchical model of the research is shown in *Fig. 2*.
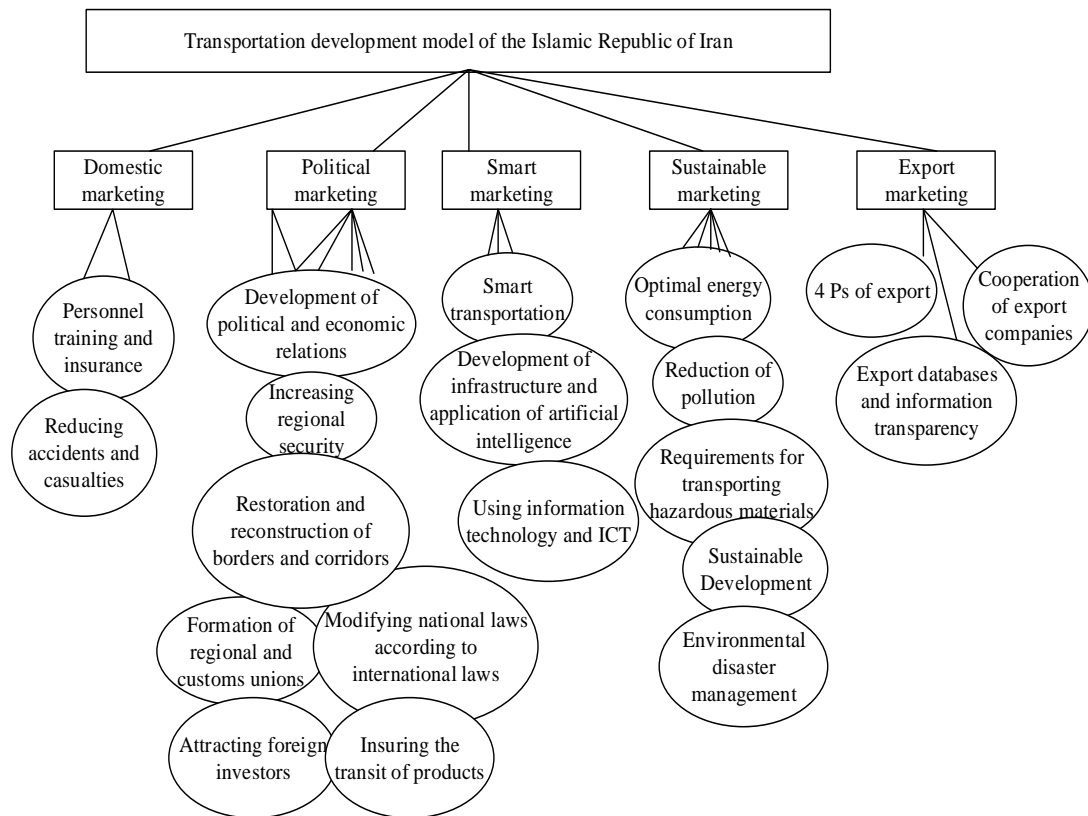
Fig. 1. Transportation development model of the Islamic Republic of Iran.

Table 1. Introduction of research factors.

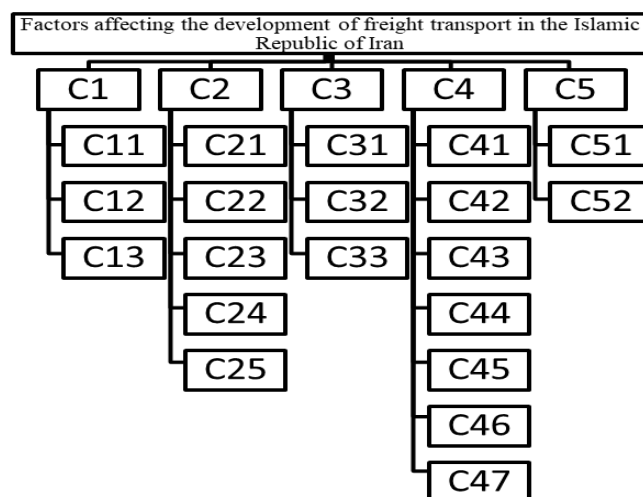| Criterion	Criterion Code	Sub-Criterion	Sub-Criterion Code
Export marketing	C1	4 Ps of export	C11
		Export databases and information transparency	C12
		Cooperation of export companies	C13
Sustainable marketing	C2	Optimal energy consumption	C21
		Reduction of pollution	C22
		Requirements for transporting hazardous materials	C23
		Sustainable Development	C24
		Environmental disaster management	C25
Smart marketing	C3	Smart transportation	C31
		Development of infrastructure and application of artificial intelligence	C32
		Using information technology and ICT	C33
Political marketing	C4	Development of political and economic relations	C41
		Increasing regional security	C42
		Restoration and reconstruction of borders and corridors	C43
		Formation of regional and customs unions	C44
		Modifying national laws according to international laws	C45
		Attracting foreign investors	C46
		Insuring the transit of products	C47
Domestic marketing	C5	Personnel training and insurance	C51
		Reducing accidents and casualties	C52

Fig. 2. Hierarchical model of the research (coded).

5 | AHP Results to Prioritize the Factors

In the previous steps, research factors were introduced. In this step, AHP method was used to determine their importance and weight. First, based on *Table 3*, pairwise comparisons of criteria and sub-criteria were created and provided to the experts. The experts in this section are the same 10 people in the previous step. After completing the pairwise comparison matrices, the inconsistency ratios of each were calculated, all of which were less than 0.1, indicating the stability and consistency of the matrices. Then the pairwise comparisons of the experts were integrated by the geometric mean method and then the Expert Choice software was used to determine the weight. The following are the results of pairwise comparisons and weights.

5.1 | Pairwise Comparison of the Main Criteria

Pairwise comparisons of 5 main criteria are given in *Table 2*. The inconsistency ratio of this pairwise comparison is 0.009 which indicates an acceptable consistency because it is less than 0.1.

Table 2. Pairwise comparisons of the main criteria.

	C1	C2	C3	C4	C5
C1		0.461	0.429	0.555	1.382
C2			1.484	2.101	4.072
C3				1.681	4.158
C4					2.698
C5					

The pairwise comparisons of *Table 3* are entered in the Expert Choice software, where the criteria weights are calculated and shown in *Fig. 3*.
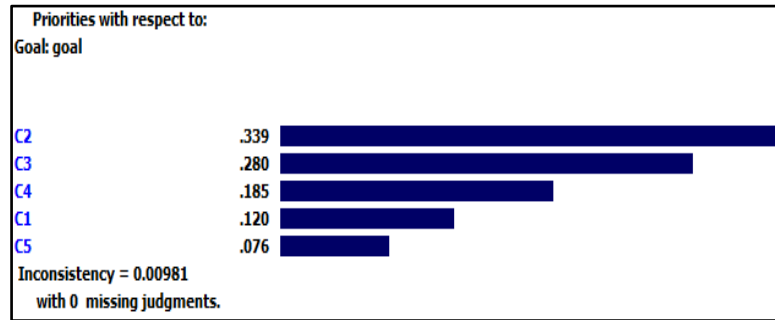
Priorities with respect to:
Goal: goal

C2   .339

C3   .280

C4   .185

C1   .120

C5   .076

Inconsistency = 0.00981
   with 0 missing judgments.

Fig. 3. Weights of the main criteria.

Table 3. Weight and rank of the main criteria.

Rank	Weight	Code	Criteria
1	0.339	C2	Sustainable marketing
2	0.280	C3	Smart marketing
3	0.185	C4	Political marketing
4	0.120	C1	Export marketing
5	0.076	C5	Domestic marketing

According to *Fig. 3*, among the main criteria, sustainable marketing with a weight of 0.339 is ranked first. Smart marketing with a weight of 0.280 is ranked second, political marketing with a weight of 0.185 is ranked third, export marketing with a weight of 0.120 is ranked fourth and domestic marketing with a weight of 0.076 is ranked fifth.

5.2 | Pair Comparison of Export Marketing Sub-Criteria

The export marketing criterion has 3 sub-criteria, the pairwise comparison of which is given in *Table 4*. The inconsistency ratio of this pairwise comparison is 0.05.

Table 4. Pairwise comparisons of export marketing sub-criteria.

	C11	C12	C13
C11		0.498	0.782
C12			0.766
C13			

The pairwise comparisons of *Table 5* are entered in the Expert Choice software, where the criteria weights are calculated and shown in *Fig. 4*.
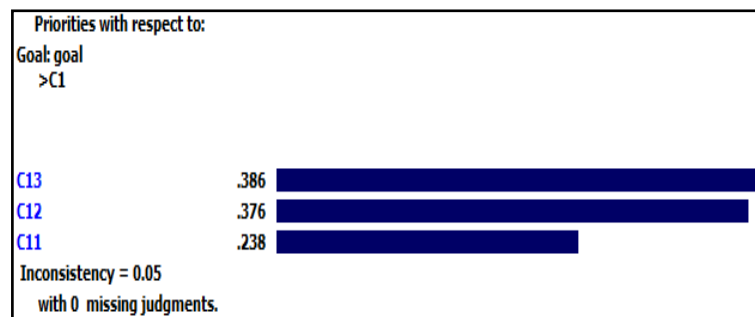
Priorities with respect to:
Goal: goal
   >C1

C13   .386

C12   .376

C11   .238

Inconsistency = 0.05
   with 0 missing judgments.

Fig. 4. Weights of export marketing sub-criteria.

Table 5. Weight and rank of export marketing sub-criteria.

Rank	Weight	Code	Sub-Criteria
1	0.386	C13	Cooperation of export companies
2	0.376	C12	Export databases and information transparency
3	0.238	C11	4 Ps of export

Among the export marketing sub-criteria, Cooperation of Transportation Companies with Exporters with a weight of 0.386 has gained the first rank. Export Databases and Information Transparency with a weight of 0.376 and 4 Ps of Marketing with a weight of 0.238 have gained the second and third ranks, respectively.

5.3 | Pairwise Comparison of Sustainable Marketing Sub-Criteria

Sustainable marketing has 5 sub-criteria, the pairwise comparison of which is given in *Table 6*. The inconsistency ratio of this pairwise comparison is 0.02.

Table 6. Pairwise comparisons of sustainable marketing sub-criteria.

	C21	C22	C23	C24	C25
C21		0.384	0.457	0.345	0.466
C22			2.502	1.070	1.069
C23				0.422	0.833
C24					2.092
C25					

The pairwise comparisons of *Table 6* are entered in the Expert Choice software, where the criteria weights are calculated and shown in *Fig. 5*.
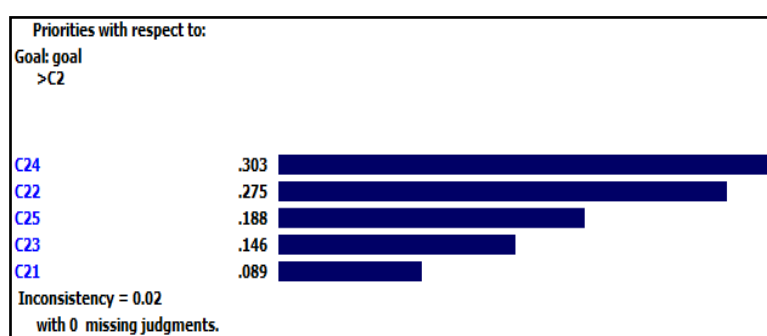

Fig. 5. Weights of sustainable marketing sub-criteria.

Table 7. Weight and rank of sustainable marketing sub-criteria.

Rank	Weight	Code	Sub-Criteria
1	0.303	C24	Sustainable Development
2	0.275	C22	Reduction of pollution
3	0.188	C25	Environmental disaster management
4	0.146	C23	Requirements for transporting hazardous materials
5	0.089	C21	Optimal energy consumption

Among the sustainable marketing sub-criteria, Sustainable Development with the weight of 0.303 has obtained the first rank. Reduction of Pollution with a weight of 0.275 is ranked second and Environmental Disaster Management with a weight of 0.188 is ranked third. Requirements for Transporting Hazardous Materials and Optimal Energy Consumption with a weight of 0.146 and 0.089 are ranked fourth and fifth, respectively.

5.4 | Pairwise Comparison of Smart Marketing Sub-Criteria

The smart marketing criterion has 3 sub-criteria, the pairwise comparison of which is given in *Table 8*. The inconsistency ratio of this pairwise comparison is 0.0006.

Table 8. Pairwise comparisons of smart marketing sub-criteria.

	C31	C32	C33
C31		1.523	0.821
C32			0.582
C33			

The pairwise comparisons of *Table 9* are entered in the Expert choice software, where the criteria weights are calculated and shown in *Fig. 6*.
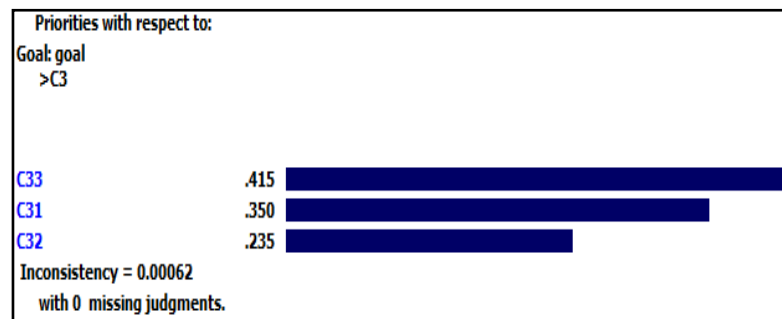

Fig. 6. Weights of smart marketing sub-criteria.

Table 9. Weight and rank of smart marketing sub-criteria.

Rank	Weight	Code	Sub-Criteria
1	0.415	C33	Using information technology and ICT
2	0.350	C31	Smart transportation
3	0.235	C32	Development of infrastructure and application of artificial intelligence

Among the smart marketing sub-criteria, Using Information Technology and ICT with a weight of 0.415 is ranked first. Smart transportation with a weight of 0.350 is ranked second and Development of Infrastructure and Application of Artificial Intelligence with a weight of 0.235 is ranked third.

5.5 | Pair Comparison of Internal Marketing Criteria

The internal marketing criterion has two sub-criteria, the pairwise comparison of which is given in *Table 10*. The incompatibility rate of this pairwise comparison is 0.000.

Table 10. Parallel comparisons of internal marketing criteria.

	C51	C52
C51		0.466
C52		

We enter the pairwise comparisons of *Table 11* in the Expert choice software, where the criteria weights are calculated and shown in *Fig. 7*.
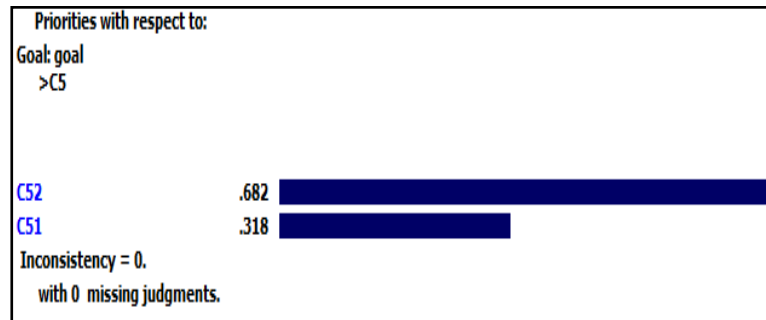

Fig. 7. Weights of internal marketing criteria.

Table 11. Weight and rank of internal marketing criteria.

Criteria	Code	Weight	Rank
Insurance and training of national and international personnel	C52	0.682	1
Reduce accidents and casualties	C51	0.318	2

According to *Fig. 7*, among the domestic marketing sub-criteria, insurance and training of national and international personnel with a weight of 0.682 is ranked first and the reduction of accidents and casualties with a weight of 0.318 is ranked second.

5.6 | Final Weights of Sub-Criteria

The final weight of the sub-criteria is obtained by multiplying the weight of each dimension by the weight of the criterion and then multiplying by the relative weight of the sub-criteria, which is done by Expert Choice software and is shown in *Fig. 8*. So, among the 20 sub-criteria, (Using Information Technology and ICT) (C33) is ranked first. After that, Sustainable Development (C24) and Smart Transportation (C31) are ranked second and third, respectively.
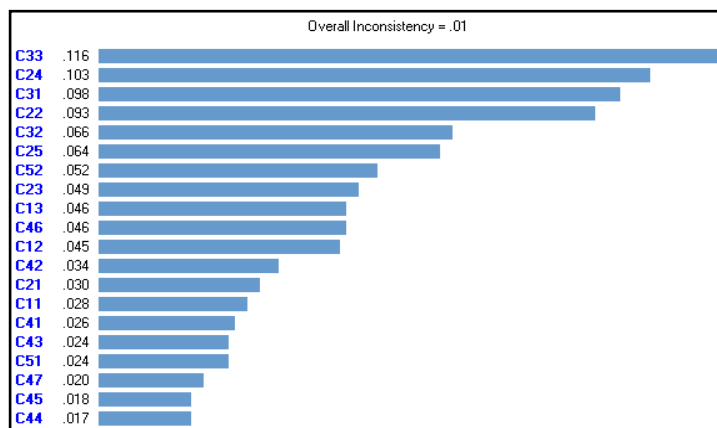

Fig. 8. Final weight and rank of sub-criteria.

Table 12. Final weight and rank of sub-criteria.

Rank	Final Weight	Sub-Criteria	Sub-Criteria Code
1	0.116	Using information technology and ICT.	C33
2	0.103	Sustainable Development.	C24
3	0.98	Smart transportation.	C31
4	0.93	Reduction of pollution.	C22
5	0.66	Development of infrastructure and application of artificial intelligence.	C32
6	0.64	Environmental disaster management.	C25
7	0.52	Reducing accidents and casualties.	C52
8	0.49	Requirements for transporting hazardous materials.	C23
9	0.46	Cooperation of export companies.	C13
10	0.46	Attracting foreign investors.	C46
11	0.45	Export databases and information transparency.	C12
12	0.34	Increasing regional security.	C42
13	0.30	Optimal energy consumption.	C21
14	0.28	4 Ps of export.	C11
15	0.26	Development of political and economic relations.	C41
16	0.24	Restoration and reconstruction of borders and corridors.	C43
17	0.24	Personnel training and insurance.	C51
18	0.20	Insuring the transit of products.	C47
19	0.18	Modifying national laws according to international laws.	C45
20	0.17	Formation of regional and customs unions.	C44

6 | Conclusion

Regarding the identified factors, due to the special position of product transit in Iran and using interviews with experts, 5 main criteria and 20 sub-criteria that were subsets of the main criteria were identified. There was a doubt about the position of some sub-criteria, which was finalized after the consensus of experts. The main and sub-criteria are as shown in *Table 11*, respectively:

Table 13. The result of the qualitative part of grounded theory.

Sub-Criteria	Main Criterion
4 Ps of export	
Export databases and information transparency	Export marketing
Cooperation of export companies	
Optimal energy consumption	
Reduction of pollution	
Requirements for transporting hazardous materials	Sustainable marketing
Sustainable Development	
Environmental disaster management	
Smart transportation	
Development of infrastructure and application of artificial intelligence	Smart marketing
Using information technology and ICT	
Development of political and economic relations	
Increasing regional security	
Restoration and reconstruction of borders and corridors	
Formation of regional and customs unions	Political marketing
Modifying national laws according to international laws	
Attracting foreign investors	
Insuring the transit of products	
Personnel training and insurance	
Reducing accidents and casualties	Domestic marketing

Given that the subject of transportation is a specific and macro issue, investigating it from a marketing perspective is a novel perspective, the studies conducted by students have remained at the research level, and there have not been many related studies on marketing in Iran, the most important limitation of the research was the ability to explain the reason of conducting this research and controlling the interviews to prevent them from getting out of the main discussion and reaching a model. However in many cases, the words used by experts differed from those found in the literature, which were specific terms for

experienced people. In recent interviews, attempts have been made to validate them based on marketing scientific terms. The most important factor influencing the development of transportation and transit of goods is sustainable marketing. Smart marketing and political marketing rank second and third, respectively. Therefore, managers and strategists active in the transit of goods should pay more attention to the issue of sustainability and, in a sense, energy costs and environmental issues. The use of information technology, intelligent systems and automation will certainly be effective because we are in the fourth industrial revolution and the more transparent and accessible information and intelligent systems; the more confident the owners of goods will transit their goods from Iran. This study, in addition to identifying the factors affecting the transportation development in the Islamic Republic of Iran, has prioritized the identified factors. In this section, all identified factors, regardless of the larger categorization, or all sub-criteria have been prioritized separately. This was done for several reasons. First, there are limited resources for any development, so strategy plans, in addition to comprehensively investigation of all the factors and strategies, should allocate most of their resources to the most effective marketing strategy. Also, this study is one of the first studies that have investigated the transportation development in the Islamic Republic from a marketing perspective, therefore, the researcher preferred to provide comprehensive and integrated results to make it more comprehensive and practical.

According to *Table 14*, it can be said that the most important marketing strategies for the development of transportation in the Islamic Republic of Iran are: 1) using information technology and ICT, 2) sustainable development, 3) smart transportation, 4) reduction of pollution, 5) development of infrastructure and application of artificial intelligence, 6) environmental disaster management, 7) reducing accidents and casualties, 8) requirements for transporting hazardous materials, 9) cooperation of transport companies with exporters, 10) attracting foreign investors, 11) export databases and information transparency, 12) increasing regional security, 13) optimal energy consumption, 14) 4 Ps of export, 15) development of political and economic relations, 16) restoration and reconstruction of borders and corridors, 17) insurance and training of national and international personnel, 18) insuring the transit of products, 19) modifying national laws according to international laws, 20) formation of regional and customs unions.

Table 14. Prioritization of marketing strategies for the transportation development in the Islamic Republic of Iran.

Rank	Final Weight	Sub-Criteria	Sub-Criteria Code
1	0.116	Using information technology and ICT	C33
2	0.103	Sustainable Development	C24
3	0.98	Smart transportation	C31
4	0.93	Reduction of pollution	C22
5	0.66	Development of infrastructure and application of artificial intelligence	C32
6	0.64	Environmental disaster management	C25
7	0.52	Reducing accidents and casualties	C52
8	0.49	Requirements for transporting hazardous materials	C23
9	0.46	Cooperation of export companies	C13
10	0.46	Attracting foreign investors	C46
11	0.45	Export databases and information transparency	C12
12	0.34	Increasing regional security	C42
13	0.30	Optimal energy consumption	C21
14	0.28	4 Ps of export	C11
15	0.26	Development of political and economic relations	C41
16	0.24	Restoration and reconstruction of borders and corridors	C43
17	0.24	Personnel training and insurance	C51
18	0.20	Insuring the transit of products	C47
19	0.18	Modifying national laws according to international laws	C45
20	0.17	Formation of regional and customs unions	C44

According to the results of the research, some suggestions are made in this field:

– *Resources and costs must be identified before any strategy can be developed. Although the development of Iran's transportation and product transit is one of the important goals in Iran's development plans. It is suggested that first of all, a suitable model would be used to supply fuel for transportation in a way that does not cause pollution.*

– *It is suggested that, like many other industries and based on the experience of many other countries, the presence of information technology in various forms be welcomed in the transportation industry and the required infrastructure be created for it. Iran is in a good position in the field of information technology in the region, but updating measures need to be taken.*

– *The important issue observed in this study is that the development of political and economic relations in the field of political marketing has an effect on improving transportation conditions. This is important, both regionally and globally. The Middle East is very insecure, and Iran, as a regional power, must try to ensure security. The result will improve transportation development.*

– *Considering that some hazardous materials should be transported from Iran through roads or by ships, special measures should be taken in this regard. Although it is effective in the development of transportation, but regarding the sustainable development, it should not be done in a way that threatens the environment.*

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Appendix A

Table A. Demographic characteristics of experts.

Percentage	Abundance	Concept
Gender		
90%	9	Man
10%	1	Female
Age		
10%	1	30 to 40
60%	6	41 to 50
30%	3	51 to 60
Education		
20%	2	Masters
50%	5	Masters
39%	3	PhD and above
History of activity in the field of transportation		
20%	2	Less than 10 years
10%	1	10 -15 years
50%	5	15-20 years
20%	2	More than 20 years
Specialized field of transportation		
20%	2	Maritime Transportation
30%	3	Ground transportation
20%	2	Air transport
20%	2	Strategic Transportation Headquarters
10%	1	Researcher or professor

Identifying and ranking the factors affecting the transportation of products from a marketing perspective using the fuzzy analytic hierarchy process approach