FINANCING OF TOURISM INDUSTRY (A HYBRID APPROACH DELPHI - ANP - VIKOR)

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Abstract
Tourism is one factor that led to the establishment of equilibrium in the balance of payments and growth in revenue is generated and as an important source of income for the national economy is considered. The purpose of this study, evaluate of factors affecting the financing of tourism industry in Iran. In this study of 15 experts in the field of tourism is used. We use the Delphi method to identify factors affecting the financing of tourism industry. The effective factors that have been identified include: rules, financing methods, sanctions, monetary policy, banking system, currency fluctuations, problems of supply and demand, Money and Capital Market. The factors were weighted by the method of ANP. The analytic network process (ANP) is a generalization of analytical hierarchy process (AHP) and can be used to treat more sophisticated decision problems. Finally this factors through VIKOR method examined on travel agents, company advertising, hotels, and tourists. The VIKOR method was developed for the multi-criteria optimisation of complex systems. This method focuses on ranking and selecting from a set of alternatives in the presence of conflicting criteria. Results showed that these factors will have the greatest impact on tourists.

Keywords: Financing, Tourism industry, Delphi, ANP, VIKOR

1. Introduction
This paper evaluate factors affecting the financing of tourism industry in Iran. Tourism is defined as the largest industry in the world and the part that has the highest growth rate. On the other hand, over 33 percent of the total value of services that constitute the world [19]. Tourism is now one of the largest and most diverse industries in the world. Its rapid growth and changes in social, economic and environmental conditions and because of the frequency leads to an important area of research among scholars has become [21]. In many small islands with tourist attractions in the world, the main source of income is [19]. The results of tourism development, including social benefits, the economic goal is to [1]; [13]. The travel and tourism industry today is the world’s largest and most diverse business sector. According to the World Tourism Organization (WTO), total international tourist arrivals and receipts worldwide in 2006 were 846 million and US$733 billion, respectively [5]. Tourism can be used as an alternative exports. Tourism is one factor that led to the establishment of equilibrium in the balance of payments and
growth in revenue is generated and as an important source of income for the national economy is considered [3]. Other financial income from tourism activities, including tax revenues, employees, and other sources of income for the country [10;1;7]. There are a number of proven and experimental evidence that tourism contributes to economic growth around the world [15;12;8]. As the purpose of this study, the following research questions are posed:

RQ1. What are the factors affecting the financing of tourism industry?
RQ2. What are the priorities of these factors?
RQ3. How is severity of the impact of these factors on the financing of tourism in Iran?

2. Literature review

Tayebi, Babaki & Jabbari as the relationship between tourism and economic growth in Iran has been carried out; Given the successful experience in the development of the tourism industry in many countries and its importance to economic development, This paper examines the relationship between international tourism and economic growth in Iran in using Granger causal model years 1960 - 2005 deals. This study shows the causal relationship between tourism and economic growth in Iran, is a bilateral causal relationship between these two variables, there is a long-term equilibrium [21]. A study by the "World Tourism Demand Forecasting Mixture" of Shen, Li and Song have been in England. This econometric study using five models and time series models for forecasting international tourism demand deals. Information on the study of British outbound passenger destinations in seven countries in the world have been collected. The results show that combined forecast as the best way to forecast passenger demand is typically implemented [20]. Seetanahin their study investigates the impact of tourism on the economy of the island is covered with tourist attractions. Information This island of 19 different tourism between 1990 and 2007 has been collected. In this study, the GMM method is used to analyze the data. The results suggest that tourism growth and economic dynamism in these islands is [19].

Another study "Developed as Tourist Destinations (the integration of different perspectives)" by Haugland And colleagues Associates has been done in Norway. In this study, we tried to develop goals that are to be distributed, to concentrate. Some studies have focused on one or more indicators or factors, and some theoretical studies on different topics and integrating various subjects. In this study, three factors have a direct impact on development objectives have been identified. These factors include: the ability to integrate, coordinate relations between the different levels of goals and cross the bridge [9].

3. Methodology

In this study using the Delphi method and interaction with experts, factors were identified. Then this factors were weighted by analytic network process (ANP) method. Finally, severity of the impact of these factors on the tourism industry was determined by the VIKOR method.
3.1. Delphi method

The Delphi method is a structured communication technique, originally developed as a systematic, interactive forecasting method which relies on a panel of experts [6]. The experts answer questionnaires in two or more rounds. After each round, a facilitator provides an anonymous summary of the experts’ forecasts from the previous round as well as the reasons they provided for their judgments. Thus, experts are encouraged to revise their earlier answers in light of the replies of other members of their panel. It is believed that during this process the range of the answers will decrease and the group will converge towards the "correct" answer. Finally, the process is stopped after a pre-defined stop criterion (e.g. number of rounds, achievement of consensus, stability of results) and the mean or median scores of the final rounds determine the results [17]. Delphi is based on the principle that forecasts (or decisions) from a structured group of individuals are more accurate than those from unstructured groups [18].

3.2. Analytic Network Process (ANP)

The analytic network process (ANP) is a generalization of analytical hierarchy process (AHP) and can be used to treat more sophisticated decision problems[11]. Saaty (1996) proposed using the Analytic Network Process (ANP), which relaxes the hierarchical structure restriction. However, two questions related to the ANP model warrant attention: how to generate the influential network relationship and how to evaluate the degree of influence [14]. The basic ANP consists of the networks of influence that contain the factors of the problem and the logical groupings of these factors into clusters. Each decision network is composed of clusters, their elements, and links between the elements. A link between an element (the “parent”) and the elements it connects to in a given cluster (its “children”) makes up the usual AHP pairwise comparison set. The dependencies and, feedback, among clusters, and dependencies in the system are expressed through these links. Links between elements within the same cluster are called inner dependencies, whereas links between a parent element in one cluster and its children in another cluster are called outer dependencies. If there are outer dependencies between two clusters in both directions, this relation is called as feedback. Inner and outer dependencies are the best way decision-makers can capture and represent the concepts of influencing or being influenced, between clusters and between elements with respect to a specific element. Pairwise comparisons are made systematically for all combinations using the fundamental comparison scale (1–9) of AHP that is used to indicate how many times an element dominates another. The decision-maker can express relative dominance between each pair of elements verbally as equally important, moderately more important, strongly more important, very strongly more important, and extremely more important. These descriptive judgments would then be translated into
numerical values 1, 3, 5, 7, 9 respectively with 2, 4, 6, and 8 as intermediate values for comparisons between two successive points. Reciprocals of these values are used for the corresponding transpose judgments. In making judgments, the decision-maker can incorporate experience, knowledge and hard data. Tangibles can be included in the model alongside intangibles. After the pairwise comparisons are completed, the results are synthesized.

*Step 1.* (Model Construction): Determine all the elements that affect the decision and group them into clusters for the network.

*Step 2.* (Formulating the links and performing paired comparisons between the clusters/elements): In the network, formulate the links between the elements and perform the following paired comparisons to derive eigenvectors and to form a supermatrix.

*Step 3.* (Constructing the Supermatrix): The outcome of the process above is the unweighted supermatrix. Its columns contain the priorities derived from the pairwise comparisons of the elements. An unweighted supermatrix may not be column stochastic. To obtain a stochastic matrix, i.e., each column sums to one, multiply the blocks of the unweighted supermatrix by the corresponding cluster priority. Stochastic matrix obtained is called as weighted supermatrix. Raise the weighted supermatrix to a large power to capture first, second, and higher degree influences. When the differences between corresponding elements of a row are less than a very small number, for successive powers of the supermatrix, the process has converged. The output is limit matrix from where priorities can be read [11].

### 3.3. VIKOR method

The VIKOR method was developed for the multicriteria optimisation of complex systems [4]. It determines the compromise ranking-list, the compromise solution, and the weight stability intervals for preference stability of the compromise solution obtained with the initial (given) weights. This method focuses on ranking and selecting from a set of alternatives in the presence of conflicting criteria. It introduces the multicriteria ranking index based on the particular measure of “closeness” to the “ideal” solution. Assuming that each alternative is evaluated according to each criterion function, the compromise ranking could be performed by comparing the measure of closeness to the ideal alternative. The multicriteria measure for compromise ranking is developed from the \( L_p \)-metric used as an aggregating function in a compromise programming method. The various J alternatives are denoted as \( a_1; a_2; \ldots; a_J \). For alternative \( a_j \), the rating of the \( i \)th aspect is denoted by \( f_{ij} \), i.e. \( f_{ij} \) is the value of \( i \)th criterion function for the alternative \( a_j \); \( n \) is the number of criteria. Development of the VIKOR method started with the following form of \( L_p \)-metric:

\[
L_{p,j} = \left\{ \sum_{i=1}^{n} \left[ w_i \left( f_{ij}^* - f_{ij} \right) \right] \left( f_{ij}^* - f_{ij} \right) \right\}^{1/p}, 1 \leq p \leq \infty ; j = 1, 2, \ldots, J.
\]

Within the VIKOR method \( L_{1,j} \) (as \( S_j \) in Eq. (1)) and \( L_{\infty,j} \) (as \( R_j \) in Eq. (2)) are used to formulate ranking measure. The solution obtained by \( \min_j S_j \) is with a maximum group utility (“majority” rule), and the solution obtained by \( \min_j R_j \) is with a minimum individual regret of the “opponent”. The compromise solution \( F^c \) is a feasible solution that is the “closest” to the ideal \( F^* \) and compromise means an agreement established by mutual concessions, by \( \Delta f_1 = f_{i1}^* - f_{1c} \) and \( \Delta f_2 = f_{i2}^* - f_{2c} \).

The compromise ranking algorithm VIKOR has the following steps:

(a) Determine the best \( f_{i1}^* \) and the worst \( f_{i1} \) values of all criterion functions, \( i = 1, 2, \ldots, n \). If the \( i \)th function represents a benefit then:
\( f_i^* = \max_j f_{ij} \), \( f_i = \min_j f_{ij} \)

(b) Compute the values \( S_j \) and \( R_j \), \( j = 1, 2, \ldots, J \), by the relations

\[
S_j = \sum_{i=1}^{n} w_i \left( \frac{f_i^* - f_{ij}}{f_i^* - f_{i-}} \right), \quad (1)
\]

\[
R_j = \max_i \left[ w_i \left( \frac{f_i^* - f_{ij}}{f_i^* - f_{i-}} \right) \right], \quad (2)
\]

where \( w_i \) are the weights of criteria, expressing their relative importance.

(c) Compute the values \( Q_j \), \( j = 1, 2, \ldots, J \), by the relation

\[
Q_j = v \left( S_j - S^* \right) / ( S^* - S^- ) + ( 1 - v ) \left( R_j - R^* \right) / ( R^* - R^- ) \quad (3)
\]

Where

\( S^* = \min_j S_j \), \( S^- = \max_j S_j \), \( R^* = \min_j R_j \), \( R^- = \max_j R_j \).

And \( v \) is introduced as weight of the strategy of “the majority of criteria” (or “the maximum group utility”), here \( v = 0.5 \).

(d) Rank the alternatives, sorting by the values \( S, R \) and \( Q \), in decreasing order. The results are three ranking lists.

(e) Propose as a compromise solution the alternative \( \hat{a} \) which is ranked the best by the measure \( Q \) (minimum) if the following two conditions are satisfied:

\[ C1. \text{“Acceptable advantage”:} \quad Q(\hat{a}) - Q(\hat{a}^\sim) \geq DQ \]

where \( \hat{a}^\sim \) is the alternative with second position in the ranking list by \( Q; DQ = 1/(J - 1) \); \( J \) is the number of alternatives. \( C2. \text{“Acceptable stability in decision making”:} \) Alternative \( \hat{a} \) must also be the best ranked by \( S \) or/and \( R \). This compromise solution is stable within a decision making process, which could be: “voting by majority rule” (when \( v > 0.5 \) is needed), or “by consensus” \( v \approx 0.5 \), or “with veto” \( (v < 0.5) \). Here, \( v \) is the weight of the decision making strategy “the majority of criteria” (or “the maximum group utility”).

If one of the conditions is not satisfied, then a set of compromise solutions is proposed, which consists of:

- Alternatives \( \hat{a} \) and \( \hat{a}^\sim \) if only condition \( C2 \) is not satisfied, or
- Alternatives \( \hat{a}, \hat{a}^\sim, \ldots, \hat{a}^{(M)} \) if condition \( C1 \) is not satisfied; and \( \hat{a}^{(M)} \) is determined by the relation \( Q(\hat{a}^{(M)}) - Q(\hat{a}) < DQ \) for maximum \( M \) (the positions of these alternatives are “in closeness”).

The best alternative, ranked by \( Q \), is the one with the minimum value of \( Q \). The main ranking result is the compromise ranking list of alternatives, and the compromise solution with the “advantage rate”. Ranking by VIKOR may be performed with different values of criteria weights, analyzing the impact of criteria weights on proposed compromise solution. The VIKOR method determines the weight stability intervals, using the methodology presented in Opricovic (1998). The compromise solution obtained with initial weights \( (w_i, i = 1, \ldots, n) \), will be
replaced if the value of a weight is not within the stability interval. The analysis of weight stability intervals for a single criterion is performed for all criterion functions, with the same (given) initial values of weights. In this way, the preference stability of an obtained compromise solution may be analyzed using the VIKOR program. VIKOR is a helpful tool in multicriteria decision making, particularly in a situation where the decision maker is not able, or does not know to express his/her preference at the beginning of system design. The obtained compromise solution could be accepted by the decision makers because it provides a maximum ‘‘group utility’’ (represented by min $S$, Eq. (1)) of the ‘‘majority’, and a minimum of the individual regret (represented by min $R$) of the ‘‘opponent’. The compromise solutions could be the basis for negotiations, involving the decision makers’ preference by criteria weights [16].

4. Results
The results of Delphi method is shown in Table 1.

<table>
<thead>
<tr>
<th>Symbols Factors</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factors</td>
<td>Sanctions</td>
<td>Rules</td>
<td>financing methods</td>
<td>Monetary policy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Symbols Factors</th>
<th>C5</th>
<th>C6</th>
<th>C7</th>
<th>C8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factors</td>
<td>Banking system</td>
<td>Currency fluctuations</td>
<td>Problems of supply and demand</td>
<td>Money and Capital Market</td>
</tr>
</tbody>
</table>

The unweighted supermatrix is shown in Table 2.

<table>
<thead>
<tr>
<th></th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
<th>C6</th>
<th>C7</th>
<th>C8</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>0.0000</td>
<td>0.0909</td>
<td>0.0769</td>
<td>0.0769</td>
<td>0.0666</td>
<td>0.1282</td>
<td>0.2093</td>
<td>0.2800</td>
</tr>
<tr>
<td>C2</td>
<td>0.0322</td>
<td>0.0000</td>
<td>0.1282</td>
<td>0.1282</td>
<td>0.1111</td>
<td>0.0769</td>
<td>0.1627</td>
<td>0.2000</td>
</tr>
<tr>
<td>C3</td>
<td>0.0967</td>
<td>0.1515</td>
<td>0.0000</td>
<td>0.1794</td>
<td>0.1555</td>
<td>0.1794</td>
<td>0.0697</td>
<td>0.1200</td>
</tr>
<tr>
<td>C4</td>
<td>0.0967</td>
<td>0.2121</td>
<td>0.1794</td>
<td>0.0000</td>
<td>0.2000</td>
<td>0.2307</td>
<td>0.1162</td>
<td>0.0400</td>
</tr>
<tr>
<td>C5</td>
<td>0.1612</td>
<td>0.2727</td>
<td>0.2307</td>
<td>0.2307</td>
<td>0.0000</td>
<td>0.0769</td>
<td>0.1627</td>
<td>0.1200</td>
</tr>
<tr>
<td>C6</td>
<td>0.2258</td>
<td>0.0303</td>
<td>0.1282</td>
<td>0.0769</td>
<td>0.1111</td>
<td>0.0000</td>
<td>0.1162</td>
<td>0.0400</td>
</tr>
<tr>
<td>C7</td>
<td>0.2903</td>
<td>0.0909</td>
<td>0.0769</td>
<td>0.1282</td>
<td>0.1555</td>
<td>0.1282</td>
<td>0.0000</td>
<td>0.2000</td>
</tr>
<tr>
<td>C8</td>
<td>0.0967</td>
<td>0.1515</td>
<td>0.1794</td>
<td>0.1794</td>
<td>0.2000</td>
<td>0.1794</td>
<td>0.1627</td>
<td>0.0000</td>
</tr>
</tbody>
</table>
The influential weights is shown in Table 3.

**Table 3: Influential weights**

<table>
<thead>
<tr>
<th>Factors</th>
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<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
<th>C6</th>
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<tbody>
<tr>
<td>weights</td>
<td>0.1191</td>
<td>0.1100</td>
<td>0.1184</td>
<td>0.1295</td>
<td>0.1526</td>
<td>0.0936</td>
<td>0.1344</td>
<td>0.1419</td>
</tr>
</tbody>
</table>

The experts decision matrix is shown in Table 4.

**Table 4: Decision matrix**

<table>
<thead>
<tr>
<th></th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
<th>C6</th>
<th>C7</th>
<th>C8</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>4.0</td>
<td>6.6</td>
<td>4.2</td>
<td>6.2</td>
<td>5.8</td>
<td>4.2</td>
<td>4.0</td>
<td>5.8</td>
</tr>
<tr>
<td>A2</td>
<td>5.0</td>
<td>6.0</td>
<td>4.6</td>
<td>4.2</td>
<td>6.0</td>
<td>6.0</td>
<td>5.4</td>
<td>5.0</td>
</tr>
<tr>
<td>A3</td>
<td>4.2</td>
<td>4.4</td>
<td>5.4</td>
<td>5.4</td>
<td>4.2</td>
<td>5.8</td>
<td>4.2</td>
<td>6.2</td>
</tr>
<tr>
<td>A4</td>
<td>5.8</td>
<td>5.8</td>
<td>5.0</td>
<td>6.6</td>
<td>6.3</td>
<td>5.4</td>
<td>6.3</td>
<td>5.8</td>
</tr>
</tbody>
</table>

The results of the best $f_j^*$ and the worst $f_j^-$ values of all criterion functions is shown in Table 5.

**Table 5: Best and the worst values of all criterion**

<table>
<thead>
<tr>
<th>$f_j^*$</th>
<th>C1</th>
<th>C2</th>
<th>C3</th>
<th>C4</th>
<th>C5</th>
<th>C6</th>
<th>C7</th>
<th>C8</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.8</td>
<td>6.6</td>
<td>5.4</td>
<td>6.6</td>
<td>6.3</td>
<td>6.0</td>
<td>6.3</td>
<td>6.2</td>
<td></td>
</tr>
<tr>
<td>$f_j^-$</td>
<td>4.0</td>
<td>4.4</td>
<td>4.2</td>
<td>4.2</td>
<td>4.2</td>
<td>4.2</td>
<td>4.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

The results of the compute the values $S_j$, by the relations is shown in Table 6.

**Table 6: The values $S_j$**

<table>
<thead>
<tr>
<th>$S_j$</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4522</td>
<td>0.5575</td>
<td>0.5662</td>
<td>0.1500</td>
<td></td>
</tr>
</tbody>
</table>

The results of the compute the values $R_j$, by the relations is shown in Table 7.

**Table 7: The values $R_j$**

<table>
<thead>
<tr>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
</tr>
</thead>
</table>
The results of the compute the values $Q_j$, by the relation is shown in Table 8.

**Table 8 : The values $Q_j$**

<table>
<thead>
<tr>
<th>$Q_j$</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.7821</td>
<td>0.9419</td>
<td>1.0000</td>
<td>0.0000</td>
<td></td>
</tr>
</tbody>
</table>

The final ranking of VIKOR method is shown in Table 9.

**Table 9 : Final ranking**

<table>
<thead>
<tr>
<th>S</th>
<th>R</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tourists</td>
<td>0.1500</td>
<td>Tourists</td>
</tr>
<tr>
<td>Travel Agents</td>
<td>0.4522</td>
<td>Travel Agents</td>
</tr>
<tr>
<td>Company Advertising</td>
<td>0.5575</td>
<td>Company Advertising</td>
</tr>
<tr>
<td>Hotels</td>
<td>0.5662</td>
<td>Hotels</td>
</tr>
</tbody>
</table>

5. Conclusions

Iran is among the few countries that have four seasons and unparalleled civilization of several thousand years. It has also attractions as well as the unique and the global ranking of countries in terms of tourist attractions in the first ten rows of the world. But there has not yet achieved its real position in the world and the many problems facing infrastructure to develop its tourism industry. Today, financing is a major challenge for tourism industry. The purpose of this study, evaluate of factors affecting the financing of tourism industry in Iran. In this study, we use the Delphi method to identify of factors affecting the financing of tourism industry. The effective factors that have been identified include: rules, financing methods, sanctions, monetary policy, banking system, currency fluctuations, problems of supply and demand, money and capital market. The factors were weighted by the method of analytic network process. Finally this factors through VIKOR method examined on travel agents, company advertising, hotels, and tourists. The final ranking of VIKOR method is shown in Table 9. According to the survey results suggest:

1. Reduce financing constraints for tourists.
2. In subsequent studies, effective factors identified, on the other components of the tourism industry will be investigated.

References


