“Applying the Multiple Criteria-Decision-Making procedures in Environmental Management of Ecotourism in Protected Areas (Case study :Tange-Sayad in Chaharmahal &Bakhteyari Province)” AHP

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ABSTRACT

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Ecotourism development is a tangible and permanent strategy to persistence the protected area by systematic planning. Suitable planning and management of ecotourism function are most functional multi-variable decision-making in protected area which is depend on environmental factors. Protected area “Tang- sayad” is 27000 hectore and located in Chaharmahal & Bakhteyari province. It has capability to ahract ecotourism due to steep ecosystem with special vegetative coverage and animal population, natural attractiveness and its position near to province center, significant environmental variants, available road, beautiful mountain ecosystem perspective (view), beautiful rocks and suitable weather. The aim of the research is to present ecosystem ecotourism management and stress on environmental issues in protected area. AHP procedure was selected base on studies and different multiple criteria decision making method due to its accuracy and other advan tages. Three effective criteria on ecotourism function were selected base on field surveys and management projects of ecotourism area stable resources GEF and consult with experts (natural environment factors, social-educational factors- economical factors), then four ecotourism functions according to protection function were selected base on visitors altitude to work with AHP. The best option was selected base on these criteria and hierarchical analyse and expert choice software to reach group function by questionnaire, weighting to options and data analyse, was presented base on management remedy.

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Introduction

Ecotourism is a word that has entered to world literature from 1970 and has been double each year. It means purposive and responsibly trips to nature. (zahedi 2006). Ecotourism development result in improve permanent utilities culture of natural resources and decrease environmental societies threats. Ecotourism is going to develop in tourism world market discipline. The goal of tourism mainly is places such as national park, will life, resources, natural and abstractive area which are origin (Rangbar 2011).

Due to population stress and increased consumption, natural resources are threatened by huge demand, then finding origin area become more difficult.

The aim of purposive ecotourism is protected area control and has multiple functions such as environmental protection, respected to local societies and cultural criteria improvement of host soueties which are in line with in line with permanent development (Drumm, 2008).

Ecotourism world meeting which hold in 2003, showed the importance of ecotourism In traditional land. Issues such as permanent tourism, economic, social, environmental effect, notice to local souety were studied in the meeting. (HiH- 2006).

Ecotourism has developed in this short period (1980).

The yearly growth rate of ecotourism was 20-34 percent in 1990 which was threefold in 2004. Permanent development and healthy society need to environment protection. Due to strategic and significification important of ecotourism, environmental planners will be faced with challenge which they have to find away to tourism visit from natural attractive places (kohen 2009).

In Iran, natural and cultural heritage were not exploited correctly due to incorrect management. As a result its high potential is failed, then it is referred back warded country and located in bottom of WTO statistical schedule, although 2002 was named ecotourism year and 2004 was named exercise tourism by UN which is a branch of tourism and ecotourism (Eesmoelinia 2003).

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Ecotourism industry and permanent management, planning importance in ecological protection, ecotourism abilities, the environmental management of ecotourism is most important criteria and powerful strategy of economical exploitation to effective protect and public engagement by lower demolition which needs the use of management function, new decision making and their modeling. Recent multi-criteria decision making methods have different function in respect to help decision maker by considering a set of criteria (sahy, 1997). The use of reliable methods to quantify qualitative criteria and their analyse will increase the confidence to measurements results and correct decision making. Then it is tried to study possible capabilities and limitation in ecotourism environmental management in protected area and select the best method by library studies and study of available book and text in internet resources and analyse three important ecotourism factors and introduce environmental management methods with multi criteria making. The results showed that AHP is a suitable model to ecotourism environmental management against other.

The aim of this research is determining of suitable methods to protect protected area in tang- saayad in Chaharmahal & Bakhteyari province, use permanent ecotourism development by purposive programme in the area. Then, area was studied during 1 year. (May 2012-2013) Tang- saayad is located in the east of shahre Kord which is 2700 Hectare, 15 Km near to province center. 21600H of it is protected area and 5400H is national park. Environment variety, different views, mountain ecosystem, beautiful rocks which is the birth place of ewe, in shahrekord in Eshehan draw tourists attention. Its capabilities is available asphalt road, its location near to provience center and Esfehan tourism hearth, suitable weather, origin areas, beautiful and permanent spring and unique wild life. Protected area is located in category 5 in IUCN table. Ecotourism and recreation are initial goals in the area. Support from environment methods and economic function in line with nature and social-cultural protection from local society are its managemental goals.

Map 1: The location of protected area: tang- saayad in Chaharmahal & Bakhteyari province.

Materials and Methods

Data were collected from library studies such as books, texts and Internet resources. Ecotourism is initial or secondary goal in environmental managements by IUCN category, available reports and researches were studied in second part of library studies.

In field studies, necessary information were obtained by visits, interview with visitors, responsible, environmental protector and experts, related organization visit (pictures and present report). These were used to compose permanent ecotourism management in this area.

It is necessary to recognize and rank criteria and options by correct model. At first, effective criteria are determined in three factors by considering experts attitude base on GGF guidance in Ingeada- turkey. (Natural area, economic- social area, caltral area). These criteria were studied. The rate of them were determined in national references and international by ecotourism international criteria, protection, mission and protected area goals, research literature.

Ecotourism decision making must be done base on model which can use natural, social, cultural and economical criteria, then multi criteria models was selected. As a result, ecotourism function index was determined by questionnaire (1) in the area which is completed by visitors base on 4 options. (Watching wild life- watching natural views- fishing, hunting- photography from nature and wild life) Excel and spss software were used to analyse.
The questionnaire AHP hierarchical method was used to study and decision making about multi criteria factors. To do it, at first, hierarchical tree was drawn, criteria and sub criteria were determined.

Secondly, pair comparative tables were prepared and referred to experts as questionnaire 2. Third, completed tables were studied in respect to adjustment rate. Then tables which had more than 0.1 adjustment rate were returned to people in order to revision. Lastly, people attitudes considered were and final ranking was done by expert choice software. Hierarchical structure construction which is most important goal in second level of criteria and third level of sub criteria and forth level of option was done after effective factors determination on ecotourism environmental management in protected area and ecotourism function options.

According above description, following process was constructed in this research:

Table 1: The construction of hierarchical structure in research.

<table>
<thead>
<tr>
<th>The level of goal</th>
<th>Select of ecotourism</th>
<th>The level of criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>The level of goal</td>
<td>Cultural factors</td>
<td>Economical- social factors</td>
</tr>
<tr>
<td>The level of sub-criteria</td>
<td>The existence of museum-historical monument in area</td>
<td>Available roads</td>
</tr>
<tr>
<td></td>
<td>The distance from tourism region</td>
<td>The distance between area to city</td>
</tr>
<tr>
<td></td>
<td>The culture of civil people in region</td>
<td>Facilities in area</td>
</tr>
<tr>
<td>The level of options</td>
<td>Watching wild life</td>
<td>Watching natural views</td>
</tr>
<tr>
<td></td>
<td>Hunting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Photography from nature and wild life</td>
<td></td>
</tr>
</tbody>
</table>

Level ranking was done after constructing different level of hierarchical by experts. As a result, questionnaire 2 designed. Some ecotourism experts who had necessary information and Tang- sayad answered to it.

The questionnaire was designed to criteria, sub criteria ranking and pair comparison by AHP method. The comparison was done by ranking base on preference of criteria with numbers (1, 3, 5, 7, 9) which dominate similar preference- low preference- high preference very high preference, absolutely preference, respectively.

Second part was done to ranking options and their measurement to criteria and sub criteria. Experts ranked each options by numbers (1, 3, 5, 7, 9) which dominate unimportant- low important- middle important- high important- very high important.

Statistical populations were all of visitors during the research period. From 50 questionnaires, 30 questionnaires were completed and returned to Tange sayad protected area staff. According to central limit in statics, when number of questionnaire are bigger or same as 30, we can propose normal distribution in statistical population. Questionnaire 2 which was related to experts attitude who was familiar with protected area and ecotourism included 10 Shahrekord university experts, planning assistance of governor, provience environmental protection association and provience tourism organization.

Due to statistical population limitation, the whole of them were determined as statistical sample, then questionnaire were distribution among them.

According to Kokran formula, to determine sample volume, the number of sample are same as statistical population to statistical population limitation. Expert choice software was used to facilitate mathematical calculations and pair comparison of Matrix. As a result, the ranking of each experts separately entered .

To software, then its maladaptation was diminished finally, combine software was used pair comparison was done to construct hierarchical structure and values evere entered in related software.

Ecotourism planning and management were composed after analyzing and selecting best management in protected area.

The results:
Ecotourism function index was determined by questionnaire 1 which completed by 30 visitors in different seasons in Tange sayad. Following results were obtained after questionnaire.

Analyzing:
According to above figures, attractions which has attracted visitor in the area were watching wild life 14%, weather 9%, natural views 21%, hunting 35%, photography 11%, scientific research 5% (pharmaceutical vegetative- vegetable- wild life, others 5%).

Fig. 2: Preference function of visitors. (%).

Preference function in the area is as below:
- Watching wildlife 18%, hunting and fishing 43%, watching nature and natural views 17%, walking 12%, climbing 10%.
- As a result, research options were determined.

After questionnaire completion by experts, expert choice software was used and hierchical structure was constructed. Then results were extracted as graphs. Figure 3 showed hierchical structure entered to the software, then each criteria and sub criteria was giren special value according it experts ranking which has shown with “L” in front of each parameters.

It is refer to local priority. The green color refers to its value against others. The figure show that the sum of the criteria value are same as 1 and the sum of the sub criteria value are 1 too. Parameter L shows the value percent of each parameter.

Fig. 3: Hierchiacal structure of entered research in the software.
Criteria ranking base on the aim:

Although the aim of questionnaire 2 is to designe and rank permanent ecotourism function in protected area- Tange sayad in respect to natural, economical, social- cultural criteria, figure 4 has shown criteria ranking base on the aim. As it has shown, environmental factors are determined by (L: 0.481) degree 1, economical factors by (L: 0.282) degree 2, cultural criteria- social factors by (L: 0.237) degree 3.

Fig. 4: criteria ranking base on the aim.

Sub criteria ranking which is related to environmental criteria base on the aim:

Sub criteria which are related to natural factors such as weather, natural views were compared in figure (5). As it mentioned, natural views by (L: 0.648) was in grad 1, by (L: 0.215) was in grade 2 and weather by (L: 0.137) was in grade 3.

Fig. 5: Sub criteria ranking which is related natural environmental factors.

Ranking of sub criteria which is related to economical factors in respect to aim:

Sub criteria which are related to economical factors such as available site distance from city and facility of area were compared in figure 6. As it mentioned, available site by (L: 0.532) was in grade 1, facility by (L: 0.321) was in grade 2, distance from city by (L: 0.147) was in grade 3.

Fig. 6: Ranking of sub criteria which is related to economical factors.

Ranking of sub criteria which is related to social- cultural factors in respect to aim:

Sub criteria which are related to social- cultural factors such as museums, the distance from tourism centers and local culture were compared. Museums by (L: 0.381) was in grade 1, local culture by (L: 0.365) was in grade 2, the distance from tourism centers by (L: 0.254) was in grade 3.
Fig. 7: Ranking of sub criteria which is related to social-cultural factors.

**Ranking of options in respect to goal, criteria, sub criteria and selection of best ecotourism function in area base of AHP method:**

Options which are related to ecotourism such as wild life, natural views, hunting-fishing and photography in respect to goal, criteria, sub criteria, were compared in figure 8. As it has show, watching natural views was in grade 1, photography of nature was in grade 2, watching wild life was in grade 3, hunting and fishing was in grade 4.

Fig. 8: Ranking of options in respect to goal, criteria, sub criteria and selection of best option.

The analyse of function sensivity has shown in Figure 9. Relative importance is obvious respect to other options base on criteria, sub criteria, goal in this graph. Priority level of each option was determined base on overall goal by watching graphs and their intersection with overall vertical line and reading y axis in right hand. According to graph, natural environmental factors was the important criteria, economical factors and social-cultural factors placed after it.

Fig. 9: The analyse of function sensivity discussion and results.

Ecotourism capability priority beside of other capabilities increase ecotourism management importance in Tange sayad in Chaharmahal & Bakhteyari. Then it is necessary to create and develop ecotourism and present management plan and program in area due to ecotourism potential. Tang- sayad has been in category 5 in world union of protection, recreation is initial goal in such area. Biology method and economical activities support in line with local social-cultural structure are important parts of management in area. Field research results in 2012-2013 showed that Tang- sayad is a place which tourists can visit in all of seasons due to public capabilities, research worth, ecotourism capabilities, available road to area, the distance to city, aquatic-vegetable-animal resources, watching wild life directly, asphalt road, drinkable water, w.c. platform for silting units in sharekord and farokh-shahr, parking in entrance door, permanent watch post of duty in farokh-shahr, Iranche, Bostan shir, Abshorshor, bidkhel, Korchi, natural history museum, area facilities, Hunting capabilities
with related authority from environmental protection organization. The peak of visit season is spring. There is no formal statistic about number and manner of in trance to area because visitors enter from different routes and there is no control on it. Area experts declared 300 visitors in month. The number of natural museum visitors has been 300-1000 visitors in different month. It is 6000-7000 in 1 year. Visitors visit all natural attractions. There is no special part as index which have more visitor than other. Area have same distribution relatively.

According to results of experts analyse, watching natural views, photography of nature, watching wild life, hunting- fishing were considered suitable in area, respectively. In other hand, visitors perfered hunting- fishing, watching natural views, watching wild life, photography of nature, respectively. Then it is necessary to change visitors attitude from hunting- fishing to other options which is were harmony with area protection. It will change with policies such as culture making, instruction, notify, establish of necessary facilities and permanent control. In other hand, effective criteria on ecotourism management include environmental criteria, economical criteria, social-criteria, respectively.

According to environment factors importance and its sub criteria, it in very important to consider environmental factors. Ecotourism management goals determine ecotourism functions which have effect on protection aim of area. Due to obtained results of research, management program is considered in Tang- sayad as below:
1- The segmentation of protected area, Tang- sayad segmentation is an important factor which include goals allocation and general priorities in area. Permissible and unpermissible utility are determined by goals allocation and general priority to each zone. It is important in Tang- sayad because of rich animal- vegetable coverage. As a result, we can propose 4 zones by ecological ability measurement.
2- The design of visitors place
It in necessary due to visitors dispersion in area without no limitations. Public park limitations has done to facilitate management. In other hand, centered structure construction is more executive than others.
3- Stable sub structure design which is compatible with nature.
Ecotourism development in Tang- sayad need sub structure which damage environment and resource little beside of tourist attraction.
4- The creation of income in Tang- sayad natural resources protection result in multiple economic profits such as clear atmosphere, recreation, gen bank, … Which hasn’t considered economically. These are as God gift.
Resources are threatened as a result of unequal distribution and their request. None paid of entrance fee is one of the reasons.
Finalicial resources such as ecotourism functions, private investment, government aid, international aids which show entrance fee necessary.
5- Visitors effects management visitors have positive and negative effect on Tang- sayad. Ecotourism management try to decrease their negative and increase positive effects by their recognition. It need ecology potential measurement and its capacity according to permissible index and threshold.
According to visitors existence in different season in all of the area, visitors effects control and management is a essential way for ecotourism management. Visitor dispersion don’t follow no pattern in Tang- sayad. Environmental effects include contaminations, vegetable coverage damage and life damage. These are effects of tourists, because there is no city or village in area.
6- Ecotourism guides in area
Trained guides have effective role in area protection beside of visitors guidance and ecotourism attraction.
7- Season limitation or transit limitation in Tang- sayad transit season limitation is a management way to control visitors entranced to protected area, especially in peak season. It is done by park and staring station limitation and authority issue limitation.
8- Construct limitation in Tang- sayad or some parts of it.
We can prevent to disharmonic construction in area by determining sensitive points to damage such as camping in unique animals and plants or by limiting entrance permission in special seasons.
9- Fire limitation in Tang- sayad and special man or armed people entrance limitation.
The aim of fire limitation is decrease of visible effects on environment. It is important to halter fire and use of fire wood. The aim of armed people entrance is keep security of visitors and wild life protection in area.
10- The timing of visitors programme.
The aim of timing include time and place of visitors visit in Tang- sayad. Timing special time and determining special place techniques that cause least negative effects on nature and control tourists population and provide opportunity for tourists. It provide better guidance and control with more accuracy in area.
11- Visitors entrance limitations in special places visitor permanent or transit entrance limitation is a technique to prevent visitor entrance to special area such as reproduction places and sensitive vegetable coverage. It decrease negative effects of visitors.
12- To strenge Tang- sayad in respect to tourism capability. Installation construct and repair, road and staying places orientation, ecotourism facility preparation decrease negative effects of tourists in sensitive places.
13- Information bank preparation and information distribution in Tang- sayad. Information bank preparation, data, film, map, picture distribution and provide of necessary consultation to visitors by fraind guides will have important role in area management. These information are important in visitors attraction.
14- Instruction program execution and compilation and its intrepration in Tang- sayad. The interpretation of information is belong to visitors it attract them to tearning, teaching and becoming familiar with Tang- sayad. It is done data and facts composing to becoming visitors familiar with area and engaing in protection program which have least negative effect on area.
15- In form, marketing and advertisement in Tang- sayad. Due to this most of the visitors are old visitors in Tang- sayad, advertisement and informing are done by administrator departments (tourism organization, …), information distribution is done by public media, internet, catalogue and text.
16- Natural science museum and visitors center development in Tang- sayad. According to present welcoming from natural science museum in area, its development and visitors center construction are important role to attract tourist and informing them.

Referring proposals and management program:
The studying of multi decision making models, especially AHP and its function in ecotourism environmental management reflect model ability to determine and ranking ecotourism function options. Then it is proposed to use model correctly as a flexible and correct way and determine its advantage and disadvantage. Due to recent analyses, below points are proposed to develop and manage ecotourism function in protected area:
1- The use of maximum potential to attract financial aids in nation and international level to develop ecotourism in area and allocate government financial resources to protect and manage in Tang- sayad.
2- The study and research in protection criteria in Tang- sayad and their performance by use of new technology to reach permanent development in area and prepare overall design as superior document in protected area Tang- sayad.
3- The study of potential measurement and ecotourism effects measurement in Tang- sayad and perform refine designs in two level:
  ❖ Refine visitors effects. (base on periodical study of index, information about visitors effects are collected, analysed and measured, then essential ways are determined.)
  ❖ Refine quality of series. (Which need to collect information, analysed and measurement of information in order to determine visitors needs.)
4- To design program in order to segment area to recognize sensitive ecological area base on available information and area potential.
5- To increase environmental information in local people, related organization and department and entrance ecotourisms in area to attract local support and related organization to protect of environment and mention to making- income advantage and making employment.
6- To establish health management structure, security in Tang- sayad.
7- To introdute nature and natural views and tourism attraction to domestic and foreign tourists in Tang- sayad.
8- To prepare information bank in Tang- sayad base on available information, visitors and local people attitudes.
9- To plan roads and axis, construct nature trils, use of local architecture consistence with nature to construct camp, transit staying places, visitors centers and park.
10- To design and perform environmental ways, collect productive refuse in area.
11- To design and perform instruction program and interprate by ecotourism centers beside of catalogue, guid, instruction package base on experts attitude for local people, tourism staff, investors, private organization and public organization.
12- To create look-out tower in suitable point to direct experience of world in Tang- sayad.
13- To prepare camera and ecotourism equipments for natural attraction usage and world life watching in Tang- sayad which is not possibility of 100- out tower construction.
14- To establish of environmental research center in Tang- sayad.
According to above points, ecotourism development in Tang- sayad must be base on region conditions and tradition associations and environmental factors which is consistence with ecotourism plane and enjoy from
permanent profits. It needs to concrete management of environment, economical-social, cultural factors beside of continued refine to protect area attraction, prevent from resources damage, as a result Tang- sayad become a ecotourism pole.

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