

## Prioritization of historic buildings based on their values

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### Abstract

*Iran is located in a high-risk seismic zone of earthquakes. It has thousands of valuable historic buildings, mostly made of unreinforced masonry, which is quite vulnerable to natural hazards, especially earthquakes. The conservation and seismic upgrading of these buildings is vital for their survival. However, resources are limited and some sort of prioritization is needed in order to allocate the budget. There are several factors, which should be considered when ranking heritage buildings, but this paper mainly focuses on the values of historic buildings and describes a survey undertaken to find out whether it is possible to rank them. The method applied is choosing a particular group of people and determine whether they can classify buildings into a hierarchy? The results showed that most people could perform this task, so some sort of hierarchy exists, although different groups might choose different hierarchies.*

*Keywords: Values, historic buildings, earthquake, hierarchy, prioritization, planning, protection, cultural heritages*

### 1. Introduction

Vast destruction of the recent earthquake of Bam proved the necessity of a conservation policy in Iran. The earthquake of 26th of December 2003 had an intensity of 6.3 on the Richter scale, killed 43000 people and destroyed 80% of the Bam citadel, which is part of UNESCO international heritage and was constructed of most 2000 years ago [1]. This example was just one out of several devastating tremors of the country suffered in the past.

Iran has a very large number of historic buildings and in the meantime is located in the active line of earthquakes. The very high risk of earthquakes is threatening these precious buildings unless they are protected. If not, they will be destroyed inevitably.

In addition, most of the Iranian historic structures are made from un-reinforced masonry, which is particularly vulnerable in the event of earthquakes. Obviously, protection of thousands of historic structures is not possible all at a time within the limited resources available. Therefore, there is a need for a decision making tool that allows choosing some over the others in conservation. The problem is how to choose? Is there any type of hierarchy that can rank historic buildings? This paper will discuss an approach that solves the problem. To achieve a suitable plan of protection, there is a

need for basic criteria ranking the scale of importance within cultural monuments. Thus, it will be possible to programme the protection of historic buildings in danger with various terms of planning.

### 2. The aim of research

The aim of this paper is to suggest a scale of values that could form the basis of a conservation policy in Iran. In this paper 'values' are the attributes of buildings that people evaluate when asked to rank one building against another. The scale of values is empirical, determined by the choices made by those to whom the buildings are important. Values therefore change with time and vary between groups of people. It is also important to ask whether there can be consistency in the choice of values, even within a narrowly defined group of users.

The survey asked particular coherent sample of Iranians in academic professional positions. The selected sample is well-educated people who are aware of the cultural situation and the general condition of Iran. Iranian scholars studying abroad have been chosen randomly as the sample group. They were asked to rank certain values in relation to particular buildings to see whether there exists a consistent agreement on the values.

The intention was to determine whether there is any consistency between individuals in ranking these values and, if so, whether there might be a hierarchy of values that could form the basis of a policy for conservation and maintenance of monuments.

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The viewpoint of this people might be different from the others; different conclusions might be made out of different group of people. But it shows that this does exist that people can make judgement on the relative importance of the values.

### 3. How to choose?

Forming suitable policies for maintaining the national heritages of each country is vital. By ranking the national heritage of each country the priority of grant allocation will be clear in similar circumstances. In other words the most efficient and deciding factor is the fixed budget; with such a budget, which buildings can be chosen to protect. How can the most important one be determined among the historic buildings of Iran? In other words, how historic buildings can be prioritized? To reach the right decision it is required to know which characteristics of historic buildings can determine the first priority in their conservation.

The policy should consider three efficient factors for adjusting the ranking systems of historic buildings:

- the values of buildings,
- the condition of buildings and
- The cost of conservation.

Several values can be defined for historic buildings; some of them might cover each other or overlap together. The condition of historic buildings is related to both their seismic location and the quality of their stability. The cost of conservation is not just money spending on it, but also the amount of values of the cultural heritage which is being threatened in the result of repair or strengthening actions especially in the safeguarding of monuments for high-level earthquakes; are regarded as the cost of conservation. The fundamental question is 'what can be preserved?' in some cases preservation harms the building more than not doing anything at all. The main concept is the values and whether is possible to protect those values.

### 4. The values of historic buildings

The criteria for listing buildings in England are mainly based on their age, their quality of survival and their character (Ross, 1996). Ross also explains that in choosing buildings, particular attention is paid to architectural and historic interest. The selection criteria in PPG 16 also take the following factors into account: 'survival and condition', 'rarity', 'fragility and vulnerability', 'diversity', 'documentation records', 'group value' and 'potential' (Annex 4 of PPG16) [2].

According to Pickard (1996), the method considered in Canada for the formulation of plans and policies for individual or groups of historic buildings relies on a site survey of buildings assessed according to five main headings. Each of these headings are then subdivided into secondary headings, which are ranked up to a maximum score in each case and overall provide a grade total of 100 points [3]:

- Architecture: including style; construction; age; architect; design; and interior,
- History: including person; event; and context,

- Environment: including continuity; setting; and landmark,
- Usability: including compatibility; adaptability; public services; and cost,
- Integrity: including site; alterations; and condition.

Pickard (1996) states that the purpose of this formulation is to find a heritage value ranking, which can be measured in terms of different options according to the relative points attributed to each issue. These may be identified as being 'to do nothing', 'to repair', 'to alter for new use', or 'to redevelop' [2].

In England, at present, only a very basic ranking system is used for listed buildings by grading in the categories of I, II\* and II which are respectively the representative of buildings of exceptional national interest, important buildings of more than special interest and buildings of special interest [4].

Another idea considered in the United States has a similar ranking system according to certain defined headings:

- Historical significance: including national; state; and community,
- Architectural significance: including example of style; importance to neighbourhood; desecration of original design/detrimental additions,
- Physical condition: including structure; grounds; neighbourhood; and relation to surroundings.

This form of assessment has been used to rank areas for heritage significance and a measure against which tax relief, subsidised loans and grants can be given to particular buildings [2].

An example of similar planning in Asia, can be mentioned in the research of Awan (1993) which proposed a grading system for listing historic buildings of Lahore. In his work, he referred to the previous policy in Pakistan for the grading of buildings by the 'Department of Archaeology and Museums', and the research of PEPAC (Pakistan Environmental Planning and Architecture Consultants) [5]. Then after defining the exact meaning and categorizing the different values of historic buildings, he proposed the new grading system. The research has proposed categorizing the historic buildings of Lahore chiefly in the fields of: 'building condition', 'architectural value', 'historical value', 'usage value', 'ownership and maintenance', 'listed statuses'.

An attempt has been made to access information about the policy for listing and grading buildings and the strengthening of historic buildings against natural hazards, especially earthquakes, in Iran. There exists a legislation from 1973 which indicates the age and the approval by authorities as the main criteria for listing and grading buildings [6]. However all later efforts to add extra values of cultural, historical, social, artistic and political have not yet been passed. The above reviews of planning policy in various countries show that there is a need to have the specific criteria in various countries according to their own local conditions. Specifically in Iran, which is highly prone to earthquakes, there is a need to advanced preparation for the strengthening of historic buildings to resist earthquakes. Moreover the criteria are required for choosing some buildings over others to protect them as the safeguarding would not be possible all at once, the topic that is the subject of this paper. After analyzing the international quotes and

the criteria of several countries, the most common values, which determine the importance of buildings, are as following:

#### 4-1. Cultural Value

Pickard (1996) believes that the definition of the culture based on national terms is most usually recognised in a patriotic way [2]. Rapoport (1991) pointed out that culture is the result of unwritten rules, customs, traditions and habits [7]. Based on other definitions and on regional beliefs the cultural value can be defined as: identity identifier of the land, significant historically rooted beliefs, customs and practices, symbol of the religions of the ancient nations, evidence of the civilization in the history of the country.

Marston (1992) believes that the cultural survival of each country depends on the conservation of that country's heritage [8]. With regard to the cultural role of the preserved monuments, he states that the traditional architecture and town planning of each country extends far beyond their tourist significance.

The culture in architecture is the effect of the people's beliefs in the design; for example, the desire for intimacy resulted in the courtyard houses in a country like Iran. Pirnia (1990) defined five characteristics for traditional architecture of Iran which could be considered as the culture of Iranian traditional architecture: 1) intimacy and tendency to the inside of the building (*Mahramiat* and *Daroungaraei*), 2) abstaining from uselessness (*Parhiz as Bihoudegi*), 3) building and designing in human proportions and human requirements (*Mardomvari*), 4) self-sufficient (*Khod-Basandegi*) and 5) stability and durability (*Niaresh*) [9].

#### 4-2. Architectural Value

The most determining factors for architectural integrity of the building are the intact features of style (or any special architectural features), material and neighbourhood of the building. The buildings, which are historically important for their architectural design or significant style, decoration and artistry, composition or particular building types, possess architectural value.

Some other values such as aesthetic value and the proportion of buildings both based on the dimensions of different parts of a building, and the design ideas such as the co-ordination of mass and open spaces could all be involved in this value.

#### 4-3. Historical Value

The identifier of the historic value of the building results from its connection with very important historic events (nationally, provincially or locally), or a symbol of specific historic period. Also, the identifier can be monumental of a very important person or a close historical association with nationally important events. In addition, the related buildings or sites to the important aspects of the nation's social, economic and cultural events can bear historical value. Some buildings may have little architectural importance but are of a higher historical value and vice versa.

#### 4-4. Rarity or Uniqueness Value

The monument as a remaining example of a once widely used architectural, engineering or industrial design or process, as far as the more widespread or influential the design, the more valuable would be the remaining monument.

#### 4-5. Age Value

The buildings which were able to survive longer are more precious. In this regard Feilden (2003) believes that buildings able to survive the hazards of 100 years of usefulness have a good claim to being called historic [10].

#### 4-6. Structural Value

Techniques, details and materials are all efficient factors in the structural value of the monuments. However workmanship could also be considered in this value as the different way of building itself might be worthwhile concerning, since, some days completely different methods were used.

#### 4-7. Economic Value

Economic value of the building is relevant to two factors of the ability to attract tourists and the daily benefit arising from the building.

#### 4-8. Usage Value

The present use of the building can be compared with its initial use. As much as a building has kept its features intact, it is able to keep its integrity with the past. As the changing of the building's function will affect the lateral changes of the fabric of the structure, so the alternative use is also important to see whether it is compatible with the initial use.

#### 4-9. Other Values

There are other expressions for the interests and values, but in reality all of them are just the mixture of above definitions or various phrases, such as: aesthetic value, symbolic value, social value, archaeological value, archival, documentary or research value, authenticity and significance value, scenic and group value for buildings in their landscape setting. Other values also mentioned for the monuments such as mysterious value like Egyptian pyramids and the political value like the remained palaces, etc.

The other value, which is also another expression of above values, is the integrity or completeness value. This interest is a sort of comparison of appearance, and function of a building, structure and architecture with the original condition, appearance and function. In other words, the percentage of being intact can specify the degree of importance for the building.

Drury (2000) described the type of significance of the heritage under the headings of archaeological, historical, associational, use, architectural, landscape and ecological [11].

## 5. The survey of values

Now this question comes to mind, whether all the values of buildings have the same worth or is there any superiority among the values?

### 5.1. Method of the survey

To find out more about the values of historic buildings, the statistical survey was managed. The main aim of this survey was to achieve a suitable ranking of the monuments on the basis of their values. The selected method was first of all the

final selection of values which encircling all other values with similar definitions and just different in the name. The questionnaires were in the form of several values, being defined in separate sheets. Each sheet contained an explanation of that value plus an example from the one of historic buildings of Iran that is quite prominent and famous because of that value (figure 1-8). Then respondents were asked to rank sheets in the descending order of their preference for preserving and protecting against natural hazards especially earthquakes, namely based on limited budget.

The sample group for answering the questionnaires were



Fig. 1. Photographs of Imam Reza Shrine, Mashad, presented in the sheet of "Cultural value"

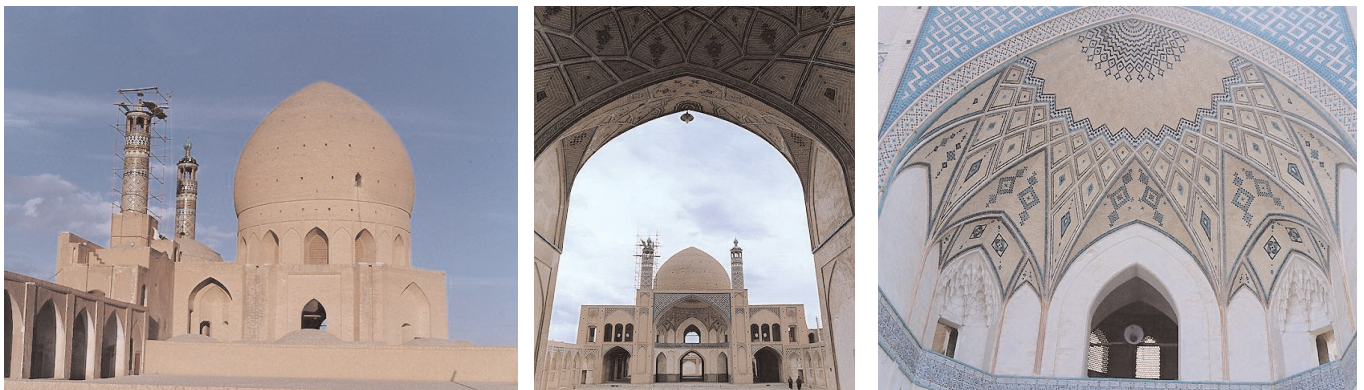
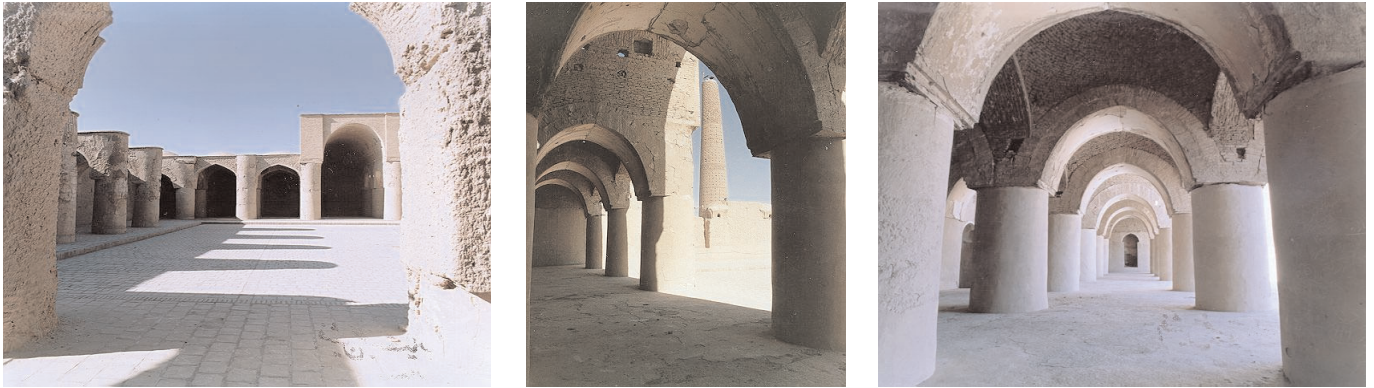


Fig. 2. Photographs of Agha-Bozorg School, Kashan, presented in the sheet of "Architectural value"



Fig. 3. Photographs of Bagh-i-Shah in Fin, Kashan, presented in the sheet of "Historical value"



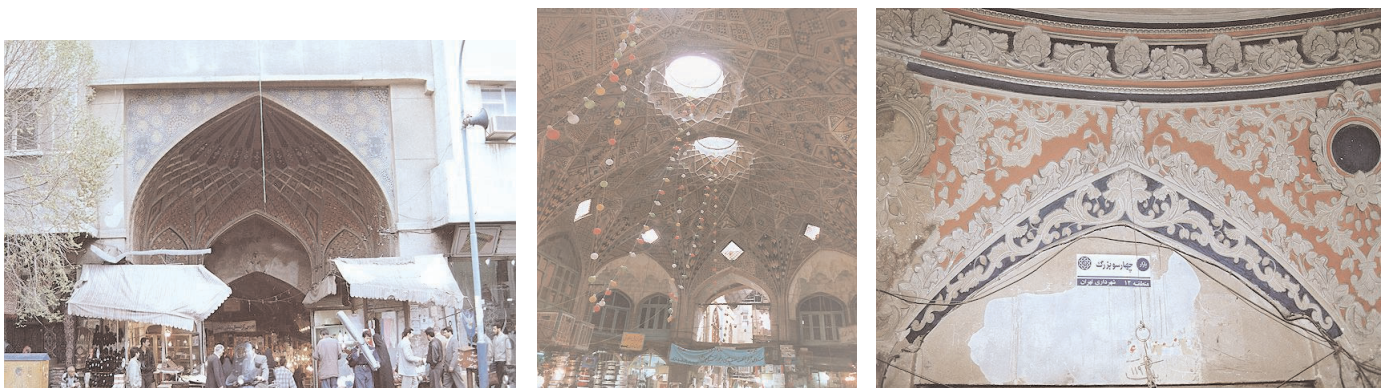
**Fig. 4.** Photographs of Tarikhane Mosque in Damghan, presented in the sheet of "Rarity value"



**Fig. 5.** Photographs of Chogha-Zanbil Zigurat in Shusha, presented in the sheet of "Age value"



**Fig. 6.** Photographs of Gunbad-i-Sultaniya (Oljeito Mausoleum), presented in the sheet of "Structural value"



**Fig. 7.** Photographs of Bazaar in Tehran, presented in the sheet of "Economic value"



Fig. 8. Photographs of Abgineh Museum in Tehran, presented in the sheet of "Usage value"

highly educated Iranians living abroad. Some of respondents have been asked by person and some by email. Some respondents were architects, which their point of view has also been analysed separately regarding to their more familiarity with the case. About 330 emails were sent to the PhD Iranian students throughout the UK and other parts of the world, and 79 replied. The nearby Iranian correspondents were 41 and in addition the total of 120 replies was received, and the total number of architects among them was 24.

The aim was to discover whether Iranian people have a consistent view about the relative importance of the different types of values associated with buildings.

## 5.2. Results

Attempts to give weight to the different values of historic buildings by asking Iranian views chiefly resulted in the principal division regarding to the four different analyses of orderings, including all the voters, nearby voters, distant voters

and architects [12]. The analysis used the Kendall coefficient of concordance 'W', which can be used in the case of having k sets of rankings, to determine the association among them (Siegel, 1988).

### 5.2.1. Analysing the ranking orders of all voters

Table 1 shows the final number of votes for each of the values in different priorities. Table 2 also shows the computation method of  $R_i$  for different values depending on the ranking order of respondents:

The lower the  $R_i$ , the higher the ranking order for the related value. Therefore, the last row in table 1, which is adjusted from the lowest  $R_i$  to the highest  $R_i$ , shows the ranking order of values based on the respondents' points of view.

For determining the association among the k sets of ranking, Siegel (1988) proposes using the Kendall coefficient of concordance W [13]. He believes that "Such a measure may be particularly useful in studies of inter judge or interest reliability and also has applications in studies of clusters of

Table 1. The ranking order of all (120) voters

Priority	Final number of votes for each value in different priorities							
	Architectural	Historical	Age	Cultural	Structural	Rarity or uniqueness	Economical	Usage
First priority	16	25	29	20	2	23	5	0
Second priority	22	21	18	16	10	25	3	5
Third priority	29	22	14	13	16	19	4	3
Fourth priority	28	18	12	16	19	17	6	4
Fifth priority	11	16	16	20	24	15	10	8
Sixth priority	10	10	11	23	30	12	11	13
Seventh priority	4	5	9	9	12	8	30	43
Eighth priority	0	3	11	3	7	1	51	44
$R_i$	402	404	452	480	586	409	781	806
Values	Architectural	Historical	Age	Cultural	Structural	Rarity or uniqueness	Economical	Usage

Table 2. the calculation of  $R_i$  - The sum of ranks for each value

Architectural value:	$R_i =$	$16*1 + 22*2 + 29*3 + 28*4 + 11*5 + 10*6 + 4*7 + 0*8 =$	402
Historical value:	$R_i =$	$25*1 + 21*2 + 22*3 + 18*4 + 16*5 + 10*6 + 5*7 + 3*8 =$	404
Age value:	$R_i =$	$29*1 + 18*2 + 14*3 + 12*4 + 16*5 + 11*6 + 9*7 + 11*8 =$	452
Cultural value:	$R_i =$	$20*1 + 16*2 + 13*3 + 16*4 + 20*5 + 23*6 + 9*7 + 3*8 =$	480
Structural value:	$R_i =$	$2*1 + 10*2 + 16*3 + 19*4 + 24*5 + 30*6 + 12*7 + 7*8 =$	586
Rarity or uniqueness value:	$R_i =$	$23*1 + 25*2 + 19*3 + 17*4 + 15*5 + 12*6 + 8*7 + 1*8 =$	409
Economic value:	$R_i =$	$5*1 + 3*2 + 4*3 + 6*4 + 10*5 + 11*6 + 30*7 + 51*8 =$	781
Usage value:	$R_i =$	$0*1 + 5*2 + 3*3 + 4*4 + 8*5 + 13*6 + 43*7 + 44*8 =$	806

variables."

In the ranking of N objects in the order of 1, 2... N, by K persons, the sum of ranks will be calculated for each object with the name of  $R_i$ . In the case of perfect agreement among k sets of rankings, the  $R_i$  would be k, 2k, 3k... Nk and the average ranks would be 1, 2, 3... N. However in the case of random agreement among the k judges, the various  $R_i$ 's would be approximately equal. On the other hand, the degree of agreement among the k judges is reflected by the degree of variation among the N sums of ranks. W, the coefficient of concordance, is a function of that degree of variance.

Following equation is used to calculate the coefficient of concordance, W [13]:

$$W = \frac{N}{\sum_{i=1}^N (R_i - R^i)^2} / (N(N^2-1)/12) \quad (eq.1)$$

Where k = number of sets of rankings, e.g., the number of judges

$N$  = number of objects (or individuals) being ranked

$R_i^i$  = average of the ranks assigned to the ith object or subject  $R^i$

$R^i$  = the average (or grand mean) of the ranks assigned across all objects or subjects [13]

Equation 1 can be simplified into Eq. (2) [13]:

$$W = (12 \sum R_i^2 - 3k^2 N(N+1)^2) / (k^2 N(N^2-1)) \quad (eq.2)$$

W varies between 0 and +1, regardless of the number of sets of rankings. The reason that W cannot be negative is that when more than two sets or ranks are involved; the rankings cannot all disagree completely.

When there is no consensus among the rankers, the variability of rankings will be zero, i.e., the average rank will be the same for all objects ranked. One way to measure consensus is to determine the degree of agreement among the rankers in their judgements. The Kendall coefficient of concordance is a measure, which would provide such an index [13].

The ranks allocated to each of the  $N=8$  values for each of the  $k=120$  respondents are given in table 2. A rank of 1 meant the most important value for historic buildings to spend the funds for their protection, and a rank of 8 was assigned to the least important assessment. To calculate the coefficient of concordance, it is first necessary to calculate the sum of ranks for each of the values, which were ranked by the respondents. The sums of the ranks for each value,  $R_i$ , (been calculated by multiplying the

number of votes for that value in the related priority) are given in table 2.

$$\sum R_i = 402 + 404 + 452 + 480 + 586 + 409 + 781 + 806 = 4320$$

$$\sum R_i^2 = 402^2 + 404^2 + 452^2 + 480^2 + 586^2 + 409^2 + 781^2 + 806^2 = 2529798$$

The check on the computation is possible here since  $\sum R_i$  should be equal to  $kN(N+1)/2$ . Since the observed sum is 4320,  $N=8$ ,  $k=120$  and  $120(8)(9)/2 = 4320$ , we have partial check on the calculations.

The degree of agreement among respondents in their rankings of values of historic buildings can be determined from equation 2 [13]:

$$W = (12 \sum R_i^2 - 3k^2 N(N+1)^2) / (k^2 N(N^2-1)) \quad (eq. 3)$$

$$= (12(2529798) - 3(120^2)(8)(8+1)^2) / (120^2(8)(8^2-1)) = 0.326$$

Then it could be concluded that with this degree of agreement between respondents, these sorts of values from most important to least important ones could be set (Table 3).

Testing the significance of W:

According to Siegel (1988), as with other nonparametric statistical techniques, the method for testing the significance of the Kendall coefficient of concordance depends on the sample size-in this case, the number of objects being ranked.

With reference to Siegel (1988), "the quantity  $[\chi^2 = k(N-1)W]$  is approximately distributed as chi-square with N-1 degrees of freedom [13].  $H_0$  is the null hypothesis that the k sets of rankings are independent and shows that alternative hypothesis  $H_1$  states that the k sets of ranking are dependant. Siegel continues that the probability associated with the occurrence when  $H_0$  is true of any value as large as an observed W may be determined by finding  $\chi^2$  by using the eq.3 and then determining the probability associated with as large a value of  $\chi^2$  by referring to the table C, which shows the critical values of the  $\chi^2$  distribution with N-1 degrees of freedom and a preset significance level [13]. If the computed value of  $\chi^2$  equals or exceeds than shown in table C for a particular level of significance and a particular value of  $df = N-1$ , then the null hypothesis that the k rankings are unrelated (or independent) may be rejected at that level of significance.

In the ranking of values of historic buildings,  $k=120$  respondents rated  $N=8$  values and w calculated as  $W=0.326$ , the significance of this concordance can be determined by [13]:

**Table 3.** The concluded rating of values of historic buildings based on all (120) the rankers

Values	Architectural	Historical	Rarity or uniqueness	Age	Cultural	Structural	Economic	Usage
Ordering sorts	1	2	3	4	5	6	7	8
$R_i$	402	404	409	452	480	586	781	806
Divergence	2	5	43		28	106	195	25
Range of precedence		I			II	III		IV
Concluded rankings	Architectural, Historical, Rarity or uniqueness			Age, Cultural		Structural	Economic Usage	

$$X^2 = k(N-1)W \quad (\text{eq. 4})$$

$$= 120(8-1)(0.326) = 273.61$$

The table C [13], shows that  $X^2 \geq 273.61$  with  $df = N-1 = 8-1 = 7$  has probability of occurrence under  $H_0$  of  $p < 0.001$ . Referring to Siegel (1988), with considerable confidence, it could be concluded that the agreement among the 120 respondents is higher than it would be by chance had their rankings been random or independent. Therefore, the null-hypothesis to be rejected and the alternative hypothesis is valid, that can be used as a proof, demonstrating that there is a significant agreement among the correspondents. Heyes (1986) also stressed that in the case of turning out the coefficient to be significant, it means that it is unlikely to have been the result by chance and will probably be found again if the same variables have been measured from a similar sample of people [14].

The very low probability under  $H_0$  associated with the observed value of  $W$  enables us to reject the null hypothesis that the respondents' ratings are unrelated to each other and conclude that there is good consensus among members concerning the ranking order of the values in the position of determining and selecting the most important one to invest for protecting and strengthening.

According to Siegel (1988), a high or significant value of  $W$  may be interpreted as meaning that the  $k$  judges are applying essentially the same standard in ranking the  $N$  subjects [13]. Often their pooled ordering may be used as a 'standard' especially when there is no relevant external criterion for ordering the objects. However many items can influence whether the orderings are correct, Kendall suggests that the best estimate of the 'true' ranking of the  $N$  objects is provided. When  $W$  is significant, with accepting the criteria, which the various judges have agreed upon in ranking the  $N$  entities, by the order of the various sums of ranks  $R_i$ , the best estimate is provided. As can be observed in the table 3 of 'concluded rates of the values on the basis of all rankers', there is no significant difference between the architectural and historical and rarity values, but there is significant difference between them and age value. In this regard, the best estimate would be that, of the eight values of historic buildings to give them priority in their protection, architectural, historical and rarity values are the most important, and usage is the last considerable value in choosing the priority.

### 5.3. Discussion

A Similar analysis has been made for nearby respondents, distant respondents and architects. The ranking categories from the tables for all, nearby, distant and architect respondents are reproduced in Table 4:

There is some evidence in the results that architects should be viewed as a separate group. It would be a reasonable conjecture that, because they have professional expertise, they might use different criteria for ranking. In fact, this idea is supported by the comments from this subgroup: some of the architects stated that the categories overlap and it was therefore very difficult to give priority to a single value.

**Table 4.** Summaries from the results of survey analysis for different groups

Ranking orders	1 <sup>st</sup> priority	2 <sup>nd</sup> priority	3 <sup>rd</sup> priority	4 <sup>th</sup> priority
All (120) respondents	Architectural, Historical, Rarity or uniqueness	Age, Cultural	Structural	Economic Usage
Nearby (41) respondents	Architectural, Historical	Rarity or uniqueness, Age, Cultural, Structural	Economic	Usage
Distant (79) respondents	Rarity or uniqueness, Historical, Architectural, Age	Cultural	Structural	Economic, Usage
Architect (24) respondents	Architectural, Rarity or uniqueness, Age, Cultural	Historical, Structural	Economic	Usage

Some of their comments suggested a tendency to make judgements by considering specific buildings, especially those of the greatest quality, which are highly valued in several different ways. Secondly, the response of this group varied from the others, and although overall statistics showed that this sample could be viewed as part of the total population of respondents, good practice would treat it separately at present. The notable difference in the results is that the architects' group tended to place 'historical value' in the second category while the other groups tended to rank it first.

The main purpose of the survey was to determine whether people could consistently attach cultural and practical values to historic buildings. The homogeneity of the responses within groups implies that the answer is 'yes'. The different results of the architects' group imply, though, that there may not be consistency between different sectors of the population. The particular differences between the qualified architect and the lay groups is interesting and suggests further research; though outside the scope of this research, it has been noted that the result is consistent with a broad literature on attitude differences between architects and other groups.

Construction of a scale of values for purposes of decision-making in conservation practice is necessarily a matter of judgement. The results of this limited survey are not necessarily representative of the views of the Iranian population as a whole, let alone the opinions of all, worldwide, who have an interest in the conservation of these buildings. Nevertheless establishing criteria for any standard, however apparently objective, ultimately requires judgements of value - of factors of safety in structural standards, for example, or of balances between energy use and user preferences for environmental criteria.

In the present context the survey results suggest that, for the implementation of a conservation policy, judgements will be required of the relative importance of the weightings of values held by different population groups. The author would suggest that if this research is to be applied, (1) a broader survey should be made and (2) an individual or a representative committee should compile a ranking of building values, taking into account all the evidence



available.

It is necessary, however, to have a ranking scale to demonstrate the next stage of the research, the development of a procedure for choosing between buildings in allocating conservation resources. For this purpose, the following categorisation of values based on all respondents specified in table 3 will be adopted:

1. Architectural, Historical, Rarity
2. Age, Cultural
3. Structural
4. Economic, Usage

The list is based on a process, which has been achieved via the survey results; and judged in the context of the author's experience as an Iranian and an architect. The following considerations can be seen in the logic of concluded ranking order:

*The meaning and intellectual importance of the monument.* In the highest place are those which have both great architectural and historical value and which are not only impossible to replace but rare; next come monuments with two, then one of these attributes. In the second category are buildings, which have acquired value simply because they are old and those with significant cultural associations but are not necessarily old. There is also a need to consider those that have structural or other technological interest, or are examples of other intellectual interests.

*The present use of the building.* This includes a building's economic importance, as a tourist attraction, for example, or the use of the building by local people, or its function within the structure of an urban area, as a landmark, for example. The finest monuments may have considerable present use as well as architectural importance. Humble buildings may be valued for substantial local use.

Whether the building is replaceable. The cost of preserving an old building can be greater than that of replacing it with a new building of comparable size and quality. As Dobby (1978) states: 'the cost of adapting them (outstanding beautiful buildings) would be greater than demolishing them and replacing them by new buildings'. A great monument has values that cannot be replaced; substituting a new building for an old utilitarian structure may lead to an enhanced overall value.

In the building evaluation procedure, these considerations are to be set in the context of the following questions:

*What is the probability of specific levels of earthquake damage?*

*What are the costs of reconstruction and repair at each damage level?*

*What losses of value would occur with intervention to protect the building from damage at each level?*

*What are the costs of preventative intervention at each damage level?*

The reasoning described above can be used to develop a flowchart and then a numerical scale of required protection. This in turn leads to a tentative proposal for a routine and mainly numerical procedure to rank buildings for earthquake protection and finally to a plan of action for the strengthening of historic buildings.

Now in assessing ancient monuments to see which of them

should have greater priority in being protected, apart from the condition of the buildings and their location, they can be graded through their values. Higher coefficients can be simply given to the more important values and lower coefficients to the less important values. In the case of overlaps between the values or where one example has several values, all those values have to be considered with their relevant coefficients and add them up.

## 5 Conclusion

1- The results of the survey showed that consistency does exist. There would be a consistent view if the survey used different respondents but just other samples might have different sets for the values.

2- The main question is whose hierarchy we are going to choose to rank historic buildings to allocate resources.

3- There is a need to identify the values of historic buildings before taking any action. Then it should be decided whether it is possible to maintain all the values.

4- Historic buildings can be protected from earthquakes up to a certain scale. They cannot be protected to withstand major earthquakes.

5- Judgement should be made based upon the individual values for each building. For instance, if something is historically important then there might be possibility to change the architecture as long as it is still testimony to the event that happened in it. Alternatively, if one building is only commercially important then its change cannot be a problem. Moreover, judgement for a nationally important building differs from a locally important building.

6- Finally, the main conclusion of the survey is as follows:

A. Hierarchy does exist but different groups of people have different hierarchies

B. The main point is whose hierarchy do we choose?

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