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Codification of Principles of Architectural Adjacent with the Historic Sacred Buildings in Iran According to the Method of "Reasoning Based on Reasoning"

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Abstract

Case studies are frequently used in research in the field of architecture and urban studies and according to the research subjects, some cases are evaluated. However, the role of these cases in the research process and how to extract useful data from them are usually vague and no method is specified in this regard. In fact, researchers usually analyze the cases personally and without the scientific method. The lack of systematic method, on the one hand, diminishes the value of scientific research, and on the other hand, increases the possibility to exercise personal opinion of the researcher on the study, so that two researchers may make two different conclusions about a single case.

On the other hand, architectural studies that are going to benefit from past experiences are forced to refer to previous cases and take their positive aspects for further ideas. For this reason, it is essential that proportionate to the research subject, scientifically codified techniques be identified and used in a systematic framework. To respond a need, i.e. how to formulate rules of juxtaposition with sacred monuments, the present study attempts to propose an approach to formulate criteria for future projects through existing cases. The resource constraints, holistic and non-indigenous laws and documents (international charters and recommendations), conflicting views of experts on the conservation and new structures, and the implications of study on valuable historical monuments indicate that among the available methods, a method that analyses the past cases in a geographic region and extract principles related to that geographic and cultural platform is preferred from all existing methods. The proposed method, "case-based reasoning", based on a structured model, helps the researcher to analyze cases in a specific process and achieve the expected outcomes. This method can be used for similar researches and makes researchers in the field of architecture and urban planning free from the different attitudes toward same cases.

Keywords

Criterion, Adjacent, Historic sacred edifice, Cultural values, Case-based reasoning, Architectural design.

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Introduction

Any valuable object has a dignity and to deal with it, specific attitudes and etiquettes are demanded through the audience. The architectural juxtaposition with monuments with different values has etiquettes proportionate to the values of that monument. The question is how this juxtaposition (close proximity) should happen to preserve the values of that monument, especially its historical and cultural values, and the new buildings indicate their contemporary architecture of the time. This research seeks to find an appropriate answer to this question. Since the 1990s, sacred historical areas have attracted the atte n tion of international heritage institutions as "new h eritage" (Torkzaban & Moradi, 2011) and thei r protection is underway in the form of document a tion and preservation of intangible heritage . However, there are no design criteria for possible development of these areas is in the form of a codified collection. And general recommendations are often used for proximity to the monuments. This is whil e religious complexes, due to their special functio n in communities, are certainly different from a historic palace, historic house, etc. and need different etiquettes to design and develop.

Literature Review

A subje c t of proximity to historic sites and how to protect the site and its surrounding area date back to the 1 9th century. Two theorists of the time, John Ru s kin, and Violet Leduc consider the initial foundat i ons of the subject and their theories have mainly been debated by other experts in the field of conservation, restoration, and cultural later.

Of rese a rch on the subject conducted in recent decades in Iran, Khoshnevis (Khoshnevis,2004) not onl y judges the interpretations proposed by Leduc u n fair but also criticizes the "stylistic unity". He believes that protection rules do not meet mo d ern requirements. In other research, design c riteria in a historical context are examined (Torkza b an & Mohamadmoradi, 2011) .However, the study is general and introduces universal criteria.

In their research, Shahteymouri et al. (Shahteimouri & Mazah e rian,2012) provide guidelines for new structu r es on the historical grounds and attempt to extr a ct design criteria that meet the criteria for international charters and rules.

Fadaeen e jad (Fadaeenejad and Hanachi, 2014) examines the evolution of policies and programs in a conser vation of cultural heritage in the last three decades in Iran and explores the ups and downs of the general policies of cultural heritage and protection area. O n the "principle of minimum intervention", Amanpour points out that due to reasons including the infl uence of the certain atmosphere of the time, the lac k of alternatives at that time, as well as excessi ve concerns about the loss of monuments, many pr oblems and deficiencies have affected the underlying principle and have provided the context for the formation of serious problems in the field of preservation interventions, from inappropriate choice of words for the principle to the lack of inclusiveness and universality.

The nea rest research on the subject of the present article is a paper outlined the development of monuments with the use of contemporary architecture (Mahdavinejad, 2008). Mahdavinejad believes that in the development plan for historic buildings, modern keywords (modern elements) can be used to increase the attractiveness and prosperity of these buildings. Rezazadeh Ardabili, et. al. (Ardabili & Peighami, 2012) in stud ying design management of the tomb of Sheikh Safi, consider the proximity to the monument in executive terms and try to achieve a harmony and agreeme nt between designers and employers of the plan, and propose an applied method for the design that bo th considering protection principles and providing the client's opinions in the highest level.

Researc h on this subject can be divided into three categor ies, a group that is stopped at theorizing layer a nd only analyzes theoretical discussions and thoughts. The second group introduces criteria but in a general way. The third group deals with proximity issue w ith instances and the research work in this area cannot be extended.

On the other hand, to develop the design criteria in the historical context, scientific methodical processes are not used. As a result, the results are hardly comprehensive enough or do not have the ability to be generalized to a type of monuments.

Based on what mentioned above, this research seeks to develop criteria for a type of buildings (sacred monuments) in the form of design etiquettes so that they can be used for future development of the same type of buildings. And they can be codified it by a scientific method and tool. It should be avoided generality, and be applied and academic, and be not limited to the theoretical field.

Definition of Etiquettes

There are numerous definitions of etiquettes as the keyword of this research that all help to better understand the issue. Dehkhoda dictionary defines it as a plural of the word etiquette, and quoted from Jorjani, defines it as knowing things by which man is immune to all kinds of errors (Dehkhoda, 1998). Amid encyclopedia defines it as in an appropriate method, and Nafisi dictionary defines it as keeping the limits about something (Nafisi, 1964).

Etiquettes are actually keeping the extents and its implementation requires good manners, which should be well observed in juxtaposition with monuments, and are whatever that prevent human from any error. In this study, the necessity of juxtaposition etiquettes is related to those buildings that are in the presence of rich historical-belief heritage with rich historical, artistic, political, social, and cultural values. The etiquettes should be observed in such a modest way that the sanctity and dignity of the monument be maintained, free from any fault, to tie the symbols and values to modern technologies in the monument, while maintaining integration between old and new monuments, and to be able to sustain the dynamics of valuable sacred historical buildings.

"In historical texts and Islamic and Iranian culture, etiquettes have been the guiding texts and instructions for arts and careers, and a range of beliefs, virtues, and deeds that should be obtained by professionals

with practice and discipline and practice to reach self-sustaining. These texts were called "etiquette" or "etiquettes". One could even say that in the general classification "Fotovatnamehs" were the professional and spiritual creed for technical people among the "etiquettes". In these essays, a pleasant teaching of inward and outward etiquettes was seen (Ghayoumi Bid hendi, 2007). Since this study aims to develop a comprehensive guidance as far as possible for the structural design of buildings annexed to the sacred monuments, as a subset of the architecture career, according to ancient texts, the term "etiquettes" can be used, that can sufficiently cover the key issues of the hypothesis. It should be noted that the research is aimed at providing only outward etiquettes that are reflected in the body of the building.

To design systems, components, and structures, the term etiquettes represents definitions of principles, codes, regulations, rules, criteria, character, standard, foundations, and guidelines, each one has a specific legal content and meaning, out of the scope of this research. Respect for the monument as proximity or juxtaposition is necessary for the development process of the monument. However, this respect is double for the sacred monuments with historical value, and considering their dignity and value which cannot be described or repeated in another place and time, demands specific considerations and etiquettes. This research seeks to provide a pattern that can be used to achieve the best possible and reliable status for the annexation of the Islamic valuable historical sacred edifices.

Of the whole UNESCO World Heritage sites, nearly 100 sites are considered as religious heritage and sacred places that point out the importance of holy places.

The sacred monuments include mosques and shrines, of which shrine of Imams have long been considered and developed by Shia over the years. Conservation and development in the Islamic sacred monuments to prevent physical exhaustion erosion is an important point and because of religious beliefs among Muslims

and the presence of the audience in these buildings, intervention is performed with the aim of increasing the spatial-functional efficiency according to the needs of the day.

In order to attach a building for valuable historic sacred Islamic monuments development, the dignity of valuable historic sacred building should been recognized and preserved. Creation of a building with contemporary architecture principles should be able to provide current age essential cultural and social dynamic life, presenting principles. This article intends to provide a method to extract criteria for the annexation and development of historic sacred edifices.

Research Hypothesis

In the development of architectural juxtaposition with historical sacred monuments, existing cases are considered very important for four main reasons, i.e. limitations of research references, holistic and non-native rules and documents (international charters and recommendations), conflicting views of experts on the protection and new structures and ultimately, complexity of study on valuable historical monuments. Therefore, it seems to fill the gap in the design criteria in the Annexation debate, in order to localize the international charters and rules, that are mainly general and universal, by analyzing cases in a specified cultural-geographical area (e.g. Iran) in accordance with a method and extracting patterns and common rules, the juxtaposition etiquettes of the sacred historical buildings can be found to be used in future plans in the same cultural area.

The Scope of Research

To conduct a successful study, the researcher should narrow and limit the subject to avoid generalizations and expansion of research and to prove hypotheses in the time frame anticipated.

For this reason, the present study focused on a particular type of historical monuments. According to Fig. 1, of a variety of architectural juxtapositions, those that include construction of a new building

adjacent to those of a sacred monument will be considered.

Therefore, other proximity states in monuments are outside of the scope of this study, and the results only will be consistent with these cases. It is evident that the methods and techniques used to develop juxtaposition rules can be evaluated and used in separate studies and lead to different results (e.g. proximity to a monument without modern performance, such as citadel of Bam);(Fig. 1).
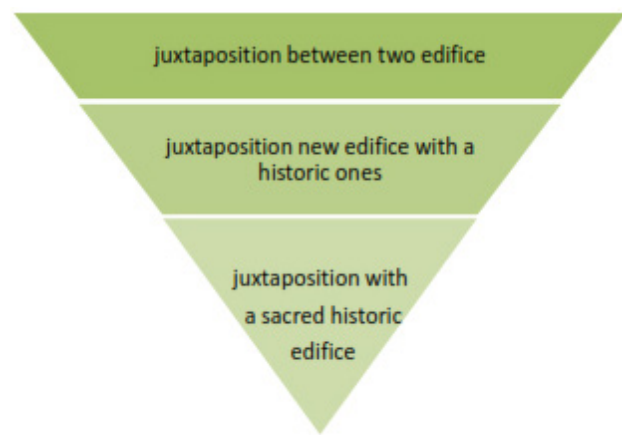

Fig. 1. Limiting and narrowing down the process of the research subject. Source: authors.

Some criteria and indicators are required to select samples, including 5 criteria: Type of adjacent, type of historic heritages, Function of the historic edifice, time and Qualification of the historic edifice are illustrated in the following diagram (Fig. 2).

The Position of Case Study in Research Process

The main question is that when the researcher seeks cases? It seems that the limited primary resources and references cause the researchers to seek case studies in order to collect and analyze data.

According to Figure 3, analyzing case studies is in strategy layer. In fact, a research main strategy can have different modes. Selecting any strategy, of course, is tailored to the needs and resources of researchers. Therefore, selecting strategies based on case studies is applied when it is superior to 6 other modes.

This strategy is recommended when theoretical research resources are not sufficient for the study
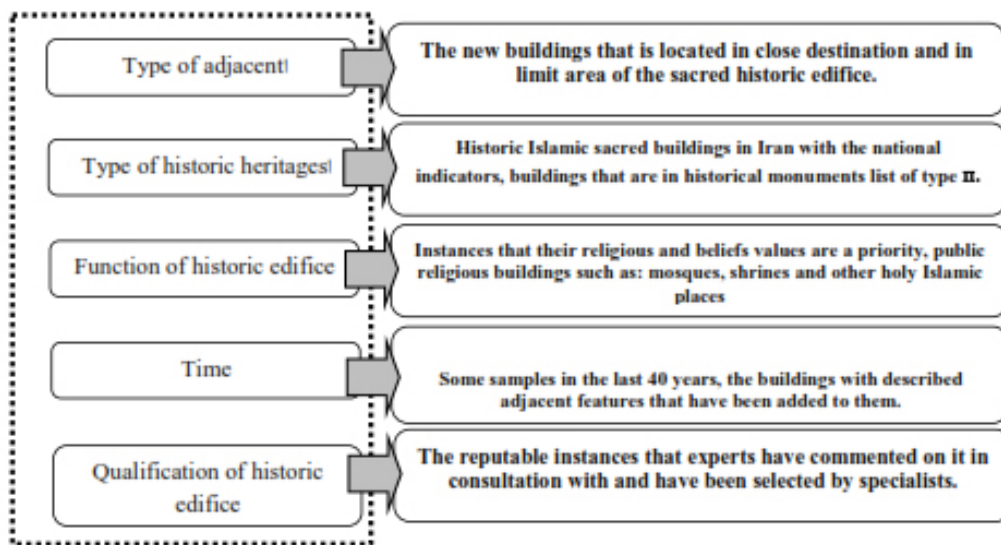
Type of adjacent!	→	The new buildings that is located in close destination and in limit area of the sacred historic edifice.
Type of historic heritages!	→	Historic Islamic sacred buildings in Iran with the national indicators, buildings that are in historical monuments list of type **II**.
Function of historic edifice	→	Instances that their religious and beliefs values are a priority, public religious buildings such as: mosques, shrines and other holy Islamic places
Time	→	Some samples in the last 40 years, the buildings with described adjacent features that have been added to them.
Qualification of historic edifice	→	The reputable instances that experts have commented on it in consultation with and have been selected by specialists.

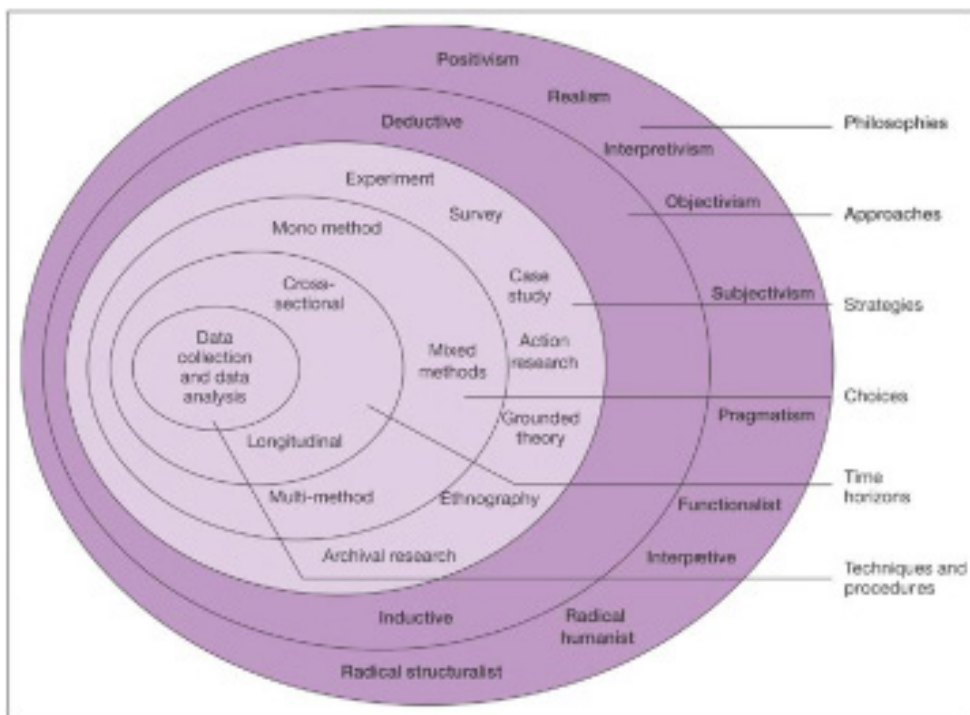Fig.2. Narrowing down of case studies. Source: authors.

Fig. 3. The different layers of a research.
Source: Saunders, et al, 2009.

(Saunders, Lewis & Thornhill, 2009). Seeing the cases as projects that have been implemented and their positive and negative aspects have become apparent over time are important. In this regard, findings of the study are obtained from these cases, while in experiment strategy, data are extracted from experimentations and tests.

In survey strategy, the subject should be observed in a specific time frame, and according to the criteria of the study, data should be collected and analyzed. Survey strategies can be used along with the case studies.

Other strategies (action research, experimental, data-based theory, ethnography) are not useful for this research or do not provide data for research, or are not mainly feasible in the field of architecture.

When the theoretical foundations of a subject (such as juxtaposition with monuments) were not agreed among experts, and different interpretations of international instruments occur in different lands; therefore, to reach a relative consensus, in addition to theoretical resources, the researcher should seek for real projects and provide increased data after their analysis. The more diverse research data, the more credible results.

To analyze inputs, appropriate techniques and methods should be selected based on the research subject. These methods are formed based on sound reasoning and are divided into three categories: induction, deduction, and comparison. Combined methods (e.g. deductive-inductive) can also be used. Based on these three categories, different techniques and methods are developed and recommended for different fields.

In this study, to develop etiquettes, former case have been studied, and the repeated patterns are used to collect etiquettes. Therefore, those techniques are concerned that can analyze existing projects and enrich the required data based on a process. Of the techniques that rely on the case studies, case-based reasoning can be referred to.

Data Analysis and Criteria Extraction Techniques for Architectural Juxtaposition

This study intends to refer to past experiences and to use their teachings to develop the criteria and etiquettes. This return to the past and analysis for the future is often called case study in architecture and urban planning literature.

Robert yen, author of a reference book in the field of case study research, provides the following definition of this method: "Case study is an experimental search that studies a contemporary phenomenon in real life, especially when the boundaries between phenomenon and time are not so clear." In other words, in architecture, it is defined as following: experimental search to study a phenomenon or a given location.

By dropping the word "contemporary" and adding the word "location", the historical environments

and sites are considered as potential areas of research (Grote & Wang, 2012).

According to the typology of "yen" quoted by Linda Groot, this study seeks to explain and explore the etiquettes based on cases; In fact, the cases studies are tools to achieve the research objectives. In this research, cases are selected for study relying on experts' opinions.

In order to meet the above (Yen viewpoint), the use of scientific and up-to-date techniques can guarantee the research results. For this purpose, a common approach with an appropriate theoretical framework known as "case-based reasoning, briefly CBR" is used. This method analyzes and classifies the input data based on an algorithm, and its outputs have high reliability in similar fields of research.

Case-based Reasoning

CBR is a problem-solving approach that instead of just relying on general knowledge of the problem scope, or providing extended relations between problems and solutions, is capable of taking advantage of specific knowledge related to previous experiences and other issues. A new problem is solved by finding a similar situation that has already been observed and using it in the new situation as a case study. Another important difference is that the CBR is a method for reinforcing and incremental learning since when a problem is solved; a new experience is obtained and available for subsequent problems. The application of CBR has grown rapidly in recent years. The evidence is numerous papers at important conferences, commercially available tools and successful applications.

● **CBR in Simple Words**

Basically, CBR is solving a new problem by recalling a similar situation earlier, and reuse of information and knowledge related to it. In the following, this concept will be explained with a view to solving specific problems:

● After examining a patient in his office, a physician remembers another patient with the same problem

who has been treated successfully two weeks ago. The recall is due to the similarity of the main symptoms, not due to the similarity in hair color or speaking manner of the patient. In this condition, the physician uses the diagnosis and treatment applied in previous cases for the diagnosis and treatment of the current patients.

● A financial adviser who works on a difficult decision-making problem remembers previous positions in which the company was faced with a similar problem and uses it to decide in the current situation (Nayeri, "006). As the above examples show, reasoning with the use of past experience is a powerful method for solving problems by humans. This claim is confirmed by the results of psychological research. Part of the foundation of case-based approach is its reasonability in psychological terms. Many studies have provided the empirical evidence required to prove the importance of using experience from previous positions (called states) to solve human problems. Schank has presented a theory of teaching and remembering based on keeping experiences in a dynamic and deductive structure. Anderson has shown that when people learn how to solve problems, they use the past experiences as models (Ahn, Kim & Han, "007).

In a study using CBR, it is attempted to study the similarities between cases (the lowest layer) to achieve the criteria and patterns (Fig. 4). In this study, the goal is to reach the criteria and etiquettes.

● **CBR Cycle**

Case-based reasoning technique has a general cycle which can be described by the following four procedures:

1. Case retrieval
". Case reuse
3. Case revision
4. Case retainment-learning

Each of these steps has its own procedures, as shown in Fig. 5.

The main idea of CBR is that "similar problems have similar solutions". Therefore, when looking for criteria in designing a project, we can use the solutions and patterns previously used and validated by experts. But, how patterns can be identified among different states? What is the theoretical basis for using patterns?

Pattern Language

In his theory of pattern language, Christopher Alexander proposed the use of previous patterns in architecture (Alexander, Ishikawa, & Silverstein, 1977).
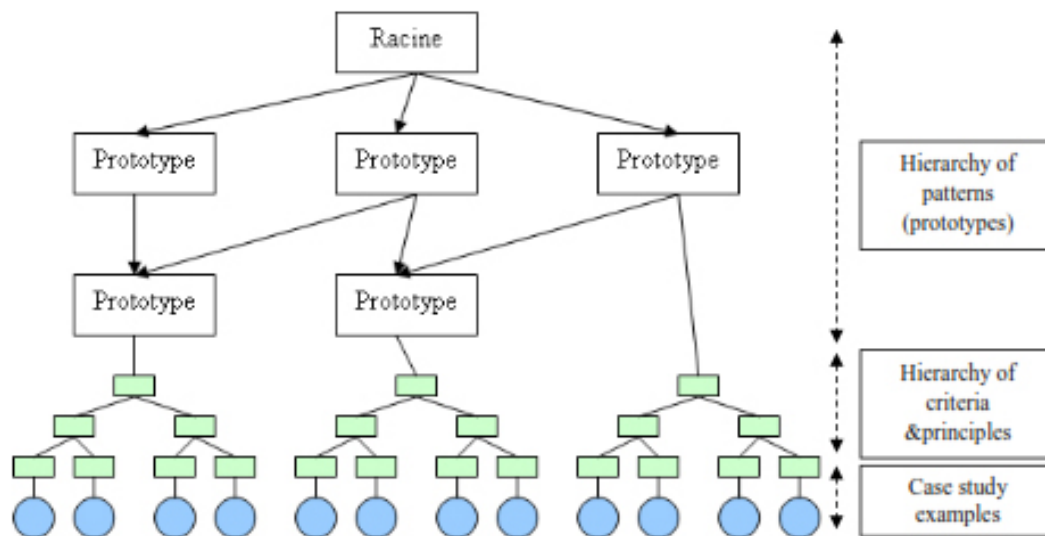

Fig. 4. Hierarchies and relationships between cases, criteria, and models based on Alexander's theory. Source: authors.
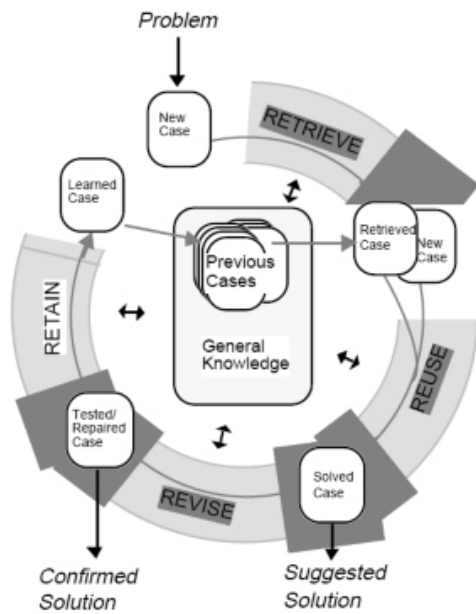
Fig. 5. CBR Cycles. Source: Aamodt & Plaza, 1994.

 Alexander's idea was that when a pattern is repeated, the frequency of its application may indicate the accuracy of the pattern and its public acceptance. So, it can be used as a solution for future problems.

Extracting patterns and developing criteria can be achieved using various methods. In this study, to extract these criteria (etiquettes) the "case-based reasoning" method is used in combination with Alexander's pattern language theory, and it is expected to develop a comprehensive list of for etiquettes. According to Alexander's theory, the model outputs can turn into criteria that designers can use for their future projects. These criteria will, in fact, be instructions that while maintaining the creativity of designers, offer a framework to adhere to their design.

The Criteria for Selection of Cases

Logically, access to all domestic and international cases for analysis is impossible. Therefore, it is only possible to refer to an excerpt of the cases, and it is necessary to meet some criteria to choose cases. For example, cases should be available, sufficient information (documents, images, review and analysis) of them should be accessible, they should be controversial among experts and accepted by the audience. In addition, the fame and popularity of historical holy edifice can be set as a criterion in the choice of cases.

An Example: Extracting Etiquettes of "Form" in the Annexation to Sacred Monuments

By default and in accordance with international recommendations, the new design in a historical context must be consistent with the form of the mold of adjacent buildings (Williamson,2010). However, the form of this "consistency" is ambiguous and can be interpreted. For this reason, sometimes there is an inconsistency of form with historical buildings such as the Ontario Royal Museum, and sometimes there is a form similarity of form, such as Reichstag New Dome. In addition to dual "similar/opposite" states, form can take dichotomies of "neutral/imminent", or "authentic/ modern". Also, the form can have "symbolic" feature (Dedek, 2014; Jäger,2010). Selecting any one of these scenarios based on the type of historical building can be interpreted as "consistency". However, the analysis of different experiences around the world and matching successful aspects can result in a rough consensus on the "etiquettes of form in juxtaposition with monument".
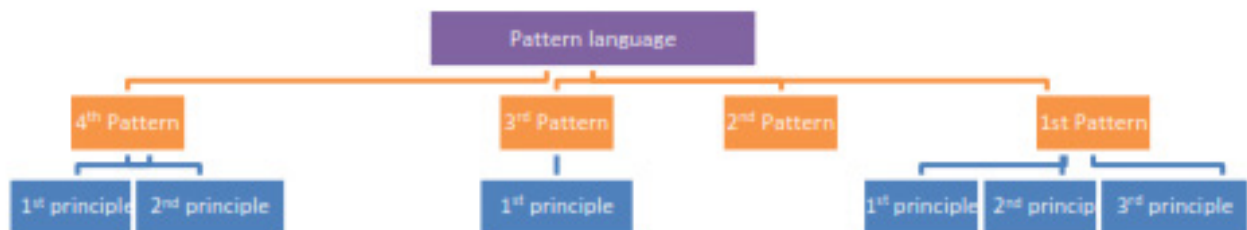

Fig.6. Integration of Christopher Alexander's theory and present research. Source: authors.

Sacred monuments also follow the above criteria, i.e. by evaluating a number of contemporary projects in the field of Annexation to historical sacred monuments, their common features can be identified in observance of the form of the new building.

According to the proposed method, i.e. "case-based reasoning", how to extract etiquettes of "form" will be as follows:

As shown in fig. 7, after reviewing the criteria in initial cases, results are evaluated in larger samples, and those with more repetitions are collected. Thus, the initial etiquettes of the "form" of the additional building are obtained. However, this cycle can continue and be repeated several times. More cases can be tested in each iteration and the accuracy of the results can be increased. Theoretically, this cycle when achieve to ideal result that it is repeated indefinitely. However, in practice, after some limited iterations, an acceptable accuracy of the results will be obtained (since changes in higher iterations are negligible). It is obvious that in a larger time scale, etiquettes can be applied in future projects and its results can re-enter the process. In this way, criteria will be modified and etiquettes will be updated.

In the example above, after analyzing cases of the juxtaposition of the sacred monuments, it can be concluded that "the form of attached building in many cases is a similar, imminent, authentic and

symbolic structure". To obtain more details (e.g. similarity in generalities or details) the same steps can be repeated in more details.

The process can also be used for the extraction of other etiquettes for designing the additional building, such as mass, full and empty, the dominant color, and materials, etc. to present a comprehensive set of criteria proposed under etiquettes juxtaposition.

Discussion: Case-Based Reasoning Method: Advantages and Limitations

Development of historic buildings is a position that is hard to develop clear benchmarks and applications for. The method used in this study, for enjoying the CBR process, leads to specific generalized criteria with the lowest level of interpretation. Certainty and accuracy of results increase due to the support of the subjects and their number. In this case, there is a possibility to prioritize and rank the design etiquettes, and the importance of criteria can be extracted with regard to their iterations.

Turning to the literature review, (section 2) regarding criteria for companionship to the monuments, there are shortcomings such as stopping at theoretical layers, lack of specific criteria for the different types of historic buildings, and lack of generalizability of case studies. Thus, this research presents a practical and scientific method to provide the possibility of
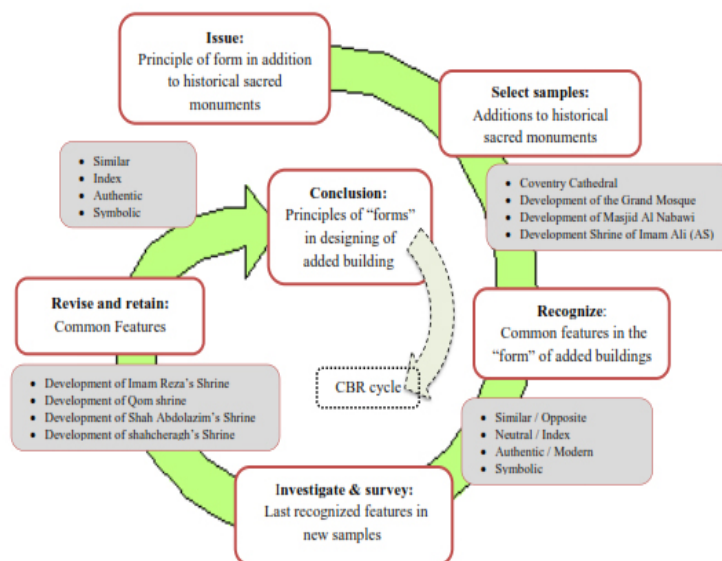

Fig. 7. Steps of extracting etiquettes of "form" in the juxtaposition of the sacred monuments. Source: authors.

determining the etiquettes.

Since "case-based reasoning" method extracts the patterns from projects implemented, it is not merely theoretical, especially considering that instead of theorizing, it tries to present practical measures to provide a realistic framework for proximity. The CBR paths move from experience to theory. It recognizes repeated experience as a pattern.

Focus on a particular type of historical buildings (here, sacred buildings) in determining the patterns accelerates the possibility of achieving the proximity etiquettes. In addition, due to the use of rational methods proposed (CBR method), the results can be reasonably generalized. Thus, it is expected that this method compensates the gap in previous studies and the proposed model be valid for other types of historical monuments.

Although determining design etiquettes may lead to uniformity and loss of creativity, since it determines the priority and value of each component of the design, the designer will be able to ignore some of the least important criteria for the criteria with higher importance. In this state, there will be some room for creativity in design. Scientific base of the processes that helps to make optimal decisions is another benefit of this method.

Despite the benefits mentioned above, there are some limitations and weaknesses in this study. Small case size makes it difficult to develop conclusions and reduces the reliability of the findings. Lack of access to all documents of cases restricts the analyses and comparisons in the study. In addition, regarding the extracted criteria, their inflexibility and excessive clarity may impose a linear behavior to the design and make development plan of the sacred monument dull and lifeless.

In terms of methodology, borrowing a method (here CBR) from other fields of science to the field of architecture leads to two consequences. First, it may face resistance from the professionals. This is a result of the artistic aspect of architecture that does not easily accept scientific methods. The second consequence is related to the efficacy of these methods. Architectural work is not like a test tube in a laboratory; dependence on external factors and mutual effects of the work and its context cause multiple factors, sometimes intangible, that are impossible to be identified and evaluated in a research in the field of architecture, and this distinguishes it from other sciences.

Conclusion

Due to the specific subject of this research that is limited to a special category of monuments, there are restricted number of written and library-based resources for research. The lack of written sources must somehow be compensated to give evidence presented for the criteria a sufficient level of theoretical and practical support. Thus, the research strategy was directed to case studies. However, to analyze the cases, a method should be used that benefits from appropriate theoretical frameworks and help researcher to achieve the expected results systematically.

According to what mentioned in section 5, and limitations of each of the strategies, using case studies and survey strategies is recommended. To realize this strategy, a proper technique is required. Therefore, using the "case-based reasoning" and "pattern language" theory introduced by Christopher Alexander was proposed to extract patterns. The combination of these two may be the best choice to collect necessary data in order to develop juxtaposition etiquettes in the sacred monuments.

Therefore, three steps are recommended for this purpose:

The first step includes selecting case studies. In this step, based on the subject and views of the experts, according to the criteria mentioned in section 3, cases of sacred monuments which were subjected to physical development should be selected.

The second step consists of extracting patterns used in each of the cases. These patterns have been affected by the etiquettes, and have been formed under certain circumstances considering place (historical and sacred sites in Iran) and time (contemporary). It is, therefore, conceivable that the classification and evaluation of their success or failure over time can lead to finding common features. At this stage, the CBR method is used to analyze the cases and to find common features. Then, according to Alexander's theory, cases that are qualified to be classified under etiquette should be developed.

In the third step, the above findings should be matched with international recommendations and charters. In the event of an inconsistency between experience and provisions of charters, preservation of functional and spiritual values (maintaining the pilgrimage etiquettes) should be the basis for decision-making. In the Charter of Venice, the countries are recommended to modify the charter to cope with the circumstances in accordance with the requirements of social and cultural needs of each country. Therefore, regarding the issue of juxtaposition with sacred monuments, due to the social and cultural significance of these collections, it would be reasonable to comply international recommendations with internal experience.

The approach of this research, rather than following the traditional doctrines of protected areas and ideas introduced by Leduc and Raskin, emphasizes the continuity of life and ongoing activities in sacred monuments. Preserving traditional religious customs in these buildings has a priority. Thus, the best criteria are obtained through empirical experience and analysis of recent annexations. The "case-based reasoning" method that reaches theory from experience provides researchers with a useful tool for determining etiquettes of juxtaposition with sacred monuments in Iran.

The output of this process in the form of etiquettes of the juxtaposition of sacred monuments will help the designers to have an action plan in the path for development of sacred monuments. The outputs can also be used to judge the success or failure of a proposed plan.

The current research further vision is selection of some cases and analyzing them according to suggested method in order to validate its performance in practice. This would be done through another complementary independent research. This requires an independent research to further complete the research.

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