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Sustainable Local Architecture as a Base to Create the Future Heritage in Contemporary Cities

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Abstract. Local architecture could be seen as a group of buildings that belong and present the place and the community features. The research problem focuses on the weakness of contemporary local architecture as a main source to generate the architectural heritage. The aim of this paper is to establish a criterion for sustainable contemporary local architecture that is qualified to create the future architectural heritage. The hypothesis is that the sustainable local architecture represents the main source to create the future heritage. The case study has been conducted on Al-Mustansiriah University campus in Baghdad. It has been evaluated by a sample of 50 specialists. The research applied the statistical method (factor analysis) to interpret the data. The results demonstrate that four main factors were extracted from many variables. These factors are authenticity, popularity, utilization and durability. The first two factors form the power of community satisfaction and the second two form the power of rational solutions. These two powers are the base of creating the future heritage.

1. Introduction

Local architecture is related to a place, culture of community and its technological appearances. This means that it has many sources to embody. Locality features basically depends on heritage values because it represents the past product, environmental treatments, and cultural stock. It appears in different scales, building, neighborhood, and city. All of them call the product that has an identity as (a result of longtime processes that usually have a historical background and contain elements of cultural and historical heritage, mentality and genius loci) [1].

2. Local architecture sources

It could be said that the main sources of the local architecture are:

a- Past architectural heritage: It is the main source of the local architecture because of its belonging and its power. The past heritage has been examined by local users and it is repeatable, inspirational and producible.

b- Geographic climate and place values: These could be represented by heat, sunshine, wind, humidity, topography, plants and soil. The main important environmental factors affect the historical buildings are: temperature, humidity, visual light, pouring rain and masonry cracks. All of these factors could be measured virtually by new technological software [2].

c- Cultural and technical values of the local community: the values that distinguish the community's identity such as habits, traditions, and day life experiences at cities that is necessary to get identity. In addition, the local technologies related to tools, materials, handcrafts and equipment.

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2.1 The local architecture motivations

The local architecture could be achieved by some assisted motivations such as:

1- The producers (actors): they involve architects, planners, investors, developers, users, owners and stakeholders. All of those actors could be motives if they do belong to the local society and if they have perfect experience with the local habits, desires and needs.
2- The characteristics of the site and the context: the local districts with popular geographic characteristics of the new project site enhance the architect to design according to the context's values.
3- The past elements, types and styles: elements are tangible and relating to the figures and monuments of elevations (physical heritage themes). In traditional cities, the new buildings could be adapted by their new materials with the heritage themes such as using reinforced brick work for high elements of new building's structure [3]. To keep the site values, while the type related with a mental image represents a typical model of building or experience. On the other hand, style means the shared characteristics between types. Usually, type doesn't connect with the shape because it represents a model of a relationship. For example, the type of enclosing a space by mass doesn't connect with circle, square or triangle. Types and styles support the popularity of the architectural heritage,

2.2 The force of belonging to the local architecture

Belonging is a sense related with place, community, and time. This means that (one is in an integral piece of the marvelously complicated fabric which constitutes the community. The depth of such belonging is revealed in the forms of social organization and association in the community [4]. On the other hand, belonging means a locality which is the main base to produce the local architecture that has characteristics of familiarity, cultural and place locality, expressing the local architecture identity and harmony. These characteristics make the product a founder of continuous local architecture and future heritage. Local architecture has two bases to achieve the belonging to the local architecture: (community satisfaction power and perfect rational solutions power).

2.3 Sustainable local architecture

It is well-known that every product is continuous, valuable, keeping high level of efficiency (high-economic, social, environmental, and physical performance) and rationality with the time represents as sustainable product. So, if we can keep the local architecture product as valuable, efficient and rational product with the time, we shall create the sustainable local architecture. For a building to be sustainable, it must respond to the social and economic conditions of the context within which it exists, possible future changes in its use which may happen due to different future socio- economic conditions. A building, therefore, should be flexible and adaptable [5]. On the other hand, the sustainable local architecture has the same features of architectural heritage. As a result, we can say every sustainable local architecture product is being a future heritage. The research tries to build the perfect structure of local architecture to be sustainable then to create the future architectural heritage.

2.4 The risks against the local architecture

There are three main risks confront the local architecture:

1- The weak past architectural heritage. The research assumes that the past architectural heritage is one of the recent local architecture sources and it will be a source for the next local architecture. The architectural heritage could threat the local architecture in two cases. First, if it cannot continue for

more time even structurally, usably or it cannot be able to adapt the future cultural, political and economic developments. Second, if it is dealt with as an icon (abstract mental image) belong to the past where the transferred meaning is sketchy and single with decreasing value and less effect on the local architecture. Many historical buildings and cultural heritage objects have been in poor conditions. These products have a great value, but they need funding and rehabilitation to be used efficiently. So, there is a need to develop effective measure to preserve these important products [6]. The development of historic cities faces many problems such as the wide distribution of architectural heritage buildings in the city centers may be as a shock. On the other hand, the local architectural identity is threated by any new development without respecting the original character of the historic cities [7].

Table 1. Impact of the architectural heritage on local architecture

No.	The character of weak architectural heritage	The impact of weak heritage on the local architecture	The impact on the local architecture bases
1	Inability to continue	Inability to use	Lack in achieving the perfect solutions
		Collapsed structurally	
2	Investing the heritage imaginary only	Sketchy values could be obsolescence	Weakness in achieving the authenticity
		Abstract imaginary transfer	

2- The "print" building: They are the unique products that advertise the designer and the building. A finger print architecture could be more reputed than the popular local architecture and the context such as the buildings of Dubai. In most cases, the print architecture buildings have strange characteristics far from the local context. They are model buildings cannot be repeated to create new pattern to establish original local architecture. The print architecture is egotistic, impermanent, costly and touristy. The big threat of this architecture is when these buildings high distributed inside the local urban fabric. They will form a distorted architectural contexts lead to timing out the past.

3- The imported buildings (globalization and architecture): Globalization is new image of world relationships. It is meant the cumulative processes of a worldwide expansion of trade and production, commodity and financial markets, fashions, communication networks, transportation systems, and flows of migration … etc. [8]. It has two dimensions in architectural or urban design field, the first "positive role", integral with the identity and locality features, the second "negative role", it is dark side which is trying to change and damage the local identity and place, especially "the risks which are engendering by large-scale technology, environmental damage and epidemics, as well as organized crime and terrorism [8]. Imported buildings represent the buildings that are imported from another countries or regions. It could not be adopted with the local sites in terms of characteristics and conditions. These buildings are dug, costly and show the internationality. Usually, dazing leads to import this kind of architecture. It needs more modifications to adapt the local context.

3. The local architectural and architectural heritage

Local architecture and architectural heritage represent the valuable products, which have the perfect rational solutions and community satisfy, both of them depend on each other and are carrying the local identity which has many unique variables but the Belonging is the main character combines them, while

the main difference between local architecture and architectural heritage that are all architectural heritage products are unique, valuable and local, but not all local products are unique and heritage product, because it need the time and enter into many examinations.

3.1. The concept of future architectural heritage

Heritage is a valuable and popular product. Recently, may be some of the 20th century buildings have become cultural heritage such as President Prudente railway station in Brazil. The value of these buildings came from the relation with the beginning of the city's development [9]. There are three facts related to the sustainable heritage products: First is the preservation of historical buildings and monuments makes it possible for the present and future generations to experience and appreciate the splendor of past works [10]. Second is the role of conservation process is to manage the change. The specialists should facilitate this change with all users. It takes a long time to enable the communities to adapt to the change and to consider the benefits for future generations [11]. It could be generated by producing a perfect local architecture with assuring its foundations such as belonging. On the other hand, it should be avoided from the threats and effects of weak heritage, finger print architecture and imported architecture. Third, the regeneration projects of old urban fabric in cities have increased recently [12], therefore, it must be valuable products. As a result, the perfect local architecture means it is sustainable, resilient and continuous which leads to valuable heritage. It could be concluded that the recent local architecture is a pre-image to the future heritage. The future perfect conditions need to establish a developed framework respecting the current built heritage as an element of local identity and social culture**.** Finally, the future heritage is the sustainable architectural heritage and valuable local architecture which has two main powers: perfect rational solutions and community satisfaction**.**

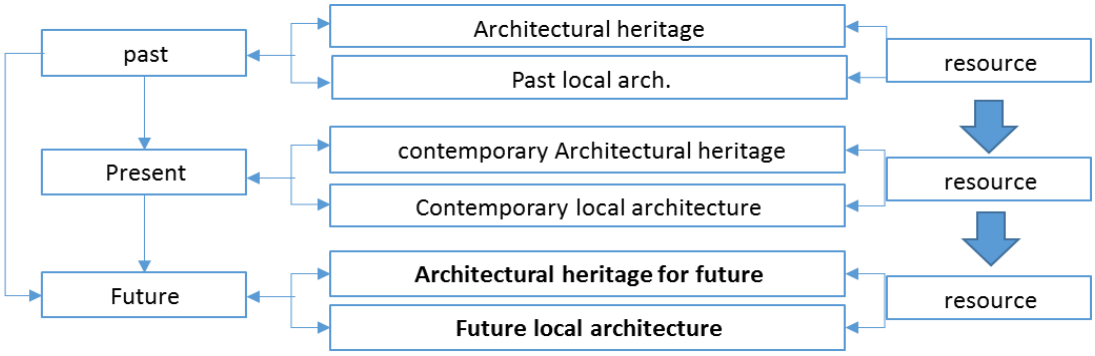


Figure 1. Time and Sources to create future heritage

3.2. Qualification of the local architecture product to be a future heritage

The research hypothesis "there are two powers are working to create the future heritage from local architecture: "power of community satisfaction and power of perfect rational solutions". Both of these powers depend on many main factors which depend on many variables. The research tries to exam many variables which relate with the two powers to get the main factors that participate to achieve the belonging and sustainable local products, consequently to achieve the future heritage. These variables include: (social habits, laws and legislations, physical context, crafts, natural materials, community participation, use solutions, efficient infra-structure, construction solutions, economic solution, technical solutions, and environmental solutions).

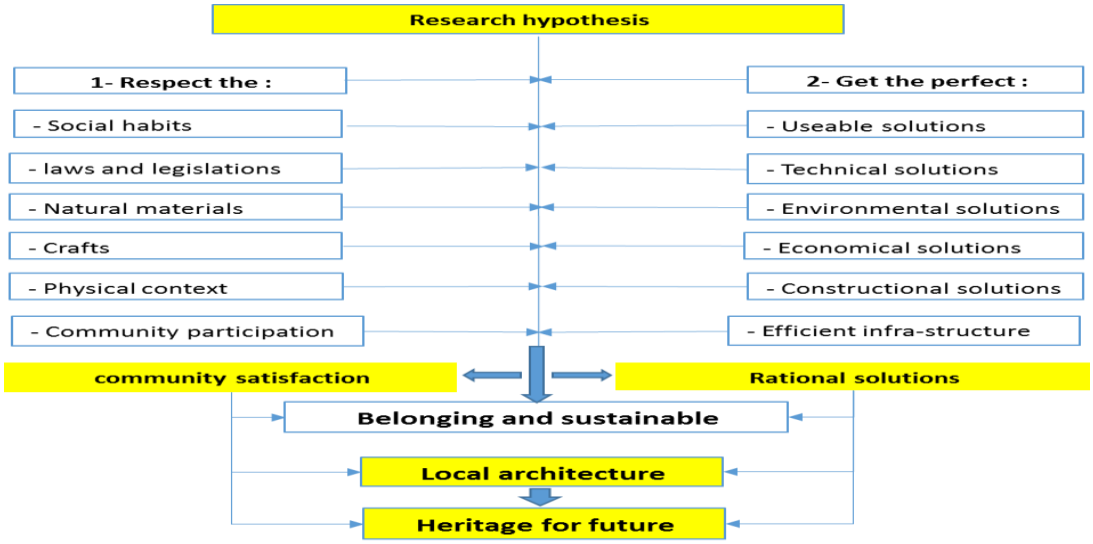


Figure 2. Research hypothesis to create future heritage

4. The case study: the campus of Al-Mustansiriah University at Palestine Street in Baghdad/Iraq as valuable local architecture product

This campus has represented Al-Mustansiriah University initially between 1963 and 1966. It contains many educational buildings, laboratories, cafeteria, conference hall, monumental clock, landscape and gates. It is designed by the Iraqi architect Kahtan Auny base on an order from the government. This campus represented an important event and a first step towards design and plan for a group of buildings (Al-Sultany). The campus's name inspires the designer to borrow from the historic Abbasid Al-Mustansiriah School. The designer added some required imagine and functional modifications as a concept of the project.

The designer depended on the plan of historic Al-Mustansiriah school to design the university. The central space has been surrounded by the masses of local brick finished elevations as an analogy to the past local types and styles. The actor (designer) and analogical images of the history have succeeded to avoid the past local architecture's risks.

4.1. The spatial design of Al-Mustansiriah University

The court yard plan of the historic Al-Mustansiriah School has been taken and divided in two parts by a circulation axis. The main axis starts from the gate to the last point of the campus. All of masses and paths are perpendicular on the main axis. This cluster found many small courtyards to be occupied by the students. The main axis has a low height to encourage the students running out to these small courts. The University is still used as a scientific and architectural edifice. The design has a great impact as an architectural value to express the heritage to produce a future local architecture.

4.2. The elevations of the educational campus

The elevations have identified by their harmonic context with brick finishing and concrete structure. The brick elevations form screens of historic decking and graving as aesthetic and environmental function. The conference hall and the clock tower have a structural and aesthetic solutions express a high level of architectural thinking.

4.3. Designing a questionnaire form

The questionnaire form has been designed according to the following:

1- The form is a tool to discover the special indicators of the case study by classifying and measure the information of the research.
2- The form has been divided into columns represent evaluations and (12) rows of variables represent characteristics and their parts.
3- The values of evaluations (0, 1, 2, 3, 4, 5) which represent the indicators of impacts relationships between the variables and belonging of local architecture.
4- Later, the research uses the data of questionnaire and variables impacts to get the main factors which have the main role to get the belonging and sustainability by factor analyses program.
5- Belonging and sustainability of local architecture who are creating the future heritage.

4.4. The Data Analysis

Statistical Tools: The data were analyzed by using Factor analysis, Correlation and Regression analyses to test the hypotheses. Statistical Package (SPSS version 24.0) was used to analyze and interpret the data.

Table 2. the result of factor analysis (Rotated Component Matrix)

	Component			
	1	2	3	4
Crafts	.962			
Social habits	.957			
Natural materials	.955			
Context values		.855		
Laws and legislations		.810		
Community participation		.777		
Economic solutions			.874	
Use solutions			.791	
Efficient Infra-structure			.760	
Construction solutions				.826
Technical solutions				.799
Environmental solutions				.721

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

4.5. Results and discussion

1- Factor analysis was performed with (1) as the Eigen value. Then, four factors were extracted when the rotation converged in their iterations. The four factors were Authenticity, Popularity, Durability and Usability as fourth factor. Out of the (12) items in the questionnaire, the first (3) items were categorized as Authenticity and the second (3) items were categorized as Popularity and the third (3) items were categorized as Utility and the remaining (two) under Durability.

2- The Analysis extracted a four-factor solution, each with Eigen values above one, which explains (76.892%) of the total variance. The KMO was (0.712) indicating a meritorious level based on Kaiser and Rice and the Barlett's test for sphericity was significant ($p < 0.05$). The Measure of Sampling Adequacy (MSA) was found to be above (0.7) for all (10) items.

3- Community satisfaction power represents some principles of conservation have been fully considered such as social habits, crafts, law and legislations, local materials, environmental treatment and physical context.
   a- Authenticity (power of originality): it is the group of real solutions represented by the cultural, environmental characteristics in solving the problems completely. It defines as being "in accordance with fact, as being true in substance". Or it is "real, actual" [13]. In architecture Authenticity is related to the crafts, social habits, and natural materials.
   b- Popularity: increase the acceptance of the architecture product to be repeatable and changing its situation from model to a type. It is represented by laws and legislations, physical context, and community satisfaction.

4- Perfect rational solutions power which refers to the perfect solutions it means the integration of economic, environmental, functional, constructive and technical solutions which support the product's value by the local community. It has two characteristics:
   a- Durability: it means the power of continuous existence of the product in terms of construction, building materials and service systems. The mechanical behavior of the building materials especially in foundations plays the core role in the durability of the architectural buildings [14]. It is represented by construction, technical, and environmental solutions.
   b- Usability; it is the continuous need that achieved by the product and its flexibility to use for long time with changing the function continuously at the same context. It is represented by economic, use, and efficient infra- structure solutions.

Finally, the belonging and sustainable local architecture could be achieved by the authenticity and perfect rational solutions and it necessary to create the future heritage.

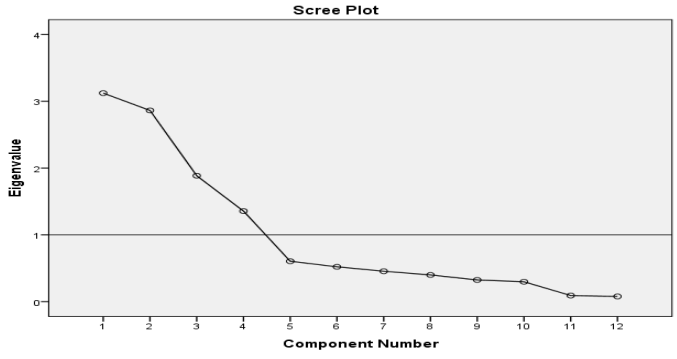


Figure 3. The diagram of the four factors**.**

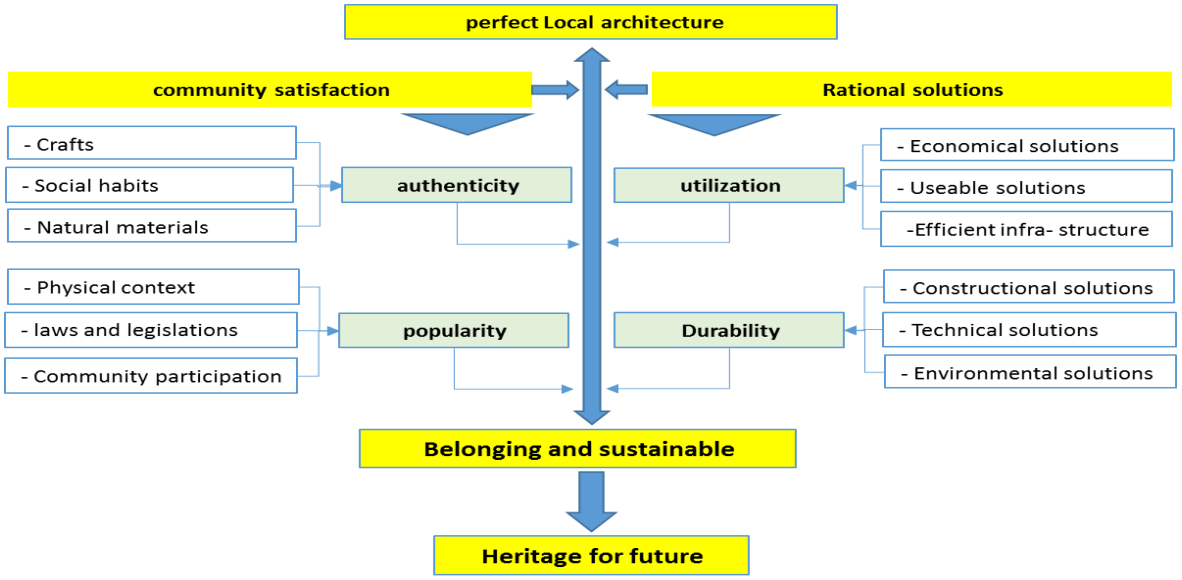


Figure 4. The perfect structure to generate sustainable local architecture and to create future heritage

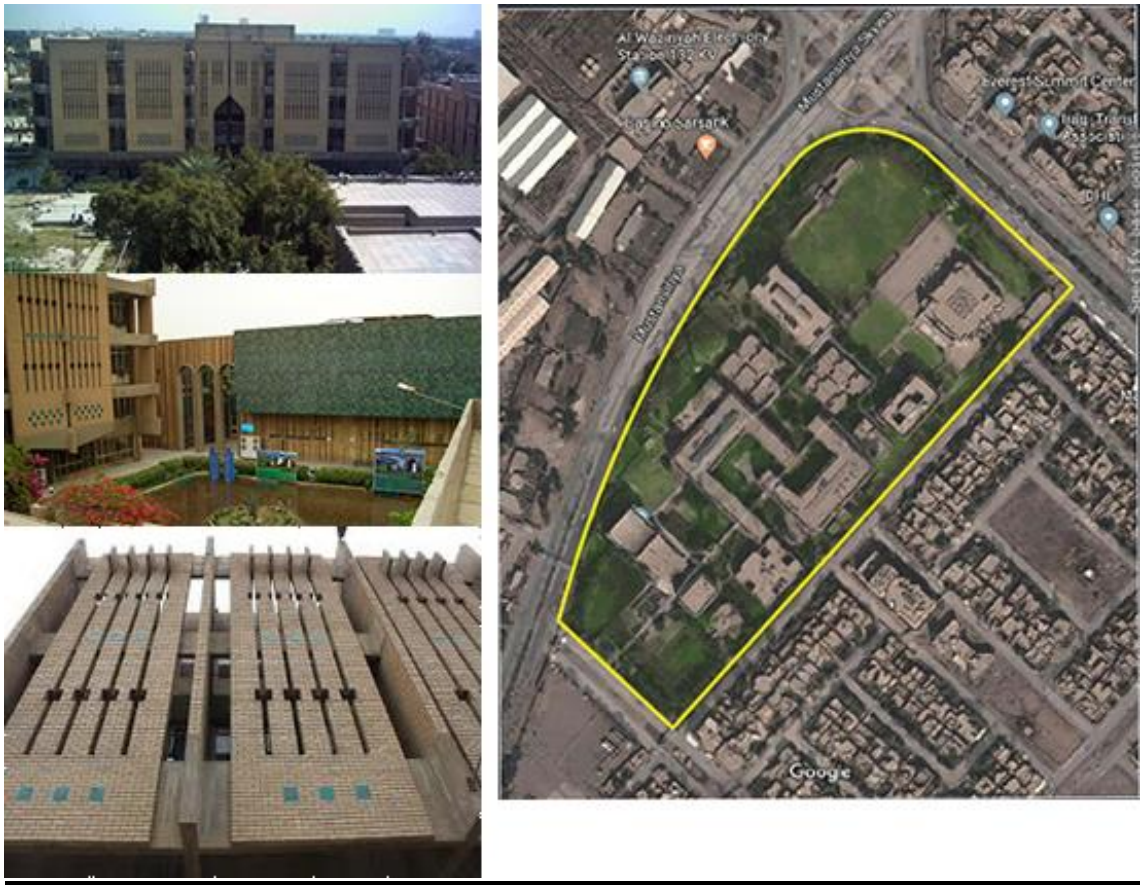


Figure 5. Site plan of Al-Mustansiriah University and some perspective views

5. Conclusions

1- The local architecture is the stock of buildings which are belonging and carrying the social and place identity.
2- Local architecture depended on two powers as community satisfaction and perfect rational solution (it depends on sense and mind), which are coming from many variables.
3- Sustainable local architecture powers depended on four main factors which are: (authenticity, popularity, durability and utilization).
4- Future heritage is a sustainable local architecture that depends on two powers, or it is a valuable local architecture that depends on four factors.

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