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The Interaction with the Context as a Main Driver in Evaluating the Architectural Projects

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Abstract

Architecture fronts many challenges to be accepted by people locally and globally. Interaction with the surroundings variables is the key factor of this acceptance. Architecture's surroundings are various, common and so complicated. On the other hand, they are so important in the design process and the evaluation by the architecture's audience. This paper investigates the interaction between the architectural product and its surroundings' variables to be accepted. It explores the main effective factors of the surroundings and extracts the most important variables to establish the questionnaire template. This template has been relied to evaluate a sample of three famous architectural projects by fourteen of specialists. Each of these projects awards an international prize and they have been hold as accepted architecture. The results have been analyzed and conclusions have been made. Architecture should interact with these factors to be accepted. Some of these factors have stronger effects than others according to the obtained results. Finally, the accepted architecture depends on three powers which are the potential power, the external power by audience and the interaction with surrounding's power.

Keywords: Accepted architecture, Interaction factors, technological drivers, aesthetic values, international awards.

1. Introduction

There is an interaction relationship between architecture and its context. This relationship could be recognized at the scale of architecture and the urban fabric scale. In the Middle East for example, the environment affects the type of architecture in its forms, materials and planning. The courtyard house style is common in use in many countries in this region as a result of this interaction. The sustainability in architecture should address the environmental, economic, cultural and aesthetic dimensions of the society in addition to the technological aspects. As the sustainability is the ability to meet the present needs without affect the future generations to meet their own needs (Cenek, 2013, pp.1).

The local architecture should give the most importance to the historic, cultural and imitations of the local community as important as the architectural context in order to keep the local identity. It should be integrated with the habits and public values of the local society. Architectural elements such as buildings and spaces have a great impact in supporting the relationship between the user and the built environment. The well designed elements enhance the local people to interact and improve their local areas. On the other hand, the social behavior will be developed such as the feeling of familiarity and remove the negative interaction such as uncertainty.

The rapid spread of the use of international /global styles of architecture neglects the evaluation of the local society both in social values and traditional images of their architecture. This neglecting may cause losing the relationship between the community and their context and decreases the values of the local identity. That's why many of buildings, spaces and other urban places have been abandoned even though they are located in city centers. Architecture should be concerned as a motivate factor in forming the local environment socially, economic and technologically. It is the best reliable appearance of the local culture and identity. The urban environment and the society have a dramatic relation between each other and they recognized as the elements of architecture assessment.

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This paper addresses seven factors that are important for architectural projects to interact with in order to be an accepted architecture. These factors are: environment, society, technology, aesthetic values, economy, function and site.

1. 1 The interaction with the climatic environment

Environment affects and produces architectural forms, elements models, and patterns. These components have become common in use as important parts of local and international architecture. On the other hand, the urban planning of a city or a district has a great impact on the energy system of this urban area in terms of energy supply and demands (Al-Saidi, 2014).Pitched roofs and chimneys for example, was founded to avoid the effect of the heavy weight of ice caused by the snowy and cold weather in Europe cities which involve British cities. Pitched roofs and chimneys have become one of the main characteristics of traditional British architecture. Another example is the large areas of glass on high-rise buildings' elevations in the cities that sunshine is required. Conversely, in the cities of hot dry climate, the small openings and narrow streets are preferred. In addition, there is a common use of trees to reduce the area that sunshine can enter. Many other examples present the response of architecture to the environmental requirements. Traditional architecture in hot dry regions such as Iraq, Baghdadi house architecture is common there. It depends on the principle of open central courtyard and inward looking at the scale of a house, and narrow coal de-sack at the scale of urban fabric.

The technological changes happened when car enters to the organic urban fabric. It causes increase in distance between the two sides of the street let the car can enter to reach every house on that street easily. This access has led to lose the thermal comfort feeling for the pedestrian users. From this example, it could be compared between traditional urban fabrics which analyses and interacts with the environmental circumstances, and the modern grid iron urban planning which ignores the environmental requirements for the sake of car entry. This ignoring led to sudden change, not only at the scale of modern city planning, but also affects peoples' feelings in these cities, in terms of thermal comfort and the relationship with architecture. On the other hand, the urban form of a city offers possibilities to reduce carbon emissions caused by the operation of this city (Al-Saidi, 2016). Environment interacts with architecture through many variables. These variables should be considered in the design stage because they are so important in the evaluation stage as accepted architecture. They could be summarized in:

- The availability of thermal comfort in the geographical site which has a particular climate characteristics
- Assimilate the develop technologies to improve the environmental efficiency
- A small amount of energy demands for efficient operation
- A little pollution for the environment and consumption of available resources

1.2 The interaction with the society

The products of a local or an international architecture is a cooperative production between the architects and the society represented by various kinds of clients. It requires addressing the all social needs, values and ideologies to establish the foundation of a society's architecture for the future. It is important to share the roles between architects and their society to produce sustainable architecture. The quality of architecture is critically evaluated not only according to its forms, details and spaces that produced, but also according to the acceptance of the society. On the other hand, the accepted architecture reflects its quality to improve the society's life. This relationship is a main reason to the continuous connection between the built environment and the audience and it determines the evaluation of architecture to be more respectable or to be neglected (ABB, 2016, pp. 2). The architecture of a people is a crucial factor to express its culture and its identity. The active societies are qualified by their human products and in the front of these products is architecture. The buildings of any society are the living expression of their culture, beliefs and aspirations. As a result, buildings will be public criteria for the people. In addition, an accepted architecture has become an important indicator of the living societies and this view still has its validity across the time internationally. Locally, architecture discipline enables the local architecture to interact with the local climate, aesthetic, economic and cultural factors of the local society. As a result the design process has the most important role to manage and direct this interaction. The affected variables of interaction between architecture and the society could be listed as:

- Availability of the accepted social behavior
- The social communication and create the passive ability to continue in the society's memory

- The connectivity with the social ideology and religious ceremonials
- The ability to compare with the valuable physical existence

1.3 The interaction with technology

Technology has become an important appearance of the urbanization and the rapid development has become a part of the function of the city. The design of the cities at various scales from urban planning to the individual buildings must keep pace with these developments. It is common among architects that the good architecture means it has the potential ability to be a sustainable architecture automatically (Cenek, 2013, pp.2).

The cities often have the inherent potential to assimilate the new technologies. These technologies help cities in the optimal investment of available resources. For example, laying sensors to read and analyze the data with those cities for the development of energy efficiency, security and transportation management. On the other hand, at the level of individual, buildings can optimally use advanced technology to manage the energy resources to assure the sustainability of buildings. The integration, that happened between technology and designing of cities and buildings with all its requirements after World War II is a good example of mutual stimulation between technology and architecture.

Technology has become an architectural need for its operation. Steel and glass for example, used to meet the formic and construction needs. Various systems such as Mechanical, electrical, telecommunications and all design elements such as curtain walls, air diffusers and returns, escalators and controlled interface have become crucial demands for nowadays architecture. The new Innovations such as plastic molding technologies add new architectural design abilities for architects.

The strong relationship between architecture and technology could be seen obviously when address the technology's quality and the durability of architecture (Cenek, 2013, pp.3). The integration between architecture and technology gives the built environment more reliance and high quality. Architecture should provide spaces or layers both in its ceilings and walls to contain these technologies. On the other hand, architecture should not be affected when any technological problems arise.

The rapid development in technologies enables architecture to deal with the building's skin as an independent part of the building itself. These technologies add to architecture new intermediate spaces between the interior and exterior spaces in order to meet the developed technologies to be established. The continuous innovations in technology used in architecture establish a stronger relationship between them. As the new generation of technologies appears, remarkable changing could be used to improve the built environment at the city or the single building scale. The recent innovations in technologies have continuous development. As a result, architectural elements and services are adopted at the same pace. Furthermore, the rapid innovations of digital technologies and services give the inspiration to produce new types of architecture such as parametric architecture. Many technologies could be integrated in architecture especially in its outer skin such as solar panels, heating/cooling equipment, dynamic cantilevers and the natural ventilation elements. So, it could be seen that the main variables of the technological factor are:

- The optimization with the prevailing technologies in the various periods
- Does not conflict with the originality
- Gain the benefits from the local abilities and not expensive in terms of production, maintenance and operation
- Achieve the sustainability
- Ability to assimilate the new technologies and renewable resources

1.4 The interaction with aesthetic values

The architectural projects gain their values as negative or positive assessment by the local users and observers. Consequently, the aesthetic values of architecture are equivalent to the extent to which this architecture gives rise to a multitude and complexity of interpretations by any person, at any time (Poriau, 1986, pp. 119).These values remain in the memory of the society as associative assessments in mind as the time is a crucial factor in the evaluation process to give a chance for the product's values to appear and interact with the surroundings (Alshimary & Al-saidi, 2016, pp. 8). A comparison will be done continuously between the new and old projects and their values. Meanings will be added to the new buildings according to the old ones. Matching the values of the local architecture with the new projects' values is a type of belonging to the context (Salura & Fauzy, 2012, pp.7088).

In the Iraqi local architecture for example, the climate circumstances and the social habits are the main drivers of the local context. The process of matching meanings and values will be reviewed by the audience for the new projects until they gain the people's acceptance. This initial acceptance establishes the base to generate new meanings and values for these new projects as an accepted architecture. This process will continue across the time as a generator of the endless accepted or unaccepted architecture. It could be represented by the following diagram.

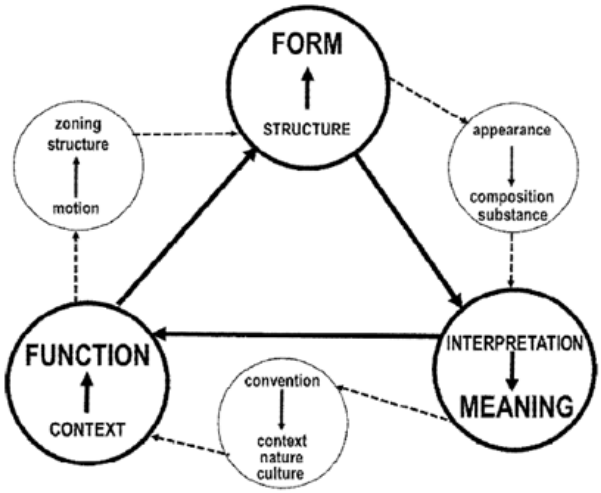

Figure (1): The values gained by the architectural projects (Salura & Fauzy, 2012, pp.7089).

The durability of any architecture is depending on three main foundations; form, function and meaning and they have different degrees of importance from building to another. Any lack in one or more of these factors causes a real problem with the local and social status of these buildings. In addition, the relationship between these three bases is circulation interaction. The function is always affected by the natural and cultural local environment. On the other hand, the form is always contains the distribution of function inside the building. Ultimately, the meaning could be established based on the physical appearance of the form. The interaction variables of the aesthetic values could be summarized in:

- A beautiful according to the reliable aesthetic criteria such as symmetry, materials and style
- The positive relationship with the context weather it is coordinating or contrast
- Form a phenomenon or a unique local or international icon
- Laying a new inventions or new relationships between the forms or with the surroundings

1.5 The interaction with economy

Architecture has become one of the most important factors to encourage tourism in many countries such as Aliyev Center in Azerbaijan. In addition, architecture forms an economic behavior base on the consumption of its fabricated components such as cladding materials and operation systems for mechanical and electrical services. Architecture is an economic appearance of the financial power of the construction companies, material factories in particular countries. It has become an integrating factor to stimulate the entire economic status of the local societies and nations.

Architecture has become one of the international marketing systems and the role of architecture in developing the economic status of any country is changed (Piatkowska, 2012, pp. 549).Recently, architecture is one of the important devices of the market and forms a significant sign of the economic competition between cities and countries and this why the developed cities exceed their urbanism areas. On the other hand, local architecture gains more importance against the globalism in order to support the economic status of the nations.

The use of architecture as a marketing tool has a crucial role to enhance the total economic growth of many cities such as Dubai and New York. Improve the local environment by using new technologies in designing and construction in the field of architecture has the greatest impact to strength both the economic status and the local identity of the cities and societies.

Architecture got a dramatic support in the economic development of countries by offering the numerous abilities such as high rise buildings, technologies and design methods. Recently, it has a crucial role in the process of economic growth and many cities and countries has become express their economic power by their architectural abilities and buildings. On the other hand, architecture plays an advertising role to build-up many national products even though they are not related with architecture and building process.as the main buildings in a named city or country has become an economic icon for them. The big companies and other commercial associations have become compete to gain any relation with the main architectural icons by sites, symbols and shapes. Thus, these companies have become understand the potential economic power of architecture (Piatkowska, 2012, pp. 554).

One of the most effective factors that attract the consumers is architecture. So, it has been considered as a strategic element to stimulate the local economic. There are many potential capabilities of architecture related with improving the economic status of the nations. These abilities depend on the method that used architecture as a devise to attract the consumers in the planning and conducting the local economic strategies. After the last global financial crises and the collapse of many economic powers and banks, the review of how to invest the potential abilities in the exist devises especially in architecture has become more important. The interaction variables related with economy could be defined as:

- Construction cost and maintenance
- The wealthy of spending money to produce architecture
- The economic income of architecture
- The contribution in arise the economic environment for the context

1.6 The interaction with function

The architect Lewis Sullivan believed that architectural forms of buildings should express their functions in his famous statement Form follows Function. This statement is the main bridge between Sullivan and Frank Lloyd Wright who develop this idea by applications on the nature as form and function are one in a new theory called later as organic architecture.

The Guggenheim Museum in New York is an example of the effect of function on the architectural form. The continuity of form, space and structure achieved a complete project according to Wright's view, one continuous thing instead many things as form of organic architecture (Cruz, C., 2012, pp.34).The architect focuses on the main issue of designing a museum which is circulation. The visitor starts the show in the museum from the top with continuous movement downward as panoramic visions. The form of this project was created by following the main idea of the museum's function which is circulation. It is a white spiral ramp form inside and an inverted cone from the outside. This example gives indicator about how could function be affect the form of the project successfully.

The exterior form should not be the vision of interior exactly but each of them plays its specific role in establishing the project's identity. The function is the main order of the project and all elements, shapes and spaces should interact with function as a whole entity. The best image of continuity is integration of structure, purpose, space and form in one expression of each to another as Wright said; form and function are one (Cruz, C., 2012, pp.34).

All elements should have their right places according to the main order of design. Each of these elements gains its value base on its nature. The continuous change in new demands lays the need of producing new architectural forms of buildings (Turley, J., 2015, pp. 341). Mies said that the main criterion of designing a successful architecture is meeting the future utilization and functional requirements to be worthy. He considered the nature of things such as materials and function. Recently, Architects work conversely. They design and develop good forms and then optimize functions into them. This operation came to meet the continuous change of functions in many buildings. On the other hand, buildings and their forms cannot be changed economically. As a result the main variables of interaction with function are:

- The flexibility to operate multiuse functions
- The continuous functional needs and durability such as government and power centers, services and commercial centers
- The likable functions by the society
- The buildings have infrequent functions such as craftsmen centers that are not used recently but they have historical value

1.7 The interaction with site

Many architects got their inspirations from site. Site is a crucial motivator of designing projects. Some architects interact with site in a coordinating process. On the other hand, other architects deal in contrast with site. Architects in the two cases consider site as a main factor in the design process. Site components such as shape, neighbors, history, culture and topography play a main role in designing many famous projects such as falling water house designed by Frank Lloyd Wright and Abu Dhabi performing art center designed by ZahaHadid.

Design process in architecture should consider site as a main factor. A new project interacts with existing surroundings and site potentials and forming a developed environment. In addition, each site has its positive and negative characteristics. A successful design invests all opportunities of site to support the new project and develop the previous environment aesthetically, emotionally, functionally and economically (Fasla, 2000, pp.1). Site area, location, topography, accessibility, expected utility, complexity of the context and facility requirements are the main drivers of site impact on the design process. Any new project should be familiar with the existing conditions of the site to be accepted, especially when there are cultural or social constrains. So, an initial assessment of the site to explore the potential abilities is a vital part of design process.

Site potentials such as location on a seafront could stimulate architects' inspiration. These types of sites give more practical experiences for architects especially when the same characteristics are repeated (Utzon, 2000, pp. 9). Open areas around site make architects taking in their accounts that the project could be seen from all sides. On the other hand these sites offer more freedom in design. A free edges site has a special empty sky as a background giving the observer feeling of moving upwards and support the attitude monumentality concepts. On the other hand, site selection is important to be appropriate for the prospected use projects. The function requirements form a critical constrains in the design process especially when the site is smaller than the required building area and have special services (Utzon, 2000, pp. 10). So, it is important to copping the site properties with the anticipated project use. It could be said that the main variables of site interaction are:

- Gain more benefits from the site properties and activate the local environment
- Be familiar with the site in both coordination and contrast
- Support the surrounding components as one environment aesthetically, socially and economically
- Contribution in express the local identity at the city and the country scale

2. Case study

The case study depends on exploring the hypothesis of this research. It relies on evaluating architectural projects according to the interaction variables that are extracted. This sample involves three famous projects that are evaluated by fourteen of specialists. Each of these projects awards an international prize and they have been hold as accepted architectural projects. The results have been analyzed and conclusions have been made according to the obtained results. These projects are Burj Al Arab, Guggenheim museum Bilbao and California Academy of Sciences

- **Burj Al Arab in Dubai designed by Architect Tom Wright**

Tom Wright has wanted through the design of the Burj Al Arab to become a landmark and a symbol of Dubai's equivalent of its importance to the Eiffel Tower in France or the Sydney Opera House in Australia.Wright was inspired by the design of the form of the Burj Al Arab in Dubai of the history and culture of the area, chose the form of a ship sailing

commentator on the Dow, and established the longest reef in the world along the 321 meters, becoming the fourth tallest hotel in the world and consists of sixty floors.

Figure (2): Burj Al Arab in Dubai

The front facade is composed of Teflon material and glass air to enter and exit.The interior has decorated the walls of about two hundred room guestrooms in a way that imitates the heritage room Arab and UAE (ar.wikipedia, 2017). It took structural works on the Burj Al Arab in Dubai about five years, the first two of which not only the foundations of the building appear because the Burj Al Arab in Dubai is built on an artificial island located about one hundred meters from Jumeirah Beach, so it has emerged several obvious challenges to the designer Tom Wright and port construction Rick Gregory, was exceeded all of those challenges successfully.Opened the Burj Al Arab in Dubai in 1999 to receive visitors and tourists from all parts of the world, it has won international awards design of the hotel in 2006. Burj Al Arab Hotel, the iconic designs in the world of engineering. What is required is building design serve as a definition for Dubai. Whenever we saw this hotel, it links an immediate picture of the emirate.Hotel is about 321 meters above the surface of the water. The hotel has 28 double suites and 202 single suites. Smaller wing has 169 square meters, the biggest one has780 square meters.

- **Guggenheim museum Bilbao in Spain designed by Frank Gehry**

In the late nineties to build the Guggenheim Bilbao specialist contemporary art on a two shores Nrfen River in the north of Spain, the commercial city museum, was opened specifically the year 1997 to become Ten years after one of the most important Bilbao tourist landmarks along the Alhambra and the Roman theatre and the famous Mosque of Cordoba, and more buildings surprising in the world has been celebrated as the finest building in the present time.

Figure (3): Guggenheim museum Bilbao in Spain

Guggenheim Museum Bilbao on geometric links unexpected complex. The museum is designed from a diverse set of geometric shapes curved and curved and orthogonal made of limestone and covered with plates of titanium.

The museum walls with curtains of glass, which works to provide transparency, and light which the museum needs. The thickness of the titanium plates used in most of the walls of the building cover museum of half a millimeter has been using this article to work to give a touch of aesthetic in the form of the building from the outside.

After passing visitors to the Guggenheim Bilbao Museum Hall Home for the museum are moving directly to the lobby museum, which serves as the real heart of the museum and one of the most distinctive features in the design of Gehry. A skylight metal flower made of metal form and allows this alcove flow of light rays that give rise to the lobby is a kind of warmth and gravity. The choice of the city of Bilbao is to most important cultural centers of the Guggenheim Foundation in Europe. . The Guggenheim Bilbao Museum is one of the major projects that have been taken into account when the redevelopment of the city and the development of this city .This is not a cultural project, it's an economic development project (Harvard, 2016, pp.3). The exhibition halls designed on three levels around the central lobby, and these levels connected to each other through a system of trails winding locket from the roof of the museum, which is fitted with a small glass elevators and towers with staircases with an aesthetic purpose and allows visitors to look outside the museum through.

- **California Academy of Sciences designed by Renzo Piano**

The project belongs to the scientific institution of San Francisco which considers the environment issue strongly. It is founded on an old site that consist the natural history museum and some buildings. The large green roof is established on the historic spaces of the museum to express the idea of interaction between architecture and the nature. The site planning, program of uses and design of the academy are respectful of that history and commitment to social responsibility (Kociolek, etal, 2005).

Figure (4): California Academy of Sciences

The academy of Science in California is one of the most important institutions in the United States of America. The buildings of this academy are affected strongly by the earthquake of 1989 called Loma Pirate. So, new buildings are required to cover the resulted lack. One of these new buildings is the project designed by Renzo Piano under review. The project is established on the Golden Gate Park and consists of eleven buildings that have various construction periods from 1916 to 1976. These old buildings were assembled around a central courtyard. Three out of these eleven buildings have been conserved in the new project. These buildings are the Steinhart Aquarium, the North American Hall and the African Hall. This new project founded on the same site and direction of the old one. It keeps the same distribution around the courtyard which is operated as an entrance and main void of the circulation to the other spaces. This main space is covered with a decorated plane of glass similar to the web of spider that could be open in the centre. The project has assembled many functions under one roof such as exhibition halls, education rooms, research areas and conservation. It also involves a museum of natural history, aquarium and interior green area. The variety of these functions has been reflected on the general roof area.The large area of the project enhanced the vision of cutting 37000m from the park and lifting up about 10m above the ground.

The total roof is flat with some natural green area and landscape rising smoothly from the flat area. This landscape forms two main domes above the planet area and the exhibition of rain forest hall. These domes area decorated from inside and outside with automated skylights open and close for natural ventilation.

The air-conditioning system of the project depends on the thermal inertia phenomena which play the main role of cooling the inside of the museum. On the other hand, it keeps the entrance and the public area of the project warmer. The green roof is surrounded by a rectangular frame made of double transparency planes of glass. The designer inserts solar cells between these planes to get clean energy for supplying electricity required by the museum.

Many factors support the project to obtain LEED platinum certification as a green architecture. These factors are construction materials, recycling process, solid and glass position, natural lighting and ventilation, rain-water usage and energy production.

Table (1): A sample of questionnaire form to evaluate the acceptance of the architectural projects and its analysis

The Factors	The variables	1	2	3	4	5	Sum.	Interaction ratio
Environmental interaction	The availability of thermal comfort in the geographical site which has a particular climate characteristics						8	40%
	Assimilate the develop technologies to improve the environmental efficiency							
	A small amount of energy demands for efficient operation							
	A little pollution for the environment and consumption of available resources							
Sum.(1) = (3*2+1*2)= 8 out of 20 Interaction ratio(1) =8/20 = 40%		Sum. (14) = (sum.1+Sum.2 +……+Sum.14)/14= Interaction ratio (14) =Sum.14/20 = …..%						
The social interaction	Availability of the accepted social behavior						19	95%
	The social communication and create the passive ability to continue in the society's memory							
	The connectivity with the social ideology and religious ceremonials							
	The ability to compare with the valuable physical existence							
Sum.(1) = (4+5*3)= 19 out of 20 Interaction ratio(1) =19/20 = 95%		Sum. (14) = (sum.1+Sum.2 +……+Sum.14)/14= Interaction ratio (14) =Sum.14/20 = …..%						
The technical interaction	The optimization with the prevailing technologies in the various periods						13	52%
	Does not conflict with the originality							
	Gain the benefits from the local abilities and not expensive in terms of production, maintenance and operation							
	Achieve the sustainability							
	Ability to assimilate the new technologies and renewable resources							
Sum.(1) = (3*2 +4+2+1)= 13 out of 25 Interaction ratio(1) =13/25= 52%		Sum.(14) = (sum.1+Sum.2 +……+Sum.14)/14 Interaction ratio (14) =Sum.14/25 = …..%						
tio n	A beautiful according to the reliable							

	aesthetic criteria such as symmetry, materials and style										20	100%	
	The positive relationship with the context weather it is coordinating or contrast												
	Form a phenomenon or a unique local or international icon												
	Laying a new inventions or new relationships between the forms or with the surroundings												
Sum.(1) = (5*4)= 20 out of 20 Interaction ratio(1) =20/20 = 100%		Sum. (14) = (sum.1+Sum.2 +……+Sum.14)/14= Interaction ratio (14) =Sum.14/20 = …..%											
The economic interaction	Construction cost and maintenance										13	65%	
	The wealthy of spending money to produce architecture												
	The economic income of architecture												
	The contribution in arise the economic environment for the context												
Sum.(1) = (2+1+5*2)= 13 out of 20 Interaction ratio(1) =13/20 = 65%		Sum. (14) = (sum.1+Sum.2 +……+Sum.14)/14= Interaction ratio (14) =Sum.14/20 = …..%											
The functional interaction	The flexibility to operate multiuse functions										13	65%	
	The continuous functional needs and durability such as government and power centers, services and commercial centers												
	The likable functions by the society												
	The buildings have infrequent functions such as craftsmen centers that are not used recently but they have historical value												
Sum.(1) = (1+4+5+2)= 12 out of 20 Interaction ratio(1) =12/20 = 60%		Sum. (14) = (sum.1+Sum.2 +……+Sum.14)/14= Interaction ratio (14) =Sum.14/20 = …..%											
site interaction	Gain more benefits from the site properties and activate the local environment										18	90%	
	Be familiar with the site in both coordination and contrast												
	Support the surrounding components as one environment aesthetically, socially and economically												
	Contribution in express the local identity at the city and the country scale												
Sum.(1) = (4*2+5*2)= 18 out of 20 Interaction ratio(1) =18/20 = 90%		Sum. (14) = (sum.1+Sum.2 +……+Sum.14)/14= Interaction ratio (14) =Sum.14/20 = …..%											

Table (2): The interaction ratio of the architectural projects

The factors	The interaction ratio of the architectural projects		
The factors	Burj Al-Arab	Guggenheim museum Bilbao	California Academy of Sciences
Environment	43.6%	42%	90.7%
Society	86.4%	38.5%	87.9%
Technology	66.4%	73.2%	82.8%
Aesthetic values	87.1%	83.9%	68.5%
Economy	77.8%	69.2%	68.5%
Function	75.3%	65.4%	82.5%
Site	91.4%	63.9%	81.4%
The average of the total interaction ratio with all factors = Sum. of all factors /7	75.43 %	62.3 %	80.33 %

Figure (5): The interaction ratio of the architectural projects with context's factors

4. The results analysis:

The three architectural projects have been evaluated by fourteen specialists. Each factor of interaction has four variables of interaction except the technological factor which has five variables. The questionnaire form has five levels of evaluation from one to five. One means the lower level of interaction. On the other hand, five means the upper level of interaction. Two, three and four are graded from the lower to the upper level respectively. The research considers the levels one and two as weak levels of interaction between architectural projects and the factor's variables. The summation of the variables' levels of the same factor refers to the interaction level between that factor and the architectural project. The interaction ratio is obtained by dividing the summation levels of each factor on 20 unless the technological factor which has five variables it has been divided on 25. The research considered the interaction ratio as the main indicator of acceptance. So, each project achieves the strong level of interaction ratio which is 50% and more of has been classified as an interacted project with that factor in an accepted level. The accepted architectural projects could be defined as the projects that have high levels of interaction ratio with the seven factors of the context. These projects will lose their acceptance if they have any decrease in the levels of interaction. The weakness of interaction comes from the factors of under 50% of interaction ratio. The opportunity factors of more than 50% could be supported by improving the architectural project's characteristics. On the other hand, the interaction ratio with each factor of less than 50% could be classified as a threat level and may cause losing the acceptance of that project. . Base on this classification the obtained results explored three indicators which are:

First

The results show that architectural projects interact with these factors base on their characteristics and the ability of interaction. Burj al-Arab and California center interact strongly with the society but Guggenheim Museum interacts weakly. California center interacts highly with technology and function, but Burj al-Arab and Guggenheim Museum projects interact with them moderately. California center interact with the environment very highly but Burj al-Arab and Guggenheim Museum interact weakly. Burj al-Arab and Guggenheim Museum interact strongly with aesthetic values but California center moderately. All of them interact with economy moderately. Burj al-Arab and California center interact with site highly but Guggenheim Museum moderately.

Finally, the results demonstrate that the average of the total interaction ratio with all factors of California Academy of Sciences is 80.33% which means that this project achieves the highest level of acceptance with the most factors and it will keep its values of acceptance for longer time. On the other hand, Guggenheim museum Bilbao gained the lowest level of average interaction ratio which means that it may lose its acceptance shorter than the others. Burj Al-Arab achieves an average interaction ratio of 75.43 in the second level and time of acceptance.

Second

- Burj al-Arab is threaded from the interaction with the factor of function and environment. It needs to improve the interaction with economy and technology. It is good with society, aesthetic and site interactions.
- Guggenheim Museum is threaded in social, function and environment. It needs to improve in technology, economy and site. It is good at aesthetic.

- California center needs to improve aesthetic, economy and site. It is good at social, technology, function and environment.

Third

Interactions with aesthetic and the society are the most important factors. Interaction with environment is a critical factor as a second importance. Site and technology are in the third step. Economy and function are in the bottom of affected factors of interaction.

Conclusions

Architecture should consider many factors to interact with in order to be accepted.These factors are society, environment, aesthetic, site, function, technology and economy. In addition, all of these factors have many variables of interaction.These factors are various in their impact of interaction on the architecture evaluation. Architects should consider these factors according to their importance in the interaction process.Aesthetic values and the social impact are the main drivers of the interaction for architecture evaluation.Although economy is considered as crucial factor for projects construction, it has the lowest impact in the interaction of architecture.Function has alsolow impact in the interaction.All architectural projects should consider the weakness of interaction with the above factors in the future.

The above conclusions give the following explorations;why the good interactive projects base on environment and aesthetic values stay valid for more time even though they have lack in interactions of other factors.Why many famous projects have been empty after short time andwhy some projects were assessed negatively after primary positive evaluation. The acceptance evaluation form used in this research is reliable to assess all architectural projects according to their interaction with the context's factors.

References

ABB, (2016), "create Architecture for today and tomorrow", a company of the ABB Group, www.BUSCH-JAEGER.com, info.bje@de.abb.com, Access in 20/12/2016.

Al-Saidi, AdilZamil, (2016), "The Impact of Urban Form Characteristics on Carbon Mitigation Process in Cities", Civil and Environmental Research, ISSN 2224-5790 (Paper) ISSN 2225-0514 (Online), Vol. 8, No.1, 2016, pp. 107.

Al-Saidi, AdilZamil, (2014), "Finding a Scientific Method to Reduce Carbon Dioxide Emissions from Urban Areas in Iraq/ Baghdad as a Model", Journal of Environment and Earth Science ISSN 2224-3216 (Paper) ISSN 2225-0948 (Online) Vol.4, No.20, 2014, pp. 72.

Alshimary, H., and Al-Saidi, (2016), "The Valuable Age of the Urban Products", Journal of Engineering and Architecture, December 2016, Vol. 4, No. 2, pp. 1-16

Cenek,M."Architecture: concept,form and aesthetics from the perspective of sustainability" central Europe towards sustainabil building, 2013, Integrated building design. Pp. 1-4.

Cruz, C.A., (2012), "Wright's Organic Architecture: From Form Follows Function to Form and Function are One", for Wolkenkuckucksheim – Cloud-Cuckoo-Land, Vol. 32, 2012.

Fasla, F. Z., (2000), "Site analysis", Excerpt from The Architect's Handbook of ProfessionalPractice, 13th edition ©2000.

Harvard design school, (2016), "the vision of Guggenheim museum in Bilbao", http://www.gsd.harvard.edu/wp-content/uploads/2016/06/pollalis-case-BilbaoG-CaseA.pdf, pp.3

https://ar.wikipedia.org/wiki/ , access in 12/3/2017.

Kociolek, J., P., Renzo, P., R. Jean, (2005), "The New California Academy of Sciences", pp. 5-19.

Piatkowska, K., (2012), "Economy and architecture. The role of architecture in process of building the economic potential of space", Humanities and Social Sciences Review, Vol.1, No. 2, 2012, pp. 549-555.

Poriau, M., A., (1986), "The aesthetic value of architecture", Philosophica 38, 1986 (2), pp. 117-120.

Salura, P. and Fauzy, B., (2012), "The Ever-rotating Aspects of Function-Form-Meaning in Architecture" ,Journal of Basic and Applied Scientific Research, PP.7086-7090, 2012, V.2 No. 7

Turley, J., (2015), "Madisonian Tectonics: How Form Follows Function in Constitutional and Architectural Interpretation", The George Washington law review, February 2015 Vol. 83 No. 2, pp. 341

Utzon, J., (2000), "The Sydney opera house", Utzon document, dated 4 June 2000.