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Compatibility between Architectural Criticism and Users' Satisfaction in Evaluating Architectural Works

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Abstract

The Architectural criticism is considered as one of the most important ways that helps to describe and evaluate any creative work. In fact, the Architectural criticism is considered a main approach to increase the creative values in the contemporary Architecture. On the other hand, The Architectural Intellect needs a completely criticisable methodology that focuses on users' satisfaction towards the architectural works. Therefore, this study comprises of two research papers, the first part focused on the theoretical background for the architectural criticism, the analytical framework application, and case study analysis. While the second part of the study is focusing on measuring the users and publics satisfaction levels towards the same case study presented in the study first part. This research paper presents the second part of the study and aims to highlight the importance of measuring and reflecting the users' satisfaction level in evaluating the architectural work which affect the formation of the criticism process. Therefore, to achieve this goal the study implements quantitative research method, through using two different tools; questionnaire and interviews. First, conducting a questionnaire for the visitors of one of Zaha Hadid's designs in Riyadh, KSA which is King Abdullah Petroleum and Research Center (KAPSARC). Second, interviews for users and professionals, in order to reflect the influence of the building design on the attractiveness of users and their place attachment to it which influences mainly the criticism process. Based on the questionnaire results, the study comes out with recommendations which can help to improve and develop the Architectural movement in the Arabian region through activating the effective role of the architectural criticism.

Keywords: Evaluation, criticism criteria, users' satisfaction, assessment process, functionality, aesthetics

INTRODUCTION

King Abdullah Petroleum and Research Center (KAPSARC) is one of Zaha Hadid's designs in Riyadh, KSA, that was opened in 2017 with total area 70000 m^2. Zaha Hadid follows the contemporary approach in her designs. KAPSARC design is different, unique, and irregular forming a case that is highly controversial. KAPSARC, a non-profit institution that focuses on researching in economics, policy, technology, and the environment. The building is a LEED platinum certified. The building structure is done by Drake & Scull. The use of a cellular structure of crystalline forms, which is Composed of a network of three-dimensional six-sided cells with many junctions and bonds, as shown in Figure 1. The hexagonal building style is a contemporary building with a cellular building form having interconnected public spaces. The modular, adaptive building is made up of: series of shaded outdoor spaces courtyards. The KAPSARC building consists of five main buildings ,namely ,research center ,library, conference center, IT center, and prayer hall. Each building comprises a cluster of non-uniform hexagonal cells ranging from one story high in the site buildings to four stories in the research center. Each major cell has a courtyard or an enclosed atrium with a skylight covering its plaza [1].

Figure 1: KAPSARC a network of three-dimensional six-sided cells
(Source:http://www.zaha-hadid.com/architecture/king-abdullah-petroleum-studies-and-research-centre/.)

This research aims to identify different critics and visions about this building, analyze it in deep, and collect opinions from different types of participants to help forming a comprehensive critical view. The methodology followed in this research is mainly quantitative research method, through using two different tools; questionnaire and interviews to collect opinions from professionals and users. This study is significant in pointing out the effect of building design on society, culture, and the users, and the effect of articulating between concept, form, and function on user's experience. The survey will include various users that have experienced the internal space of hadid's work in Riyadh, Saudi Arabiya. In the process analyzing different architecture parameters for KAPSARC design to measure and examine occupancy level of satisfaction of indoor, and outdoor quality. As a result, the user's experience differed from one user to another' according to their personal reference, professional background in architecture, or the employees working in KAPSARC.

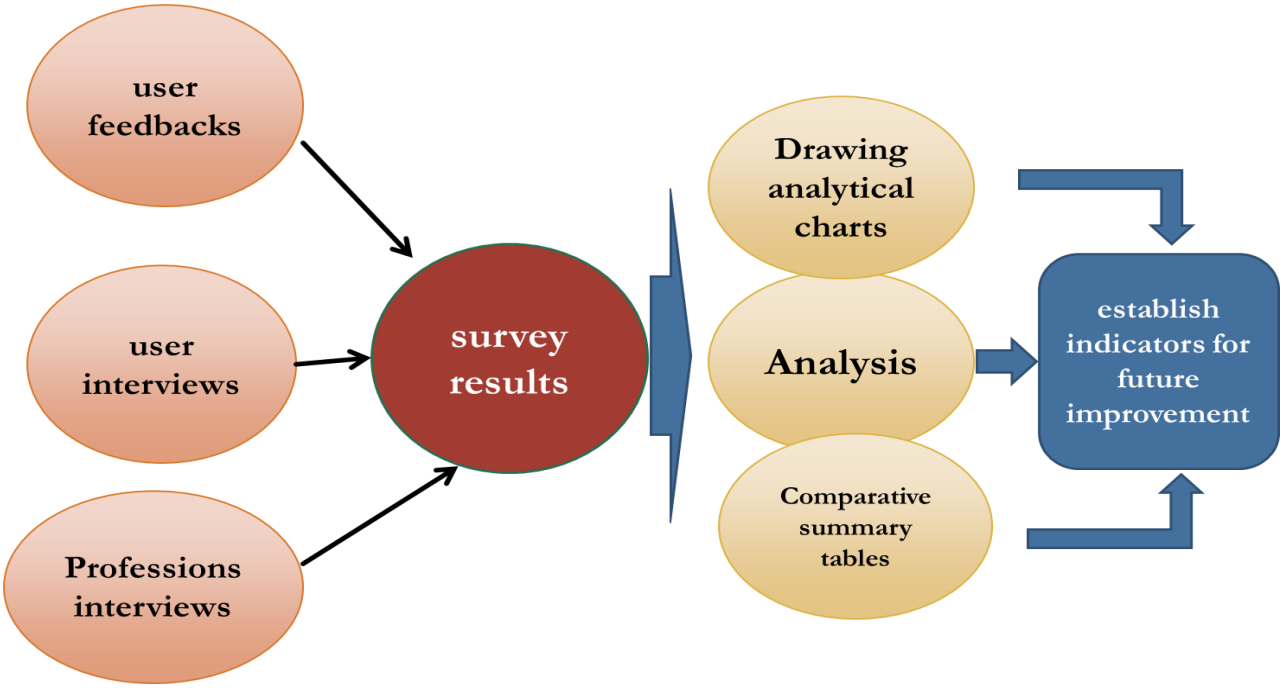


Figure 2 the research process to achieve the final goal.

Figure 2 is showing the research process to achieve the goal, through using the survey results from users' feedback, users interviews, and professional interviews to draw the analytical charts and compare results, to end with some indicators for future improvement.

LITERATURE REVIEW

Darke wrote about the primary generator for the design process; she argued that a designer should focus on a small group of objectives that form a starting point for the architect, that is, a group of related concepts rather than a single idea, which she defined as the "primary generator" that generates a solution [2]. Shoen wrote about the Reflective Practitioner and defined the reflective practice in the design process as the practice by which professionals become aware of their implicit knowledge base and learn from their experience, he indicated some keys aspects, such as the framing problem, and discussed how designers need to frame and reframe the problem while considering each decision is a local experiment that contributes to reframing the problem [2]. Altman and Low mention that interaction between humans and places can be classified in three dimensions: cognitive which has led to an environmental elements perception, behavioural interaction, which relates to activities and the functional relationship between people and their surroundings, and emotional interaction, causing attachment to place [3,4]. Enhancing identity leads design to respond to specific context and create a balance between two views: the 'traditional' perspective, where designers see the loss of traditional ways and values, and the 'modern' perspective, where designers declare the inevitability of change in the age of globalization [5].

The users' satisfaction results from all social phenomena and their personalities, their experience of the built environment, and the relationship of society and manmade environment [6]. Social interactions and socialization play an important role in determining the shape and the design features of buildings. Research in Social Factors is research into the human experience of the built environment. Social Factors continues to ask questions about how people use space and what meaning that space holds. The lens of valuing the user's needs helps in understanding the built environment [6, 7, 8]. Responsive identity is a quality of relation between the internal spaces of a building, and between the building and its context. The Continuity with existing physical environment and its history is considered as a local memory image of the place [9]. Cultural factors play a major role in shaping the form and context in the development of any city. The cultural factor is considered one of the most important factors influencing the formation of urban context, to investigate the extent of its effects on the texture and composition of architectural form. Culture is a way of life; it is the best way to accept the constraints of a place, as every building can engage in a dialog with the history, beliefs and needs of a particular place and time [10,11]. Visual compatibility expresses the continuity with the existing context, linking the building with the physical environmental features. In the urban design context, morphology refers to the underlying factors of urban form that draw upon society's attitudes towards and in relation to physical elements and spaces [12,13].

If building design professionals want to situate themselves as stewards of the built environment, this entails a responsibility for the performance of the buildings they create. The construction industry, in particular the design professions and their professional bodies, needs to adopt a more rigorous ethical approach to protect the needs of building users. This

means adopting a research-driven approach to the generation and synthesis of new knowledge, and the generation of evidence-based design [14, 15]. To enable building assessment tools to influence the design of buildings, further development is required to allow architects and engineers to use them to compare different solutions or optimizing sketches and designs during the whole design process including the very early phases of conception or pre-design [16, 17].

Recently, the importance of assessing building performance has increased as a main branch of the new architectural intellect, as building performance evaluation (BPE) includes post–occupancy evaluation (POE) and user satisfaction with building quality in specified aspects. The performance-based building approach has its roots in describing and assessing a building's functionality, serviceability, and the compliance of user/owner requirements with corresponding building characteristics and attributes [18]. However, the updating of performance assessment criteria is likely to extend user demands into the realm of societal requirements (particularly environmental protection). The issue of describing and assessing a building's environmental performance as well as other sustainability aspects is currently being discussed within the scope of the 'performance-based building' approach [19, 20].

Previous researchers in the discipline of POE concentrated on studying building performance criteria, and described it as an interpretation of the user needs and satisfaction, functions, and activities, including the required environmental conditions. User satisfaction is a main factor that is used for evaluating building quality and performance [21]. It expresses and shows how users evaluate building performance in terms of meeting their needs and expectations, and how it supports their activities according to a group of aspects: functionally, aesthetically, environmentally, and technically [22]. Most of the recent studies suggested six indicators to measure the user satisfaction level as a part of evaluating the performance of buildings (known as building performance indicators (BPIs). These indicators are spatial (functional) comfort, visual comfort, thermal comfort, indoor air quality, acoustic comfort and building integrity (structural and material performance) [22].

METHOD

A questionnaire for visitors of KAPSARC building in Riyadh was conducted to investigate their needs and expectations and to determine the functional and aesthetically quality of KAPSARC by the occupants, as a quantitative method, in order to reflect the influence of the building design on its attractiveness to users and increase their place attachment. The objective of this questionnaire is to measure and examine occupancy level of satisfaction of indoor, and outdoor quality. The users' experience and satisfaction level for spaces are measured through questionnaire and interviews for visitors and professionals.

Questionnaire and analysis

The questionnaire sample consists of 50 users from visitors. The interview sample consists of 10 professionals (academics). The questions are designed to measure the quality of the building's spaces through the users' spatial experience, comfortability and level of interaction within the spaces. The survey's questions cover five main aspects; functionality, Aesthetics, interior spaces, site design, and thermal comfort. The goal from this questionnaire is to know people's feedback through the user's of this building, or the professionals from academics. Each question in the survey had a specific measurement scale that matched the question's goals, as shown in (Table 1). The data-gathering tool was a printed questionnaire distributed on site for the building's visitors. The survey was distributed to 50 visitors and was carried out in November 2019, and the responses were received immediately after the visitors answered it.

Questionnaire results analysis

- **Functionality**

Most of the participants (80%) stated that the accessibility for the building is clear and it's easy to reach a specific space, they found the place legible and can find their way easily inside. This result reflects that the building has clear circulations pattern and the building's way finding is in a good state.

- **Aesthetics**

75% of the participants thought that KAPSARC building form serves its function as a research center, which reflects the success of the form in reflecting the function. While 30% only of the participants agreed that the form and facades blend with the context, which showed how the building is contradicting with the surrounding environment as the nearest buildings to it is Princess Noura University that reflect the Islamic style and features which is totally contradicting the KAPSARC futuristic form and style. Princess Noura Bint Abdulrahman University was designed on the Islamic style using formal grid and regular shapes. On the other hand, KAPSARC follows a modern approach and doesn't follow a specific grid. 70% of the participants agreed that the facade treatment is suitable for the local climate, and 20% of them found the building aesthetically appealing. Regarding the form composition, 45% believed that it is balanced and stable, that showed how most of the users are feeling unsafe with this complex strange building, they don't accept the form from the aesthetic point of view.

- **Interior spaces**

90% of participants agreed that the colors of the interiors are convenient and fitting the building style and function, that reflects how the interior spaces are comfortable and relaxing for users.

- **Site design**

90% of participants found a place where they can engage with the nature and enjoy the outdoor green areas through the multiple courtyards which are distributed all over the project. On the other hand 94% of participants agreed that they easily found a place to park their cars.

- **Thermal comfort**

Regarding the ventilation system inside the spaces, 25% only from the participant believed that it's good and sufficient.

Table 1 The questionnaire survey aspects and questions.

Aspect measured	Key words	Questions	Measurement Scale	Target participants
1. Functionality	Accessibility, Circulation	1. Is it easy to reach a specific space?	(yes/no)	visitors
2. Aesthetics	Form	2. The building form serves its function.	(agree/disagree)	Visitors academics
	Facades	3. KAPSARC building form and facades blends with its context.	(agree/disagree)	
		4. The facade treatment is suitable for the local climate.	(agree/disagree)	
		5. Do you find KAPSARC aesthetically appealing?	(yes/no)	
	Composition	6. What do you think of the form composition?	(good/avrg/bad)	
3. Interior Spaces	Colors	7. The colors of the interior spaces are convenient.	(agree/disagree)	Visitors academics
4. Site Design	Outdoor activities	8. Do you find a place where you can engage with the nature?	(yes/no)	visitors
	Parking design	9. Is it easy to find a parking for your car?	(yes/no)	
5. Thermal Comfort	Ventilation	10. How do you find the building ventilation systems?	(good/avrg/bad)	

Interview result analysis

- **Aesthetics**

50% of the interviewed academics agreed that the building form serves its function and give the impression of research center, bringing a lot of light to the building, as they stated that it is different than the traditional research centers usually they designed as high rise building with a regular shape and the architect here choose to stand out by having design different from the surrounding buildings which is good. Although the other half of the interviewees disagree that the building form serves its function and clarified that it is more like a museum not governmental buildings. With regards to questioning if KAPSARC building form and facade blends with its context, all interviewees disagreed for this statement and they stated that it is standing out with different scale and materials than the surroundings, which make it odd and out of context. On the other hand most of them (82%) agreed that the facade treatment is suitable for the local climate and is sustainable, with modern courtyards and small openings as the curve in the wall makes it not directly exposed to the sun double skin and the openings design suits the weather perfectly because it brings light to the building with minimum heat. The majority of the interviewees (70%) agreed that KAPSARC is aesthetically appealing and it is a good recognized building but it is too sharp and pointed, therefore a few percentage of them (30%) accepted the form composition as most of the interviewees don't accept the building formation and the composite crystals concept look of the building, they stated that the complex of hexagonal cells with different sizes and orientations is totally against the approach of modernism where less is more and simplicity is preferred. The majority were against using irregular shapes with so many edgy sides while only four sides can perform the same function perfectly.

- **Interior spaces**

Regarding the colors of the interior spaces most of the interviewed academics (85%) don't like the interior design of Zaha Hadid's building, as she chose the white color for all the interior spaces that reflects the cold vibes, while she highlighted the corridors with black and it is too strong color

for something not important like corridors, the corridors should be more integrated and transparent to see the movement of the people. Besides the interior design needs more colors for way finding, for example colors guide us to the stairs and corridors; the space is empty because of using the minimum of furniture with white color. 10% of the participants agreed that the chosen colors for the interior spaces are convenient and clear which is comfortable for the employees.

DISCUSSION

After analyzing different point of views from the visitors and professionals, a comparison summery table and chart was created to measure and compare the resulted percentages between the visitors and the professionals as shown in Table 2 and Figure 3. This comparison table helped to analyze and understand different approaches for criticising the building from the visitors and the professionals, where they have analyzed from educational background, and work point of view. Although most of the building's visitors agreed with the building functionality and quality of spaces in regards of design and colors, but most of them do not agree to the building style and formation, they feel that the building is not compatible with the surroundings and they agreed that the building failed in the point of the aesthetic appeal.

In conclusion, this questionnaire shows the critical portion from the user that visited KAPSARC, the citizens, and the professionals who had different responses. In total many people didn't feel satisfied, due to lack of functional point of view for each category. The lack of entrance emphasis was also another problem that was concluded through this questionnaire. All participants in the questionnaire and interviews agreed that KAPSARC building form and facades failed in blending and fitting with its surrounding context; the building seems to be a monument in the middle of the desert, it is totally contrasting from the surrounding. It looks like an alien came from the space and spread his body on the ground. Visitors' satisfaction about the building is relatively high in terms of building facades treatments, parking availability, navigation through the interiors, and integration with nature. This indicates that the building has successfully met most of the users' needs.

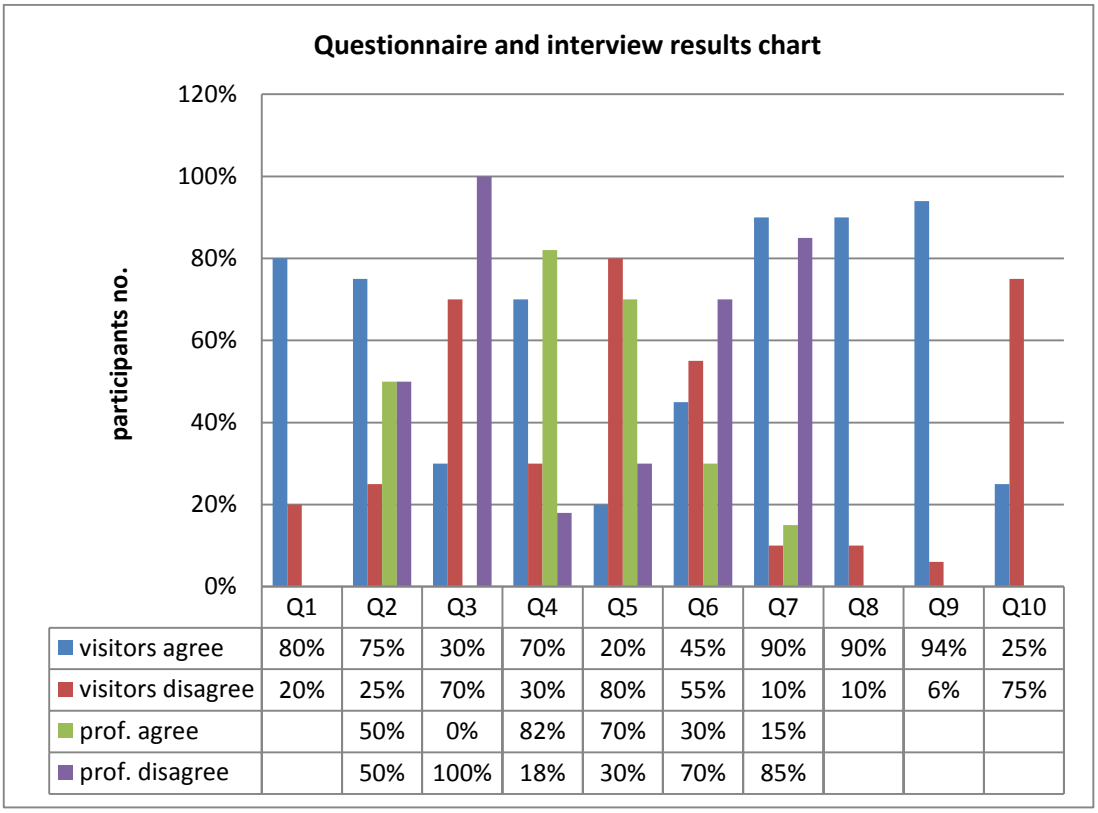
On the other hand, most of the visitors have showed dissatisfaction about the ventilation system and the interior colors which indicates that the building gives a cold feeling to its users either physically (due to ventilation issues) or psychologically (because of the bale colors). That is actually, what the academics participant has noted during the interview saying, "I feel it's cold". Concerns mainly arose about the building form, its functionality, and integration with the surroundings. Opinions have splitted between academics and visitors; some had a positive attitude towards it while others were totally against it. This mainly depends on the architect school and approach, it is a matter of different opinions rather than right or wrong. The design gives proper attention to environmental values by applying adaptable strategies to help the building stand in the harsh climate conditions. These strategies include sky lighting, courtyards approach, small openings, and facade treatments. There is no doubt that Zaha Hadid design has succeeded to catch people's interest although most participants agreed that it is unique but they disagreed that it is aesthetically appealing, and has viewed architecture in a modern, different, and sophisticated way.

In conclusion, discussing the building complexity against functionalism; this complexity result in nothing but waste of money, waste of materials, and waste of space. Architecture is not a challenge of creating futuristic, complicated forms that attract people's attention. The challenge is to have a building perfectly meeting its function in the simplest way possible with a convenient structural system to build. This will result in having a functional facility with a reasonable budget. So, less is always more. Looking at Zaha Hadid's building form, one notices a complex of hexagonal cells with different sizes and orientations, as shown in figure 4. It is totally against the approach of modernism where less is more and simplicity is preferred. Why to use irregular shapes with so many edgy sides while only four sides can perform the same function perfectly? Why to have so many different sizes and shapes of openings while simpler techniques could be used for fenestration?

On the other hand, Zaha Hadid was very successful in encouraging social interaction by providing fluid spaces. She provided the building with many courtyards between the masses & one main big courtyard in the middle, which encourage people to interact with each other while they are moving between the buildings, sharing food in the break time and having conversation in these common spaces, as shown in figure 5. In the courtyards, the natural light penetrates and reflects on the floor in a dramatic way and with the combination of the breeze coming from the opening above will give people a very comfortable feeling, as shown in figure 6.

Table 2. Comparative summary table

Aspect measured	Key words	Questions	Answers	
			Visitors	Professionals
1. Functionality	Accessibility, Circulation	1. Is it easy to reach a specific space?	80% agree 20% disagree	-
2. Aesthetics	Form	2. The building form serves its function.	75% agree 25% disagree	50% agree 50% disagree
	Facades	3. KAPSARC building form and facades blends with its context.	30% agree 70% disagree	0% agree 100% disagree
		4. The facade treatment is suitable for the local climate.	70% agree 30% disagree	82% agree 18% disagree
		5. Do you find KAPSARC aesthetically appealing?	20% agree 80% disagree	70% agree 30% disagree
	Composition	6. What do you think of the form composition?	45% agree 55% disagree	30% agree 70% disagree
3. Interior Spaces	Colors	7. The colors of the interior spaces are convenient.	90% agree 10% disagree	15% agree 85% disagree
4. Site Design	Outdoor activities	8. Do you find a place where you can engage with the nature?	90% agree 10% disagree	-
	Parking design	9. Is it easy to find a parking for your car?	94% agree 6% disagree	-
5. Thermal Comfort	Ventilation	10. How do you find the building ventilation systems?	25% agree 75% disagree	-



	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
visitors agree	80%	75%	30%	70%	20%	45%	90%	90%	94%	25%
visitors disagree	20%	25%	70%	30%	80%	55%	10%	10%	6%	75%
prof. agree		50%	0%	82%	70%	30%	15%			
prof. disagree		50%	100%	18%	30%	70%	85%			

Figure 3. Questionnaire and interview results chart

Figure 4. Complex of hexagonal cells with different sizes and orientations.
(Source:http://www.zaha-hadid.com/architecture/king-abdullah-petroleum-studies-and-research-centre/.)

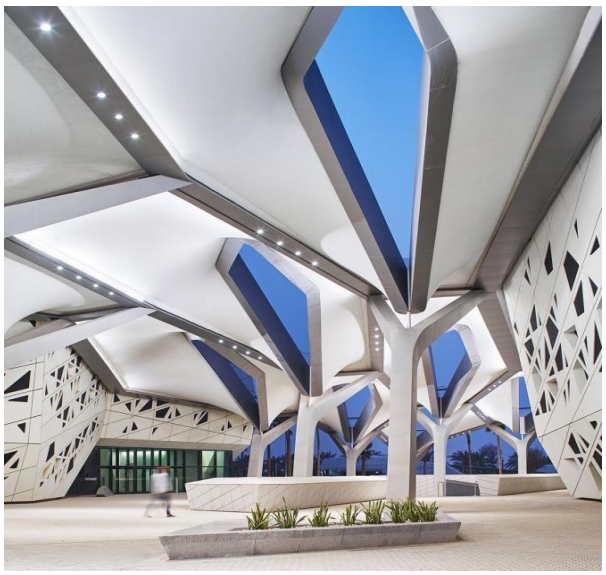


Figure 5. Many courtyards between the masses.
(Source:http://www.zaha-hadid.com/architecture/king-abdullah-petroleum-studies-and-research-centre/.)

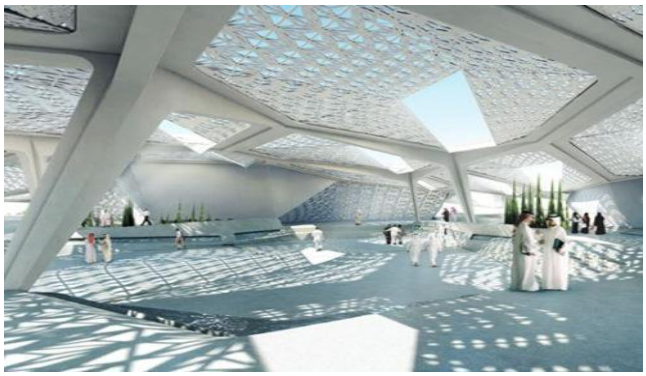


Figure 6. The opening above courtyards.
(Source:http://www.zaha-hadid.com/architecture/king-abdullah-petroleum-studies-and-research-centre/.)

CONCLUSION

After the detailed study conducted on KAPSARC building, and with the help of data gathered from a population sample including academics and visitors, the following critics and visions can be concluded:

In conclusion, compared to the survey results, and the previous case study analysis, the results are the following: Space circulation lacks in functionality; due to building form, where it creates a type of confusion for the user, the facade treatment are not aesthetically satisfying. For the building form, the result stated that the building scale is big, compared to the previous analysis, it is considered big in scale and proportion, where they connect together, but do not integrate on the site. The building form is not simple; it shows it is complexity within building construction and structure. Building entrances are not considered functional whatsoever, where the majority showed that it is not clear, reaching to the conclusion that it was not functional due to un-clarity. Outdoor and landscape is not used efficiently, where they are provided for aesthetics purposes. Finally, construction, building structure and sustainable strategies cannot be compared through the survey, since they are functional topics that were not asked to the user's. The conclusion and criticism for KAPSARC, aesthetically it is an attractive building form, and has an interesting structure system, that makes the viewer question on how it is standing, and being connected from one cell to another. The concept of this building is emerging well with the landscape, and has a good aesthetical approach. using sustainable strategies that helped in looking into positive functional approach, where the use of natural resources are higher in percentage rather than using electrical methods.

Though KAPSARC has positive critical response, it also gains negative criticism in functionality, where the entrance to the site is not clear how to approach the building, and consumes time to find it by the user. The lack of integration on the site also is another negative point where it gives the effect of dominance on site, without feeling the connection between the surrounding and the building. Moving to the smaller scale inside the research center, the hallways are not functional; due the narrowness, that can create discomfort for the user. The internal spaces are not functional either, where small spaces, and wasted external spaces without a proper function.

Finally, This study outlined the significance of integrating users' satisfaction dimensions and values in the main criteria framework of the POE, specifically as a main part of evaluating the general building performance. linking the public and institutional buildings to the community is an important aspect in order to engage users with the surrounding community by having special spaces and treatments that reflecting connection with surroundings. In addition, taking into account designing the building forms and facades as an interactive aspects that could be considered as pillars in designing a successful public building.

The analysis and questionnaire results confirm and prove how the users' satisfaction level has a strong impact on evaluating and determining building performance quality. The sociocultural factors play an important role in connecting

public buildings to their physical, humanitarian, and spiritual surroundings, turning them into liveable influential buildings instead of iconic popular monuments. Sharing the emotions and feelings of the community, and effectively connecting the community with its surroundings, are considered the most important features. The framework of measuring the users' satisfaction level is tested using a case study of an existing contemporary building. The application on the case study demonstrates the explanatory and analytical powers of the framework. However, the derivative power still needs further testing in academia and praxis on other cases, which represents a future extension of this study. Furthermore, although the scope of the framework in this study is manual, a future version may be based on the automation of the processes underlying its structure.

Despite the case study KAPSARC is a LEED-platinum certified building and extremely successful from the environmental point of view, but it faced a lot of problems from the functional point of view and did not succeed to win the critics and users satisfaction in regards the contextual fitting, as the project is out of context not fitting the locality concept and Saudi Arabia architectural features and styles. Economically the project was unsuccessful as the building went deliriously over-budget. The building is a repeated version of Zaha Hadid's projects with the same style without considering surrounding context or functional aspects. it has succeeded in responding to the local climate conditions through many complicated and well implemented sustainable strategies. These include the small openings, courtyards approach, skylights, and orientation of the masses. The building also emphasises the importance of users' experiences and comfort inside the building. This is done through the courtyards integrated through many interior spaces that penetrate natural light and cool breezes into the space. Overall, although the building is complex, Zaha Hadid succeeded in turning such a complicated cellular structure into a liveable and comfortable facility that satisfy both researchers and viewers of the building.

This study including its two parts highlighted and stressed on the important of developing a critical plan to be used in the evaluation and analysis of the architectural works that incorporate the users' satisfaction and reflection on the project, including the main aspects: humanitarian, social, economic and political criteria, as well as architectural and urban criteria such as: Formative, schematic, environmental, construction and design sides. This is the critical approach that has been applied in this search. The need to access non-biased architectural criticism, which depends on the balance of criticism of the critic to his mind and emotions together. Encourage the monetary climate between architectural students and pioneers through the presentation of monetary seminars dealing with the contemporary arabian architectural works and perpetuating the objective criticism of these works.Increasing the space of criticism and architectural writings that address the non-specialized reader as a means of raising the cultural awareness of the architecture for publics and thus realizing the value of architectural and creative work.

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