International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 2, Issue 6, pp 15-19, August-2018

'ORIELS' (Jharokha) As Passive Design Strategy for Energy Efficiency

[1]Irfan Ahmed Memon, [2]Dr.Sabeen Qureshi, [3]Mehwish Soomro, [4]Sabeen Shah, [5]Muazam Ali Pathan

[1,2,3,4,5]Department of Architecture, Mehran U.E.T., Jamshoro, Sindh, 76062, Pakistan.

***Abstract* - Buildings and construction industry play an important role at local, regional and global scale in utilization of natural sources, energy consumption and environmental problems. In this respect; discipline of the architecture has a prominent responsibility in achieving sustainability by constructing environmentally-friendly buildings. Some features in building sector play key role in provision of effective ventilation system and energy conservation. One of the old and effective features seen in most of the buildings of India and Pakistan are Oriels (Jharokha). Oriels are façade extension that can be places on building fronts and corners in a variety of way. Oriels for façade and roof can be used to determine and ornament and the Architecture of houses as well as of street fronts and plaza facades. Oriels and attics are suitable for every landscape and every house whatever the purpose or Architecture style. They enrich the appearance and entry the practically of all buildings. In this study, traditional houses selected from different climate regions of Pakistan and India are reviewed, which examined in terms of settlement characteristics, planning scheme, form, facade characteristics and material use, attempting to determine whether there are precepts for architecture.**

Keywords: Oriels, Passive Energy, Energy conservation, Environmental Friendly, and Sustainability.

I. INTRODUCTION

The typical feature of traditional architectural i.e. Oriel (jharokha) are present in the Havelis of pre partition period of Hyderabad .this feature was given to help maintain thermally comfortable environment inside, enhancing aesthetics and provide privacy to the buildings.[1]

Oriels (jharokha) are façade extension that can be places on building fronts and corners in a variety of way. Oriels are as significant for interior as for exterior architecture. On interior space, they fulfill a variety of functions the foremost of which is to provide improved visibility. They are satisfying media for illumination and sunlight the as well as for the structural and functional qualities of the interior spaces.

Oriels for façade and roof can be used to determine and ornament and the Architecture of houses as well as of street fronts and plaza facades. Oriels and attics are suitable for every landscape and every house whatever the purpose or Architecture style. They enrich the appearance and entry the practically of all buildings.

The decision to employ Oriel depends on the type of building to be built and the particular functions intended of it. The field of vision from an Oriel can be up to 180^{o} substantially more than from a stranded window lacing in oriel on a building corner can increase the range of vision to as much as to 270^{o} in a tower like construction can increase it to 360^{o} through the use of Oriels the optimal view out the street, squares, corridors, gardens or country side can be achieve where ever appropriate and desirable. [2]

There is a long tradition shaping rooms through the use of Oriels. In exceptional cases, the need for more rooms can be a reason to use oriels, either extended at floor level outward or recessed into the roof area.

Externally, Oriels fulfill various purposes, such as the accentuation of or transition between different buildings elements. Oriels like extensions are widely used as entryway accents, wind or rain deflection features, or protective shelters against the elements.

Access to buildings or between different buildings can be serving by the use of Oriel like entryways or trellis extensions on the facades.Oriels can be at ground level, on the facades, or hunk from the eaves, they can be resisting free hanging or structurally supported. The realization of Oriels is as various as the functions. Heating requirements must be consider when one a building has large oriel. The advantage of an oriel must be functionally and formally so convincing that they compensate for the difficulties entailed in installing them and for any other disadvantages they poses. Improved visibility, good illumination, effective room delineation, room extension and differentiation of building features on building facades, as well as other possible functional uses of oriels, justify their frequent inclusions [3].

II. LITERATURE REVIEW

Roshān or roshan (pl. rawāshīn) is an old term utilized for a wooden anticipated window found in Makkah and in a few urban communities of the Islamic world. It was archived as

International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 2, Issue 6, pp 15-19, August-2018

"roshān" in arranging and building control reports of the Islamic urban areas amid the Mamlūk time (1248-1516), as Amin and Ibrahim [4].

The use of ornamental projected balconies called jharokhas is commonly found in the historic buildings in Bhuj

Figure -1: The Roshān (Jharokha) [5]

III. DESIGN OF ORIELS (jharokha)

The design and coloration of oriel are as multitudinous body as they were in earlier periods. This single architectural element manifests itself in a richness and variety that allows the design originality of architect, contractors and builders.
The extreme variety of design is due to the demands of interior space and to the specific placement of Oriel on the façade. [6]
On the floor plan, one can distinguish rectangular, triangular, sloped, polygonal, semicircular and circular Oriels. The upper extremities can also be flat, with or without a balcony supports or sloped like a console. The overall design of the facades dictates weather the oriel should be solitary, groped in rows or staged.

IV. CONSTRUCTION OF ORIELS (JHAROKHA)

Oriel constructions can be complex, but more often they are simply regular window construction features or elements of large super structures. Construction techniques are there for slandered well known and except in special cases where the connection of surfaces is sloped. The manufacture is done by firms that excel in specialization rather than in magnitude in production. Oriels are differ in size, weight and function and construction techniques vary accordingly, some Oriels are on the ground level, some on the roof stories, and other hang from facades. The structure are made up of front, side, and upper and lower elements that serve as roof and floors. [7]

The traditional jhrokha is collected from indistinguishable parts and units sourced locally, so the side boards of the jhrokha have one standard tallness, which additionally applies to the front board with slight varieties, not in the development but rather in little points of interest, fig. 1. The variety may happen because of the joints between one board and another, and with a specific end goal to accomplish a palatable outward presentation of the roshān in general. This could be with the stipulation that for the most part the width of the side board ought to be equivalent to the separation between the uprights that partition the boards of the roshān as guaranteed by Hariri [8]. Nonetheless, Taha contends that the inside division of the upright board must be fitting and composed, he additionally expresses that: the roshān is isolated into various upright segments with the goal that the even part of the roshān ought to be symmetrical (by and large) while its vertical perspective need not be symmetrical as a result of the varieties in the segment parts and their utilization. [9]

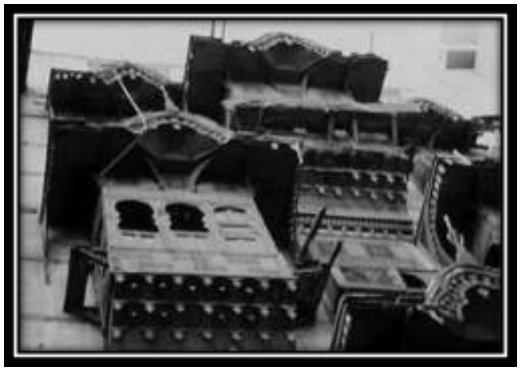

Figure -2: The Lower and the Upper Treatment [10]

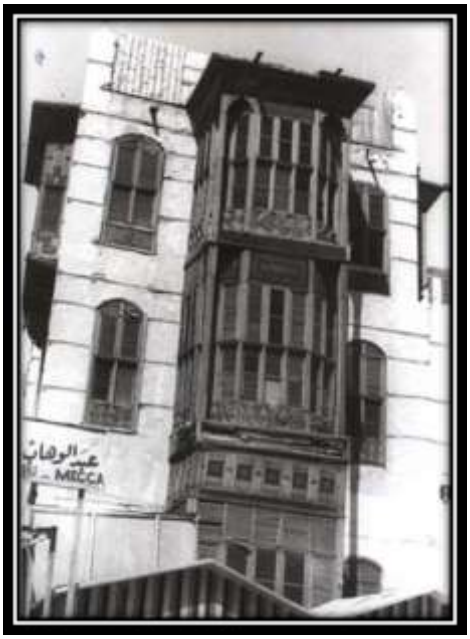

Figure -3: The Roshān–Separate and Continuous Unit [10]

International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 2, Issue 6, pp 15-19, August-2018

Figure -4: Wooden Historical Jharokha in Jeddah [11]

V. METHODOLOGY

Numbers of researches related to the current study were reviewed before going any step advance; all the papers were taken under consideration by taking related information and statistics related in order to solidify the study. The features of building, those contribute to reduction in energy use were identified from the previous studies. Un-Structured interviews of professionals, architects and Environmentalists were also part of study in order to map out other factors if not present in questionnaire. Questionnaires were then prepared by considering all those factors and features. Questionnaires were filled up online as well as in hard form.

VI. ANALYSIS

Several features those contribute to reduction in energy use and pollution are analyzed using percentages and ranks technique with the SPSS software. Analyzed data is represented using tables made in MS Excel software.

VII. RESULTS & DISCUSSION

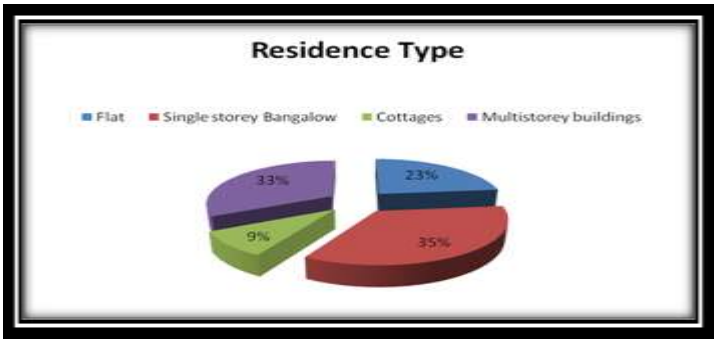

Figure -5: Residence Type

Figure 5; highlights the resident type by percent in Hyderabad city of Pakistan. Most of the people with 35% live in Single story bungalows, 33% live in Multi-story bungalows while 23% and 9% live in Flats and Cottages. Results make it quite clear that 56% residence types are flat and Multi-Story bungalows so chances to have oriels are very high as this type of residence has space to make oriels.

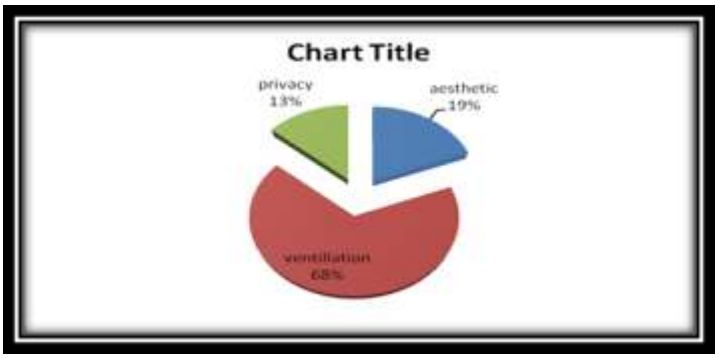

Figure -6: Purpose of Oriels

Figure 6; highlights the purpose of oriels by percent in Hyderabad city of Pakistan. Most of the people with 68% chose ventilation as the main purpose of having oriels in the building, 19% chose aesthetic purpose while 13% chose privacy as a main purpose of having oriels in the building of Hyderabad. Results make it quite clear that 68% respondents thinks that oriel is moistly use for ventilation in the building.

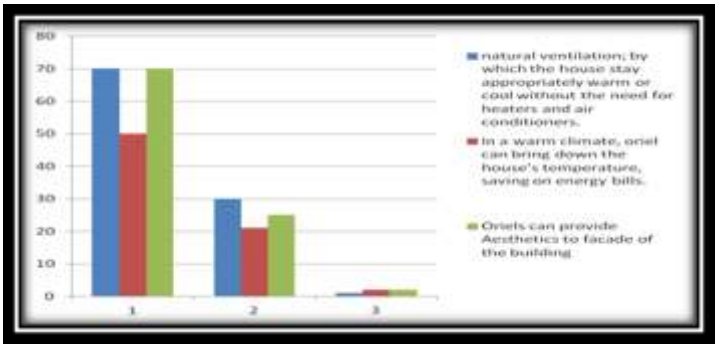

Figure -7: Benefits of Oriels

If we talk about the benefits of having the Oriels in our buildings which reduces the environmental pollution and helps in conserves the energy; the benefits will be countless. A survey was conducted based on questionnaire mentioning the benefits of having Oriels in the building which had a great response from the respondents. The benefits included natural ventilation; by which the house stay appropriately warm or cool without the need for heaters and air conditioners ranked on the top and most important benefit scoring 2.67 points. Second important benefit was in a warm climate, Oriels can bring down the house's temperature, saving on energy bills, score 2.59 points. As Oriels reduces the air temperature of the houses during the summer season which suits our climate to sustain the energy and less electricity us utilized during the day time if the Oriels is present in the houses. Least important

ISSN (online): 2581-3048
Volume 2, Issue 6, pp 15-19, August-2018

benefit of Oriels in public survey was 'secure and usable space' with the score of 2.05.

TABLE I
Energy Saving Features

Energy Saving Features	PERCENTAGE					Score	Rank
	MOST IMPORTAN	IMPORTANT	AVERAGE	BELOW AVERAGE	LEAST IMPORTANT		
Windows/ doors/ventilators	62.50%	9.38%	3.13%	3.13%	21.88%	3.88	1
Courtyards/veranda	16.67%	58.33%	16.67%	8.33%	0.00%	3.83	2
Oriels	13.33%	6.67%	6.67%	40.00%	33.33%	2.27	5
Ducts	21.05%	5.26%	42.11%	15.79%	15.79%	3	3
Atrium	21.43%	0.00%	35.71%	21.43%	21.43%	2.79	4

Table no.1 shows the results asked by the respondents regarding the features through which energy can be saved and the concept of conservation of energy can be achieved, successfully. Energy saving features e.g. Windows, Oriels, oriels, ducts an atrium were provided in the questionnaire and people were asked to rank the feature they think is most important and is effectively used in their respective homes. Ranking scale was assigned; starting from 1 to 5; in other words from Most Important to least important. With maximum percentage score of 3.88; Windows, doors and ventilators were ranked the most important feature by the respondents to conserve energy in household, Hyderabad. Un-expectedly, Oriel was counted as second most important feature with score of 3.83 to conserve energy while people mostly don't have those in their homes. The reason behind choosing Oriel would be the responses of those people who belong to rural areas or live in old home; as they really know the benefits of Oriels. Third ranked feature was Ducts with score of 3: mostly the people living in the high rise building do have this feature to maintain ventilation and light in the staircase. Atrium and oriels have reached good response rate and have score of 2.79 and 2.27 respectively. Oriels have a vital history if we look few decades behind; but recently they are only used as decorative feature of the building. It has lost its functional importance.

TABLE II
Reasons of Not Having Oriels in Modern Buildings

Reasons of not having Courtyards in modern buildings	PERCENTAGE						SCORE	RANK
	MOST IMPORTANT	IMPORTANT	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE	LEAST IMPORTANT		
Lack of Land	70.83%	8.33%	4.17%	0.00%	0.00%	16.67%	5	1
Cost of construction	11.11%	50.00%	5.56%	5.56%	11.11%	16.67%	3.94	2
Construction of vertical buildings	8.70%	17.39%	43.48%	13.04%	17.39%	0.00%	3.87	3
Unawareness of benefits of courtyards	12.50%	8.33%	20.83%	37.50%	8.33%	12.50%	3.42	4
Modern living style	17.39%	13.04%	8.70%	13.04%	30.43%	17.39%	3.22	5
Artificial means of ventillation	10.00%	5.00%	15.00%	10.00%	20.00%	40.00%	2.55	6

Survey was conducted among the people living in houses of Hyderabad having Oriels as a major means of saving the energy and as solution in green architecture to reduce environmental pollution. The analysis was ranked from 1 to 5; 1 as the most important reason of not having Oriels in their house in the questionnaire and 5 as the least important reason of not having Oriels in their houses. Because of rapid growth in population and frequently migration from rural areas to urban areas the land is reducing day by day; this reason has mostly chosen by the people with top score of 5. Second main reason of not having Oriels in the modern building which people has chosen is the rapid increase in the cost of construction with the score of 3.94. After the land reduction third reason in the questionnaire with the score of 3.87 is the construction of the vertical buildings reduces the importance of not designing the Oriels in their houses. With the score of 3.42 on fourth ranking people has chosen unawareness of benefits of Oriels. It is very much important to give awareness of the benefits of Oriels in the buildings. And with the score of 3.22 and 2.55 modern style living and artificial means of ventilation has been chosen respectively.

VII. CONCLUSION

To conclude, I can say, that oriel (jharokha) has come a long way from being just an object of light and ventilation to some of the most important and decorative element in architecture. In this journey of evolution it has not only incorporated in itself various styles and tastes at differing points of time but has found its distinct place in a wide plethora of Art forms be it painting, architecture, theatre, poetry, literature etc.

The study of the oriels isn't a call to come back to the past; it is fairly an open way to gain from the past and apply what is reasonable, or what could be embraced, as per the new pace of life. The need is to fathom the idea of the oriel (jharokha) so as to apply it or adjust it to a cutting edge variant. This is an endeavor to protect the idea of the oriel (jharokha), in light of the fact that it demonstrates its quality in such a hot and dry condition. It additionally satisfies Muslims' inhabitation prerequisites as Islamic tenets command the pith of Islamic architecture.

REFERENCES

[1] Ansari, Saleem. *Studying Mughal Architecture Under Shah Jahan: Mosques of Agra*. Diss. Aligarh Muslim University, 2015.

[2] Al-Murahhem, Faredah. "The mechanism of the rawāshīn: the case study of Makkah." WIT Transactions on Ecology and the Environment 128 (2010): 561-573.

[3] Hariri, Majdi M. "Tasamim Al-Rowshan wa Ahamiyatahu Li Almaskan". Majallat Umm Al-Qura. 5.3, 1991, Pp 175-237.

[4] Taha, Hatim Umar, Taiyba wa Fanaha Al-Rafīy., Nadī al-Madina al-Adabī:

ISSN (online): 2581-3048
Volume 2, Issue 6, pp 15-19, August-2018

[5] Tillotson, G.H.R., 2014. Paradigms of Indian architecture: space and time in representation and design. Routledge.
[6] Hajj Research Centre, slides collection. Umm al-Qura University, Makkah
[7] Jharokha, P.O.I.A., Element, A., More, T.A. and Student, B.E., 2015. Romancing The Jharokha: From Being A Source Of Ventilation And Light To The Divine Conception.
[8] http://www.arabnews.com/rawashin-distinctive-style-heritage-buildings-jeddah
[9] BHATIA, NALIN. "ENERGY OPTIMIZATION THROUGH BUILDING ENVELOPE PERFORMANCE IN HOTELS."
[10] Duffy, Francis. "Office buildings and organisational change." Buildings and society: essays on the social development of the built environment (1980): 255-80.
[11] Prizeman, Oriel Elizabeth Clare. "HBIM and matching techniques: considerations for late nineteenth-and early twentieth-century buildings." Journal of Architectural Conservation 21.3 (2015): 145-159.

AUTHOR'S BIOGRAPHIES

IRFAN AHMED MEMON
Department of Architecture, Mehran U.E.T., Jamshoro, Sindh, 76062, Pakistan

2nd Author ***DR.SABEEN QURESHI***
Department of Architecture, Mehran U.E.T., Jamshoro, Sindh, 76062, Pakistan.

3rd Author ***MEHWISH SOOMRO***
Department of Architecture, Mehran U.E.T., Jamshoro, Sindh, 76062, Pakistan.

4th Author ***SABEEN SHAH***
Department of Architecture, Mehran U.E.T., Jamshoro, Sindh, 76062, Pakistan.

5th Author ***MUAZAM ALI PATHAN***
Department of Architecture, Mehran U.E.T., Jamshoro, Sindh, 76062, Pakistan.

Citation of this article:

Irfan Ahmed Memon, Dr.Sabeen Qureshi, Mehwish Soomro, Sabeen Shah, Muazam Ali Pathan, "'ORIELS' (Jharokha) As Passive Design Strategy for Energy Efficiency", *International Research Journal of Innovations in Engineering and Technology (IRJIET)*, Volume 2, Issue 6, pp 15-19, August 2018.

****

