

## #25

### BAHRAIN - CONTINUITY AND RUPTURE

#### Traditional And Subsidized Housing In Bahrain

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#### ABSTRACT

Societies change and with it the buildings that host them. Space is therefore, a carrier of culture and meaning, and thus, fundamental for our understanding of architecture. Vernacular architecture is said to be a direct reflection of the society who build it and its surrounding natural context. However, the Industrial and Technological Revolutions have changed this premise. Man is no longer dependent on its natural context, and the particularities of each society have been softened by the era of continuous exchange of information.

Still every society holds norms and values that should influence the way space is built, but those are more difficult to identify specially in societies that suffered an accelerated socio-economic growth.

The paper is part of an ongoing research which aims to understand the social suitability of contemporary subsidized housing in the Kingdom of Bahrain by analysing space as a carrier of social meaning. The paper makes a comparative analysis between the object of study and the traditional Bahraini house.

It is argued that the contemporary houses have lost its fundamental characteristics of the traditional Bahraini house which served the norms and values of Bahraini society which persist to this day.

#### KEYWORDS

Housing, dwelling, domestic space organisation, traditional housing, subsidized housing, Bahrain, space syntax.

#### 1. INTRODUCTION

The countries that constitute the Arabian Peninsula, especially the ones who are part of the GCC (Cooperation Council for the Arab States of the Gulf), have been suffering the consequences of the rapid urban growth verified after the discovery of oil (first discovered in Bahrain in the 1932).

In Bahrain, since mid 1950's, the growing residential pressure led the governmental authorities to develop various programs to house the growing population and plan its geographical distribution to several new towns. A new urban landscape slowly emerged composed by a variety of housing typologies experimentations that searches for the most suitable house for the modern Bahraini family

The spatial configuration of the Bahraini house was determined by the culture, needs and values of the society, economic resources, physical and technological constraints (Rapoport, 1969, p.13), but after 41 years of designing and building houses for the Bahraini citizen it is necessary to question to what extent their design acknowledges and integrates the configurational pattern of the traditional house, which has been determined by deep-rooted social norms and by the inner meaning of space and form in this specific culture.

Hillier (2008, p.223) considers that most studies on domestic space suffer from a denial of real space as of theoretical interest. Space acquires significance only while a reflection of the society who inhabits it, but not in terms of the patterns of shaped and interlinked spaces of the everyday life. According to Hillier and Hanson (1982, p.9) it is not possible to conduct a research in architecture without embracing the idea of the fundamental relationship between man, culture and buildings.

This paper makes a comparative analysis of the spatial domestic configuration of the traditional Bahraini house and of the subsidized houses developed by the Bahrain Ministry of Housing (MOH). Analysis of the spatial characteristics of both traditional and subsidized houses, is expected to shed light on their spatial and structural differences and/or similarities.

## 2. DATASETS AND METHODS

The methodology uses configurational analysis of the traditional Bahraini house and MOH subsidised houses along with a review of the social, economic and political historical background.

The sample is composed by traditional Bahraini houses - aristocracy houses (8) and commoner's houses (6); and MOH subsidized houses built between 2000-2015 - most repeated typologies (7), and less repeated typologies (3).

The comparison was based on the analysis of the justified access graphs, levels of depth/integration; visibility/permeability; transition-space ratio, rings-sequence ratio, and symmetry.

Configurational descriptions help to determine how a system of spaces is related to form a pattern, which is independent from the intrinsic properties of the individual spaces themselves. Justified access graphs are a simple way to visualize configurational differences in buildings. The graph is aligned bottom-up from a starting node, called root (the outside or any other space), the nodes directly connected to the root (i.e. with depth 1) are aligned horizontally immediately above it, then the nodes directly connected to the former set (i.e. with depth 2) are aligned in the same way, and so on, until all levels of depth from the root are accounted for. This allows us to understand how distant, in topological terms, each space is from the root (depth), as well as how spaces relate to each other which, according to Hanson (1998, p.27) are fundamental properties of architectural space configuration.

## 3. PRIVACY AND FLEXIBILITY IN THE TRADITIONAL BAHRAINI HOUSE

The introverted house, as the basic constituent element of the Arab City, stands before the public space accumulating most social and cultural aspects of daily life (events such as weddings and other festivities, receiving visitors, etc.), hosting, under one roof, all types of family reunions protected from the intervention of strangers (Hall, 1969, p.158).

The house also reflects the fundamental aspects of the social interaction between genders within the family daily social practices, manifested spatially in the hierarchic division of the dwelling in two zones: the male (*diwan-khana*) and feminine (*haram*) (Al Thahab et al., 2014, p.239).

The entrance space never allows a direct view into the 'heart' of the house and the spaces that relate directly with the entrance have a semi-private nature, since they serve the 'life of men': their visitors, public events or others. If the house has several courtyards, there will be a clear hierarchy of each divided between men and visitors (semi-private); women and family (private). If the house only has one courtyard this will always be a semi-private space. (Serageldin, 1995, p.198)

Privacy also defines the location and arrangement of openings to the outside world. The upper floors, normally have a few wood decorated extended windows (*mashrabyia*) where women can sit and observe the outside world without being seen, specially by men which are not related in 1st degree. If they wish to speak to women from neighbouring houses, it is possible to open this lattice wood window, and engage in a lively conversation. (Al-Thahab et al., 2014, p.242).

The courtyard, surrounded by the functional spaces is the 'heart' of the domestic realm, but visibility towards other spaces is limited due to the small and narrow entrance door and/or openings. The spaces distributed around the courtyard(s) usually have the same size, shape and function, (except the kitchen, storage and the area for animals) and its use or function varies throughout the day and throughout the seasons. The roof terrace is a space of great importance serving multiple functions such as storage, production (such a drying fish), sleeping (on hot summer nights) and circulation. The upper rooms located in this area may be used by women when external visitors are in the house. This vertical movement is, therefore, both daily as seasonal. According to Yarwood, El-Mansari (2005, p.18) most spaces are extremely flexible and can be used to sleep, eat or socialise.

Serageldin (1995, p.198) names it flexible formalism which can be experienced both in the use of the courtyards and of the several divisions in the home, and implies a complete symbiosis between all inhabitants regarding the overall norms of conduct.

#### 4. THE TRADITIONAL BAHRAINI HOUSE: CONFIGURATIONAL ANALYSIS

##### 4.1 THE INTEGRATING PROPERTIES OF THE COURTYARD

Noor (1979, 1986) describes the "Arab House" as determined by three factors: environmental conditions; religion and social life; design structure and space articulation. The courtyard house, even if not exclusive, is a constant typology in the GCC region, the reflection of a direct response to a combination of climatic and human factors, and how local societies understand concepts as a family, religion and culture.

In the traditional Bahraini house, both aristocratic and commoner's houses show a tree-like configuration, meaning a minimum number of connections amongst spaces which reflects a segregated spatial configuration, oriented towards inhabitant-inhabitant relationship, in this case centred in the courtyard(s).

This tree-like configuration growth is based on the multiplication of the same basic structure with few exceptions. The spatial configuration observed in the justified access graphs is confirmed by the high integration values: apart from Al Shirawi (0.41), all houses (aristocratic and commoners) vary between 0.61 and 1.14. The courtyard is always the most integrating space of the house, the central space through where all residents pass and perform all sorts of daily activities. It's integrating power seems to be mainly affected by the number of courtyards within the house and the relationship with each other.

Sh. Isa and Sh. Salman houses have both 4 courtyards but the integrating values of Sh. Salman courtyards (1.44, 1.24, 1.41, 1.23) are always higher than Sh. Isa's (0.82, 1.07, 1.16, 0.74). This is related to the distributedness characteristics of each house, as described by Hanson (1998, p.28). It is interesting to observe that in the case of Sh. Isa house the most integrated courtyard is not the main or visitor's courtyard but the female/family one, with its secondary entrance and centralized location connected to all areas of the house – higher degree of choice.

The analysis of the traditional houses sample shows that the division of functional areas around distinct courtyards is more common in the earlier and bigger houses, beginning to shift to only one or two courtyards already around 1880. Therefore, it is reasonable to assume that size alters the spatial configuration but rather the appearance of wealth to the eye of the viewer and/or the optimum functionality within the household.



Figure 1 - Plans and J-Graphs for Traditional Bahraini Aristocratic houses. Source: Yarwood, El-Masri, 1998. 1. entrance/ vestibule; 2. *majlis*/ reception quarters; 3. *liwan*/portico hall; 4. room; 5. *hamman*/bath; 6. kitchen/cookery/coffee burner; 7. storage; 8. door keeper; 9. men's room; 10. visitors room; 11. living room; 12. servants room; 13. animals; 14. courtyard/reception courtyard; 15. family courtyard; 16. married son courtyard; 17. servants/animals courtyard; 18. private courtyard; 19. shop; 20. roof terrace.



Figure 2 - Plans and J-Graphs for Traditional Bahraini Aristocratic houses. Source: Yarwood, El-Masri, 1998. 1. entrance/ vestibule; 2. *majlis*/reception quarters; 3. *liwan*/portico hall; 4. room; 5. *hamman*/bath; 6. kitchen/cookery/coffee burner; 7. storage; 8. door keeper; 9. men's room; 10. visitors room; 11. living room; 12. servants room; 13. animals; 14. courtyard/reception courtyard; 15. family courtyard; 16. married son courtyard; 17. servants/animals courtyard; 18. private courtyard; 19. shop; 20. Roof terrace.

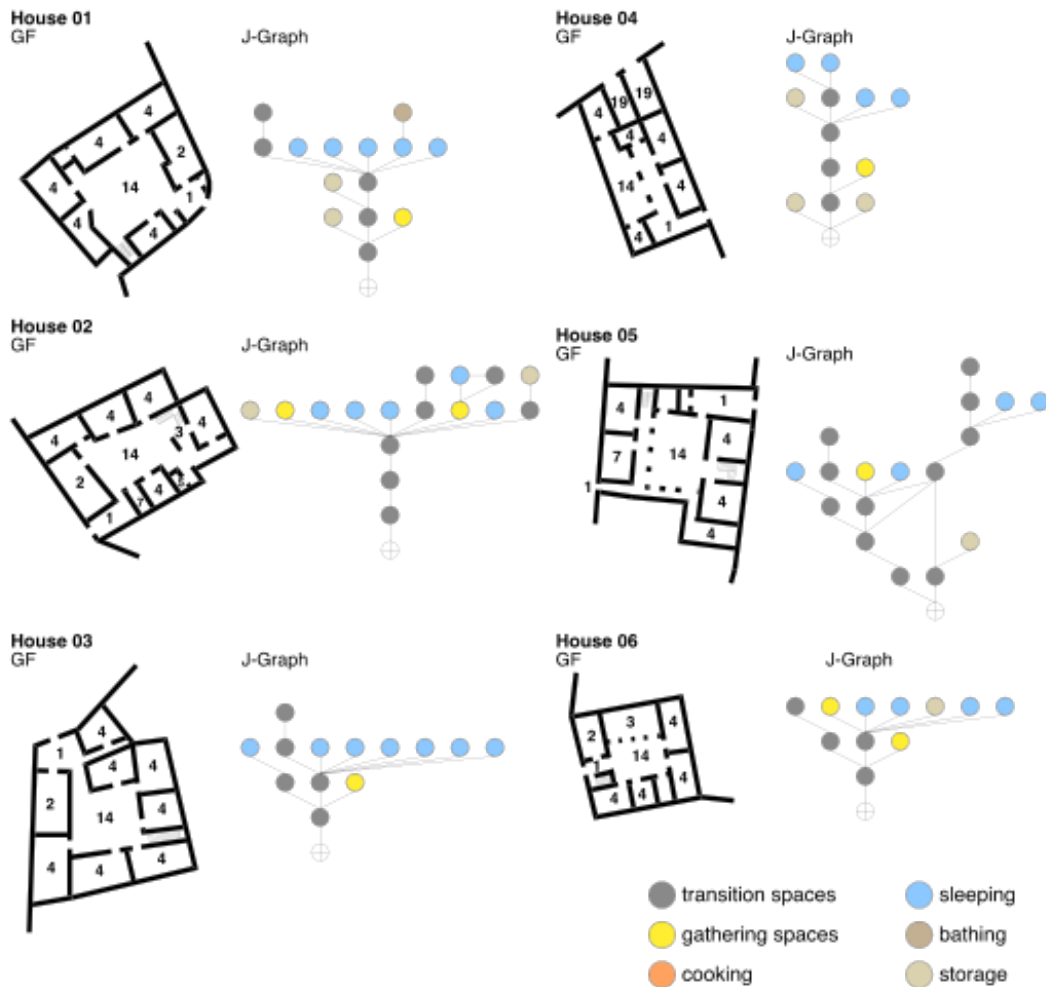


Figure 3 - Plans and J-Graphs of Traditional Bahraini Commoners houses. Source: Waly, 1992. 1.entrance/ vestibule; 2.majlis/reception quarters; 3.liwan/portico hall; 4.room; 5.hamman/bath; 6.kitchen/cookery/coffee burner; 7.storage; 8.door keeper; 9.men's room; 10.visitors room; 11.living room; 12.servants room; 13. animals; 14.courtyard/reception courtyard; 15.family courtyard; 16.married son courtyard; 17.servants/animals courtyard; 18.private courtyard; 19.shop; 20. open roof.

Note: the roof plan of commoner's houses is not depicted since, unlike aristocratic houses, these are open circulation spaces with temporary occupations and activities.

The analysis of the traditional houses sample shows that the division of functional areas around distinct courtyards is more common in the earlier and bigger houses, beginning to shift to only one or two courtyards already around 1880. Therefore, it is reasonable to assume that size doesn't alter the spatial configuration but rather the appearance of wealth to the eye of the viewer and/or the optimum functionality within the household.

The reception quarters (*majlis*) is normally described as the reflection of the almost total segregation between male and female members: a space, representative of the status symbol of the household owner, directly related to the entrance, or with a completely independent access from the domestic/family domain (Yarwood, El-Mansari, 2005, P.19).

Waly (1992, p.30) believes the traditional house can be categorised according to the nature of the reception quarters (*majlis*) as a spatial and functional element:

1. private *majlis* visually separated from the dwelling but spatially connected to the mass of the building;

2. *majlis* with its own individual entity within the mass and its own entrance and courtyard;
3. a simpler form of *majlis* in the shape of a main *qa'aa* adjacent to a central courtyard for daily living;
4. no private *majlis* within the mass of the house but connected to public *majlises* existent in the residential neighbourhood (*fareej*). These were more common in commoner's houses.

The analysis of the traditional houses shows that the reception quarters acquire different positions within the house. The less integrated examples normally occur in the bigger houses, located in the open roof, accessed from a private vertical access. This is a deep space apparently designed to promote the social status of the household owner, allowing its visitors to make acquaintance with a part of the house (used by male members), as they move towards the reception quarters (*majlis*). This is revealed in a tree-like branch configuration with a sequence of transition spaces leading to the *majlis*: Sh. Salman, Al Shirawi, Seyadi, Sh. Isa houses. Sh. Abdullah reception quarters (*majlis*) with an independent access from the exterior is shallow but highly segregated, as the previous examples. These examples seem to correspond to Waly description n.2.

The reception quarters (*majlis*) of the remaining houses are more integrated. In commoner's houses this space is normally shallow but equally segregated (houses 1, 3 and 6) reflecting a strictly rational approach to the norms of privacy and segregation prevalent in the traditional house: by placing it directly accessible from the main entrance vestibule, the visitor's visibility is immediately "blocked" from the remaining interior spaces, including the central courtyard, allowing residents to move freely while insuring the proper reception of visitors. In the humbler houses, it would also be a way of concentrating care and decoration in the entrance area insuring the pride of the household owner. These seem to correspond to Waly description 3.

The reception quarters (*majlis*) in Ahmed Mattar, Sh. Abdullah Bin Mohamed and commoner's houses 5 and 2 are highly integrated, located in the central courtyard. This is the only configuration where the integration level of this space is equal, or similar, to the remaining spaces (rooms) located around the central courtyard. In these cases, privacy could be achieved through a vertical movement between the ground floor and the open roof.

In summary, it is possible to conclude that the reception quarters (*majlis*) have a significant importance in the overall configuration of the traditional house. However, the varied positioning within the overall spatial configuration doesn't allow us to describe it as a highly structured and segregated space since, even if this occurs frequently it is not a norm.

HOUSE TYPE	NAME	TIME PERIOD	N. FLOORS	RA	INTEGRATION	INTEGRATION MAJLIS	INTEGRATION COURTYARD 01	INTEGRATION COURTYARD 02	INTEGRATION COURTYARD 03	INTEGRATION COURTYARD 04
Aristocracy	Sh. Salman	1790-1850	2	0.14	0.74	0.47	1.56	1.26	1.15	1.14
	Sh Isa	1840-1869	2	0.12	0.72	0.66-0.59	0.82	1.06	1.16	0.74
	Sh Abdullah	1880	2	0.13	0.7	0.72	1.09	0.92-0.81	1.12	-
	Sh. Abdullah B.Moh'd	1880	2	0.27	0.83	0.93	1.68	-	-	-
	Seyadi	1850-1921	2	0.30	0.61	0.55	0.86	0.51	-	-
	Salman Mattar	1927-1950	2	0.21	0.66	0.62	1.15	0.71	-	-
	Ahmed Mattar	1929	2	0.19	0.77	0.88	1.24	-	-	-
	Al Shirawi		2	0.07	0.41	0.51	1.64	-	-	-
Commoners	House 01		1	0.25	1.14	0.73	2.64	-	-	-
	House 02		1	0.17	1.10	1.30	3.21	-	-	-
	House 03		1	0.29	0.96	0.71	2.03	-	-	-
	House 04		1	0.37	0.74	-	1.33	-	-	-
	House 05		1	0.22	0.91	0.99	1.75	-	-	-
	House 06		1	0.29	0.89	0.87	1.73	-	-	-

Figure 4 - Integration values of the house, majlis and courtyards.

#### 4.2 THE IMPORTANCE OF TRANSITION SPACES

Spatial configurations can be made up of four topological space-types normally represented with letters - 'a', 'b', 'c', 'd' – where, 'a' are terminal spaces, static in nature; 'b' spaces are thoroughfares on the way to a terminal space, where movement is still highly directed; 'c' spaces have more than one link and can be crossed, part of a single ring; and 'd' spaces have more than 2 links part of more than one ring which generate choice.

Space-types represent structural dimension of spaces. Dominant space-types within the system support the measurement of key spatial characteristics of buildings layouts such as transition-space ratio, ring-sequence ratio, symmetry and asymmetry (Hanson, 1998, p.173).

The transition:space ratio measures the economy or insulation of the layout independent of size, allowing the interpretation of spatial patterns as a product of social practices, unaffected by economic constraints. Transition spaces may be used to a greater or lesser extent to separate and insulate activities and people from one another or draw them together respectively.

A predominance of 'a' and 'b' space-types emphasize tree-like configurational properties, because such spaces offer no route options, strongly framing the activity of its occupants and, therefore more segregated and non-distributed, whilst the predominance of 'c' and 'd' space-types are conducive to ringiness, which give people choice and is therefore, more permissive and distributed.

According to Hanson (1998, p.188) transition:space ratio allows the understanding of the distributedness of plans:  $(a+b)/(c+d)$ =distributedness, where a low value is distributed and a high value is non-distributed; whilst the ring:sequence ratio measures asymmetry which expresses the houses potential to differentiate and express distinctions of personalities and social situations:  $(a+d)/(c+b)$  = asymmetry, where a low value is asymmetric and a high value symmetric.

The transition-space ratio in the analysed houses is overall high varying between 1.55 and 3.00, which confirms that this is a non-distributed scheme. It is noted that transition spaces seem to be mainly concentrated in two areas of the house: the main entrances and the roof terraces. Commoners house 5 has the lowest transition:space ratio of the entire group (1.55). The exterior space and first courtyard is, on average, separated by 2.5 transition spaces. All houses, aristocratic and commoner's, share this characteristic, designed to ensure the privacy of the domestic realm, and constituent part of the configurational pattern of the traditional house.



According to Waly (1992, p.35) the urban house was characterised by the extension of open spaces on two levels: the residential courtyard on the ground floor and the open roof on the upper floor. The open roof, due to its high parapet walls ensured enough privacy for the family to circulate between several (or single) courts of the house, as well as to perform several daily and seasonal activities. This means that the open roof integration is in direct opposition to the ground floor segregation.

The analysis of the traditional houses transition-space ratio with and without considering the roof level reveals striking differences. When the measure considers the roof level, the values are overall lower (between 1.55 and 3.00) and the aristocratic houses show the lower transition-space ratio, meaning that the plans use a higher number of transitions in relation to the overall number of spaces, the only exception being commoners house 5.

However, the same measurement, not considering the roof level, shows that the overall transition-space ration increases (between 1.86 and 4.50) and the former distinction between aristocratic (higher use of transition spaces) and commoner's houses (lower use of transition spaces) disappears.

This means that the traditional Bahraini house optimises the use of transitions with respect to the function spaces drawing people together, and focusing the use of transition spaces in specific areas such as the entrance area for insulation and thus configuring space efficiently to achieve the described social purposes. However, the roof is an open space that performs the link between all areas of the house, which means that in houses with higher number of courtyards, the number of transitions will tend to increase, whilst, in houses with only one courtyard, the opposite will happen, and the circulation will occur through the strategic location of staircases in different areas of the house.

Therefore, we can conclude that the traditional house both insulates and brings people together: each courtyard acts as a social integrating element while transition spaces are employed in strategic spaces to separate or allow communication between the different integrating elements.

The analysis of the ring:sequence ratio shows that all houses is above 0.5 except for Salman Mattar, Ahmed Mattar and Sh. Isa houses (however, when measured without the roof only Salman Mattar house reveals a value of 0.14). This is mainly due to the unusual combination of the 3 usual rings that can be found in these houses.

The ringiness dimension appears in very specific conditions:

1. from the situation described previously — the open roof connects all areas of the house and occupants use it both for daily activities and to compensate, when necessary, the segregated ground floor;
2. rings relating specific functions such as courtyard-room-*hamman* (bath); and more rarely courtyard-*liwan* (portico hall)-room, which are quite irrelevant in the overall configuration;
3. rings passing through the exterior that connect different entrances of the house to the main courtyard(s).

As the houses grow the tendency is to create more "trees" not rings. This is a transition-integrated complex.

Most topological spaces are 'a' and 'c', followed by 'b' and 'd' and most 'c' spaces are mainly located in the open roof area, therefore we conclude that the traditional Bahraini house is, non-distributed and asymmetric, meaning the spatial configuration reflects strongly framed spaces, governed by strong rules of behaviour, where routes are constrained functionally to separate the circulation patterns of different categories, so that subtle spatial segregations are maintained (Hanson, 1998, p.188).

HOUSE TYPE	NAME	TIME PERIOD	ENTRANCE TRANSITIONS	N TRANSITION SPACES	TRANSITION-SPACE RATIO	TRANSITION-SPACE RATIO ONLY GF	A SPACES	B SPACES	C SPACES	D SPACES	RINGS RATIO	SYMMETRY	FUNCTIONAL RINGS	ROOF RINGS	EXTERIOR RINGS
Aristocracy	Sh. Salman	1790-1850	2	24	2.42	3.17	25	20	13	0	3.46	0.76	1.00	2.00	0.00
	Sh. Isa	1840-1889	3	46	1.80	2.86	21	5	41	13	0.48	0.74	5.00	7.00	1.00
	Sh. Abdullah	1880	2	30	2.03	3.27	18	11	27	3	0.97	0.55	3.00	1.00	2.00
	Sh. Abdullah B. Mon'ad	1880	2	8	2.25	2.50	8	7	3	0	5.00	0.80	0.00	0.00	0.00
	Beyadi	1850-1921	3	20	1.70	2.87	12	13	8	1	2.78	0.82	2.00	0.00	0.00
	Salman Mattar	1927-1950	3	23	1.74	3.00	5	0	31	4	0.14	0.29	5.00	2.00	1.00
	Ahmed Mattar	1929	2	16	1.94	2.11	7	1	19	4	0.35	0.55	3.00	2.00	1.00
	Al Shirawi		4	22	2.27	4.20	16	7	22	5	0.85	0.72	3.00	3.00	1.00
Commoners	House 01		2	5	2.80	4.00	9	5	0	0	137	1.80	0.00	0.00	0.00
	House 02		2	7	2.29	2.80	8	5	3	0	4.30	1.00	1.00	0.00	0.00
	House 03		1	5	2.60	3.67	9	4	0	0	137	2.25	0.00	0.00	0.00
	House 04		3	4	3.00	3.00	8	4	0	0	127	2.00	0.00	0.00	0.00
	House 05		5	11	1.55	1.66	8	4	2	0	6.00	1.33	1.00	0.00	1.00
	House 06		1	4	2.75	4.50	8	3	0	0	117	2.67	0.00	0.00	0.00

Figure 5 - Transition-space ratio, ring-sequence ratio and count of basic topological space types.

## 5. HISTORIC BACKGROUND: THE SUBSIDISED CONTEMPORARY BAHRAINI HOUSE

It is necessary to begin by contextualising the subsidised housing program developed by the Ministry of Housing in Bahrain (MOH) since its foundation, within the social, economic and political frame of Bahrain in the second half of the twentieth century.

Bahrain, according to Bahrain Central Informatics Organisation, between 1941 and 2014, saw its population increase 1461% (between 1941 and 1981, this growth rate was 350% and between 1981 and 2014 the growth rate was 375%). If we consider solely the growth of Bahraini citizens, between 1941 and 2014, the population increased 852% and between 1981 and 2014 264%.

By mid 1950's the residential pressure in the main cities of Manama and Muharraq led the Bahraini government to develop several housing projects firstly oriented to house the workers of these two cities and to build the first new town – Isa Town, 1963. The Ministry of Housing (MOH), established in 1975, bolstered and continued the previous efforts by developing subsidized affordable housing programs for citizens with low disposable income.

Several new towns were founded according to rules and legislation specifically developed for that purpose, with the main goal of ensuring the minimal standards of quality, suitability and comfort to Bahraini families, giving shape to a new urban landscape. Between 1976 and 1993, the MOH developed and built 58 different housing typologies, experimenting with various spatial configurations and relationship of building with the plot and street. In 2010, the number of different housing typologies used by the MOH didn't surpass 10 variations giving origin to a very homogenised built environment.

In 2010, the MOH, before the need to build 50.000 new housing units, established public-private partnerships programs to meet the demand and supply 24.000 to 25.000 houses by 2016.

## 6. THE SUBSIDISED BAHRAINI HOUSE: CONFIGURATIONAL ANALYSIS

### 6.1 THE URBAN DIMENSION

Since 1975, the houses developed by the MOH, with very few exceptions, have ignored the traditional relationship between house and street creating setbacks (at least one front and back yard) that have been reduced to a minimum of 3 m front and 2 m side and back, contained by high boundary walls. These dimensions leave little space for any type of outdoor function to occur besides circulation and visual privacy from the surrounding neighbourhood.

The introverted characteristic of the traditional house, fundamental generator of the highly dense city, with almost blank boundary walls on the ground level, has been reversed but

not completely: the almost blank boundary wall defining the street space remains, but the introverted characteristics has become extroverted. Openings now face the boundary walls on the ground floor level, or the immediate neighbours in the upper levels. Family members no longer overlook each other but rather unknown neighbours.



Figure 6 - Aerial photo of Old Muharraq, Bahrain, 1950 and Government housing in Hamad Town. Source: Tarek Wall via studio Anne Holtrop | Armand Hough.

#### 6.1.1 THE EXTROVERTED HOUSE

The analysis of the MOH houses show very low flexibility. The domestic space has acquired extreme functional specialisation — formal reception room (*majlis*), living room, family room, kitchen, outdoor kitchen. Even if this specialization process is verified throughout the nineteen and twentieth centuries in many developing countries, in the case of Bahrain, leads to an interesting paradox — as social norms become more flexible, the house becomes more rigid.

The only flexible place of the house seems to be a room sometimes located on the ground floor, adjacent and accessible from the living room, acquiring all sort of varied functions — sleeping, dining, living, office, playroom.



Figure 7 - Plans and J-Graphs of MOH subsidised houses — prototypes. Source: <http://www.housing.gov.bh/en> 1.entrance hall; 2.majlis; 3.living room; 4.family room; 5.kitchen; 6.toilet; 7.bedroom; 8.master bedroom; 9.storage; 10.garage; 11.outdoor kitchen; 12.laundry; 13.maid room. 14.veranda/terrace

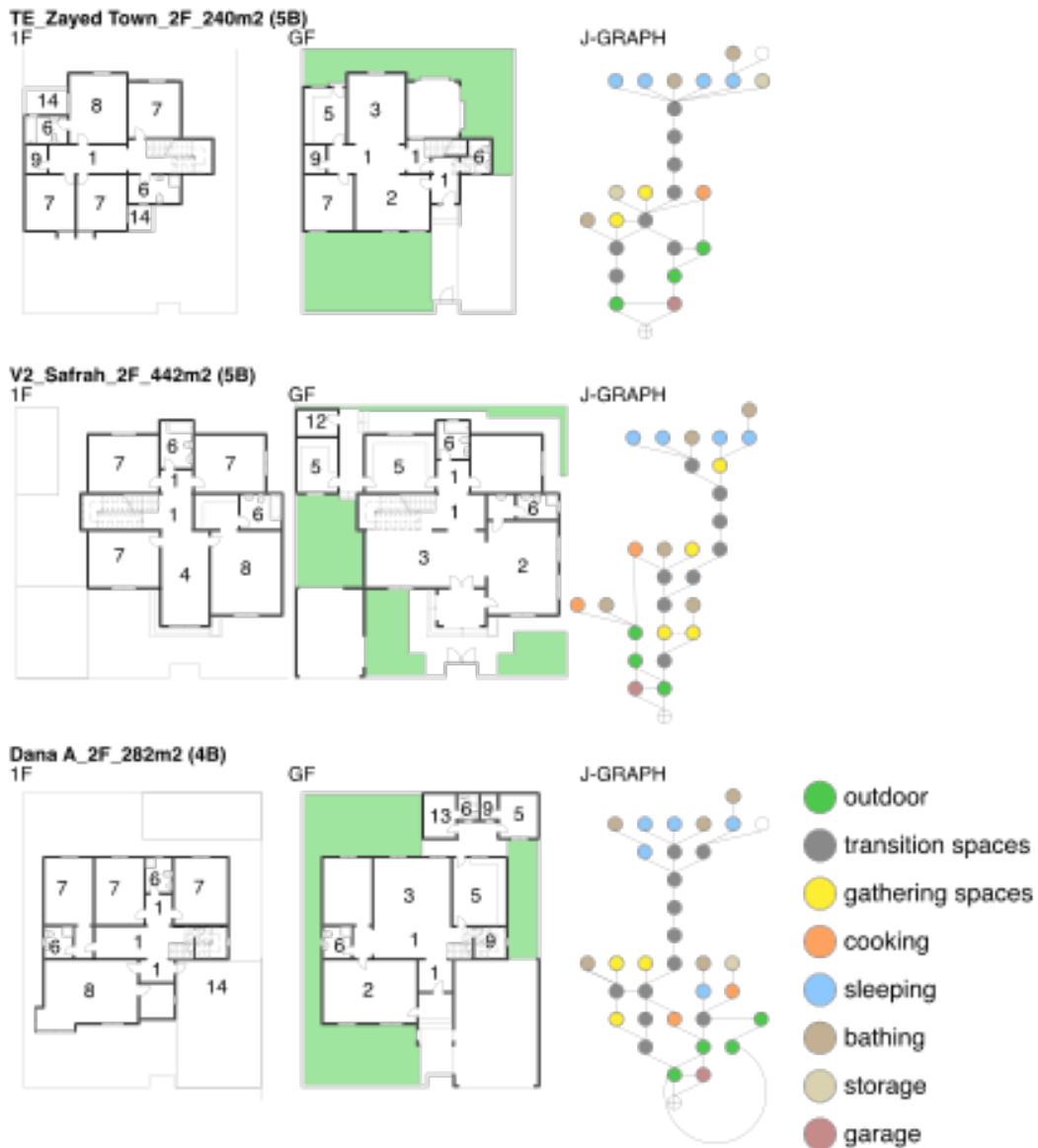


Figure 8 - Plans and J-Graphs of MOH subsidised houses — singular cases. Source: <http://www.housing.gov.bh/en> 1.entrance hall; 2.majlis; 3.living room; 4.family room; 5.kitchen; 6.toilet; 7.bedroom; 8.master bedroom; 9.storage; 10.garage; 11.outdoor kitchen; 12.laundry; 13.maid room. 14.veranda/terrace

The MOH houses have a strictly tree-like, non-integrated configuration. The bigger houses are more segregated than the most commonly used prototypes, but the variation is very low, unlike the range of variation verified among the group of traditional houses – integration values between 0.58-0.69 in MOH and 0.41-1.14 in traditional houses.

The formal reception room (*majlis*) has a constant position within the overall spatial configuration of the house: it is shallow, positioned in the frontal part of the house, adjacent to the main entrance hall. The integration of the reception room varies according to the level of segregation in relation to the overall complex (integration values vary between 0.55 and 0.82). The less integrated examples may have a direct access from the outside; be isolated by the entrance hall with its own guest toilet; or be the most segregated space within a ring that connects the majlis and living room to a guest toilet. The reception room is more integrated in the cases where the main entrance hall serves as the main distributor to all areas of the house, or within a ring highly integrated with the living room.

Unlike the variety in the traditional houses, the contemporary house seems to have drawn inspiration from the most common disposition of majlis in the last period aristocratic houses and commoner's houses — direct access from a main entrance vestibule — to optimise the need for transition spaces but still ensure an acceptable degree of privacy for the family members.

The living room is, in most cases, a highly-integrated space (T<sub>3</sub>M, T8A, T8C, D<sub>5</sub>, D<sub>9</sub>, V<sub>2</sub>), the role performed previously by the courtyard, serving both as a transition space connecting entrance, kitchen, toilet, staircase and a functional space. The integration values range between 0.80 and 1.10 very like the integration values of the courtyards in the traditional aristocratic houses with several courtyards (0.82 - 1.24).

HOUSE TYPE	NAME	TIME PERIOD	N. FLOORS	RA	INTEGRATION	INTEGRATION MAJLIS	INTEGRATION LIVING ROOM	INTEGRATION FAMILY ROOM	INTEGRATION KITCHEN	INTEGRATION BEDROOMS
Prototypes	T3M	2010-15	2	0.32	0.69	0.82	1.10	0.56	0.84	0.45-0.58
	T8A	2010-15	2	0.31	0.65	0.71	0.85	-	0.72	0.48-0.64
	T8C	2010-15	2	0.32	0.62	0.70	0.80	0.61	0.67	0.42-0.61
	D5	2010-15	2	0.33	0.61	0.57	0.84	-	0.65	0.42-0.53
	D9	2010-15	2	0.32	0.62	0.66	0.81	0.62	0.64	0.44-0.52
	D10	2010-15	2	0.34	0.60	0.66	0.73	-	0.49	0.45-0.52
	D11	2010-15	2	0.31	0.58	0.55	0.75	-	0.62	0.44-0.61
non-prototypes	TE	2001	2	0.26	0.67	0.77	0.69	-	0.71	0.52-0.69
	V2	2005	2	0.27	0.60	0.73	0.86-0.65	0.53	0.76	0.44-0.46
	DA	2009	2	0.27	0.61	0.68	0.62 (DR)	0.95	0.78-0.50	0.48

Figure 9 - Integration values for MOH subsidised houses.

## 6.2 FROM A SPACE-INTEGRATED COMPLEX TO A TRANSITION-INTEGRATED COMPLEX

The transition:space ratio of the MOH houses (2.00-3.00) is similar to the traditional commoner's houses (1.55-3.00) and quite higher when not considering the connection with the exterior (2.86-3.83), which means that the space is not highly insulating.

However, if we also analyse the ringiness dimension, the contemporary MOH houses are extremely non-distributed with values ranging between 1.22 and 22 while the traditional house ranged between 0.14 and 13 with a clear prevalence of 'a' and 'b' spaces.

The traditional house, even in its most basic configuration, appears to be more distributed than the contemporary houses. Previously the roof terrace hosted daily activities but also had a unifying function contributing to a higher connectivity amongst all function spaces while, in the contemporary houses the division of the domestic space in 2 functional levels increased the overall level of insulation within the house while the previous vertical separation — the 1st floor is simply the functional host of the most segregated spaces in the house — the bedrooms (integration levels between 0.42 and 0.53), contributing to a higher insulation of its residents.

The positioning of the formal reception room (*majlis*) within a ring, is a configurational solution that appears in 1976. According to Waly (1992, p.35) in the traditional house, the reception room (*majlis*) could have a coffee burner placed specifically at a side, away from the door, or it was prepared in a room annexed to it. Servants quarters were quite often located in mediating position between visitor's court and private court.

In the new houses however, the kitchen is normally located in the back of the house, connecting to the living room or distribution hall. The need to ensure privacy while allowing an easy access to a guest toilet and service to guests from the kitchen, led to the integration of this space in a ring, that makes the mediation between the public and private spheres. In this case, the ring is of extreme functional importance: some reception rooms such as T8A are more integrated than others within a ring - D11, D5, D9, D10 - however, it fails to fulfil its social purpose - to ensure the necessary levels of privacy between guests and family (secluded access to guest toilet).

The other common ring is exterior, connecting the yard (front and side) to the kitchen, living room and/or main distribution hall, successfully separating daily activities and offering occupants alternative routes and possibilities of behaviour – such as the possibility of accessing the house without having to cross visitors. It is the contemporary interpretation of the exterior rings in the traditional house, but more limited, in the plans where the guest reception area is not isolated from the rest of the house, especially the vertical circulation.

The levels of integration of the kitchen will vary deeply not from its location in the house, but from the connections with the exterior and, consequently, the integration within a ring.

The house went from a space (courtyard)-integrated complex to a transition-integrated complex where a sequence of distribution halls performs the task previously achieved by the courtyard. The living room is, in most cases, the only integrated space that contradicts the overall tendency for insulation.

HOUSE TYPE	NAME	TIME PERIOD	N. FLOORS	TRANSITION-SPACE RATIO	TRANSITION-RATIO WE	A SPACES	B SPACES	C SPACES	D SPACES	RINGS RATIO	SYMMETRY	FUNCTIONAL RINGS	TRANSITION RINGS	EXTERIOR RINGS
Prototypes	T3M	2010-15	2	2.33	3.50	6	7	4	4	1.63	0.91	1.00	0.00	3.00
	T8A	2010-15	2	2.67	3.43	10	7	2	4	2.83	1.56	1.00	0.00	3.00
	T8C	2010-15	2	2.88	3.83	8	7	2	4	2.50	1.33	1.00	0.00	3.00
	D6	2010-15	2	2.00	2.86	5	6	4	5	1.22	1.00	1.00	0.00	3.00
	D9	2010-15	2	2.67	3.00	9	7	7	1	2.00	0.71	1.00	0.00	1.00
	D10	2010-15	2	3.00	3.50	10	9	2	0	9.50	0.91	0.00	0.00	1.00
	D11	2010-15	2	2.67	3.00	10	12	1	0	22.00	0.77	0.00	0.00	1.00
non-prototypes	TE	2001	2	2.27	3.13	10	5	3	8	1.67	2.00	1.00	0.00	4.00
	V2	2005	2	2.45	3.36	10	9	7	3	1.90	0.81	1.00	0.00	3.00
	DA	2009	2	2.54	3.00	11	6	8	5	1.31	1.14	0.00	1.00	4.00

Figure 10 - Transition-Space ratio and Rings Ratio of the MOH subsidised houses.

## 7. CONCLUSIONS

Hanson (1998, p.3) refers that houses everywhere serve the same basic needs but a closer observation reveals an astonishing variety in the ways these activities are accommodated in the houses of different historical periods and cultures. *"The important thing about a house is not that it is a list of activities or rooms but that it is a pattern of space, governed by intricate conventions."*

The analysis of the traditional Bahraini house and the subsidised houses promoted by the Ministry of Housing in Bahrain (MOH) reveals both continuities and ruptures which might indicate a potential social inadequacy of the new houses to the social norms and values of the society it hosts.

It would be expected that the strict social conventions which governed the traditional house would have become more flexible as we move towards a globalised society, while keeping its fundamental essence. However, it seems like the new houses have lost the former unique ability to segregate genders while integrating family members through the high flexibility of its spaces and the strategic use of transition spaces in key areas such as the main entrance and the open roof to connect all segregated areas.

The new houses use transition spaces to isolate different functions of the house — reception, living and dining, family gathering and sleeping — in such a strict structure that has become overall, less integrated, non-distributed, insulating people instead of drawing them together. This happens both in terms of permeability and visibility: family members cannot visualise one another through a central integrating space (courtyard), as they are confined to functional key areas, overlooking the outdoor. This constitutes a major change in the former visual order.

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